

CLIMATE CONVERGENCE: ENHANCING NATIONAL AND SUBNATIONAL CLIMATE COORDINATION

Prepared for The Governor of The State of California's
Office of Planning and Research and
The Climate Group

Davis Cherry, Irina Bright, Zubeda Bentley, Clayton Colaw, Terisa Thurman, and Alexis Huseby

COLUMBIA UNIVERSITY – EARTH INSTITUTE

EXECUTIVE SUMMARY

The Paris Agreement of 2015 set a new agenda for global cooperation and action in slowing climate change and its effects. National governments, states and cities are all attempting to meet the commitment of limiting global warming to 2 degrees Celsius. The Climate Group and The State of California are leading efforts at the subnational level to meet this goal through the Under2 Coalition, an alliance of 170 national and subnational governments from across the world.

While it is certainly positive that both national and subnational governments (cities and states) take steps to implement climate actions to reduce greenhouse gas emissions, these initiatives often occur in parallel with little-to-no coordination. This can lead to inefficiencies, miscommunication, and lost opportunities to galvanize resources and implement truly impactful climate investments.

The project's clients, The Climate Group and The State of California Governor Jerry Brown's Office of Planning and Research tasked the team with assessing the current state of national-subnational coordination on climate action. They also encouraged the team to develop innovations or methods to enhance data and capacity sharing along with implementation of climate actions amongst national and subnational governments.

This report is the production of a team of Columbia University students in the Masters of Science in Sustainability Management program. It examines the state of engagement between subnational and national governments on climate coordination and planning in select countries, existing roadblocks to increased collaboration, and recommends a framework to help accelerate progress.

The questions the team aimed to answer include: Are national governments aware of what their subnational governments are doing to combat climate change? If so, are they working with those subnationals to align their goals to mitigate emissions, and if not, why not? What barriers do governments face, internally and externally, in setting and delivering on goals?

The team firstly reviewed documented plans of the national and subnational governments, comparing and contrasting them and identifying where gaps between them exist. Second, they conducted interviews with different national and subnational government officials via email and telecommunications, asking questions about planning, cooperation, and action. They found varying answers to their questions, but some common themes emerged: misalignment in methodology, measurement, and goals, a lack of political will at multiple levels of government, and weak capacity to achieve goals.

This report focuses only on national- and state or provincial-level perspectives as opposed to municipal and private sector activities. Given the team's capacity and time limitations, it is believed that this approach lead to more concise findings, recommendations, and clearer delineation of the project.

Combined with information culled from interviews and literature review, the report concludes with a recommendation for the advancement of a Climate Action Portal for Integration of National and Subnational Commitments (CAPI). CAPI is designed to highlight gaps in information sharing between national and subnational governments as well as provide solutions to common challenges.

CLIENTS

The Climate Group	The State of California's Office of Planning & Research
<p>The Climate Group is an award-winning, international non-profit. They specialize in bold, catalytic, and high-impact climate and energy initiatives with the world's leading businesses and state and regional governments. Their work is at the forefront of ambitious climate action. Their mission is to stimulate climate leadership in government and business to accelerate the shift to a prosperous and thriving 'net-zero' future for all.</p> <p>Founded in 2004, their offices are located in Beijing, Hong Kong, New Delhi, New York and London.</p> <p>The Climate Group is the secretariat of the Under2 Coalition.</p>	<p>The Office of Planning and Research (OPR), created by statute in 1970, is part of the Office of the Governor. OPR serves the Governor and his Cabinet as staff for long-range planning and research, and constitutes the comprehensive state planning agency.</p> <p>The Under2 MOU originated from a partnership between California and Baden-Württemberg.</p>

THE ° CLIMATE GROUP



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I. INTRODUCTION

a. Project Scope

This project fulfills the request of The Climate Group and The Governor of the State of California's Office of Planning and Research. The clients have asked a team of 6 graduate students from Columbia University to assist the Under2 Coalition, for which The Climate Group is the secretariat and the State of California is a founding member, in furthering its mission of galvanizing climate action at the subnational level to prevent global warming from rising above 2 degrees Celsius (°C). The team's mandate is to assess the current state of practice of climate coordination and communication between national and subnational governments (SNGs) and provide guidance on paths forward that allow for more accurate evaluation and exposure of data gaps. The ultimate goal is to provide insights such that a country can achieve its climate goals with more efficient use of resources and expediency to realize climate commitments under the Paris Agreement.

This project will not address technical problems related to "double-counting," finance and funding, nor measurement and evaluation, but rather the communication and coordination of climate actions within countries.

b. The Paris Agreement

The 2015 United Nations Climate Change Conference (COP21) was a watershed moment for global agreement on a path to reduce global greenhouse gas emissions (GHG) and address climate change. A key outcome was an agreement to set a collective goal of keeping the global temperature from rising above 2°C compared to pre-industrial levels. The agreement entered into force on November 4, 2016 and has been ratified by 144 countries to date.

While there are many components to the Paris Agreement, a key element to keeping track of progress and individual country commitments is through the submission of Nationally Determined Contributions (NDCs). In these documents, countries must report on their emissions and efforts to implement greenhouse gas reduction efforts.¹

c. The Under2 MOU

Prior to the Paris Agreement, on May 19, 2015, twelve subnational governments (SNG) signed the Under2 Memorandum of Understanding (MOU). Each signatory committed to reduce emissions by at least 80 percent below 1990 levels, or by two metric tons per capita annually, by 2050 – the level of emission reduction necessary to limit global warming to less than 2°C by the end of the 21st Century.

The State of California and the city of Baden-Wurttemberg, Germany, initiated the Under2 MOU by documenting commitments of SNGs to fight climate change and help spur national action prior to the Paris Agreement. Today, 170 jurisdictions from 33 countries have either signed or endorsed the Under2 MOU. These national and subnational governments form the Under2 Coalition, which represents more than 1.18 billion people and \$27.5 trillion in GDP.² The Climate Group, based in London, serves as the Under2 Coalition secretariat.

Similar to the national-level NDCs, subnational signatories are required to submit an “Appendix,” which highlights climate actions and commitments that are planned or in place for each signatory through 2030.

d. The Problem

As described above, The Paris Agreement and Under2 MOU are propelling both national and subnational governments to ramp up their climate actions.³ However, jurisdictions pursue other commitments and climate actions in parallel and without coordination between the national government, states or provinces, and cities. This is a problem frequently cited during multiple fora and amongst numerous stakeholders.⁴ A lack of coordination can lead to problems such as:

1. Double-counting

Using different methodologies or counting the planned emissions reductions from a climate project in multiple inventories could lead to inaccurate, double-counting of emissions.⁵

2. Financing and Funding

Regardless of the nation, subnational governments often rely on funding from their national governments, especially for capital for new projects. A lack of coordination often means a lack of funds to begin and/or maintain technology and expertise for a climate action plan.

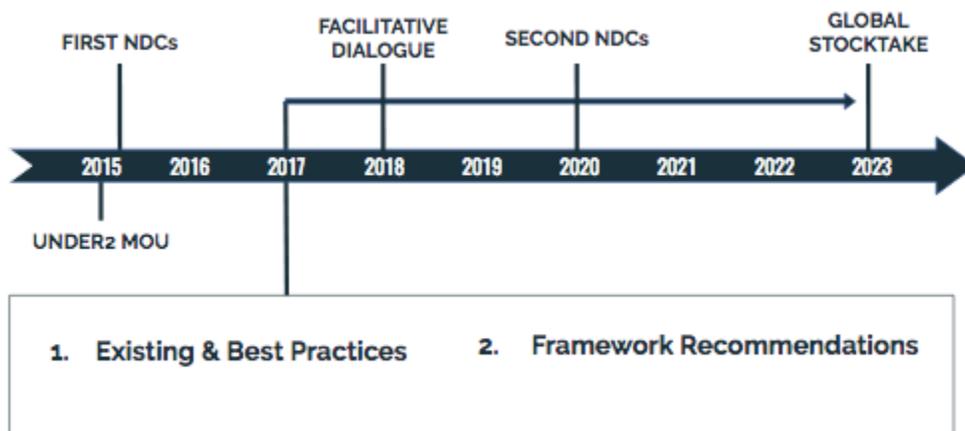
3. Overlooking Positive Climate Contributions

In preparing an NDC, national governments wanting to show the world how they are planning and implementing climate actions will likely want to display as many activities and goals as possible. However, national governments ignoring activities of subnational governments may be overlooking reduction targets that could contribute to their national goals.

The findings of this project, along with other initiatives to integrate SNG actions with national goals, will contribute to the overall NDC process as laid out in Figure 1. Every five years, parties to The Paris Agreement are expected to update their national climate pledges. The United Nations Framework Convention on Climate Change (UNFCCC), which is the secretariat of The Paris Agreement and

supports participating nations in their climate actions to fulfill the agreement’s goals, expects countries to provide more robust and updated pledges each year. The project team hopes that its efforts can contribute to the 2018 Facilitative Dialogue, which is an opportunity for countries to assess their progress in achieving their goals and to work toward improving their next NDC. Ideally, these will include improved SNG integration.

Figure 1: NDC Timeline



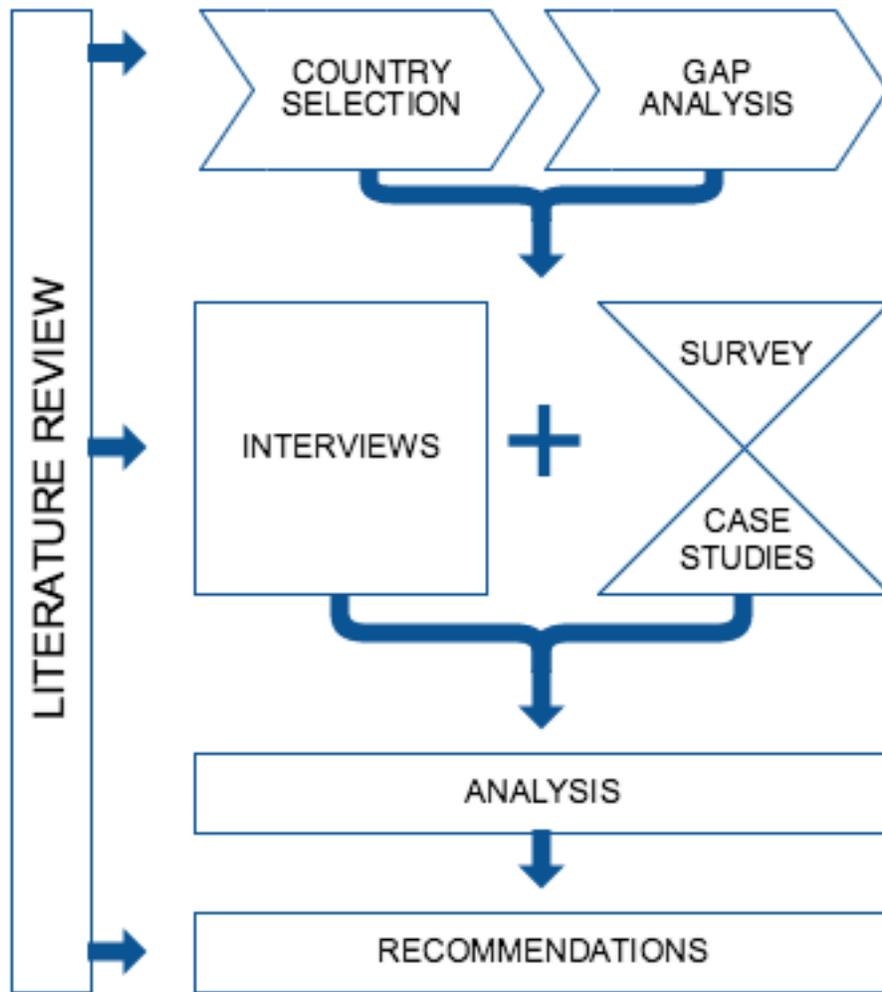
II. RESEARCH METHODOLOGY

a. Overview

The research methodology consisted of a combination of literature review and interviews. The methodology included:

1. **Review of best practices** of vertical coordination among different organizations and frameworks, as well as within countries, to inform recommendations and interviews.
2. **Review of existing frameworks and tools** for reporting and measuring climate actions to understand how national and subnational governments are currently reporting and tracking climate actions.
3. **Country deep-dive and gap analysis** of NDC and subnational climate actions to address the current alignment or misalignment of national and subnational climate actions in more detail.
4. **Interviews** with national and subnational government staff to assess current practices and inform recommendations.

Figure 2: Flowchart of methodology



b. Review of best and existing practices

Since vertical integration of climate coordination and management is a relatively new policy activity, the team examined how established national and international organizations with hierarchical structures conducted coordination of data and planning around their respective areas of focus. This included the United Nations’ Food and Agriculture Organization (FAO), the World Bank & International Monetary Fund (WB & IMF) and the U.S. Environmental Protection Agency’s (EPA) Energy Star Program.

The team also reviewed information on existing examples of national and subnational coordination on climate issues. This included The Pan Canadian Framework on Clean Growth and Climate Change, Mexico's General Law on Climate Change, and Brazil's National Climate Change Plan.

c. Review of existing frameworks and tools

The team studied numerous tools and platforms for reporting national and subnational climate actions. This included The World Resources Institute CAIT Climate Data Explorer Tool and the Non-State Actor's Zone for Climate Action (NAZCA) platform. Scoping these resources provided the team with an overview of the current climate metric coverage (targets, baselines, and sectors) and scale (national, state, and city).

d. Country & Gap Analysis

To better understand the status of national and subnational climate coordination "on-the-ground," the team chose three countries to analyze out of the 33 countries with 170 subnational governments that have signed the Under2 MOU. The team selected these countries using the following criteria:

1. **Number of Under2 MOU signatories** - this indicates there is significant SNG activity within the country as well as accountability to the Under2 Coalition.
2. **Representativeness** - the number of large cities and states, geographic diversity, and economic level helped determine the choice of countries of focus.
3. **Diversity Within Sample** - a mix of cultural, political and economic dynamics within the sample itself was important to gain insights for more than just one country-type.
4. **Accessibility** - the thrust of the project consisted of interviews with national and subnational staff. Thus, the practical feasibility of the project team's ability to interview these contacts based on factors such as time-zone difference, language barriers, and existing contacts with the clients and team members influenced country selection.

With these criteria, the team chose Canada, Mexico and Brazil as countries to both perform a data gap analysis and target for outreach. The team also reached out to Argentina as contrast--Argentina has no Under2 MOU signatories--to determine if climate coordination was significantly different. The team was able to interview a national-level representative from Peru, which has three Under2 MOU signatories, but did not undertake analysis of this country as only one signatory provided an Appendix at the time of study.

Figure 3: Country Selection Criteria

	Under2 MOU Signatories	Representativeness	Accessibility
Canada	5	High-Income, many large cities	No language barrier, easy to call/email
Mexico	11	Middle-Income, many large cities	Moderate language barrier, existing contacts
Brazil	8	Middle-Income, many large cities	Moderate language barrier, existing contacts

The team performed a gap analysis for each selected country. This analysis compared each country’s NDC with commitments listed in the Appendices of each SNG (Appendix A). General categories, such as climate goals, sector focus, and baseline, emerged to provide a snapshot of how each SNG was aligned with other SNGs and with the national government goals. Figure 4 shows a framework. A discussion of findings for each country is available in Section IV and presented in a thorough analysis in Appendix B.

Figure 4: Gap Analysis Framework Example

Jurisdiction	Publication Status	NDC/MOU Goals	NDC/MOU Strategies	NDC/MOU Sector Focus	Gap Analysis
Country					
SNG 1					
SNG 2					

e. Interviews

Interviews comprised the bulk of the research for this report, with outreach primarily aimed at the focus countries of Canada, Mexico, and Brazil. Additionally, the team interviewed experts and consultants working on SNG climate integration to discuss their experiences working with different levels of government.

Contacts ranged from Sustainability Directors to Climate Change Senior Advisors. The project clients provided an initial list that included primarily subnational contacts. The team reached out to additional national contacts to represent another perspective in a fair proportion. Some interviews resulted in new contacts that led to additional research on state and country environmental governance websites. Ultimately, the team generated and contacted a list of 30 staff at the SNG and national level.

The team made initial contact with interviewees via introductory emails explaining the project goals and focus, with care taken to not skew interviewees towards preconceived findings. Response rate to initial emails was approximately 50%. The team sent follow-up emails to individuals who did not respond within two weeks. In response to several potential interviewees' requests for a set of questions to read ahead of time, the Fieldwork Coordinator generated a questionnaire. The team designed open-ended questions so that interviewees would contribute their own thoughts and generate organic findings (Appendix C). The questionnaire was the same for both national and subnational contacts.

Example Question, Interviewee Questionnaire

- 1) Does your department keep track of the climate change commitments of national or subnational entities? Specifically, does your department communicate with country, state, city and/ or other local governments as well as private corporations regarding their climate commitments?
 - a. If so, with whom do you typically speak? How often does this reporting occur?
 - i. Annually? Quarterly? Never?
 - b. If not, would you know with whom to speak?

The team conducted approximately 90% of interviews through Skype or conference call and the remainder submitted responses to questionnaires. All country and SNG interviewees were in countries outside of the United States; as such, all interviews took place over Skype or conference call. One team member would lead the interview and cover the questions in the questionnaire, while also asking any follow-up questions based on the interviewee's answer. Thus, all interviews had similar structures. Each interviewer on the call took notes, and interview notes were compiled into a final document of transcribed information. The team did not record the interviews, so information is based on notes from the interviewers and not verbatim.

i. Interview Analysis

The Fieldwork Coordinator added each transcription to a database. After transcribing the conversation, team members on the call would immediately analyze the interview to clarify pertinent information, using the notes and discussions to inform the analysis.

The team analyzed common themes from respondents, considering common challenges or issues mentioned at least three times as significant. Microsoft Excel served as a tool for word grouping and its analysis, which identified common roadblocks and prevalent practices.

ii. Survey Confirmation & Analysis

After a first round of interviews, the team created a survey with the intention of providing a more quantifiable backing to the major findings of this report. All questions were multiple-choice with space for elaboration, ensuring measurability and expansions on topics should the participant desire to (Appendix D). The team sent a Google Forms link to all interviewees from country departments with an agreement to keep the responses anonymous. For the purpose of survey to support a final solution from the perspectives of national and subnational governments, the team excluded non-governmental interviewees. Open-ended question provided the freedom for the interviewees to respond in their own words. From newly elicited information, Google Survey Analytics pulled the key phrases and aggregated them into percentages and bar charts (Appendix E).

III. FINDINGS

a. Review of existing and best practices

The team conducted a review of existing practices from longstanding organizations that coordinate international and national projects and data. Descriptions of the organizations are in Box 1 with highlights of practices listed below. These findings informed the team's tool development and recommendations. Specifically, the importance of providing transparency of funding, identifying gaps and baseline assessments, creating a private network, and promoting integrity of data were findings that guided the team's tool development.

Funding and Capacity

FAO: Capitalizes on the influence and funds it receives from its relationship with the United Nations to work with countries to build capacity for collecting information.

World Bank/IMF: Invests in statistics and data gathering infrastructure in developing nations that lack the capacity to do so independently.

Guidelines

EPA Energy Star: Established a baseline assessment to identify gaps between current performances and goals.

World Bank/IMF: Have two sets of guidelines for data quality assurance, one for all members (GDDS), and one for developing markets that require infrastructure and capacity development (SDDS).

Collaboration and Coordination

FAO: Collects data via surveys and hosts a private network with user sign in.

EPA Energy Star: Determines all the parties involved (internal and external) and what their responsibilities are.

EPA Energy Star: Stresses that participating companies gain the support and cooperation of key people at different levels within the organization to successfully implement an action plan.

Box 1: Established/Non-Climate Initiatives

These are examples of organizations and their systems that have proven effective in sectors outside of climate action

Food and Agriculture Organization

The Food and Agriculture Organization (FAO) is a United Nations agency that leads international efforts to reduce hunger. It gathers statistics and information to support agriculture policies around the world. Member country dues fund the FAO, which facilitates technical work, member cooperation, and advocacy. The FAO initially gathers data from member country reports then determines what information is missing and fills in gaps with their own technical capacity and experts.

Environmental Protection Agency's Energy Star Program

Established in 1992 by the Environmental Protection Agency (EPA), "Energy Star" is a voluntary program that identifies and promotes energy-efficient products with the goal of reducing GHG emissions. Products covered include appliances, office equipment and commercial and industrial buildings. The program created "Guidelines for Energy Management," which provide "proven" strategies for creating energy management programs that focus on continuous improvement for energy performance. It builds on commitments that participating organizations make when they join the program.

The World Bank and the International Monetary Fund

The World Bank (WB) and the International Monetary Fund (IMF) are international organizations that work together to standardize, monitor and regulate the global economy. They gather data from individual countries on everything from population to gross domestic product and assure quality of data using one of two frameworks: the General Data Dissemination System (GDDS) and the Special Data Dissemination Standard (SDDS). Countries with the capacity to gather relevant data are expected to adhere to these data quality assurance guides. The WB invests in data infrastructure for those countries that do not have such statistical capacity.

Data Quality

FAO: Information collected is published in various reports that are used for scientific research.

World Bank/IMF: Develops frameworks intended to provide guidance for the overall development of macroeconomic, financial, and socio-demographic data. It also encourages complete data sets rather than specific indicators (e.g. no data is better than inaccurate or partial data).

b. Review of existing tools and platforms

With expert consultation and literature review, the team examined key tools and platforms relevant to its project purpose. Specifically, the team sought to understand how these tools could provide information relevant to national-level integration of SNG climate action.

The Non-State Actor Zone for Climate Action (NAZCA) portal - aggregates all commitments to action by registered companies, cities, subnational regions, investors and civil society organizations to address climate change.⁶

World Resources Institute Climate Action Tracker (WRI CAIT) – a collection of mechanisms that provide access to historical emissions data, individual country climate action commitments and climate negotiations, as well as projections

Box 2: Country Climate Coordination Initiatives and Regulatory Frameworks

These are examples of the internal country policies, programs and laws pertaining to climate action

Pan-Canadian Framework on Clean Growth & Climate Change

After the Paris Agreement, the leaders of Canada's provinces and territories issued the Vancouver Declaration on Clean Growth and Climate Change on March 3, 2016. The declaration set a goal for all the provinces and territories to support the national goal of meeting or exceeding Canada's 2030 target of 30% reduction in GHG emissions based on 2005 levels by 2030 and set in motion a process for creating the Pan-Canadian Framework on Clean Growth and Climate Change (Framework). It established guidance that the Framework should recognize the diversity of each jurisdiction and consider equity amongst the provinces and territories.

The declaration established working groups of three tiers, federal-provincial-territorial, to consult with Canadians across the country to develop the framework. Along with a cap and trade program, the nation and its provinces and territories collaborate by continually working to improve GHG emissions measurements. The Canadian Council of Ministers of the Environment (CCME) manages this process.

General Law on Climate Change (Mexico)

La Ley General de Cambio Climático was ratified in early 2012, solidifying Mexico's commitment to climate change action. It was designed to guarantee the continuity of climate goals despite changes in administration. The law includes establishing a climate fund to finance GHG mitigation and sustainable development; setting emissions measurement, reporting and verification; and goals of cutting emissions by thirty percent by 2020 and by fifty percent by 2050.

of emissions in the future.⁷

Carbonn Climate Registry – a bank for subnational government climate reporting to “enhance transparency, accountability and credibility of climate action.”⁸

The National Plan on Climate Change (Brazil)

Brazil’s National Plan on Climate Change was created by the country’s Interministerial Committee on Climate Change in 2007 and was an attempt to harmonize public policies around climate change. The action plan highlights seven topics that the Brazilian government plans to focus on, with actionable steps included in each area. The main areas of focus are energy, deforestation, and environmental impacts. The plan outlines phases of implementation to ensure that there is a constant evaluation of the intended objectives.

The above three tools and platforms provide open-source information to various stakeholders and are the most comprehensive sources of information relevant to this project. However, the team’s research found that they are not regularly used by national governments and currently do not provide context for national and SNG integration. Further discussion of these initiatives and relation to the team’s tool and recommendations occurs in Section V.

c. Country & Gap Analysis

The team found that most SNGs of the three focus countries either published their commitments, which frequently did not align with their respective national government’s NDC metrics, or did not publish anything at all. Roughly two-thirds of the appendices conformed to guidance offered by The Under2 Coalition, while others provided a substitute in the form of a sustainability report.

The gap analysis revealed many differences in plans, goals, and metrics between national and subnational governments.

Baseline measurements - Mexico State and the Yucatan, for example, use emission baselines of 2005 while the Mexican NDC uses business as usual (BAU) against which to measure emissions reductions

Goal Target Dates - e.g. 2020, 2025, 2030, or 2050

Sectoral Focus Differences - an NDC may focus primarily on land use and agriculture, while its largest city focuses on waste management and transportation

While differences across regions of a country are natural and to be expected, there were indications

from the outset, and interviews later confirmed, that national governments are often ill informed of the plans happening at more local levels, or SNGs are in the dark about what their national government does with the information they provide.

d. Interviews

The chart below shows who was contacted for interview. Numbers in parenthesis indicate how many contacts the team spoke with from each nation.

Figure 5: Interview Grouping

Government
Argentina (1)
Brazil (3)
Canada (5)
Mexico (3)
Peru (1)

Non-Government
GHG Institute (1)
ICLEI (1)
NAZCA (1)
Ricardo - AEA (1)
WRI (1)
The World Bank (1)



The findings from each research step helped the team refine questions for each interviewee. In turn, several interviews pointed the team toward additional research, such as the Pan-Canadian

Framework. Additionally, many of the findings from the interviews overlapped with research, as was expected, but also provided insights into new issues and helped contextualize and provide the most up-to-date information on the team's research.

The team grouped interview findings into eight major challenges, practices, or general issues related to national and SNG coordination on climate goals and implementation of general climate activities.

1. *Misalignment of baselines, goals, methodology, and sectoral coverage reduces opportunities for collaboration and investments and fosters uncertainty of effective communication*

As demonstrated in the Gap Analysis, basic research revealed the existence of these misalignments. However, interviews revealed the degree to which these misalignments are on the minds of national and SNG staff and whether these misalignments are blocking actual climate action. In many cases, there is frequent communication between SNGs and the national level, but this is often viewed as a “one-way-street” by subnational governments.

SUBNATIONAL

São Paulo

The state of São Paulo focused on transportation and industry when developing climate mitigation programs. On the other hand, Brazil's NDC area of interest is on agriculture and forestry. Thus, a respondent from São Paulo noted that the national government is not coordinating, sharing technical capacity, or information regarding São Paulo's target sectors. This made it difficult to know how to coordinate with the national government, per this contact.⁹

The same contact in São Paulo confirmed that their department keeps track of what the national government does and that the national government has created an in-person forum on climate change that gives the opportunity for sub-national governments to participate. However, targets are set internally at the national level and only broadly discussed. Notably, this contact did not believe that enhanced vertical communication was imperative at this point, as they already communicate with the national government by providing the information requested for Brazil's NDC.

Yucatan

In Mexico's southern state of Yucatan, quantification of the programs, strategies, and progress of

climate change action was identified as one of the mechanisms that could support climate action goals. The Yucatan contact confirmed regular meetings with other ministries about local goals and action, and that Yucatan shares its tracking information and meetings documentation with the national government, but that is where it ends. It is, as the contact put it, “bottom-up communication” and there is “not a clear path for working together to achieve goals... it needs to be a two-way road.” When asked about what would help change that, the contact said that assigning a national government representative to each state and actively involved in climate action would make a difference. Information sharing is important, but more important is collaborative work between national and subnational entities.¹⁰

NATIONAL

Argentina

Many of Argentina’s SNGs had been using outdated (e.g. 1996 IPCC inventory guidelines v. updated 2006 Guidelines for National Greenhouse Gas Inventories¹¹) and different GHG inventory methodologies amongst themselves and in relation to the national government. For instance, Bueno Aires followed GPC guidelines, while the national government was following IPCC methodology.¹² Different measurement techniques can lead to double-counting, and the contact claimed that confusion about scopes can lead to overlooked opportunities for mitigation actions as well. Further, inventories are not being compiled and gathered accurately; timetables are out of line and most of the actions listed by subnationals lack any quantification. Many Argentinian SNGs only list possible actions like “bike sharing.” To address this, Argentina is creating a system in 2017 to integrate different methodologies to better account for activity.¹³

“This is one of the key challenges implementing The Paris Agreement. Few at the national level are taking SNGs seriously because there is no method or framework for doing it.”

– International Climate Consultant

NON-GOVERNMENTAL CONTACTS

A consultant working in South Africa mentioned that methodological misalignment was an enormous barrier to coordination. The national government thought that they had a good plan leading to 2050, consistent with the IPCC guidelines. As a result, they ignored other activities within the country. The national government claimed that the tools SNGs were using were not compatible. The consultant tried to show the compatibility between the different approaches, but

to no avail.

The same contact summarized another problematic scenario, where staff at the national level may believe they already know what is happening at the subnational level, when in fact, they likely do not. National staff often struggle to “see the value in sub-national information” and “wonder what a city can add.” The contact added, “this is one of the key challenges of implementing The Paris Agreement. Few at the national level are taking SNGs seriously because there is no method or framework for doing it.”¹⁴

2. Initiatives are underway across most study countries to increase National-SNG integration and coordination

Interviews from all countries reported some type of effort to better integrate climate information both vertically and horizontally, whether it be in the form of climate change laws or development of specific communication channels between subnational officials.

SUBNATIONAL

São Paulo

A contact in São Paulo indicated that approximately eight municipalities in the country are working with the Environmental Ministry to build a “community of practice” on climate actions involving different levels of government.¹⁵

Quebec

Several SNG contacts across Canada expressed satisfaction with the Pan Canadian Framework, indicating that it provided a clear path forward for collaboration and reporting. As one SNG interviewee from Quebec stated, “if you had called three years ago, we would not have had much to say.”¹⁶

The interviewee added that though the framework puts clearer lines of communication and action in place, given the framework’s nascence, the regularity and form of communication and data-sharing will likely be improved going forward.

“If you had called three years ago, we would not have [had] much to say.”

– Staff from a Canadian Province

NATIONAL

Canada

At the national-level in Canada, the activities carried out via the Pan Canadian Framework will specifically inform the development of its NDC according to a national-level interview. The national government is in the midst of formalizing mechanisms to track progress. For now, it is incorporating annual reports from the provinces and territories.¹⁷

Mexico

Mexico is undertaking a pilot initiative that will seek input from states on what to incorporate into their NDC. By 2018, they plan to have results to share. This “bottom-up” process will require significant interactions with the states. Therefore, a staff member from Mexico’s National Institute of Ecology and Climate Change (INECC) will be traveling throughout the country for a year focused on issues like measuring transportation and waste management and building technical capacity.¹⁸

Peru

Peru plans to integrate state and private sector climate data into its NDC process by holding monthly meetings leading up to revision of the document. The country is also working on a system to harmonize metrics and planning across different levels of government.¹⁹

Argentina

Argentina’s national government is planning to provide more guidance that is clear-cut to SNGs on quantifying emissions reductions, inventory methodologies and planning as well as holding more training workshops throughout the country.²⁰

3. Informal and formal lines of communication are used to coordinate climate actions

Communication of climate information frequently occurred through personal and social channels, as well as regularly-scheduled meetings and deadlines. Additionally, while various tools and portals were used for a variety of tasks, particularly at the SNG level, there was no observed or reported online “portal” that collected and compared all of a country’s SNG and national emissions data or

planned climate actions.

SUBNATIONAL

São Paulo

Use of social networks and email was reported as the most common communication from a contact working at the SNG level. The same report articulated the frequency of interaction with the Brazilian Climate Change Secretary within the Ministry of the Environment occurs, “every month or so.”²¹

A different SNG contact in Brazil stated that a “forum on climate change” is held every three months in which each state is represented.²²

British Columbia

A contact from British Columbia stated that they frequently call their acquaintances across the country when they have a question or meet with them socially when they are in town. They have a basic tracking system within their office but are not sharing data with the national government or other provinces via an online portal or tool.²³

“I think this is a very important study. With actual implementation of goals, better planning tools, and approached for subnationals, this is a very critical time.”

– Mexico National Contact

4. Low usage of “external” platforms and tools at the national level; moderate use at SNG level

National governments indicated a preference to obtain climate information directly from SNGs. In contrast, there was more familiarity and use of online tools and portals at the SNG level.

SUBNATIONAL

São Paulo

A consultant with São Paulo stated that they make use of specific tools developed by civil society and federal agencies, like the *Observatório de Políticas Públicas de Mudanças Climáticas* and CESTESB - Proclima.^{24 25} Further, the contact stated that engagements with organizations like C40 and ICLEI help significantly.²⁶

Quebec

A contact within the Quebec government confirmed awareness of multiple initiatives, citing NAZCA and The Compact of States and Regions as sources to discover what governments are doing. The contact noted, however, that, “as it stands, there is no single platform” that they consult.²⁷

NATIONAL

Canada

A contact at the Canadian government indicated that they assemble most of their information through reports to the UNFCCC and have considered different levels of government actions. “A lot of that material exists.” For Canada, there was no portal or centralized body of knowledge, but instead a “well-established network to update reports.”²⁸

When asked about external reporting tools, such as NAZCA, the same interviewee said that they were aware of them but were not sure whether they think they accurately describe the “situation in their country.” The national government has “means to go to jurisdictions and use networks and existing meetings” to obtain climate information, which was listed as the national government’s “first choice as opposed to searching through public tools and portals.

NON-GOVERNMENTAL CONTACTS

A consultant with an international consulting firm stated that they didn’t believe national governments frequently used SNG reporting platforms due to a lack of quantification and relating SNG activities to national goals. They suggested supporting climate actions with numbers in a consistent way to garner greater national attention. The existing repositories, like C40, capture much more qualitative data. “A national government can come along and find a nice story, but it doesn’t mean much to them if it is not quantified.”²⁹

5. The economic benefits of climate actions must be articulated

At both the national and subnational levels, many countries (particularly developing ones) must justify climate actions and spending amid poverty, economic stagnation, and security. The absence of attaching economic benefit to climate change actions is perceived by SNGs to be a weakness that hinders implementation of climate actions.

SUBNATIONAL

São Paulo

Several contacts in São Paulo stressed the importance of showing how investments in clean technology will bring economic advantages and jobs.

Northwest Territories

In Canada, a contact advocated that government climate modeling should take greater account of social benefits and job creation.³⁰

NATIONAL

Argentina

According to a source in Argentina, there was significant push-back against GHG measurement across the nation because it would have revealed a high impact from the agriculture sector, which is key to economic growth in the country, particularly outside of Buenos Aires – “if you stop deforestation, you won’t be able to grow.”³¹

6. Degree of Government Centralization Impacts Target-Setting and SNG Action

The structure and power balances between the national government and states were often cited as impacting national and SNG climate interactions.

SUBNATIONAL

British Columbia

Contacts in Canada stressed that because of the clear division of powers between the provinces and national government, the national government focuses more on general goals and leaves it to the states to develop specific plans and implement strategies. According to a contact in British Columbia, “the national government will send an overarching target, then the provinces will see what they can do. It’s not that Canada dictates, they don’t have authority to tell British Columbia what they can reduce,” but the provinces will, “understand the key priorities” and then will be the ones on the ground, “making the changes... It’s a conversation, there is not one level telling the other what they are going to do.”³²

Quebec

A contact in Quebec mentioned that, until recently, the provinces had always been more proactive than the national government and that they had typically worked with other SNGs, including California, on mechanisms like cap and trade policy. Now, the national government, through the Pan Canadian Framework, has opened lines of vertical communication. “There is more interaction with the national government” and if there is a question, “it’s easy to find who to talk to.”³³

São Paulo

A SNG-level consultant in Brazil said that he has realized that subnational governments in the country have, in most cases, very limited jurisdiction, making it “very frustrating to mimic” the California model elsewhere in terms of implementing climate mitigation actions such as deploying electric vehicles and solar energy.³⁴

NATIONAL

Argentina

“The provinces often do what they want and the ministry of environment can do nothing but provide recommendations” according to a source from Argentina. “For instance, a new forest law has passed but not yet been implemented across the nation. The provinces must regulate themselves and often don’t. Furthermore, provinces can be run by families for decades, and climate action is dependent on their whims. The provinces don’t want the national government to tell them what to do, and so the national government has to incentivize them, financially or otherwise, just to sell climate action.”

Mexico

In Mexico, the national government has driven climate integration with a relative top-down approach. While several SNGs already had their own initiatives in place before the General Law on Climate Change, contacts at all levels indicated that passage of the law helped trigger action at all levels.

NON-GOVERNMENTAL CONTACTS

A consultant indicated that the degree of centralization impacts her work in different countries. “The U.S and Canada are agglomerations of states, while the UK is very top-down.” She stressed that subnationals can have a different meaning in different countries. Mega-cities can have a lot more autonomy and ability to build infrastructure. Developing a “one-size-fits-all” system is very hard.³⁵

7. Capacity impacts ability to coordinate and implement climate actions

Many countries, both developed and developing, lack the tools, funding, and technical expertise to implement emission reduction goals. Measuring, reporting and verification of progress requires technical and financial resources. States, particularly in developing nations, have less capacity to undertake both GHG inventories and quantify climate goals, let alone the capacity to fund and implement them.

SUBNATIONAL

Brazil

Several SNGs considered their country to have a very top-down approach, but one contact noted that municipalities do not have much money to spend on climate solutions and are more focused on more tangible and immediate issues like waste-water.³⁶

The same interviewee cited the importance of bringing green investments to the state because many the mitigation projects are innovations that involve more risks and are not attractive investments. International donors and organizations fund specific actions in Sao Paulo, but that is not enough.

Mexico

Baja California, Mexico, did not have the capacity to support the state climate program a year ago. Today they have increased their staff, yet need more human resources to fully develop their plans.³⁷

Canada

A contact from the Northwest Territories in Canada stated that given their small size and relative lack of capacity, they are not planning to set targets for 2050 like the national government. Compared to much more populous provinces, such as Quebec and Ontario, the Northwest Territories are still developing their targets and will not have clearer details to share for another 3-4 months.³⁸

NATIONAL

Mexico

While there are mechanisms states try to follow, it is hard to implement because of different capacities, priorities, and financial resources. The national government says it needs to help states develop more capacity that aligns with national-level planning and they find it “a very complicated task.”³⁹

Argentina

While Buenos Aires demonstrated comparative progress on climate change actions and has been conducting inventories since 2003, most of the other provinces have very little capacity. Often provinces do not know how to begin to conduct a GHG inventory or plan future climate actions. They also have insufficient financing to implement mitigation measures if they do develop plans. In Buenos Aires, there are approximately only five people working on climate issues and at the national level, their department working on climate issues is less than 20 people.⁴⁰

Canada

An interviewee said that, “there is disparity in capacity, between Ontario and Quebec on one side, and the territories on the other.”⁴¹ For Canada, a lack of capacity contributed to the lack of participation in the Pan Canadian Framework by two territories, Manitoba and Saskatchewan, though they were involved in the development process. The resource challenges and lack of existing systems in place to implement commitments factored into Saskatchewan deciding to not formally join. Another reason why these territories abstained from the agreement was the natural resource dependencies of many of the less-populous territories. Oil is vital to these economies, whereas “early actors” like British Columbia have different economic profiles, more hospitable to climate action.⁴²

NON-GOVERNMENTAL CONTACTS

A consultant claimed that departments at the national level are lacking in capacity themselves and do not want to engage with sub-nationals for fear that that such engagement could open the door to an expectation of national funding to implement programs. It may be “just too much work and hassle given limited national capacity.”⁴³

8. Political will dominates communication or coordination advances

Systems that would otherwise be effective are often obstructed by partisan politics or political determination. The degree of political will at the national or sub-national levels impacts the level of climate action at all levels as well as coordination between governments.

SUBNATIONAL

São Paulo

In São Paulo, the governor is “not that interested in climate goals.” Political will is what is needed most in the state of São Paulo because there are already “excellent advisors and technicians who can elaborate on goals,” thus capacity building is not what is needed most.⁴⁴

Mutual trust was also highlighted as an issue, since many national decisions are made behind closed doors. If there was more transparency, that could save many steps in the implementation process, according to another São Paulo contact. Convincing their president and governors that climate change is a reality with serious consequences is difficult. This same consultant said that increased communication can be “worse than pointless” as communication easily becomes cherry-picking options, grandfathering products and greenwashing companies.

Baja California

For the state of Baja California in Mexico, the most significant motivation for mitigation is environmental authority.⁴⁵ Our source there said that the state is not advancing in its efforts to reduce the emissions due to lack of political will in the governor’s office.⁴⁶

NATIONAL

Argentina

The election of Mauricio Macri to the presidency of Argentina in 2015 has led to greater climate action at the national level, as well as a plan to better integrate sub-national activities. Previously, Argentina had been recognized as a climate laggard, but Macri elevated the department of the environment and implemented an “interministerial working table” on environmental issues to make Argentina’s NDC more ambitious, per a contact.

Concurrently, while climate action is advancing at the national level, the new mayor of Buenos Aires wants to “distinguish” himself from Macri and has cut back on climate action and involvement with organizations like ICLEI. In general, if the mayor of a city is “not of the same party as the governor,” they may not give out information regardless of any communication channel.

IV. DISCUSSION

It is encouraging that there are plans amongst all surveyed countries to better integrate climate coordination between national and subnational governments.

The team observed higher degrees of satisfaction amongst SNGs in Canada, possibly due to the very collaborative nature of the creation of the Pan Canadian Framework. While all Mexican contacts cited the country’s General Law on Climate Change as spurring action, there appeared to be more frustration from SNGs contacted. This could be because of a more top-down approach implemented by the national government. Or, it could also be due to lower levels of economic development and resources available in many Mexican states.

In Brazil, no SNG interviewee mentioned their national plan. This led the team to believe that it was not taken seriously throughout the country or had little backing. As the team did not speak to a national-level staff from Brazil, that perspective was not represented.

A national-level contact from Peru mentioned that the country is developing a specific climate change law. There was no indication of a pending national law on climate emerging in Argentina, despite the drive at the national level to improve reporting and goal-setting.

Given the novelty of The Paris Agreement and efforts within countries to align multiple SNG climate actions with national goals, it is too early to tell if better communication and coordination improves the outcomes of climate goal-setting and leads to GHG emissions reductions. It is also too early to tell

what type of climate activity within a country leads to the best climate outcome. Per The Climate Action Tracker, Canada's current NDC is listed as "inadequate" whereas Mexico and Brazil are listed as "medium."⁴⁷

The Climate Action Tracker score might indicate that Canada's Pan Canadian Framework, which appears likely to be the most effective if only judged by positive responses from interviewees, is somewhat futile. However, the team challenges the climate community to differentiate between goal-setting and implementation. One country may have excellent goals, but without sufficient internal coordination, and subsequent funding, may fall short of actual implementation relative to a country with more modest ambitions.

Drawing from the findings, the team realized there are indeed difficulties with aligning goals and metrics, but also frustration and great uncertainty about how goals will be achieved and funded. Thus, the team developed The Climate Action Portal for Integration (CAPI) of National and Subnational Commitments, which assesses not just goal-setting, but how these goals will be implemented, as described in Section V.

While utilization of CAPI is not a silver bullet for solving each challenge laid out in the Findings section, it can address each finding in the following ways:

- 1. *Misalignment of baselines, goals, methodology and sectoral coverage reduces opportunities for collaboration and investments and fosters uncertainty of effective communication*** - highlights these misalignments systematically by directly comparing national and SNG metrics.
- 2. *Initiatives are underway across most study countries to increase National-SNG integration and coordination*** - can be used by any country/not country-specific.
- 3. *Informal and formal lines of communication are used to coordinate climate actions*** - can complement existing communications structures and enhance data-sharing.
- 4. *Low usage of "external" platforms and tools at the national level; moderate use at SNG level*** - an internal platform more relevant to national-level decision-making.
- 5. *The economic benefits of climate actions must be articulated*** - allows users to input any quantification of economic benefits for a specific climate project.
- 6. *Degree of government centralization impacts target-setting and SNG action*** - the tool can

integrate solutions targeted for different types of governments.

7. ***Capacity impacts ability to coordinate and implement climate actions*** - highlights funding gaps for different sectors and projects.
8. ***Political will dominates communication or coordination advances*** - while this is a much larger problem, by quantifying how SNG actions contribute to national goals, it could incentivize national-level decision-makers to engage with SNGs to a greater degree.

V. THE CAPI TOOL AND RECOMMENDATIONS

a. Introduction to CAPI

The Climate Action Portal for Integration (CAPI) of National and Subnational *Commitments* is designed to identify climate data and funding gaps at multiple levels of government within a country. Presently, the tool only allows input and comparison of national and state/provincial-level data, but integration of municipal and private-sector entities is possible in future iterations.

b. Strategic Use by the Under2 Coalition

The Under2 Coalition can take the current structure of CAPI (Alpha stage) and advance it in several directions, sequentially or simultaneously.

- 1 **Online Portal**

It is envisioned that CAPI could be converted into an online, password-protected, portal, used only by staff within a country. This would enhance ease-of-use and facilitate continuous data updates.

- 2 **Beta Testing**

The Under2 Coalition could advance the Alpha CAPI to a Beta-ready product and Beta-test CAPI (either in portal or excel form) with a national government and several or all its states. This would ground-truth many of the assumptions and reveal needed features and highlight the most important value propositions to users.

3 Additional SNG Categories

Undoubtedly, cities and private-sector actions will eventually need to be incorporated into a more holistic tool. It may be too complicated to Beta-test simultaneously with these stakeholders, thus, stepwise testing might be more prudent. The Under2 Coalition would need to consider the best approach.

The Under2 Coalition can ultimately use the tool as an added value to their members and to advance its overall mission.

The easiest path toward beta-testing or general uptake would likely be with a country in which the national government has endorsed The Under2 MOU and has several signatories. Mexico and Canada appear to be the best-positioned for this due to their reasonable amount of coordination and existing data availability. Also, outside of this project's study countries, there appears to be a moderate amount of political will in Indonesia to better align its national and SNG climate actions. Indonesia does have several Under2 MOU signatories and is also active in other initiatives, such as The World Resources Institute's CAIT Climate Data Explorer at the subnational level.

Alternatively, the tool and general approach could be used to help "jump-start" climate alignment with potential Under2 Coalition signatories or endorsers with little existing capacity, Argentina for instance. This latter approach could be interesting because in such "blank slate" countries with fewer existing commitments and plans, a structured approach could more quickly align goals, methodologies, and coordination.

More thought needs to be put into how to scale CAPI's potential use to many countries. For instance, in countries with just one Signatory, such as Nampula City in Mozambique, it would likely be difficult to get "buy-in" from the national government and other jurisdictions quickly.

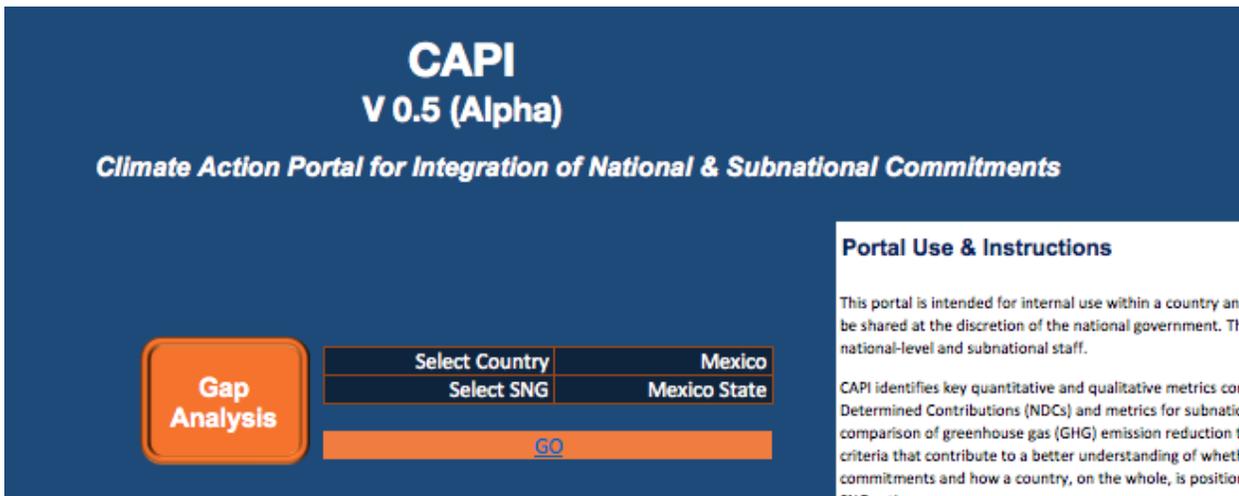
By examining just the map of The Under2 Coalition, deploying CAPI throughout the Western Hemisphere could be the most efficient approach. Through interviews, it was also clear that many staff throughout Latin America, from Mexico to Argentina, share experiences and coordinate with each other, which could lead to a multiplying effect for a tool such as CAPI and regional proliferation of more standardized best practices for national and SNG integration and coordination. Finally, if multiple countries in a region were consistently using a common system such as CAPI, potential linkages of each country's portals could lead to regional climate action aggregation.

c. Using CAPI

i. Gap Analysis

INPUTTING SUBNATIONAL DATA

A subnational representative would begin at the “Start” tab. Then, select their country and state. After pressing “GO,” they are directed to a page for their state. For this walk through, Mexico and Mexico State are examples.



Once at the state page, they can select for which year they are providing information.

Jurisdiction	Mexico State	
Select Year		Source
2020		
2030		
2040		
2050		

Mexico State’s Appendix to The Under2 MOU discloses goals and metrics only for 2050. The user then enters data into the “Summary” section and “Sector Breakdown.”

2050	Back to Top	National Comparison
Summary Data		
<i>Goals</i>		
2050 Reduction Goal		50%
Baseline		2012
Baseline Emissions (t/year)		46700000
Emissions Reduction 2050 (t/year)		23,350,000
Goal as % of National Goal		8%

Sector Breakdown			
Energy	Efficiency	Efficiency	Other
Description	Installation of 16,083	The 68,821 luminaires	
Emissions Reduction (t/year)	5,318.11	22,444.90	
Current Funding	0	0	
Total Project Costs	0	0	
Funding Gap	NA	NA	\$0
Economic Savings Quantified		\$115,000,000	
Further Information			

SUMMARY DATA GOALS DESCRIPTION

2050 Reduction Goal – the emissions reduction goal stated by the jurisdiction. Mexico State’s goal is to reduce 50% of 2012 GHG emissions by 2050.

Baseline – the baseline from which the jurisdiction is basing reduction goals. Mexico State lists 2012.

Baseline Emissions – the total emissions from the jurisdiction’s stated baseline in tons CO2 equivalent. Note that Mexico State lists 2012, but provides emissions data for 2010, which is 46,700,000 million tons of CO2 equivalent. Thus, for this version, the 2010 numbers are used.

Emissions Reduction 2050 - the percentage goal multiplied by baseline emissions in tons CO2 equivalent. Here, the 2050 emissions are calculated as 50% of 46,700,000 tons, which equals 23,350,000 tons CO2 equivalent.

Goal as % of National Goal – the emissions reduction as a percentage of national emissions reduction goals for the corresponding target year. Mexico State’s goals represent 8% of the nation’s goals for this time period.

The Goals section is a first step to addressing the misalignment and quantification challenges presented in this report. For national governments to take SNG actions more seriously, it is important that it is at least shown how achieving the SNG goals can contribute to national objectives. Beyond showing a percentage contribution, exposing some of the underpinnings of the SNG assumptions, such as baseline emissions, can help align goals. As noted, Mexico State, in its Appendix, provides data on its emissions for 2010 but sets a baseline as 2012. One assumes Mexico State has the data for 2012 since it is the baseline, but this disconnect raises concerns about how the state may be communicating its goals internally and to the national government and why it doesn’t provide more complete data.

Further, Mexico's NDC states that its "pathway to reduce 50% of emissions by the year 2050" uses a baseline of 2000. While using different baselines does not necessarily hinder comparison of reductions as long as the actual amount of emissions reductions are quantified, this could lead to questions about equity amongst SNGs within a nation. For instance, if Mexico State used a baseline of 2000 and had much higher emissions at that time, assume 60,000,000 tons CO₂, compared to 2010, the amount of reductions it would need to achieve would be greater (and cost more), likely being a greater burden for the state. On the other hand, this scenario would result in Mexico State's goals moving from 8% to 11% of the nation's goals, which, if realized, would further national ambitions. Then, presume Jalisco's 2000 baseline is actually lower in 2000 and its percentage of national reductions moves from 8% to 5%. Jalisco's burden (assuming it was self-funding all projects) would be smaller, but become less important to national goals.

Uncertainty about the ability to implement climate actions could be behind the different use of baselines, however, this assumption requires further investigation.

TRACKING AND SECTOR BREAKDOWN DISCUSSION

The Tracking and Sector Breakdown sections are designed to provide a "reality check" to the goal set forth by the SNG. The user should skip the "Tracking" inputs and fill in the The Sector Breakdown first. This section is divided into 5 major categories — Energy, Urban & Transport, Biodiversity & Forests, Agriculture and Waste. These are based on categories observed throughout reviewed Appendices. Within each category, the user can select a more specific project — for Energy, they can select Efficiency, Solar, Wind or Other; this allows for both SNG and national aggregation of total projects planned in a sector.

Description – the user can enter a short description of the project. For an Energy Efficiency project, Mexico State listed "Installation of 16,083 luminaires type LED RL2 in 17 municipalities of the State of Mexico, these luminaries stop emitting 5,318.11 Tons of CO₂ per year."

Emissions Reduction – the expected reduction in GHG emissions from the project at year 2050. Mexico State lists reductions for this project at 5,318.11 tons of CO₂ per year. Note that It is not clear from the Appendix whether these reductions will materialize only by 2050 or in earlier years. It is also not clear how this quantification was verified.

Current Funding – the current funding secured for the project. Mexico State did not provide funding information.

Total Project Costs – the funding needed to complete project and realize GHG reduction goals.

Funding Gap – the difference between total project costs and current funding.

Economic Savings Quantified – any economic savings or benefits (e.g. job creation) quantified for the project. Mexico State claims that one of its efficiency programs will lead to savings of 115 Million Pesos.

Further Information – any additional information relevant to completion of the project or GHG savings.

Much of the Sectoral Breakdown data feeds into the Tracking section.

Tracking		
Quantified Reductions [Sum of Sectoral Projections]	80,815	
Emissions Gap [Goal - Quantified] (t/year)	23,269,185	
Funding Gap	NA	
Methodology	NA	
quantified as % of national goal	0.03%	

Quantified Reductions – the sum of all the emissions reductions reported for each project for each sector. For Mexico State, this equals 80,815 tons of CO2 and is the sum of 5 quantified projects.

Emissions Gap – the difference between the emissions reduction goal and what is actually quantified. For Mexico State, there is a quantification gap of 23,350,000 because the state has only reported 80,815 in quantification for specific projects.

Funding Gap – the sum of all funding gaps for all sectors. Mexico State’s is “NA” as a 0 might indicate that every project is funded.

Methodology – what protocol/accounting framework used. Mexico State does not provide information about this.

Quantified as % of National Goal – the percentage that Quantified Reductions contribute to realizing national goals. For Mexico State, what they have actually reported represents .03% of Mexico’s 2050 national goal as reported in its NDC.

Interviews with consultants and national and subnational staff revealed that 1) the use of different GHG accounting methodologies; 2) a lack of quantification for both emissions reductions and funding;

and 3) different sectoral focuses between the national and subnational levels leads to a breakdown of communication and hinders coordination on achieving goals.

By highlighting what sectors a state is focusing on, the national government can compare whether SNGs are developing climate actions in line with its NDC goals. This information can help government staff at all levels better share technical resources or identify knowledge gaps.

This could also help SNGs view activities horizontally and advance mutual sharing of expertise. While no information was found on Mexico State’s funding needs to implement its quantified projects, some data on funding needed to implement proposed projects for Baja California were found and included in the tab “Baja California” for the year 2030.⁴⁸ Approximately \$32,000,000 is identified as needed to fund projects ranging from biodiesel to the installation of a trolley system in Tijuana. No information is provided on whether funding is secured, thus, the total funding gap is equal to \$32,000,000.

Urban & Transport	Public Transport	Public Transport
Description	Installation of a trolley system in Tijuana and Mexicali	
Reduction (t/year)	732,000	
Current Funding	0	
Funding Needed	292,400	
Funding Gap	\$292,400	\$0
Economic Savings Quantified		
Further Information		

Tracking	
Quantified [Sum of Sectoral Projections]	1457200
Emission Gap [Goal - Quantified] (t/year)	NA
Funding Gap	\$32,627,409
Methodology	NA
quantified as % of national goal	0.58%

Ultimately, understanding the costs associated with these reductions can contribute to better decision-making related to SNG goals. If the cost per unit of CO2 reduction is cheaper in Mexico State than, for example, Jalisco, the national government, which would be able to see across all states, may decide that helping fund more projects in that state produces higher benefits.

INPUTTING NATIONAL DATA

The national-level data tab is relatively simple. The user would input a reduction goal per target year, the baseline used, baseline emissions, emissions reductions and methodology used to calculate

reductions. As this is primarily meant to compare SNG activities with national goals, detailed analysis of national activities and funding is not included, but that could be incorporated if relevant in future versions.

For Mexico, only information on 2030 and 2050 are available from its NDC. Notably, it uses different baselines: a BAU calculation for 2030 and a 2000 baseline for 2050. While the justifications and implications for this disconnect at the national level were not researched for this project, having an organized system such as CAPI helps reveal these differences more clearly relative to searching through documents.

2030	
2030 Reduction Goal	0.225
Baseline	BAU 2030
Baseline Emissions (t/year)	1,110,000,000
Emission Reduction 2030 (t/year)	249,750,000
Methodology	IPCC

Goals are set for every five years. This is in line with the expectation of countries to submit updated NDCs every five years.

DATA AGGREGATION AND NATIONAL-SNG COMPARISON

Tabs 2030 Comparison Actual and 2050 Comparison Actual show the current data available from each subnational for that target year as well as national goals. Looking at the 2030 tab, there are many data gaps. It is clear that Jalisco is the only state that provides enough information to compare with the national goals. Even though Baja California provides a “goal,” it provides no baseline or baseline emissions metric, thus is incomparable.

Jurisdiction	Total States	Mexico State	Jalisco	Baja California	Yucatan
2030					
<i>Goals</i>					
2030 Reduction Goal	Mixed	NA	0.3	0.23	0.40
Baseline	Mixed	NA	2010	NA	2005 intensity
Baseline Emissions (t/year)	42,000,000	NA	42,000,000	NA	NA
Emissions Reduction 2030 (t/year)	12,600,000	NA	12,600,000	NA	NA
SNG goal as % of national goal	5.05%	NA	5%	NA	NA
<i>Tracking</i>					
Quantification Gap [Goal - Quantified] (t/year)	12,600,000	NA	12,600,000	NA	NA
SNG quantified as % of national goal	0.58%	0	0%	0.58%	0%
Funding Gap	\$32,627,409	NA	NA	\$32,627,409	NA

Showing these gaps will ideally lead to that state or the national government questioning why this data is either not communicated or not even collected.

All of the sectoral projects for each state are aggregated in Column C. Filled in comprehensively, this section would show the total number of projects taking place by sector, how much reductions are occurring per sector and how much funding is needed to realize emissions goals per sector.

A	C	D
Energy		
# projects	1	
Reduction (CO2/tons/year)	347,500	
Current Financing	-	
Funding Gap SNG	\$1,500,000	
Urban & Transport		
# projects	1	
Reduction (CO2/tons/year)	732,000	
Current Financing	-	
Funding Gap SNG	\$292,400	
Biodiversity & Forests		
# projects	-	
Reduction (CO2/tons/year)	-	
Current Financing	-	
Funding Gap SNG Total	-	
Agriculture		
# projects	1	
Reduction (CO2/tons/year)	377,700	
Financing	-	
Funding Gap SNG Total	\$0	

The 2030 Comparison Simulated tab shows how the tool would work if all cells were inputted with data. All of these are simulated numbers. This simulation more fully shows the power of the tool, however. For example, comparing cell C9 with C12 shows that even if all states' emissions goals (hypothetically) exceeded national goals, at 106%, the "tracking" functionality of CAPI elucidates that only 43% of these emissions can be traced back to a quantified project and there is a \$514,727,000 funding gap for these quantified projects.

Jurisdiction	Total States	Aguascalientes
2030		
<i>Goals</i>		
Baseline Emissions (t/year)	1,027,880,000	25,000,000
Emissions Reduction 2030 (t/year)	264,486,000	6,250,000
SNG goal as % of national goal	106%	2.50%
<i>Tracking</i>		
Quantification Gap [Goal - Quantified] (t/year)	108,344,800	3,125,000
SNG quantified as % of national goal	43%	1.25%
Funding Gap	\$514,272,000	\$23,050,000

GAP ANALYSIS SUMMARY

It is likely that national governments have more data on SNG climate actions than is presented in the simulated CAPI tool. For example, Mexico sends out questionnaires to its SNGs. However, it is also possible that any additional information the national government has is only marginally more comprehensive. The project team did not get any information during interviews about quantification or funding actions beyond what is publicly available.

Further, while national governments likely have at least data sheets that track some of the information CAPI does, there was no evidence provided through either national or SNG interviews that such a comprehensive system exists. For all countries, there is certainty that no such portal exists that states can access. Several SNG interviewees stated that they do not know what happens to the data that they send to the national government. Thus, the project team believes the Gap Analysis functionality of the CAPI Tool would be a valuable addition for most governments. It would also provide a more transparent framework for coordination that appears to be lacking in several countries.

Expecting most states or SNGs to fill in any of these data points in the next few years is ambitious based on the project team's research and interviews. However, the team believes national and subnational governments must move in this direction to actualize effective climate actions.

Without beta testing or a formal review, the team can only speculate if national governments would find significant value in the CAPI tool. One national level contact from Peru, when asked if a "tracking tool that showed clear gaps between NDC goals and subnational actions" would be useful, replied "Yes!" Further, a Secretary for the Environment for a state in Brazil wrote out the following prescription for what he would like to see in a national/subnational climate data system:

"I believe that the most efficient way to monitor actions and results about greenhouse gas emission reduction is to implement a networked data system, integrating data and information from reliable sources and using artificial intelligence.

A system with the following functionalities:

1. Commitments made by each country and targets by sector (energy, agriculture, transport, etc.) and by subnational territories
2. Ongoing actions to achieve (sectoral, local and national) targets - indicators and monitoring
3. Current and projected results for the future (functionality to automatically calculate forecasts)
4. Successful solutions (for exchanges between countries)
5. Best technologies (solutions bank available for exchange)

6. Tools for integrating data and designing indicators (graphs) by sector, by country (adding results and projections) - possibility of having indicators showing if the world will be able to keep the temperature rise below 2 degrees Celsius with actions in progress (Alerts for sectors and countries that need to improve performance)
7. General information on International Agreements, Scientific Reports and relevant publications on global warming and climate change
8. Collaborative channels and interaction for the participation of the global society (following the progress)”

The most similar tool or portal to the Gap Analysis is The World Resources Institute’s CAIT Climate Data Explorer.⁴⁹ This is a comprehensive website with several different tools that focus on topics such as historical emissions to visualizations of equity for different climate commitments. Most relevant for comparison is CAIT’s inclusion of a “Paris Contributions Map,” which outlines many of the goals that CAPI does and is more in-depth on several aspects. Further, the project has initiated an Indonesia Climate Data Explorer (PINDAI) tool which shows emissions data (projections, baselines, primary sources of emissions) for each state in Indonesia. Since this project began, the project team has noticed considerable improvement from this tool.

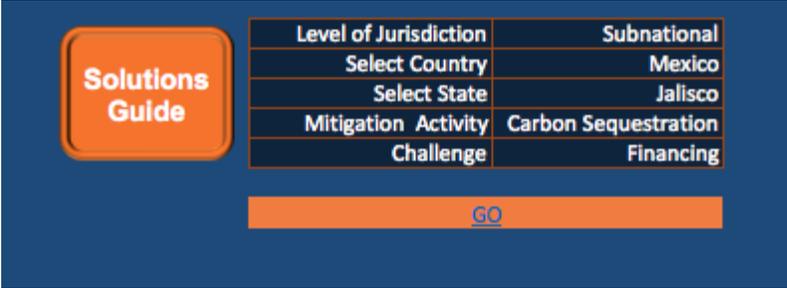
The CAIT initiative will be an important corollary to the CAPI tool. However, CAPI differs in several respects:

1. It is designed for internal use and not for public viewing
2. It directly compares national and SNG goals, which CAIT does not
3. It is project-focused and pushes national governments and SNG to quantify projects
4. It ties in funding to projections and emissions reductions and shows existing gaps in these dimensions

ii. Solutions Guide

Frequently, interviews revealed a desire for “best practices” and “solutions” of what is working. The Solutions Guide concept would be based on a simple algorithm. Depending on a user's selection, various use cases or solutions to climate problems would be “filtered out” to match those most relevant to the subject. For instance, staff in the environment department of Jalisco, Mexico, may enter in her basic jurisdictional information as well as possible problems or areas of research she is interested in. Jalisco may be considering investing in a carbon sequestration project. It may have collected data and quantified the benefits of the proposed project, but is unsure about how to finance the project.

After selecting “Carbon Sequestration” for Mitigation Activity and “Financing” for Challenge, she would press “Go” and be taken to a page with one or multiple examples of projects relevant to her project. It would have a project description, financing amount, location, CO2 reductions, contact information and any other relevant data.



Directions

1. Select your country.
2. If you are a national level, select a state.
3. If you are a subnational level, select a country.
4. Once all of the criteria are selected, click on the GO button.

Country	Peru	
SNG	Datem del Marañon	
Description	Building the Resilience of Wetlands in the Province of Datem del Marañón, Peru	
Total Financing	\$9,100,000	
Project Overview		
<p>In 2015 the GCF approved a project for Peru designed by the Peruvian Trust Fund for National in coordination with the regional and local government of the Peruvian Department of Loreto, and with the indigenous population based on the territory. This national and subnational coordination was one of the key variables of the project's viability and effectiveness as it ensured that the projects' activities were going to fulfill current needs.</p> <p>The five-year project is focused on entrusting indigenous communities in the northern Peruvian province of Datem del Marañón to manage their wetland resources in ways that do not release the large amount of greenhouse gases stored in the region's peatlands.</p>		
Mitigation Benefits		
<p>The project provides global mitigation benefits as the swamps of Datem del Marañón hold a total carbon stock estimated at around 3.78 billion tonnes of carbon dioxide equivalent (CO2 eq.).</p>		
Reference	GCF	
Contact	<p>Mr. Alberto Paniagua email: apaniagua@profonanpe.org.pe</p>	

On the “Start” tab, users, whether national or subnational, can select several criteria:

Level of Jurisdiction – national or subnational. The tool would filter out whether an example is applicable at the national or subnational level.

Select Country – this filter would prioritize examples of solutions occurring in similar countries. Within this selection, backing data may include information such as a country’s GDP per capita or level of centralization of power/decision-making at the federal level.

Select State – similar to the “select country” filter, any available data on the subnational entity, such as geographic size, terrain or coastal area could be filtered the most appropriate solution.

Mitigation Activity – a particular mitigation activity a user is interested in can be selected. This could include solar development, efficiency measures, waste management and vehicle electrification.

Challenge – the user could select a challenge or barrier to implementation they are seeking to resolve, such as financing or quantification of a project.

SOLUTIONS GUIDE SUMMARY

Relative to the Gap Analysis, this part of CAPI will require more thorough analysis, research of data and initial testing of whether there is enough information to justify categories and filters.

Further, while many potential solutions will likely incorporate examples of national and subnational cooperation, many may only be applicable to subnational or national-level governments. While useful, such information could be considered outside the scope of the national and subnational integration goals of CAPI.

The Solutions Guide's most notable corollary is the NAZCA Global Climate Action portal. This is a comprehensive portal that filters climate actions based on location, mitigation type and entity type (e.g. cities, private sector). While frequently referenced and easy-to-use, it is not solutions-focused. Its primary purpose is to serve as a registry of goals, whereas CAPI's Solutions Guide would focus on matching solutions that go a level deeper than goals and showcase successful outcomes.

To consolidate resources, the concepts from CAPI Solutions Guide could be taken to NAZCA to enhance its offerings, or, CAPI could be linked somehow to NAZCA.

iii. Next Steps, Improvements and Remaining Questions

There are additional outputs that could be generated from CAPI data, such as a cost per CO₂ reduction by SNG and multiple ways of communicating and linking data that would require further review from climate and GHG accounting professionals.

Technical work on the data sheet, such as seamless linkages between SNG tabs and aggregation data, must be carried out.

Conceptual questions must be worked out as well. For instance, as one works through the tool, it is clear that there is considerable uncertainty about when climate actions will achieve emissions reduction goals. This has important implications for when emissions reductions should be counted.

V. CONCLUSION

The recommendations in this report will help our clients, The Climate Group and The State of California's Office of Planning & Research, advance the mission of The Under2 Coalition. The findings in the report can help The Under2 Coalition better understand the challenges and needs of its members so they can communicate and coordinate with national-level staff and departments more effectively. The report also provides useful examples of existing challenges and barriers as well as some activities and plans that are working to advance the integration of national and subnational climate actions.

CAPI is a novel endeavor that meets a need not yet met in the climate space. It would not only help national and subnational governments better share data and information, but also show how subnational climate actions contribute to national goals and help multiple levels of government keep track of progress within a country.

During the next few years and coming decades, the project team hopes that subnational and national governments will be able to use CAPI and its framework to turn climate goals into reality.

ACKNOWLEDGEMENTS

We would like to thank Professor Nilda Mesa for her assistance, mentorship and support through the entirety of this project.

We would also like to thank the following individuals for their assistance in refining our research and recommendations: Jonathan Dickenson (Director of Sustainability Services for Cventure LLC), Sara Mills-Knapp (Program Climate Change Program Manager at the World Bank), Dr. Rose Bailey (Senior Consultant in Emissions Inventories and Projections at Ricardo-AEA), Angie Fyfe (Director of Resource Efficiency and Renewable Energy at ICLEI), Johannes Friederich (Senior Associate and project manager for CAIT Climate Data Explorer at the World Resources Institute), and Scott Muller (Chair, Subnational Integration Working Group for the LEDS Global Partnership).

We would finally like to thank all of our interviewees for contributing their time and resources towards making this project successful and insightful.

ACRONYMS AND DEFINITIONS

ACRONYMS

CCP: Cities for Climate Protection

COP 21: Conference of the Parties; 2015 United Nations Climate Change Conference in Paris

EPA: U.S. Environmental Protection Agency

GHG: Greenhouse Gas

ICLEI: Local Governments for Sustainability

IPCC: Intergovernmental Panel on Climate Change

SNG: Subnational Government

UNFCCC: United Nations Framework Convention on Climate Change

DEFINITIONS

Appendix: Summary of policies and programs that are planned or in place to reach climate targets, which acts as an agreement for the subnational government to become a signatory to Under2 MOU.

NAZCA: Non-State Actor Zone for Climate Change, a global platform that brings together the commitments to action by companies, cities, subnational regions, investors and civil society organizations to address climate change.

NDC: Nationally Determined Contributions, is a term used under the United Nations Framework Convention on Climate Change (UNFCCC) for reductions in greenhouse gas emissions that all countries that signed the UNFCCC were asked to publish in the lead up to the 2015 United Nations Climate Change Conference held in Paris, France in December 2015.

Under2 Coalition: A total of 174 jurisdictions (as of May 4th, 2017), representing 33 countries and six continents have signed or endorsed the Under2 MOU.

Under2 MOU: Memorandum of understanding between subnational governments that aims to achieve greenhouse gases emissions mitigation. It brings together subnational governments willing to commit to either reducing their greenhouse gas emissions 80 to 95 percent below 1990 levels or limiting emissions to less than 2 metric tons per capita by 2050

APPENDIX A: EXAMPLE NDC



INTENDED NATIONALLY DETERMINED CONTRIBUTION

Mexico is a country committed to address climate change, as demonstrated by the mitigation and adaptation actions undertaken over the last few years in a systematic way and supported mainly with national resources. In the international arena, Mexico has expressed its willingness to achieve a legally binding agreement with the participation of all Parties in order to keep the global average atmospheric temperature below 2°C.

Since the year 2000, Mexico has published three National Strategies on Climate Change and in 2009 adopted its first Special Program on Climate Change. In addition, Mexico has presented five National Communications with their respective greenhouse gas inventories to the United Nations Framework Convention on Climate Change.

In April 2012, the Mexican Congress unanimously approved the General Law on Climate Change (LGCC in Spanish), which entered into force in October of that year and made Mexico the first developing country to have a comprehensive law on this subject.

As a result of the implementation of this new LGCC, the country has established institutions and effective instruments to reduce greenhouse gases (GHG) and particle emissions, as well as to increase the adaptive capacity of the country.

Regarding mitigation, the LGCC sets a clear obligation to give priority to the least costly mitigation actions, that at the same time derived in health and wellbeing co-benefits to the Mexican population. For this reason, both the National Strategy on Climate Change adopted in June 2013 - which sets the vision for the next 10, 20 and 40 years - as well as the Special Program on Climate Change (PECC in Spanish) 2014-2018 incorporate greenhouse gases and particles, also known as Short Lived Climate Pollutants (SLCPs).

The INDC that Mexico is submitting encompasses for mitigation purposes both the reduction of all GHG and SLCPs.

SLCPs have an important Global Warming Potential and a shorter life span in the atmosphere than CO₂. Actions to abate SLCPs simultaneously contribute to climate change mitigation in the near term and to the immediate improvement of air quality, as well as to generate positive impacts on human health and ecosystems conservation; in consistence with the recommendations contained in the 5th Assessment Report of the Intergovernmental Panel on Climate Change (IPCC), as well as with the guidelines of the Clean Air and Climate Coalition (CCAC) of which Mexico is a member.

For Mexico, the inclusion of SLCPs constitutes an increase of its level of ambition and commitment since it is additional to what the country has committed to previously.

The INDC of Mexico has two components, one for mitigation and another one related to adaptation. In turn, the mitigation portion includes two types of measures: unconditional and conditional. The unconditional set of measures are those that Mexico will implement with its own resources, while the conditional actions are those that Mexico could develop if a new multilateral climate regime is adopted and if additional resources and transfer of technology are available through international cooperation. This is unprecedented, since it is the first time Mexico assumes an unconditional international commitment to carry out certain mitigation actions.

This INDC is consistent with Mexico’s pathway to reduce 50% of emissions by the year 2050, with respect to the year 2000, as mandated by the LGCC.

In presenting its INDC, Mexico reaffirms its commitment to combat climate change, to the multilateral rules-based climate regime that requires the participation of all countries, and to sustainable development, as well as its solidarity with the most vulnerable countries.

Multiple stakeholders were consulted during the preparation of the INDC, including non-governmental organizations, academia and representatives from private industry of all economic sectors, through workshops and consultations at the national level.

In sum, the INDC of Mexico is ambitious provided that for the first time it translates previous aspirational commitments into mandatory goals. This constitutes a considerable increase in the level of ambition for a developing country with moderate levels of emissions.

Unconditional Reduction	Mexico is committed to reduce unconditionally 25% of its Greenhouse Gases and Short Lived Climate Pollutants emissions (below BAU) for the year 2030. This commitment implies a reduction of 22% of GHG and a reduction of 51% of Black Carbon ¹ .
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This commitment implies a net emissions peak starting from 2026, decoupling GHG emissions from economic growth: emissions intensity per unit of GDP will reduce by around 40% from 2013 to 2030.

Conditional Reduction	The 25% reduction commitment expressed above could increase up to a 40% in a conditional manner, subject to a global agreement addressing important topics including international carbon price, carbon border adjustments, technical cooperation, access to low-cost financial resources and technology transfer, all at a scale commensurate to the challenge of global climate change.
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Within the same conditions, GHG reductions could increase up to 36%, and Black Carbon reductions to 70% in 2030.

Type	Emissions reduction relative to a Business As Usual baseline
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¹ This commitment is coherent to the mandate established in Mexico’s Climate Change Law to prioritize cost-effective mitigation actions with social benefits such as the improvement of public health.

APPENDIX B: NDC-SNG COMPARISON

CANADA



NDC Goal	NDC Areas of Focus
30% below 2005 levels by 2030	Transportation and Electricity, Clean Energy

Signatory	MOU Goal	MOU Areas of Focus
British Columbia	33% below 2007 levels for 2020 and 80% below 2007 levels for 2050.	Clean Power, Energy Efficiency, Transportation, Intensity of emissions(LNG), Offsets,
Northwest Territories	No Appendix	No Appendix
Ontario	80 % reduction relative to 1990 levels by 2050	Carbon Markets, Transportation
Québec	80-95% by 2050	Energy Efficiency, Transportation
Vancouver City	By 2020, reduce GHG emissions by 33 % compared with 2007	Energy, Land Use, Clean Energy

MEXICO



NDC Goal	NDC Areas of Focus
Unconditional- 25% below BAU, 2030; Conditional- 40% below BAU, 2030	Energy, Industrial Processes, Agriculture, Waste, Land Use, Land Use Change and Forestry

Signatory	MOU Goal	MOU Areas of Focus
Baja California	2030-20-25%, baseline not specified	Cross-Border linkage, energy, water, vehicle emissions
Jalisco	2030-30%, 2050-50% based on 2010 emissions	Energy, Urban Planning, Transportation, Biodiversity, Forests, Agriculture, Waste
Mexico City	2020-10 m tons of CO ₂ eq, 2025-21.4 m tons of CO ₂ eq, baseline not specified	Energy, Transportation, Solid Waste Management
Mexico State	2050-50% based on 2012 emissions	Energy, Reforestation, Urban Transport
Yucatán	2018-20%, 2030-40% based on 2005 emissions	Energy, Agriculture, Land Use

BRAZIL



NDC Goal	NDC Areas of Focus
37% below 2005 by 2025	Deforestation, Agriculture, Transportation

Signatory	MOU Goal	MOU Areas of Focus
Acre	50-80%, current levels by 2030	Land Use (Deforestation, Agriculture)
Mato Grosso	80% below 2001 by 2020	Deforestation
Pernambuco	Not Stated	Energy, Transportation, Industry and Mining, Biodiversity, Water, Waste, Construction, Health
São Paulo State	Not Stated	Environment (Biodiversity, Natural Resources, etc.), Industry, and Solid Waste
Tocantins	25% below 2011 by 2018,	Energy (biofuel, solar)

APPENDIX C: QUESTIONNAIRE EXAMPLES

There were no video calls with interviewees. Efforts were taken to ensure that each interview had more than one project member on the call to provide multiple perspectives. However, this was not always possible. During interviews with multiple interviewers, one project member, typically the fieldwork coordinator or project manager.

- 1) Does your department keep track of the climate change commitments of national or other subnational entities?
 - a. If so, who do you typically correspond with? How often does this reporting occur?
 - i. Annually? Quarterly? Never?
 - b. If not, would you know with whom to speak?

- 2) What would help your office/department better coordinate with the national government?
 - a. Do you have any experience with such systems/processes (e.g. in other areas requiring coordination, air pollution)?

- 3) What are some of the barriers that you see currently inhibiting achievement of NDC, Under2 or RE100 commitments?
 - a. What would help you better achieve your goals and more quickly reduce GHG emissions for your jurisdiction?
 - b. What would help you create a goal you are certain you could meet (e.g. more funding, guidance)?

- 4) Do you believe that better vertical collaboration/ communication would lead to better results in the short term, or is it pointless? Which particular sectors could benefit most from this?

APPENDIX D: EXAMPLES OF SURVEY

Please list the top three activities or achievements that you believe your staff/departments are undertaking effectively:

5 responses

Developing technical studies, GHG accounting, network with international agencies and partnerships

Promoting carbon pricing (revenue neutral carbon tax success) both domestically and abroad.
Leading the nation in GHG modelling based on real ground level data.
Demonstrating leadership through being the first carbon neutral government in North America.

Organizing the implementation of the NDC at national level, establish the institutional arrangements for compiling the National Inventory, and creating the National System of GHG Inventory

1. Creation of environmental conservation areas
2. Policies to encourage renewable energy and electric vehicles
3. Plan to adapt to climate change

Partnerships with researchers and funding organizations - including departments of the federal government, implementation of alternative energy technologies (solar, biomass, wind) in small communities, engagement of community members in planning and decision making

The NWT is a huge, Arctic and sub-Arctic territory with very small population and limited capacity. Emissions are high per capita, but low overall - GHG mitigation initiatives have limited impact due to this. Climate change adaptation will be far more important in the coming years as our permafrost melts, our coastline erodes, and our plants, animals and weather patterns change.

Please inform us of other information you feel we should know or elaborate on any of the above options:

4 responses

At the national level we cannot force the provinces to implement and we cannot talk directly to smaller governments without talking to the province first, so this reduce our options of action

I believe that the most efficient way to monitor actions and results about greenhouse gas emission reduction is to implement a networked data system, integrating data and informations from reliable sources and using artificial intelligence.

A system with the following functionalities:

1. Commitments made by each country and targets by sector (energy, agriculture, transport, etc.) and by subnational territories
2. Ongoing actions to achieve (sectoral, local and national) targets - indicators and monitoring
3. Current and projected results for the future (functionality to automatically calculate forecasts)
4. Successful solutions (for exchanges between countries)
5. Best technologies (solutions bank available for exchange)
6. Tools for integrating data and designing indicators (graphs) by sector, by country (adding results and projections) - possibility of having indicators showing if the world will be able to keep the temperature rise below 2 degrees Celsius with actions in progress Alerts for sectors and countries that need to improve performance)
7. General information on International Agreements, Scientific Reports and relevant publications on global warming and climate change
8. Collaborative channels and interaction for the participation of the global society (following the progress)

APPENDIX E: KEY PHRASES

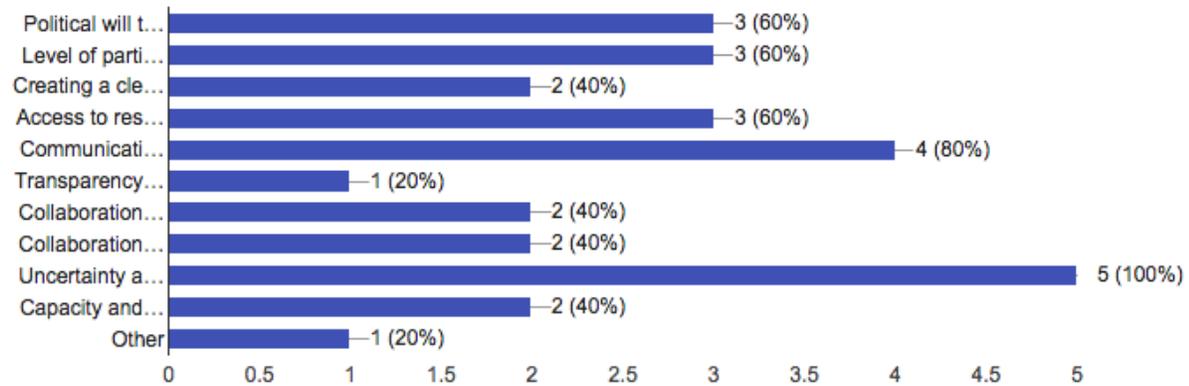
Key phrases were pulled from the open-ended question sections and the multiple-choice questions were aggregated into percentages and bar charts (Appendix E).

Please select all options that you feel your department is struggling with:

- Political will to address climate change
- Level of participation of sub-nationals in climate goals
- Creating a clear plan to achieve climate goals
- Access to resources (experts, other contacts, suggested courses of action)
- Communication and sharing of information
- Transparency of climate goals made by other departments
- Collaboration between national and subnational departments and incorporating subnational goals into nation
- Collaboration between subnationals
- Uncertainty about funding or financing to implement goals
- Capacity and staffing to conduct assessments and inventories or plan future actions
- Other...

Please select all options that you feel your department is struggling with:

5 responses

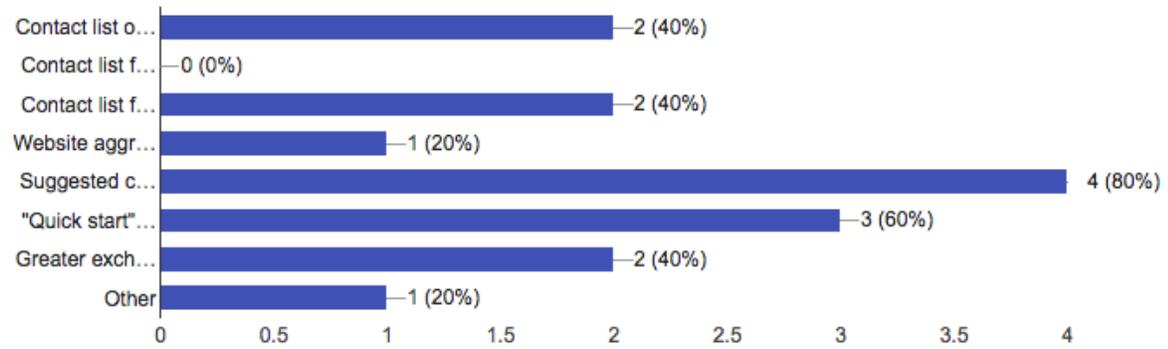


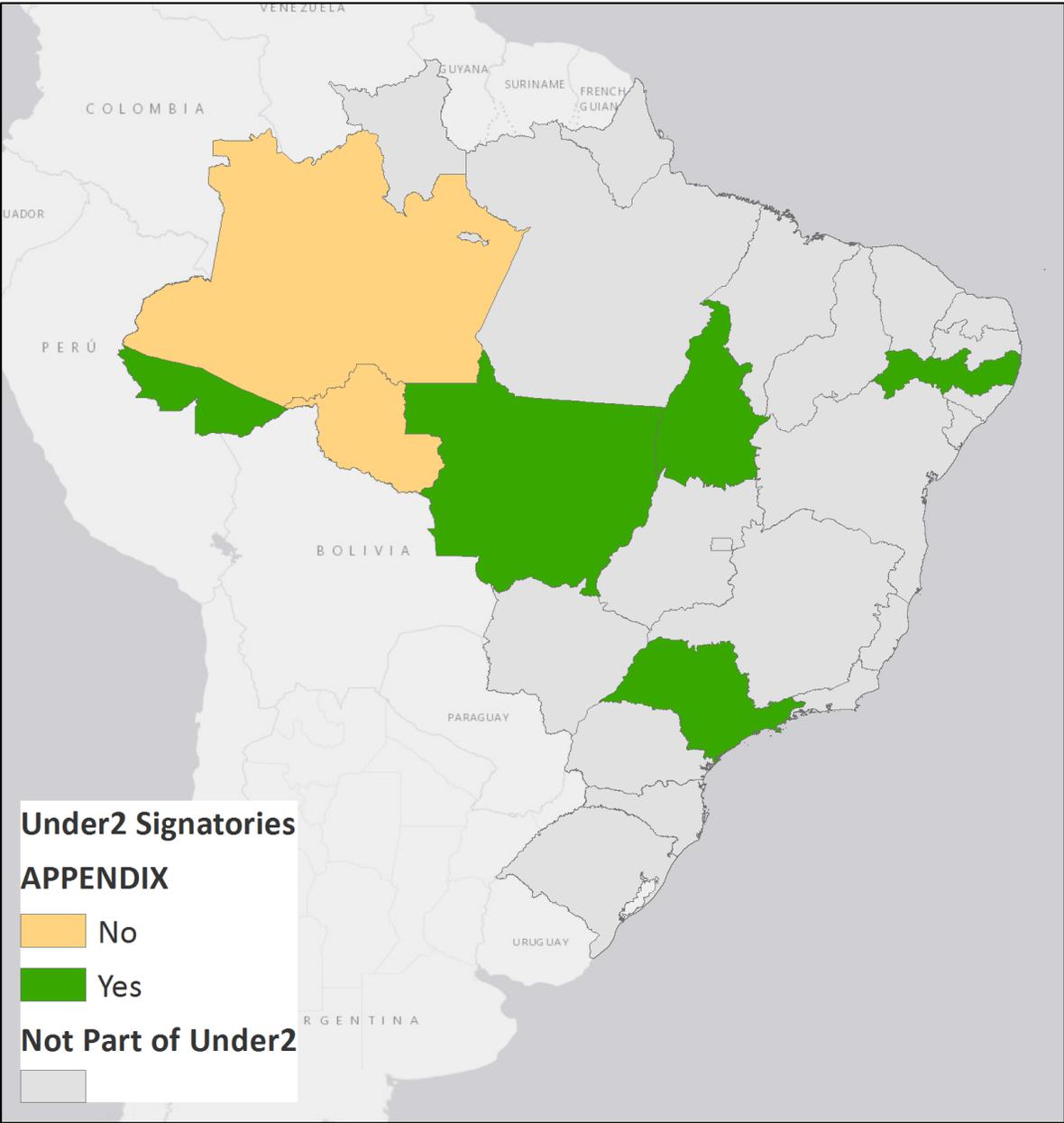
Please select all options that you would find useful for your department:

- Contact list of climate industry experts
- Contact list for environmental departments within your country
- Contact list for environmental departments for other countries
- Website aggregating NDCs and climate commitments
- Suggested courses of action based on similar countries' efforts
- "Quick start" guide to improving climate communication within your government
- Greater exchange of information between subnationals
- Other...

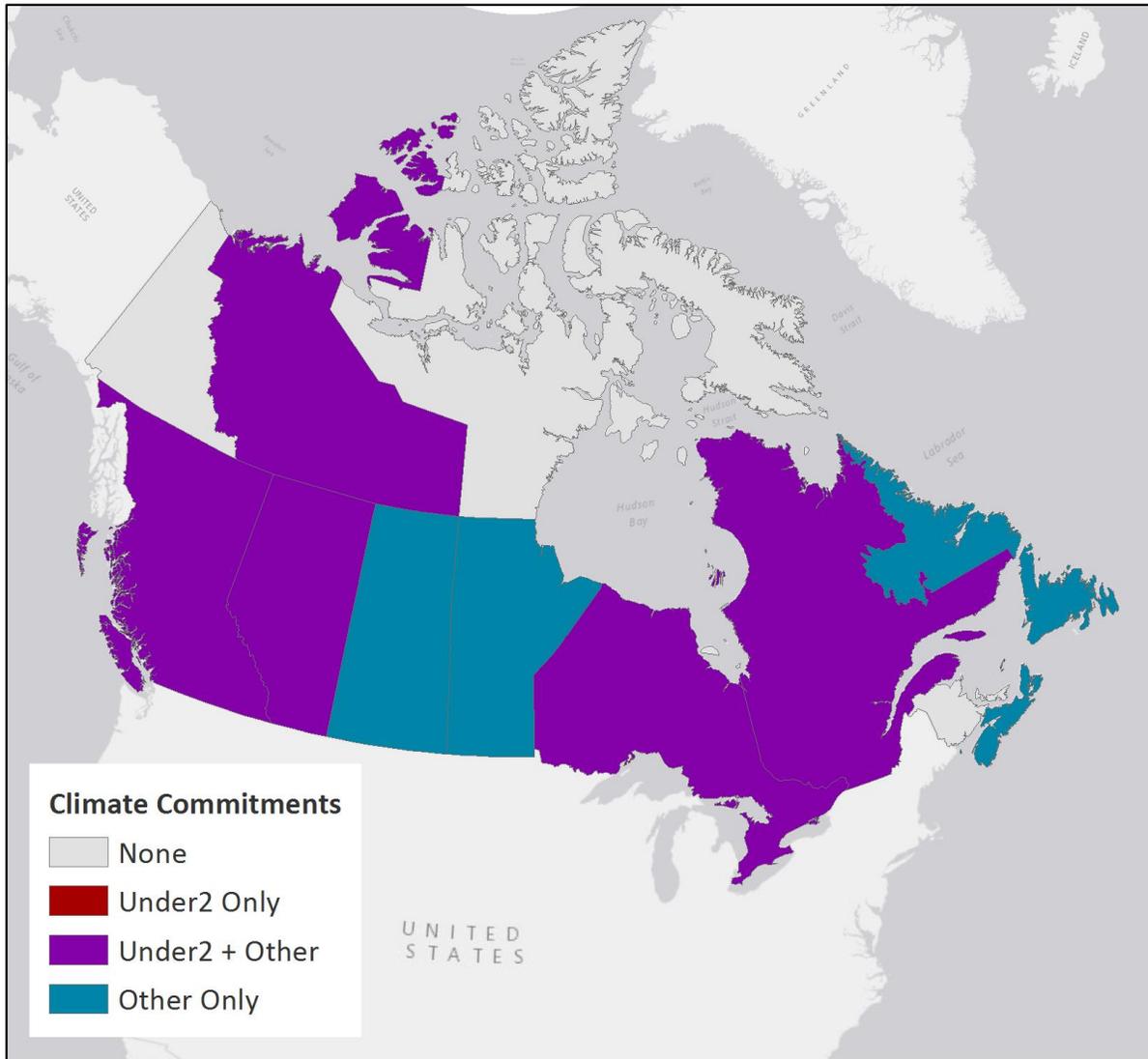
Please select all options that you would find useful for your department:

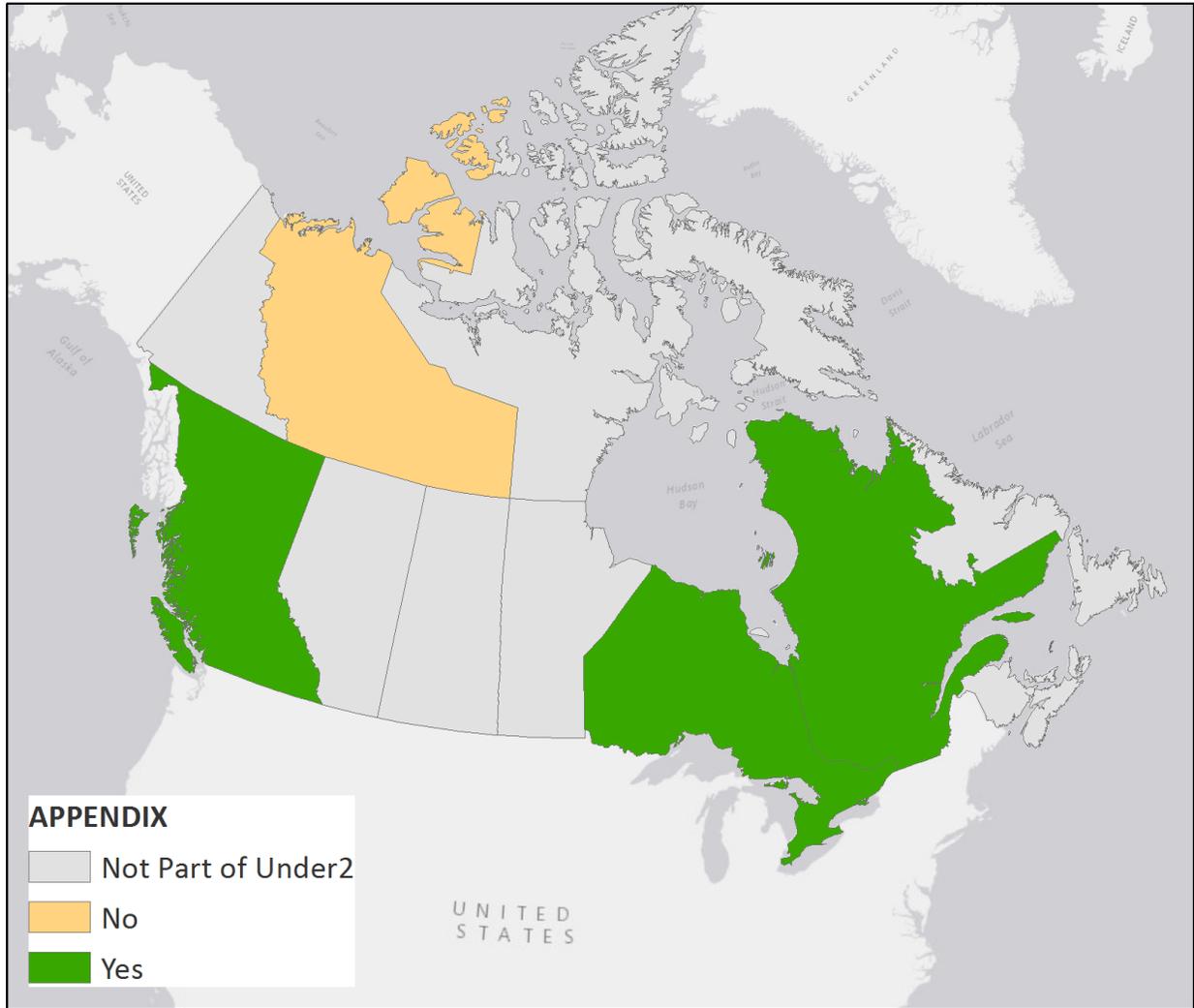
5 responses



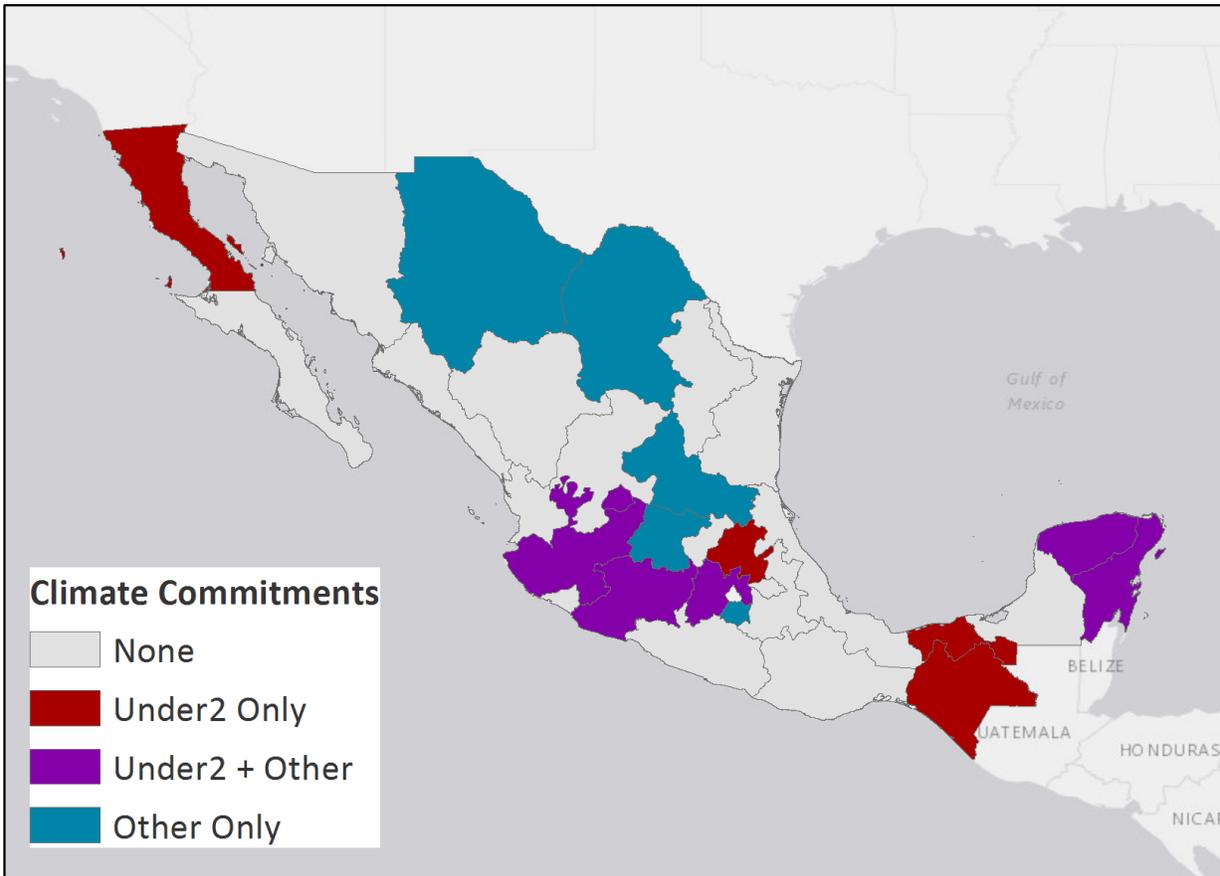


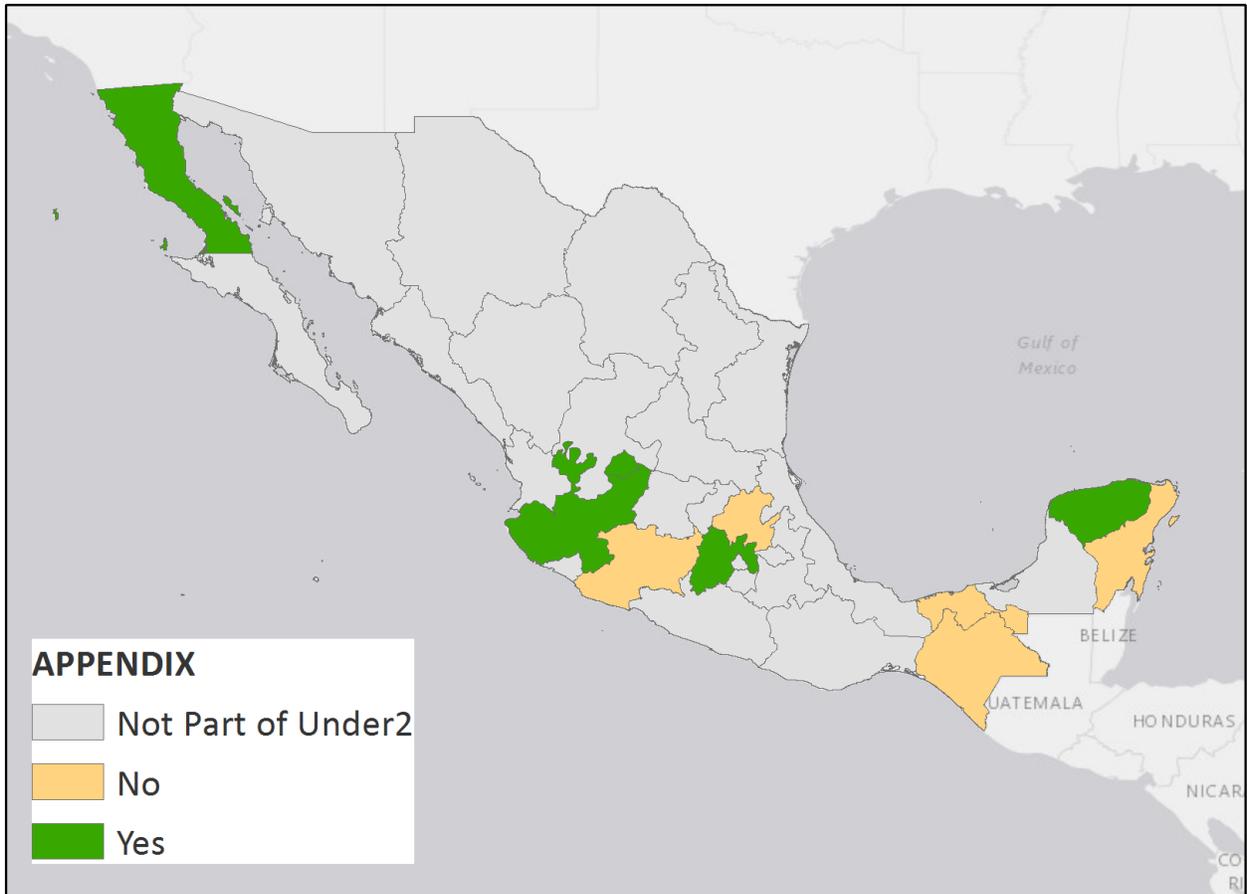
Climate Commitments by Province, Canada





Climate Commitments by State, Mexico





APPENDIX G: GHG ACCOUNTING

There are 33 countries that represent jurisdictions that have signed to be a part of the Under2 Coalition. With this in mind, the team reviewed the appendices of the countries that were suggested by the client, who not only showed an interest in reducing CO₂ emissions, but also were easily accessible.

Greenhouse gas (GHG) emissions are measured and reported according to 3 defined scopes. (Source: <http://www.ghgprotocol.org/standards>) Table 1 provides a brief description of the differences between each scope. Cities have difficulty with accurately determining emissions value because of scope 3. There is no standard way of determining the amount of emissions should be included in the boundary of a city, and which jurisdiction should claim the emissions that occurred outside city boundaries, but as a result of activities that took place within its boundaries. This process eventually leads to double counting. For this reason, a majority of cities focus on scope 1 and scope 2. When talking about the reduction of CO₂ emissions, the way in which emissions are counted is important for accuracy.

Scope	Description
1	GHG emissions located within the geographic boundary of the city
2	GHG emissions occurring from a gridded power source
3	GHG emissions occurring from outside the city from activities inside the city

ENDNOTES

¹ “The Paris Agreement.” United Nations Framework Convention on Climate Change. Last modified 2014. Accessed April 9, 2017. http://unfccc.int/paris_agreement/items/9485.php.

² “The Under2 Coalition.” Under2: Subnational Global Climate Leadership Memorandum of Understanding. Accessed April 8, 2017. <http://under2mou.org>

³ There are multiple other initiatives and endeavors that are galvanizing SNGs to action, including ICLE and The Compact of Mayors.

⁴ Numerous NGOs and gatherings are highlight these problems. For example “Workshop Tracking and Aggregating Non-State and Sub-National Climate Action Toward,” Galvanizing the Groundswell of Climate Actions, Available at: 2018<https://static1.squarespace.com/static/552be32ce4b0b269a4e2ef58/t/5834f6a95016e15e71da786e/1479866025876/09+Data+and+Analysis+Summary+-+16+Nov.pdf> and Integrating National and Sub-National Climate Action, LEDS Global Partnership, Available at <http://www.ecofys.com/files/files/leds-2014-integrating-sub-national-climate-action.pdf>

⁵ Double Counting in the Paris Agreement. Briefing Note. Climate Focus. Client Brief on the Paris Agreement II v.2.0 January 2016 Available at <http://www.climatefocus.com/sites/default/files/20160105%20v.2.0%20Double%20Counting%20and%20Paris%20Agreement%20FIN.pdf.pdf>

⁶ Non-State Actor Zone for Climate Action (NAZCA). "About NAZCA." *Global Climate Action*. Accessed February 30, 2017. <http://climateaction.unfccc.int/about>.

⁷ World Resource Institute. "Overview: CAIT Climate Data Explorer." *CAIT Climate Data Explorer*. Accessed April 4, 2017. <http://cait.wri.org/>.

⁸ Carbons Climate Registry. Homepage of Carbons Climate Registry. *Carbons Climate Registry*. Last modified 2014. Accessed March 3, 2017. <http://carbons.org/>.

⁹ Sao Paulo, Brazil. Telephone interview by Alexis Huseby. February 2, 2017.

¹⁰ Telephone interview by Alexis Huseby. February 27, 2017.

¹¹ 2006 IPCC Guidelines for National Greenhouse Gas Inventories. IPCC. Available at: <http://www.ipcc-nggip.iges.or.jp/public/2006gl/>

¹² Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. C40. Available at: <http://www.c40.org/programmes/the-global-protocol-for-community-scale-greenhouse-gas-emission-inventories-gpc>

¹³ Telephone interview by Davis Cherry. March 27, 2017.

¹⁴ Telephone interview by Davis Cherry and Clayton Colaw. Macy 20, 2017.

¹⁵ Telephone interview by Davis Cherry. February 17, 2017

¹⁶ Telephone interview by Alexis Huseby. February 20, 2017.

¹⁷ Telephone interview by Irina Bright and Davis Cherry. March 16, 2017.

¹⁸ Telephone interview by Davis Cherry and Clayton Colaw. April 4, 2017.

¹⁹ Email exchange by Davis Cherry. April 12, 2017

²⁰ Telephone interview by Davis Cherry. March 4, 2017.

²¹ Email exchange by Davis Cherry. March 15, 2017

²² Telephone interview by Alexis Huseby. February 2, 2017.

²³ Telephone interview by Davis Cherry and Terisa Thurman. February 22, 2017

²⁴ Tool available at Forum Clima, <http://forumempresarialpeloclima.ethos.org.br/observatorio-de-politicas-publicas-de-mudancas-climaticas/>

²⁵ Tool available at Proclima: <http://proclima.cetesb.sp.gov.br/legislacao/>

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- ²⁶Telephone interview by Davis Cherry March 10, 2017
- ²⁷ Telephone interview by Alexis Huseby. March 1, 2017.
- ²⁸ Telephone interview by Davis Cherry, March 17, 2017
- ²⁹ Telephone interview by Davis Cherry, March 22, 2017
- ³⁰ Telephone interview by Davis Cherry, March 2, 2017
- ³¹ Telephone interview by Davis Cherry. March 4, 2017.
- ³² Telephone interview by Davis Cherry, Irina Bright, and Terisa Thurman. February 24, 2017.
- ³³ Telephone interview by Alexis Huseby, March 2, 2017
- ³⁴ Email exchange by Davis Cherry, March 17, 2017
- ³⁵ Telephone interview by Davis Cherry and Clayton Colaw. March 20, 2017.
- ³⁶ Telephone interview by Davis Cherry, March 17, 2017
- ³⁷ Telephone interview by Davis Cherry and Clayton Colaw, March 12, 2017
- ³⁸ Telephone interview by Davis Cherry and Terisa Thurman, March 2, 2017
- ³⁹ Telephone interview by Davis Cherry, April 4, 2017
- ⁴⁰ Telephone interview by Davis Cherry, March 27, 2017
- ⁴¹ Telephone interview by Davis Cherry. February 28, 2017.
- ⁴² Telephone interview by Irina Bright and Davis Cherry. March 16, 2017.
- ⁴³ Telephone interview by Davis Cherry and Clayton Colaw. March 20, 2017.
- ⁴⁴ Telephone interview by Davis Cherry, March 27, 2017
- ⁴⁵ Telephone interview by Davis Cherry and Clayton Colaw. March 10, 2017.
- ⁴⁶ Ibid.
- ⁴⁷ Climate Action Tracker. "Climate Action Tracker: Canada." *Climate Action Tracker*. Last modified November 2, 2016. Accessed February 30, 2017. <http://climateactiontracker.org/countries/canada.html>.
- ⁴⁸ https://www.epa.gov/sites/production/files/2015-09/documents/gabriela_munoz_melendez.pdf
- ⁴⁹ <http://cait.wri.org/>