GLOBAL CLIMATE ACTION FROM CITIES, REGIONS, AND BUSINESSES

Individual actors, collective initiatives and their impact on global greenhouse gas emissions

YALE DATA DRIVEN
PBL Netherlands Environmental Assessment Agency
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Disclaimer

This publication is part of a collaborative series of reports by over 30 organizations released in concert with the 2018 Global Climate Action Summit, which showcase the extraordinary action of states, regions, cities, businesses and investors – and assess the opportunity for even greater impact.

In this specific publication we focus on the contribution of regions, cities and businesses and of cooperative initiatives that include regions, cities, businesses along with national governments and civil society partners, in order to understand their contributions to national and global efforts to reduce greenhouse gas emissions, and prevent the most damaging impacts of climate change.

The views and assumptions expressed in this report represent the views of the authors.

Methodological Appendixes

Download the Methodology for Quantifying Potential Impacts of Individual Commitments: bit.ly/yale-nci-pbl-ind-pledge-methods

Download the Methodology for Quantifying the Potential Impacts of International Cooperative Initiatives (ICIs): bit.ly/yale-nci-pbl-ici-methods

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EXECUTIVE SUMMARY

Since the Paris Climate Agreement solidified an "all hands on deck" approach to climate change, cities, regions and businesses have become key contributors to mitigation, adaptation and finance efforts. These actors are pledging a range of actions, from directly reducing their own greenhouse gas emissions footprints, to building capacity for climate adaptation and resilience to providing private finance. They are also working together to collectively deliver systemic impacts across sectors and economies. This report aims to inform the Sept. 2018 Global Climate Action Summit held in San Francisco, which convenes city, region, business and civil society representatives from around the world to discuss their contributions to global climate action. The conclusions and recommendations we provide in the report are broader, however, and could also inform international discussions such as the UN Framework Convention on Climate Change (UNFCCC) Talanoa Dialogue which, among others, seeks to include non-Party stakeholders such as regions, states, cities and business in global climate governance.

In this report, we evaluate individual climate mitigation commitments made by nearly 6,000 cities, states, and regions representing 7 percent of the global population and more than 2,000 companies with a combined revenue of over 21 trillion USD – nearly the size of the U.S. economy. This report quantifies for the first time the combined impact of these actors' recorded and quantifiable greenhouse gas mitigation pledges on global greenhouse emissions in 2030, focusing on 9 high-emitting countries – Brazil, China, India, Indonesia, Japan, Mexico, Russia, South Africa, and the United States – and the European Union. The individual efforts of the evaluated states, cities and businesses, however, represent only a snapshot of the full picture of non-state and subnational climate action occurring globally. We also evaluate international cooperative initiatives, where regions, states, cities, businesses – frequently in partnership with national governments and civil society – collectively commit to climate goals.

Both individual commitments made by regions, states, cities, businesses and international cooperative initiatives have the potential to reduce global greenhouse gas emissions significantly beyond what is currently expected from national policies alone, assuming their commitments and goals are fully implemented and accounting for overlap between actors. As we are not able to quantify the coordination effects between national governments and other actors, we assume additional reductions take place for each actor group (regions, cities, companies), if their aggregated reductions relative to 2015 are higher than reductions implied by national policy implementation. Also, we assume that both national governments and other actors do not change the pace of their existing climate policies and actions in response to these subnational and non-state efforts.

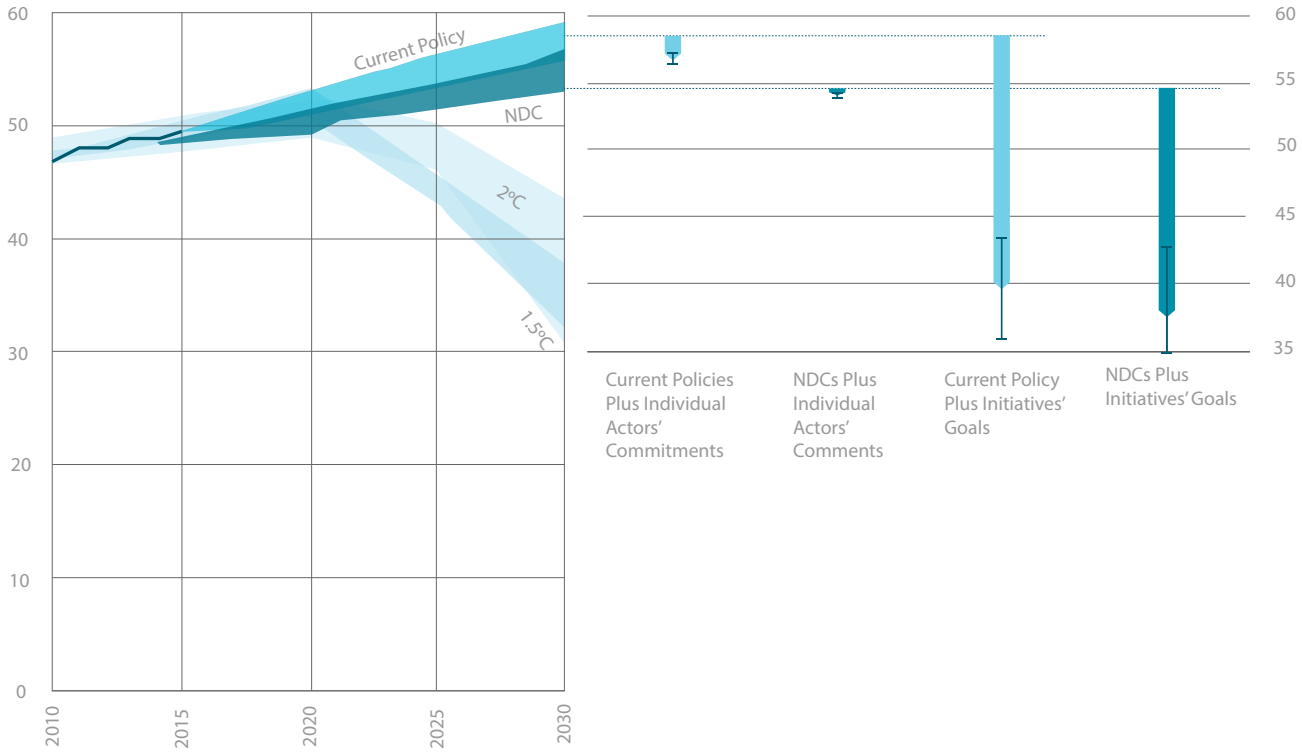

Figure 1
Potential impact of analyzed individual actors' targets and analyzed initiatives' goals full implementation on global greenhouse gas emissions in 2030 (Data sources: current policy and NDC scenario from (Kuramochi et al., 2017), 2 °C and 1.5 °C pathways from (UNEP, 2017), impact of individual actors and initiatives: this study)

Collective impact of individual commitments by regions, cities and businesses

Implementation of individual city, region and business commitments would bring the world closer to a global pathway compatible with the full implementation of Nationally Determined Contributions (NDCs), which were submitted as part of the Paris Agreement. The initial results presented in this report suggest that individual city, state, region and business commitments represent a significant step forward in bringing the world closer to meeting the long-term temperature goals of the Paris Agreement, but it is still not nearly enough to hold global temperature increase to "well below 2°C" and work "towards limiting it to 1.5° C.

Accounting for overlaps between actors' commitments, global emissions in 2030 would be around 1.5 to 2.2 $GtCO_2e$/year lower than they would be with current national government policies[1] alone, if the recorded and quantified commitments by regions, cities and businesses are fully implemented and if such efforts do not change the pace of action elsewhere (Figure 1). This additional impact would result in global GHG emissions of between 54.5 – 57.1 GtCO2e/year in 2030. These reductions could be higher, as some actor commitments could not be quantified, or others are not recorded and therefore not considered in this analysis. But overall reductions could also be lower even if these individual commitments

1
Please see the technical note on the quantification of international cooperative initiatives for more information on how the baseline scenarios were constructed, at: http://bit.ly/yale-nci-pbl-ici-methods.

are fully implemented, if the recorded actions change the pace of national government action or other actors without commitments.

Assuming that countries' climate proposals under the Paris Agreement – their Nationally Determined Contributions (NDCs) – are also fully implemented in addition to current policies (an "NDCs plus individual actors' commitments" scenario), global greenhouse gas emissions could be between 0.2 to 0.7 $GtCO_2e$/year lower in 2030 than they would be with NDCs alone (Figure 1). This added mitigation impact is smaller than compared to a current national policy scenario because the NDCs already include some of these city, region and business contributions.

Collective impact of cooperative initiatives' goals

Numerous national, regional and local governments, businesses, and civil society partners work together, often across national boundaries, to address climate change through international cooperative initiatives (ICIs). Global emissions in 2030 would be around a one-third (15-23 $GtCO_2e$/year) lower than they would be with current national government policies[2] alone, accounting for overlaps between initiatives, assuming all analyzed ICIs meet their goals of increased membership and implementation of targets, and such efforts do not change the pace of action elsewhere. This impact translates to remaining global GHG emissions of between 36–43 $GtCO_2e$/year in 2030.

Assuming that countries' NDCs are also implemented (a "NDCs plus initiatives' goals" scenario), global greenhouse gas emissions could be even lower. Combined, ICIs and fully-implemented NDCs would bring global emissions in 2030 into a range that is consistent with the long-term temperature goal of the Paris Agreement.

The potential emissions reductions of these initiatives are significant yet uncertain. They critically depend on the initiatives' full implementation and achievement of their goals, supported and adopted by all members and in some cases prospective members.

Comparing individual commitments and initiatives' impacts

The potential mitigation from cities', regions' and business' *individual commitments* appears small (1.5-2.2 $GtCO_2e$/year) compared to the impact of *cooperative initiatives' goals* (15-23 $GtCO_2e$/year in 2030). The estimated impact of the cooperative initiatives is much larger for various reasons:

- Goals are longer-term visions about the aims that a cooperative initiative tries to accomplish, in some cases making assumptions about growth in membership, while individual city, region and company

2
Please see the technical note on the quantification of international cooperative initiatives for more information on how the baseline scenarios were constructed, at: http://bit.ly/yale-nci-pbl-ici-methods.

targets are analogous to national level pledges (e.g, the NDCs) that represent more concrete steps to possibly realize the longer term goals.

- Analyzed initiatives include emission reduction targets in globally significant and ambitious sectors, such as the forestry and non-CO_2 greenhouse gases, which yield a combined 6-8 $GtCO_2e$/year in reductions alone. Recorded and quantified individual actions are primarily focused on the energy sector.
- Almost all initiatives count national governments among their members. Therefore, their impact is not exclusively attributable to non-state and subnational actors alone, but to the combined efforts and synergies across a diverse range of participants.

The large range of impact between committed individual city, region, and business emission reductions and the goals of international cooperative initiatives shows that there is an urgent need to operationalize the full scope of ambition and translate these into on the ground commitments.

The report features the impact of subnational and non-state actors and ICIs in 9 high-emitting countries and the EU, which collectively were responsible for 68 percent of global emissions in 2014 (WRI CAIT, 2018). Expected reductions from reported individual commitments are high in the US, but smaller in other analyzed countries.

- In **China**, the additional impact from the full implementation of recorded and quantified individual city, region, and business commitments is relatively small compared to current national policies (between 0 and 155 $MtCO_2e$/year in 2030). These actions play a critical role in the implementation of national goals but do not add ambition. The full implementation of the goals of selected international cooperative initiatives, in particular those focused on buildings, subnational commitments and energy efficiency, could additionally lower the emissions below current national policies (between 2,270 and 2,440 $MtCO_2e$/year in 2030).
- In the **United States**, the additional impact from the full implementation of recorded and quantified individual city, region, and business commitments is significant compared to current national policies. They could reduce emissions at least half way (670 and 810 $MtCO_2e$/year in 2030) to what would be needed to meet the US original target under the Paris Agreement. Selected analyzed international cooperative initiatives, particularly those focused on subnational governments and on renewable energy, could significantly lower the emissions expected from current national policies (by between 1,080 and 2,340 $MtCO_2e$/year in 2030).
- In the **European Union**, the additional impact from the full implementation of the recorded and quantified individual city, region, and business commitments is relatively small compared to current

national policies (between 230 and 445 $MtCO_2e$/year in 2030). Selected analyzed international cooperative initiatives, particularly those focused on renewable energy, non-CO_2 greenhouse gases and buildings, could lower the emissions significantly from current national policies (to between 980 and 1,970 $MtCO_2e$ /year in 2030).

- In **Brazil, India, Indonesia, Japan, Mexico, Russia and South Africa,** the additional impact from the full implementation of the recorded and quantified individual city, region, and business commitments is relatively small compared to current national policies (together, between 625-765 $MtCO_2e$/year in 2030). Selected analyzed international cooperative initiatives are still significant, potentially lowering the total emissions for these countries together from the current national policies by 2,220 – 3,380 $MtCO_2e$/year in 2030.

Implications for national governments

The level of ambition from some cities, regions and businesses as found in our analysis is encouraging and could accelerate or increase implementation of national policies and national climate proposals under the Paris Agreement, particularly in the United States. International cooperative initiatives' climate goals are encouraging and illustrate the potential for deeper emissions cuts when national governments partner with non-state and subnational actors. Their full implementation would narrow, and perhaps even close, the gap between the world's current emissions pathway and the emissions reductions needed to reach the long-term goals of the Paris Agreement. Delivering on this promise requires the implementation of individual actors' commitments and the cooperative initiatives' goals.

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INTRODUCTION

Since the Paris Climate Agreement solidified a global consensus for an "all hands on deck" approach to climate change, non-state (i.e., businesses) and subnational (i.e., cities, states and regions) actors have become key contributors to mitigation, adaptation and finance efforts. These actors are pledging a range of actions, from directly reducing their own greenhouse gas emissions footprints, to developing strategies for adaptation and resilience, to providing private finance. They are also working together to collectively achieve systemic impacts throughout entire sectors. Through the New York Declaration on Forests, for instance, dozens of governments, 30 of the world's biggest companies, and more than 50 influential civil society and indigenous organizations have pledged to halve the rate of deforestation by 2020 and completely end deforestation by 2030 (UNFCCC, 2014). In addition to protecting their residents, infrastructure, and supply chains from the threat of climate change, these actors pursue the gains in public health, job creation, and economic opportunities that climate action generates (Seto K.C. et al., 2014; New Climate Economy, 2015; Day et al., 2018).

To meet the Paris Agreement's goal to limit global temperature rise well below 2 °C and reach net zero emissions in the second half of this century, the world needs to move faster and further to reduce greenhouse gas emissions (UNEP, 2017; Climate Action Tracker, 2018a). The 2017 UNEP Emissions Gap Report identified a 11-13.5 gigaton gap in 2030 that separates the reductions countries have pledged from the path that would prevent temperatures from rising beyond 2°C. Even if all countries fulfill their Paris Agreement pledges or Nationally Determined Contributions (NDCs), these efforts would only deliver one-third of the emissions reductions required to maintain a 2-degrees trajectory (Rogelj et al., 2016; UNEP, 2017). If this emissions gap is not narrowed by 2030, the global goal to contain temperature rise within 1.5°C is almost certainly lost, and the 2°C goal is well out of range as well (Figueres, C., Schellnhuber, H. J., Whiteman, G., Rockström, J., Hobley, A., & Rahmstorf, 2017; UNEP, 2017). Beyond these 1.5 and 2 °C limits, the risks and costs associated with addressing climate change rise sharply (Schleussner et al., 2016).

The groundswell of commitments from a diverse range of actors can help implement and reinforce national climate goals, pilot innovative solutions, and potentially address shortfalls in national climate action to narrow this emissions gap. These contributions may also help inform national policy discussions as governments review their NDCs within the Paris Agreement's five-year review cycles, and ground key moments, such as the Global Climate Action Summit, Talanoa Dialogue discussions, and the December 2018 United Nations Framework Convention on Climate Change's (UNFCCC) Facilitative Dialogue.

Report overview

This report aims to capture the scope and impact of climate action from cities, regions, and companies, utilizing climate mitigation commitments made by the respective actors through some of the world's largest voluntary platforms for pledging and reporting on climate commitments. The report first explores the scope of cities, regions, and companies making climate commitments and describes what these commitments entail. Then, it estimates the mitigation impact that cities, regions, and companies could produce in 2030, both globally and within several key high-emitting countries, through commitments made by these actors on their own, and through international cooperative initiatives' (ICIs) commitments.

We build on a number of previous studies that have laid important groundwork in establishing methods and analyses for aggregating the climate mitigation impact of city, state and region, and business commitments (see Hsu et al., in review, which evaluates 24 of these studies). The methods we apply here have benefited from these efforts and the input of dozens of practitioners and experts convened through the Collaboration on Methodology, Data and Analysis (CAMDA) working group. Two methodological appendixes detailing the methods used to quantify 1) individual city, state and region, and business commitments to climate mitigation and 2) international cooperative initiatives' (ICIs) impacts are included alongside this report.

2

LANDSCAPE OF GLOBAL CLIMATE ACTION

The following section characterizes climate commitments made by cities,[3] states and regions,[4] and companies, recorded through some of the world's largest voluntary platforms for pledging and reporting on climate commitments. While there are many more actors undertaking climate actions, including civil society groups, universities, religious organizations, and investors, to name a few, this section only reviews the landscape of cities, states and regions, and companies participating in climate action networks and international cooperative initiatives (ICIs) that regularly collect and report information on their members. The number of non-state and subnational actors pledging climate actions through various membership networks and ICIs has grown steadily over the last few years and include:

- America's Pledge
- C40 Cities for Climate Leadership Group
- ICLEI Local Governments for Sustainability carbon*n* Climate Registry
- CDP
- Compact of States and Regions
- EU Covenant of Mayors
- Global Covenant of Mayors for Climate and Energy
- UNFCCC's Non-State Actor Zone for Climate Action (NAZCA)
- UN Environment's Climate Initiative Platform
- Under2 Coalition
- US Climate Alliance
- US Climate Mayors
- We Are Still In

These networks define membership and commitments to climate action in various ways and require members to report varying levels of information regarding their pledges. Some networks require members to pledge specific climate actions; signatories of the EU Covenant of Mayors, for instance, support the implementation of the European Union's 40% greenhouse gas reduction target by 2030 (EU Covenant of Mayors, 2018). Others, like CDP, ask participants to report data and progress on targets annually. We collected publicly-available data from the subnational actor platforms above and worked directly with CDP to include their 2017 Climate Investor and Supply Chain Disclosure Surveys results as the primary source of company-level data.

While not comprehensive of all actors and climate actions globally, the following landscape analysis provides a picture of what percentage of

3
"Cities" throughout this report generally refer to administrative units that pledge commitments to a climate action platform, which include municipalities, towns, urban communities, districts, and counties defined by the actors themselves.

4
"States and Regions," including provinces, are larger administrative units that are generally broader in geographic scope and population than cities. They usually have separate governing bodies from national and city governments but encompass lower administrative levels of government; often, they are the first administrative level below the national government. Regions can also include councils of subnational governments acting together.

Figure 2
Summary of Cities, States/Regions, and Companies with recorded climate actions in this study. (Data Source: Various)

the global population and revenue these actors cover. Due to the limitations of data availability and reporting, there are certainly subnational and non-state actors taking climate actions that are not captured in the above 13 platforms. Studies have thoroughly documented gaps in subnational and non-state actor platforms, particularly in actors from the Global South (Chan and Hale, 2015; Hsu et al., 2016; Widerberg and Stripple, 2016; UNFCCC, 2017). The data evaluated for this study does provide, however, a starting point for understanding non-state and subnational actors' participation and contribution to global climate change efforts.

2.1 SUMMARY OF CITIES, STATES, REGIONS AND COMPANIES

A total of 8,419 subnational actors, made up of 8,237 cities and municipalities from 128 countries, and 182 states and regions from 37 countries, are participants in the networks (excluding the Climate Initiatives Platform) listed above. These subnational actors represent 16% (cities) and almost 15% (regions) of the global population. There are also 2,175 companies, headquartered in 54 countries that have pledged at least 1 climate commitment to CDP (Figure 2). These companies represent $21 trillion USD in revenue, which is roughly equivalent to the U.S.'s entire GDP or half of the total revenue of Forbes 2000 companies.[5]

5
Forbes reports that the 2000 largest companies' combined revenue equals $39.1 trillion USD. (https://www.forbes.com/global2000/#25e0fe21335d)

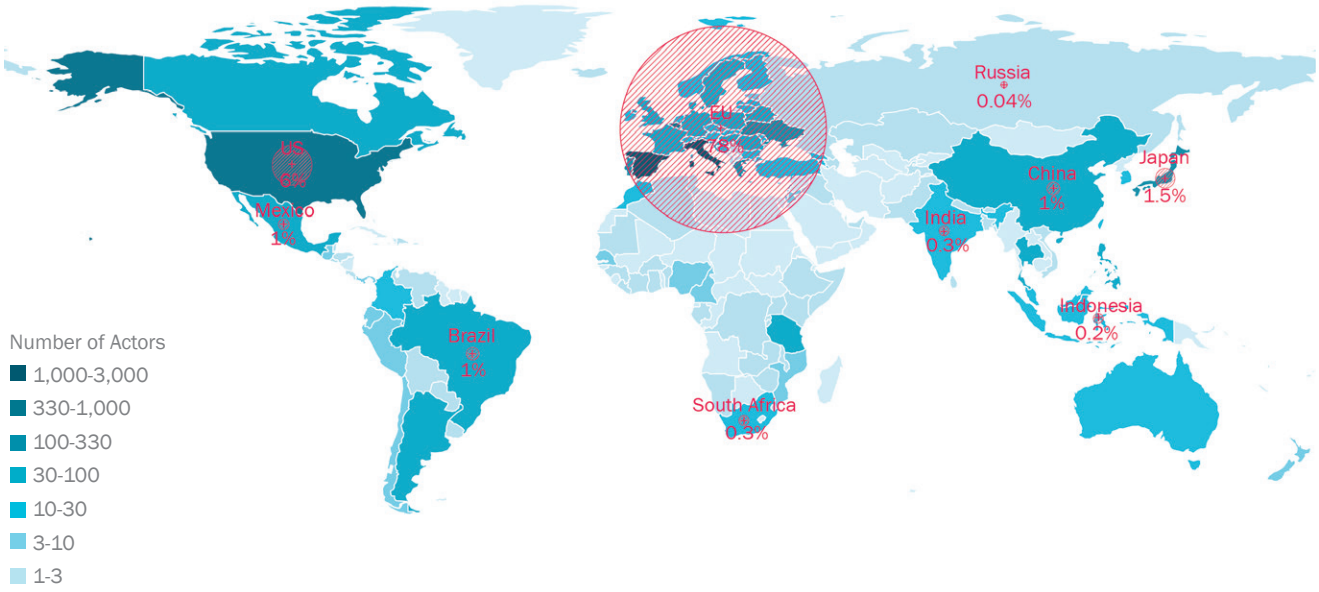

Figure 3
Global map of the number of city actors pledging climate commitments. Key regions are emphasized with percentages actors represent compared to the total. (Data Source: Various)

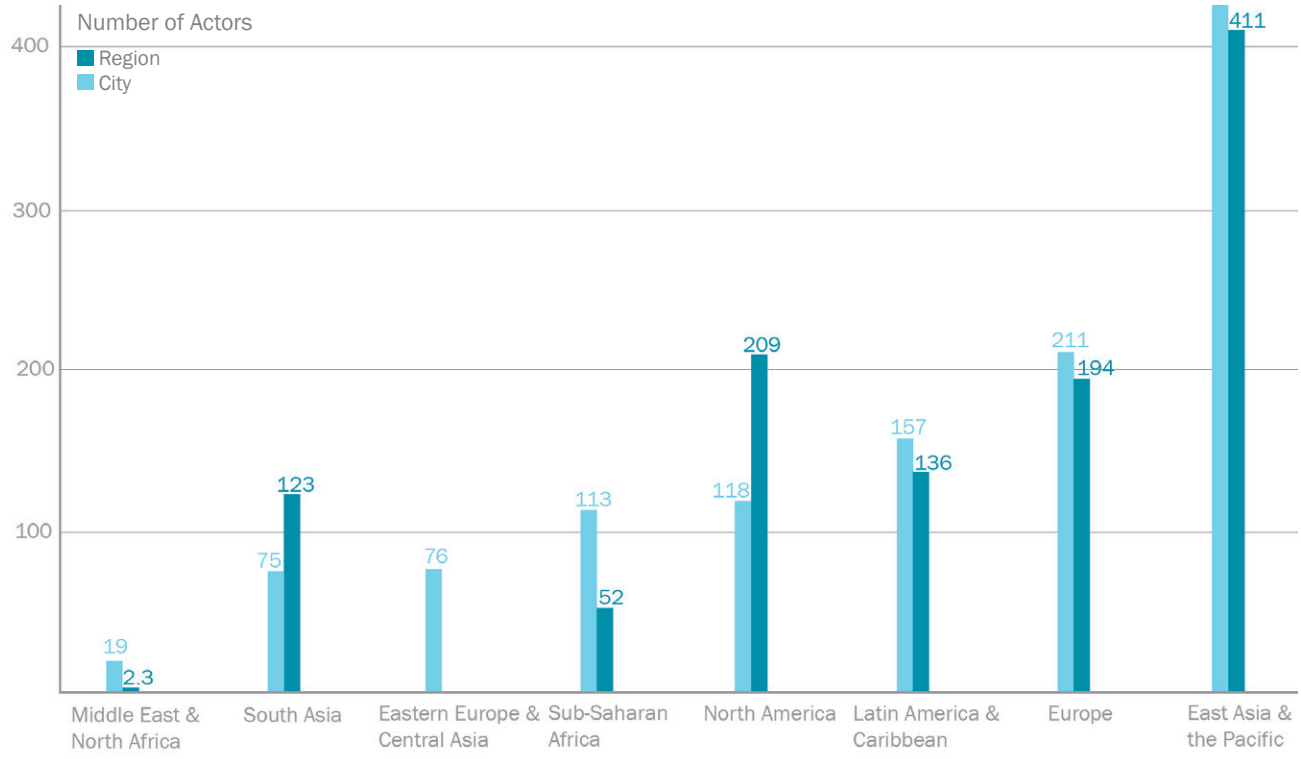

Figure 4
Total population of global subnational actors that participate in climate action networks.[6] (Data Source: Various)

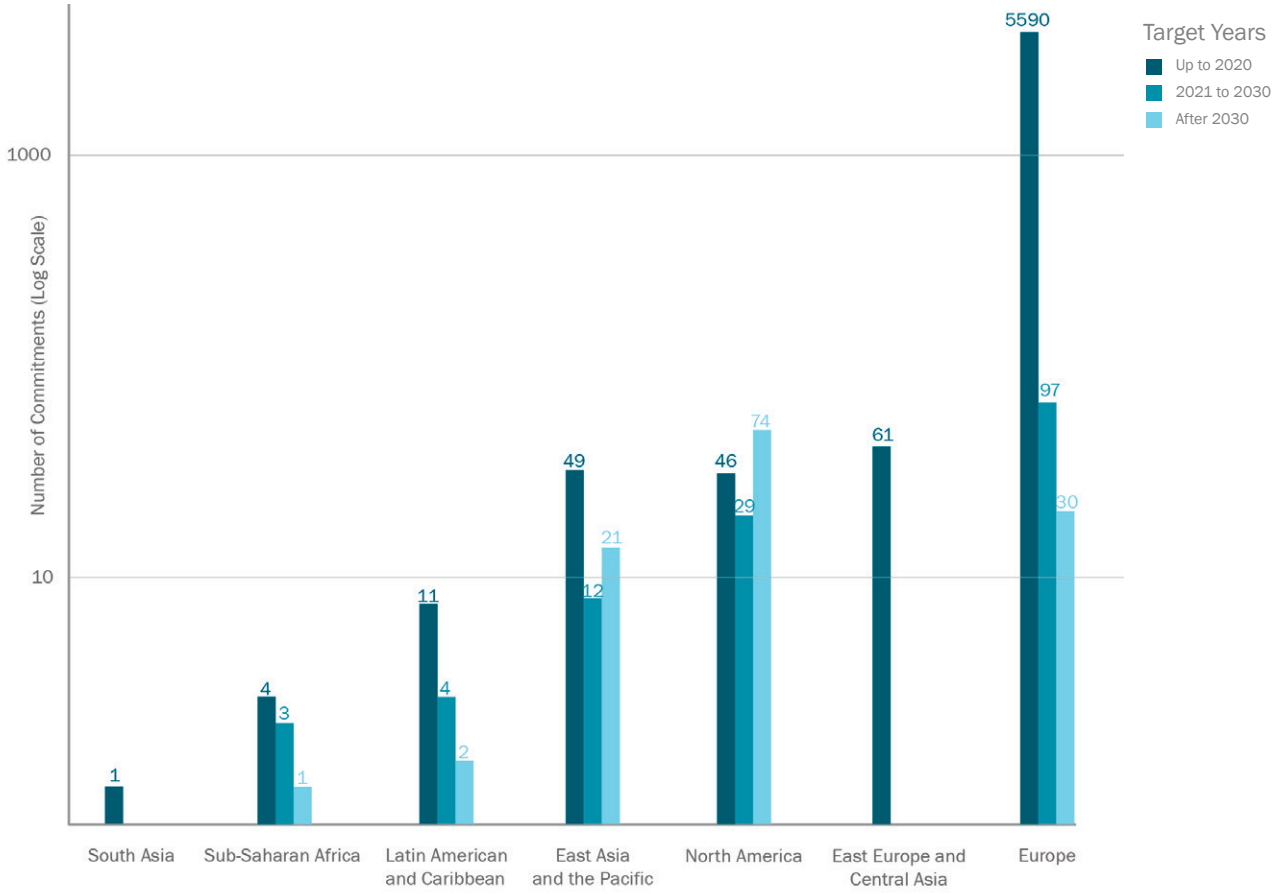

Figure 5
Ranges of short, mid, and long-term targets for cities' quantified emissions reductions targets.

2.2 CITIES, STATES AND REGIONS

Actors

Cities, states and regions are taking climate action in nearly every country in the world. Through the climate action networks aggregating individual commitments to climate change, 128 countries are represented, with Europe and North America featuring the largest number of cities and regions making commitments (Figure 3). Cities and regions pledging climate action in East Asia and the Pacific represent the largest population, given 16 subnational actors in this region are considered megacities (e.g., cities with a population greater than 10 million inhabitants) (Figure 4).

Commitments

We evaluate nearly 6,000 quantifiable emission reduction commitments from subnational actors in the 10 focus regions in our study that have committed to quantifiable emissions reductions commitments with target years, with the vast majority (96%) focused on pre-2020 action. The EU

6
C40 Cities, Global Covenant of Mayors, Climate Alliance, Climate Mayors, Under2 Coalition, We Are Still In, Compact of States and Regions, EU Covenant of Mayors, Carbonn, CDP Cities.

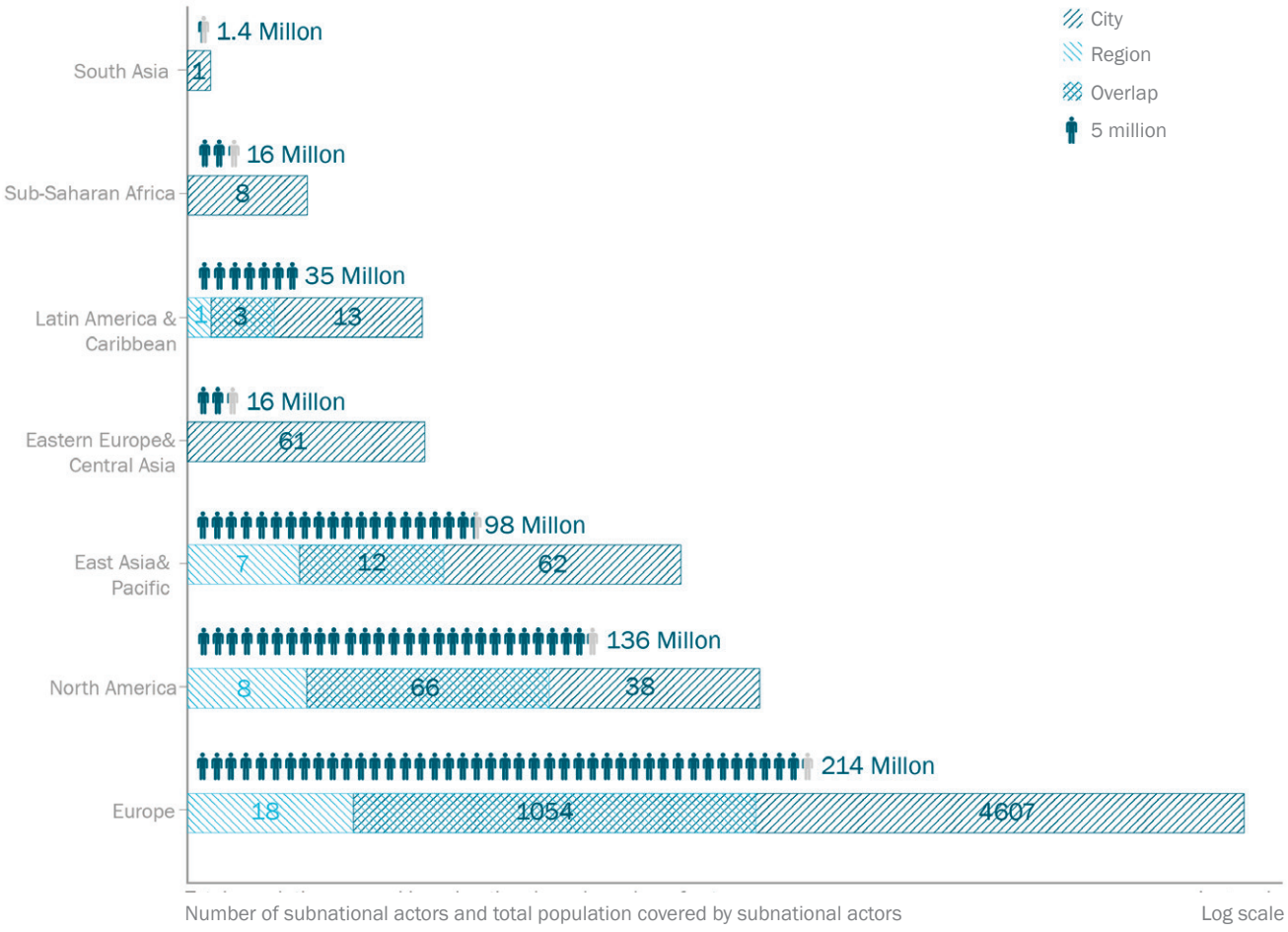

Figure 6
Overlaps between city and region actors by geography. The number of city actors that are located within regions with quantifiable emissions reduction targets evaluated in this study are shaded in the medium blue and designated as "Overlap between City and Region." (Data Source: Various).

Covenant of Mayors, with nearly all of its more than 6,000 members committing to a 2020 emissions reduction target, largely drives this trend in subnational commitments. Very few commitments (less than 5%) focus on mid- (2020 to 2030) and long-term (2050) target years (Figure 5). 124 cities have recorded renewable energy targets through CDP, with 35 of these cities aiming for 100% renewable energy. Half of these renewable energy targets have 2020 or earlier target years.

Overlap between subnational governments

Many cities that commit to quantifiable emission reduction targets are located within regions that also pledge climate action. The greatest number of city-region overlap occur in places that host a high overall volume of subnational commitments, particularly in Europe and North America (Figure 6). As we describe in the following sections, we only quantify city commitments if they are more ambitious than the region within which they are geographically located.

2.3 COMPANIES

Actors

The combined revenue of 2,175 businesses with at least one tracked commitment totals over 21 trillion USD, slightly larger than the economy of the United States in 2017. The revenue of the 100 largest participating companies by revenue accounted for nearly half (47%) of this combined revenue, and 207 companies, with a combined revenue of over 6.1 trillion USD, appear on the 2017 Global Forbes 2000[7] or Fortune Global 500[8] lists. The representation of companies taking climate action is greatest in the United States and is also high in Brazil, China, and in Germany and the United Kingdom (Figure 7).

High-emitting companies from the EU are making more than one-third of the total climate commitments analysed in this study, covering nearly 600 $MtCO_2e$/year in base-year Scope 1 emissions (i.e., direct emissions resulting from directly owned or controlled sources). Figure 8 and Figure 9 show the combined revenue and emissions coverage of companies with climate commitments tracked by CDP. Participating companies in the US and EU each represent approximately 7 trillion USD, an amount greater than the combined GDPs of Germany, India, and Sweden (World Bank, 2017).

Commitments

Overall, around 21,500 emission reduction commitments made by companies are reported to CDP in the key regions of focus for this study. 81% of these emission reduction commitments include a quantifiable emissions reduction target, with 546 commitments that specifically mention a goal or aspiration of carbon neutrality, with nearly half of these goals part of short-term commitments. About 40% of company commitments are aimed at reducing a combination of Scope 1 and 2 emissions, fewer address emissions in only Scopes 1, 2 or 3 (7, 8, and 10%, respectively), while others address emissions across all 3 Scopes or do not specify Scope in the commitment (13 and 26%, respectively).[9]

In terms of emissions reduction commitments, most companies (over 1,000) reporting to CDP have made commitments to reduce some combination of Scope 1 and 2 emissions - total of 8,000 commitments (Figure 11).

Over 400 companies have collectively made more than 1,750 commitments to reduce Scope 2 emissions, and just over 300 companies have collectively made more than 1,500 commitments to reduce Scope 1 emissions. Companies are also increasingly making commitments that include Scope 3 emissions, indirect emissions not included in Scope 2 but are in an actor's value chain upstream or downstream. Over 275 and 225

7
The Global Forbes 2000 list identifies the world's largest public companies, according to four metrics: sales, profits, assets, and market value.

8
The Fortune Global 500 list identifies the world's largest companies, according to revenue.

9
Scope 1 emissions refer to direct emissions resulting from sources owned or controlled; Scope 2 emissions refer to indirect emissions resulting from purchased electricity, heat or steam; Scope 3 emissions are other indirect emissions not included in Scope 2 that are in the value chain of a reporting actor, including both upstream and downstream sources. See www.ghgprotocol.org for further details.

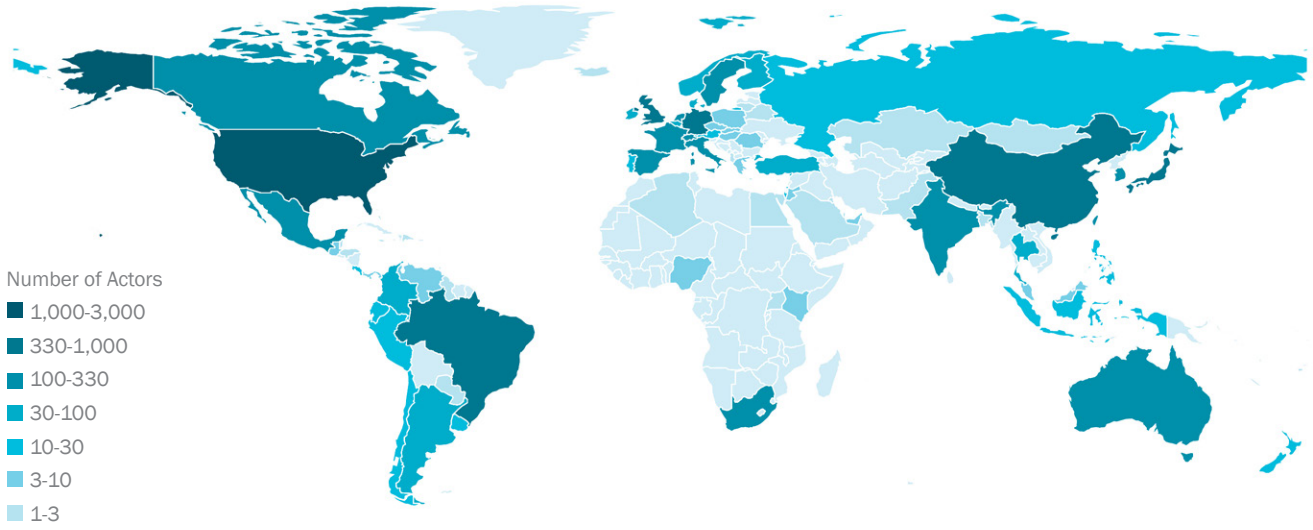

Figure 7
Map of number of companies reporting climate action to CDP in 2017 by country headquarters. (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys).

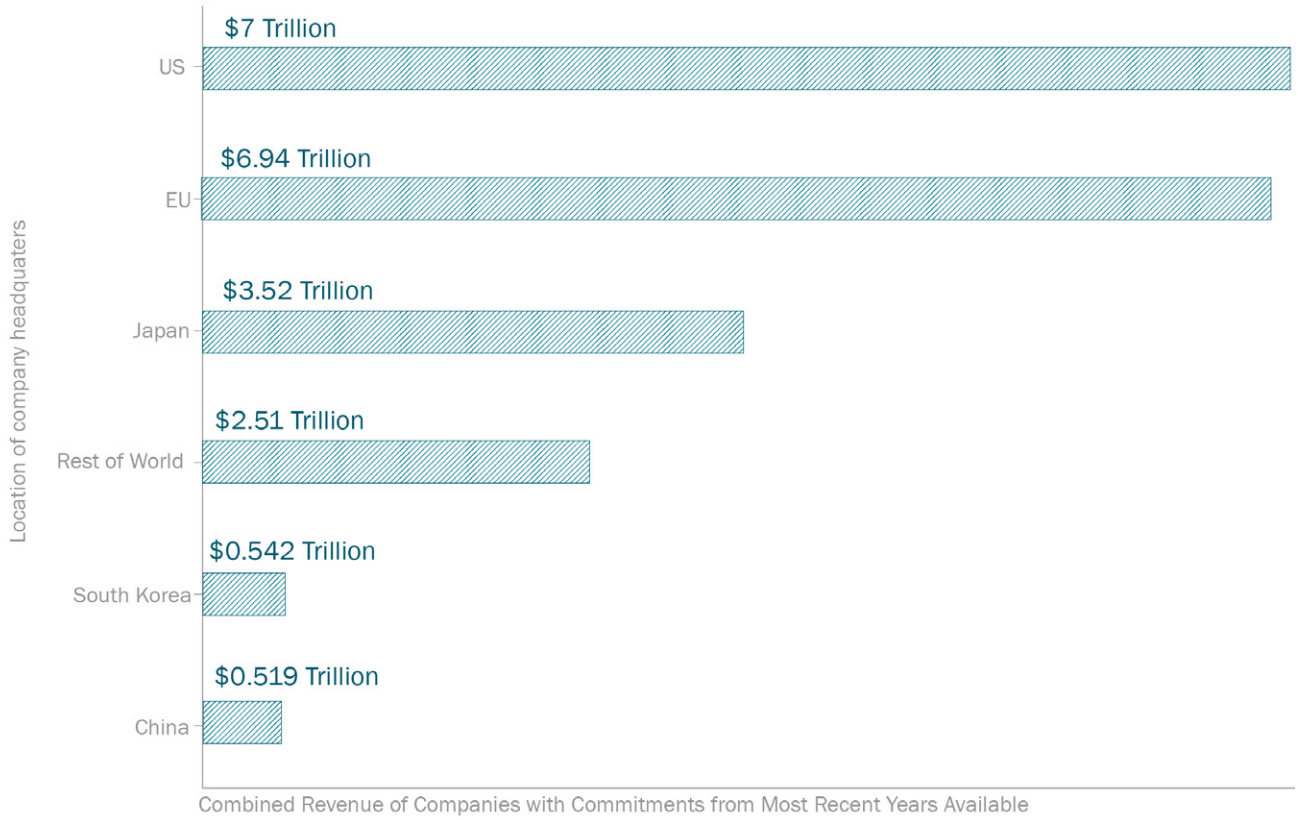

Figure 8
Combined revenue (in trillion USD) of companies with climate commitments as tracked by CDP. (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys; Revenue data from Bloomberg).

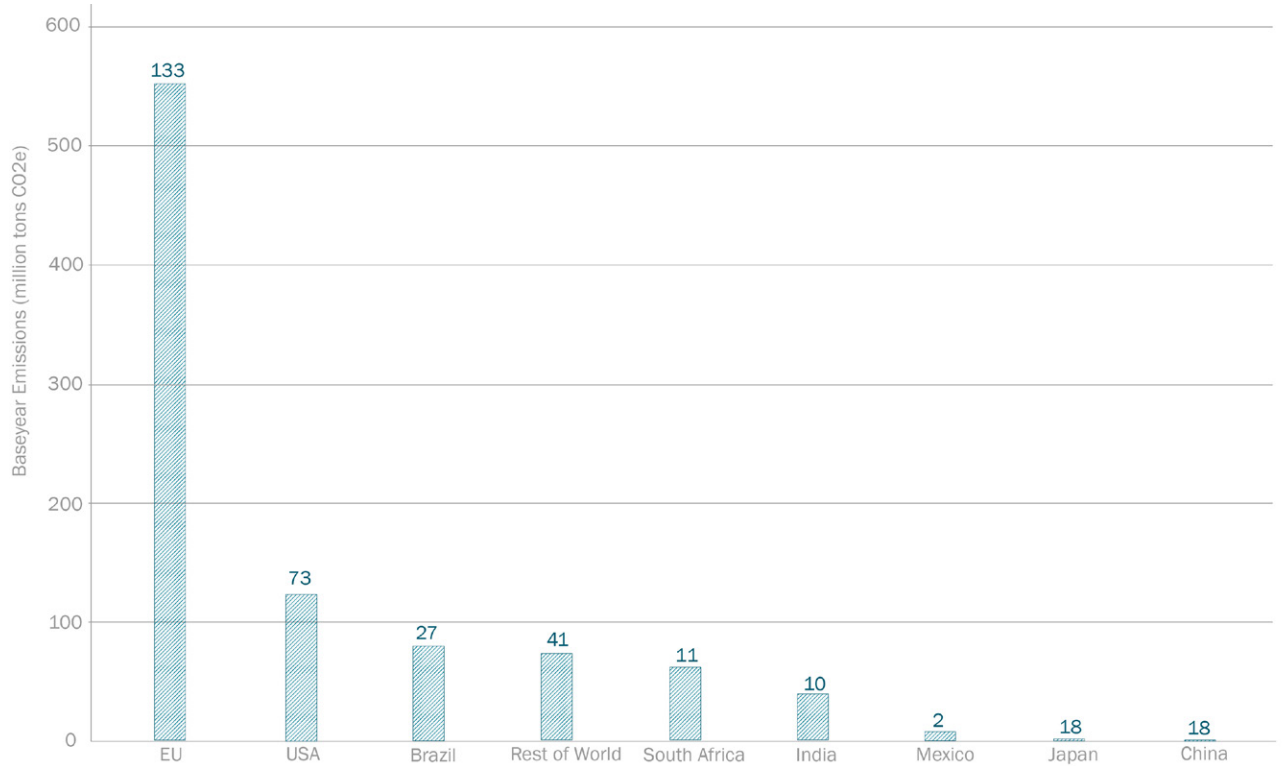

Figure 9
Combined revenue (in trillion USD) of companies with climate commitments as tracked by CDP. (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys; Revenue data from Bloomberg).

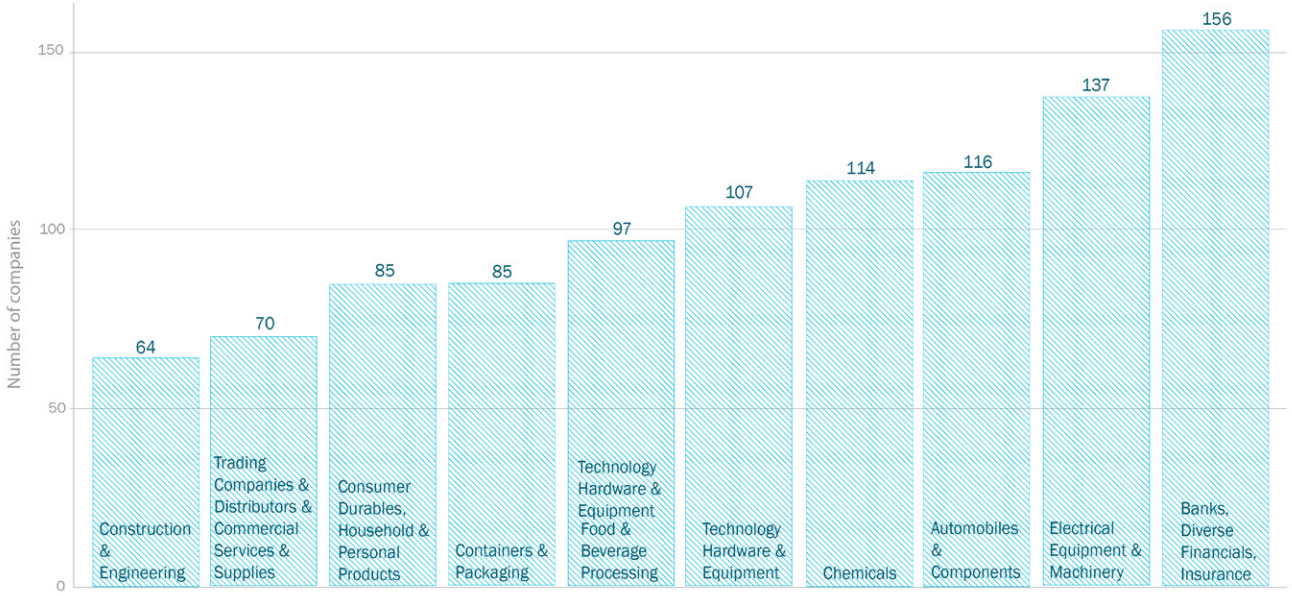

Figure 10
The distribution of companies taking climate action commitments by sector according to GRI classification (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys).

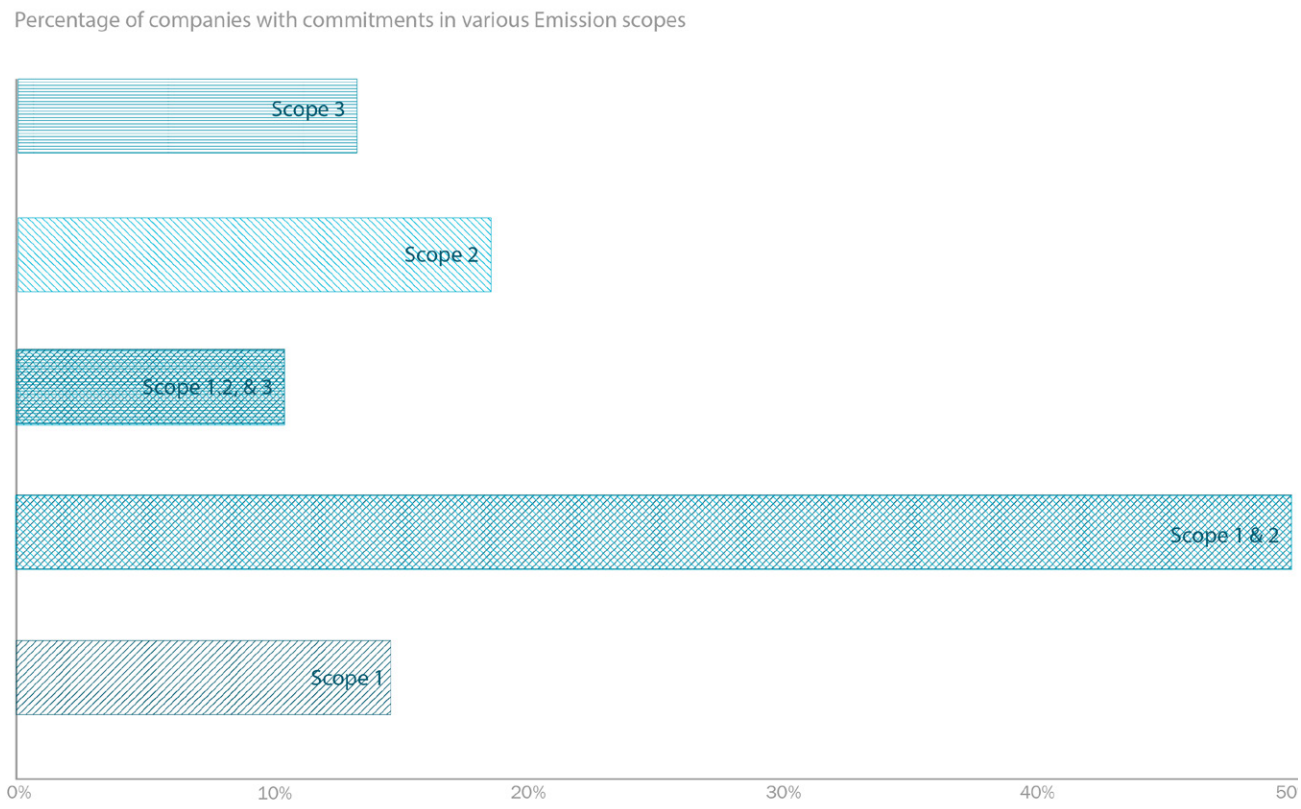

Figure 11
Companies' greenhouse gas reduction commitments according to Scope 1 (direct emissions); Scope 2 (indirect emissions from purchased electricity, heat or steam); and Scope 3 (other emissions), or across multiple scopes.[10] (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys).

companies, respectively, have collectively made commitments to reduce Scope 3 and Scope 1,2, and 3 emissions. More than 200 of the world's largest companies (according to the 2017 Forbes 2000 and Global 500 lists) have made 3,755 unique emission reduction commitments to reduce absolute emissions and the intensity of business activity (Figure 11).

Four-fifths (17,955) of companies' commitments have quantified timeframes (e.g., base and target years). Of these commitments, 58% are short-term (pre-2020) targets, 19% are medium-term targets, and 12% are post-2030 targets (Figure 12).

In addition to emissions reduction commitments, 3,115 actions specifically address renewable energy purchasing and generation. Additionally, 4,356 commitments mention or discuss renewable energy as part of a broader commitment. 80 companies include a reference to offsets from renewable energy or renewable energy certificates (RECs). More than 1,901 company commitments specifically mention energy efficiency.

2.4 INTERNATIONAL COOPERATIVE INITIATIVES

In addition to acting individually, many cities, states and regions, and companies join forces with each other and with national governments and civil society partners, forming international cooperative initiatives (or ICIs). These initiatives focus on creating systemic change, often seeking to

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As companies can have commitments that cover different scopes, percentages displayed may total over 100%.

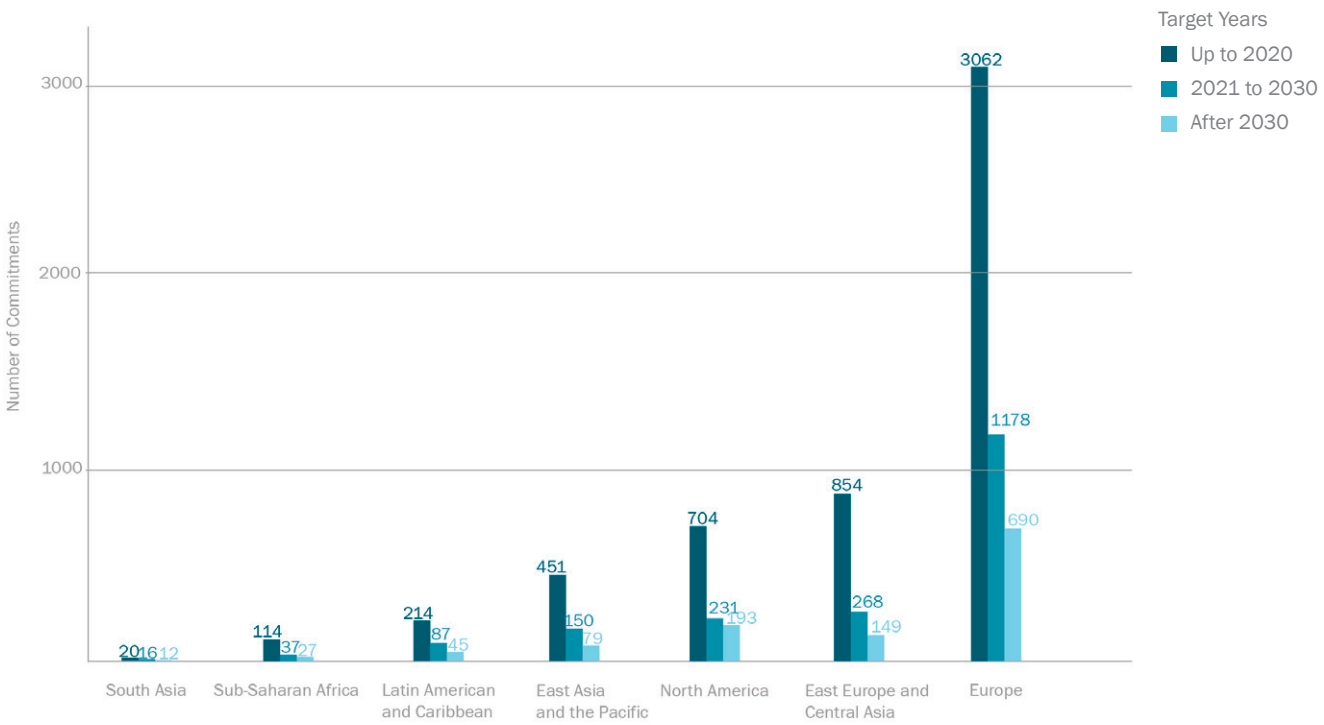


Figure 12
Companies' greenhouse gas emissions reduction targets by short-, mid-, and long-term timeframes, according to the region of operation. Companies in Europe have committed to the largest number of near-term (up to 2020), mid-term (up to 2030), and long-term (after 2030) targets. (Data Source: CDP 2017 Climate Investor and SC Disclosure Surveys).

shift the practices of an entire sector, or helping to pilot, facilitate, or scale up the adoption of low-carbon technology and mitigation or adaptation strategies.

The Climate Initiatives Platform (CIP) is one of several repositories of ICIs, and while it does not capture the full scope of these initiatives, it gives a sense of their characteristics and evolution. The 2018 UNEP Emissions Gap Report explores trends across more than 220 ICIs recorded in CIP as of August 2018. Most ICIs report a global focus, putting their efforts into practice in a wide variety of locations around the world. Among ICIs that target specific regions for their activities, most operate in North America, Western and Eastern Europe, and Asia and the Pacific (Hsu et al., 2018), a geographic distribution similar to individual commitments from cities, regions and companies. ICI activity is becoming more common across most of the world's regions (Ibid), and while ICIs have often concentrated their activities in high- and middle-income, rather than low-income, countries (Pattberg et al., 2012), the number of ICIs operating in lower-income countries is rising (UNFCCC, 2017).

Many ICIs' efforts span several sectors, and transportation, energy efficiency, agriculture, renewable energy, and activities targeting cities and regions are most prevalent (Hsu et al., 2018). Past snapshots of CIP (UNEP, 2016) and other surveys of ICIs' areas of focus (Graichen et al., 2016; UNFCCC, 2017) have also found that these sectors are especially well-represented. The most common sectors addressed by ICIs correspond with the sectors identified as having high potential for additional mitigation

Geographical Region	Number of ICIs
Global	169
Western Europe	39
North America	34
Eastern Europe	31
Asia and the Pacific	28
Africa	25
Latin America and the Caribean	25
Not Assigned	7
Small Island Developing States (SIDS)	1
West Africa	1
Note: one initiative may cover several regions (categories are not mutually exclusive)	

Table 1
Geographic distribution of ICIs. Many initiatives operate in more than one region. (Data Source: UNEP DTU Climate Initiatives Platform, accessed 24 August, 2018; UNEP, 2018).

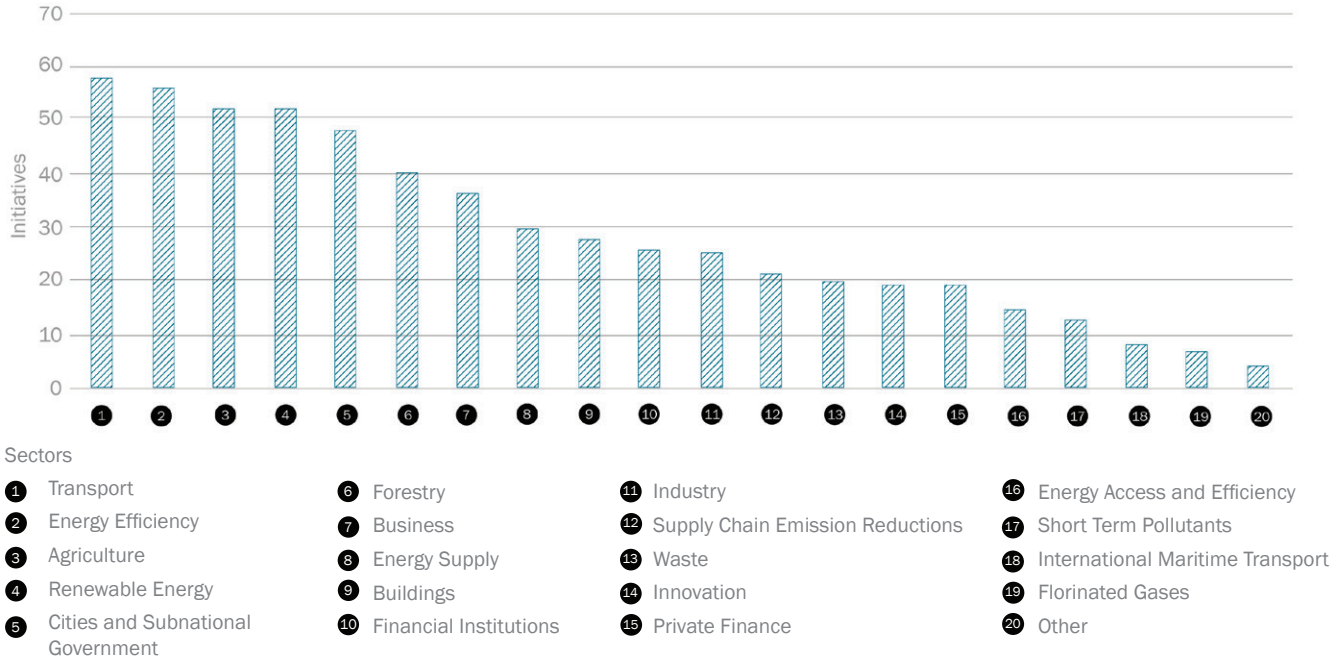


Figure 14
Distribution of ICIs across different sectors. Many initiatives operate in more than one sector. (Data Source: UNEP DTU Climate Initiatives Platform, accessed 24 August 2018; UNEP, 2018).

potential, beyond current national policies, in 2030: the energy, industry, forestry, transport, agriculture and building sectors (UNEP, 2017). While Section 4.2 explores the potential emissions reductions from the initiatives operating in each of these sectors.

3

GLOBAL IMPACT OF SUBNATIONAL AND NON-STATE CLIMATE ACTIONS

Throughout the analysis, non-state and subnational actions' impact was assessed for each actor group (e.g. companies, cities) individually, and to what extend this impact is additional to national government policies.[11] To accomplish this comparison, we consider several different scenarios or representations of what future emissions might look like, starting from scenario definitions that are commonly used (e.g. in the UNEP Emissions Gap Report):

- The **"Current national policies" scenario** considers the likely path of emissions under currently implemented national policies. To cover the uncertainty of future projections, two current national policy scenario projections are taken into account, based on (Kuramochi et al, 2017).
- The **"Current national policies plus individual actors' commitments" scenario** was constructed for this report and accounts for the impact of both currently implemented national and federal policies as well as recorded and quantifiable commitments by individual sub-national (cities and regions) and non-state actors (companies), taking into account overlap between actors. We assume additional reductions take place for each actor group (e.g., regions, cities, companies), if their aggregated reductions relative to 2015 are higher than reductions implied by (evenly distributed) implementation of national policies. As we are not able to quantify the coordination effects between national governments and other actors, we assume additional reductions take place for each actor group (regions, cities, companies), if their aggregated reductions relative to 2015 are higher than reductions implied by national policy implementation. Also, we assume that both national governments and other actors do not change the pace of their existing climate policies and actions in response to these subnational and non-state efforts.
- The **"Current national policies plus initiatives' goals" scenario** accounts for the impact of both currently implemented national and federal policies as well as the quantifiable commitments made by international cooperative initiatives (ICIs). This scenario assumes that the ICIs' commitments will be fully implemented and do not change the pace of action elsewhere. We did not further analyze specific actions or implementation barriers to meet these targets.

Comparing the last two scenarios gives an indication of the different impact of current recorded and quantified commitments and intended goals from cooperative initiatives. The goals set out by international cooperative initiatives are often aspirational, covering large geographical areas and sectors. Many (but not all) of the individual actors included in our analysis participate in these cooperative initiatives. In addition, some actors have signed up to participate in general, but have not specified an individual commitment, which partially explains the difference in impact between the individual actors' commitments and the initiatives' goals. Also, some aspirational goals cover both current members and prospective

11
For full description of the methodology please refer to the separate methodological notes on initiatives and on individual actors, at http://bit.ly/yale-nci-pbl-ind-pledge-methods, and http://bit.ly/yale-nci-pbl-ici-methods.

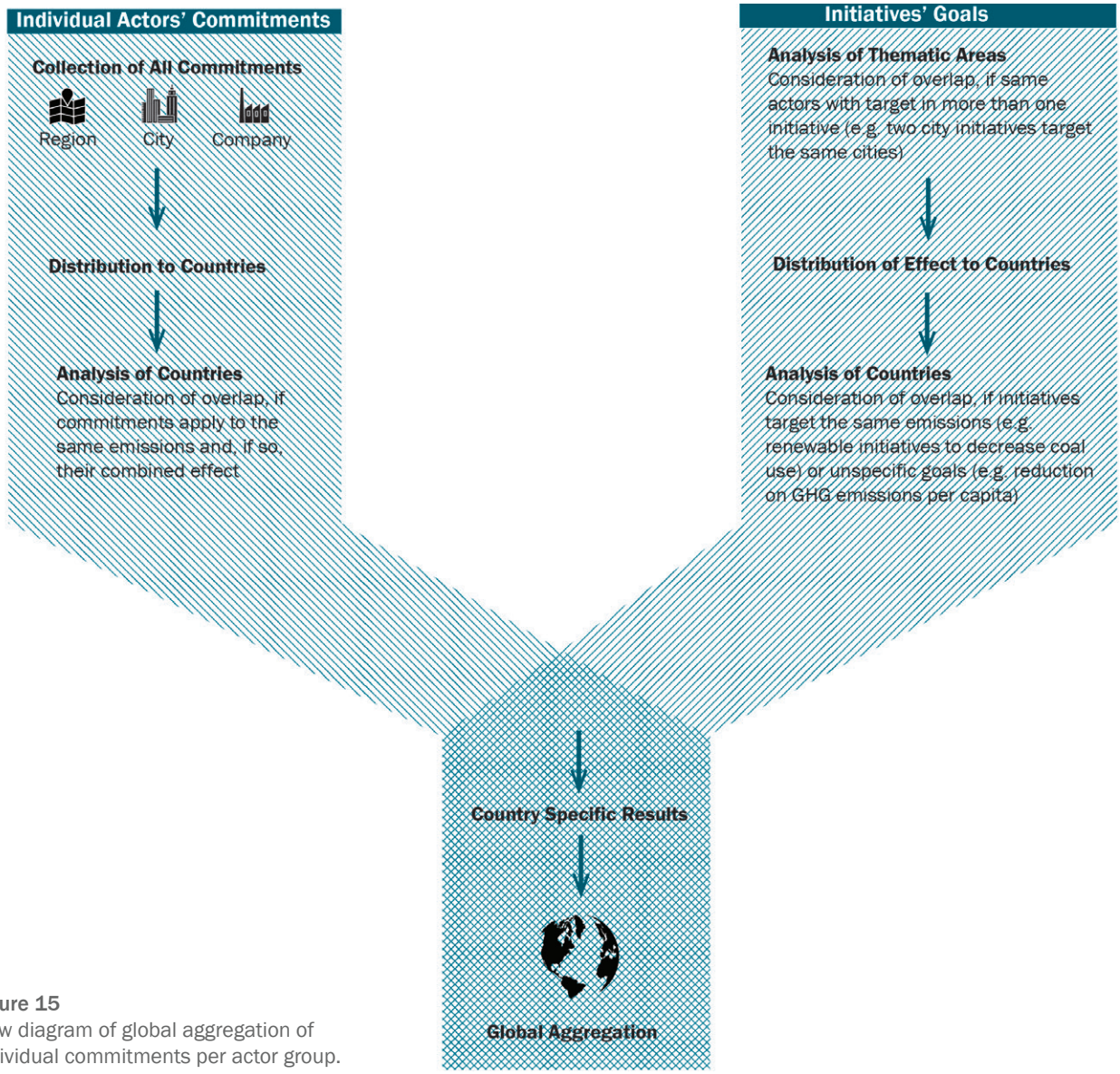


Figure 15
Flow diagram of global aggregation of individual commitments per actor group.

memberships. In addition, these initiatives often include national governments and are supported by large (non-profit) organizations.

We also investigated two additional scenarios: an **"NDCs plus individual actors' commitments"** scenario and an **"NDCs plus initiatives' goals"** scenario. Both scenarios include the impact of both currently implemented national policies and the proposals countries have made under the Paris Agreement, also taken from (Kuramochi et al, 2017). We then add the impact of recorded and quantified commitments from individual sub-national and non-state actors, assuming their full implementation.

Individual actors' commitments and initiatives' goals were analyzed separately (Figure 15). We first collected respective individual commitments within 10 focus regions and goals and then distributed them to countries. At the country level, we analyzed commitments' impact and overlaps before then aggregating all impacts to the global level.

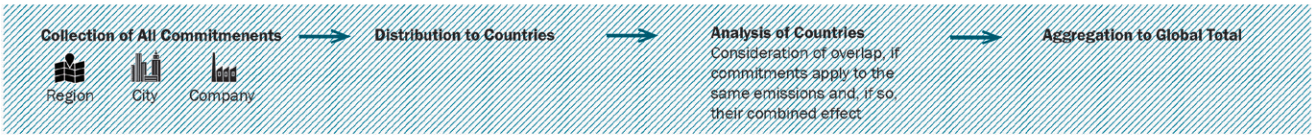


Figure 16
Steps of the analysis of individual actors' commitments

3.1 POTENTIAL EMISSIONS REDUCTIONS FROM INDIVIDUAL ACTORS' COMMITMENTS

Approach

The individual actors' commitments were first distributed to nine high emitting countries and the EU (e.g. where a company with a target operates in more than one country), analysed at the country level of impact and overlaps and then aggregated to the global total (Figure 16). The potential impact in all other countries outside of the 10 high-emitting regions was not determined due to very limited data availability.

The quantification of national level aggregate impact includes two steps (Figure 17):

- First, the share of current national emissions that is covered by regions, cities and companies with targets is determined. The share of current emissions that is not covered by regions,' cities' and companies' targets follows the right-hand trajectory of the "current policies scenario."
- Second, for the share of emissions covered by targets, the combined effect of all individual actors' targets is determined. Here the share of emissions only follows an actor's path if that actor's path is unambiguously more ambitious than the other individual actors'.

Non-state and subnational actors commit individual climate actions, as part of a global initiative or independently. Altogether these individual commitments covered 6.6 $GtCO_2e$/year after subtracting the overlaps, which is close to the emissions level of the United States in 2015. Our assessment included 76 regions accountable for at least 2.7 $GtCO_2e$/year in 2015, nearly 5,900 cities accountable for at least 2.5 $GtCO_2e$/year, and more than 2,175 companies accountable for 3.4 $GtCO_2e$/year.

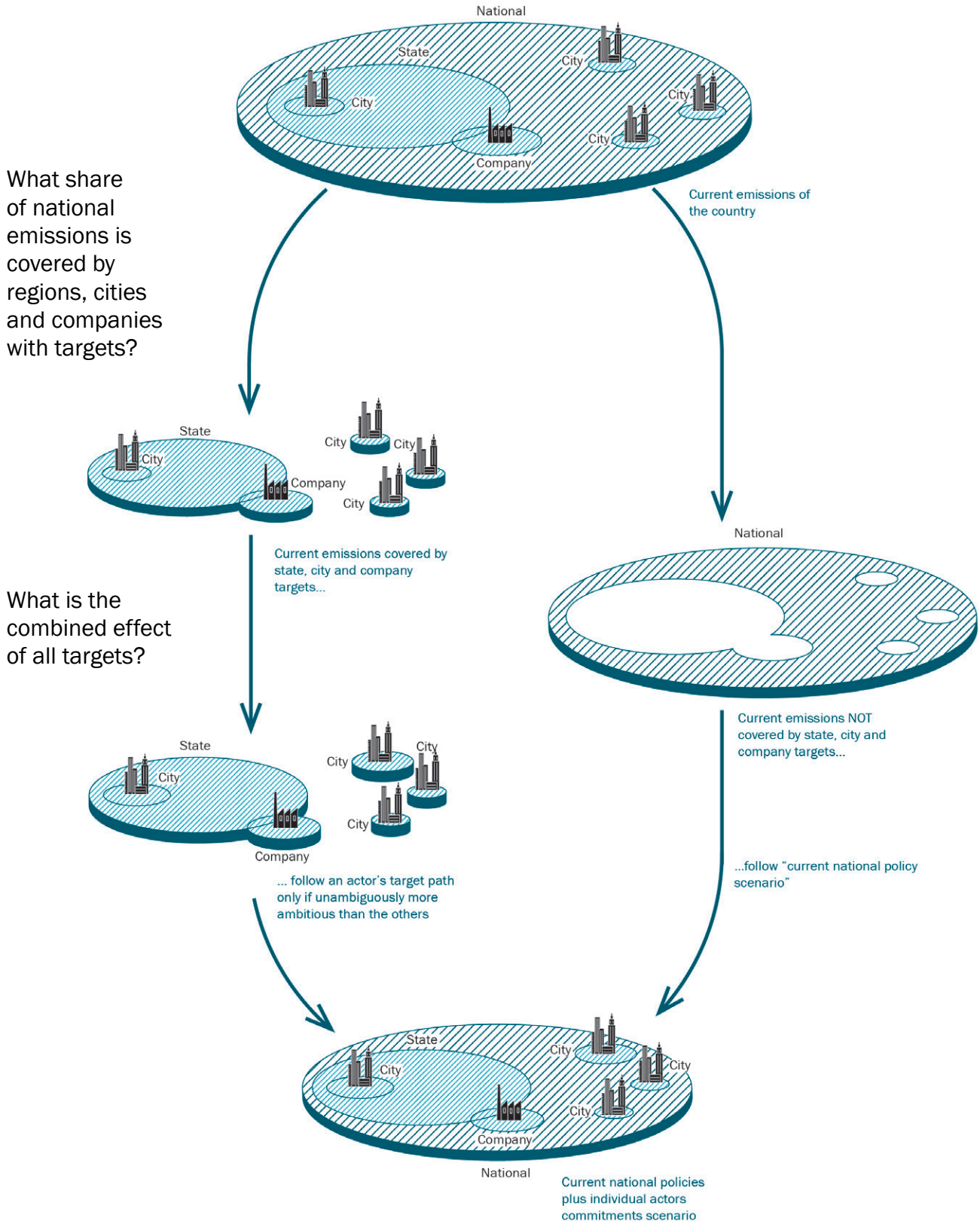


Figure 17
Steps taken to quantify the overall impact on GHG emissions of all targets in each year.

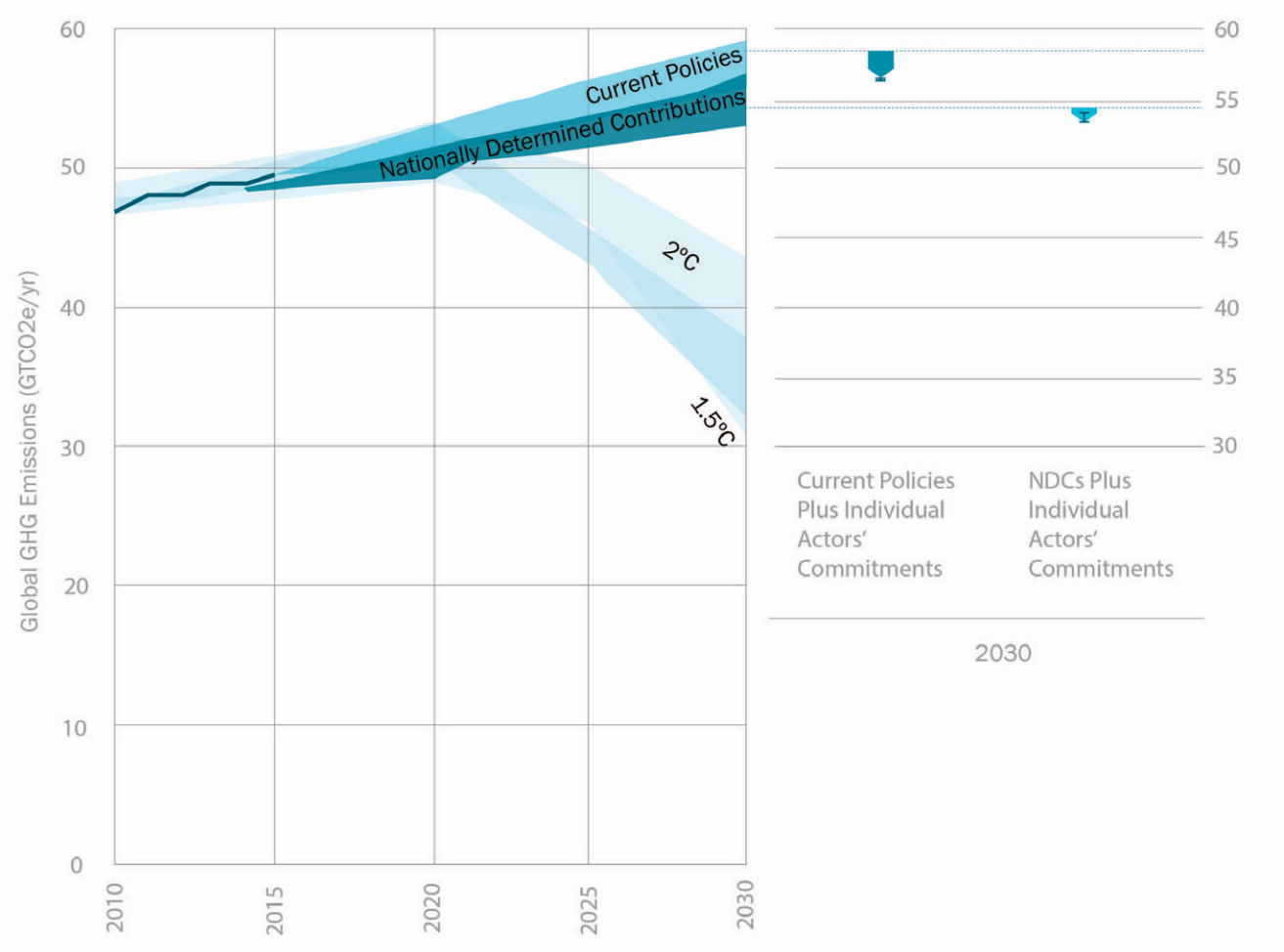


Figure 18
Impact of recorded and quantified individual region, city and business commitments' full implementation on global greenhouse gas emissions (Data source: current national policies and NDC scenario projections from Climate Action Tracker (2017) and PBL as reported to UNEP (2017), 2 °C and 1.5 °C pathways from (UNEP, 2017), impact of individual actors: this study)

Results and key insights

Individual commitments by regions states, cities and businesses have the potential to reduce global greenhouse gas emissions significantly beyond what is expected from current national policies alone (Figure 18 and Figure 19). Global emissions in 2030 would be 1.5 to 2.2 $GtCO_2e$/year lower than the current national policies scenario, if recorded and quantified commitments are fully implemented and if such efforts do not change the pace of action elsewhere. These reductions could be higher, as some actor commitments could not be quantified, or others were not recorded and therefore not considered in this analysis. They could also be lower, however, if recorded non-state and subnational actions change the pace of national government action or other actors without commitments or if regions, cities or companies do not fulfill their commitments.

Assuming that the promises of countries under the Paris Agreement – their Nationally Determined Contributions (NDCs) – are also implemented ("NDCs plus individual actors' commitments" scenario), global greenhouse gas emissions could be even lower. The full implementation of non-state and subnational actor commitments would reduce emissions to between 0.2

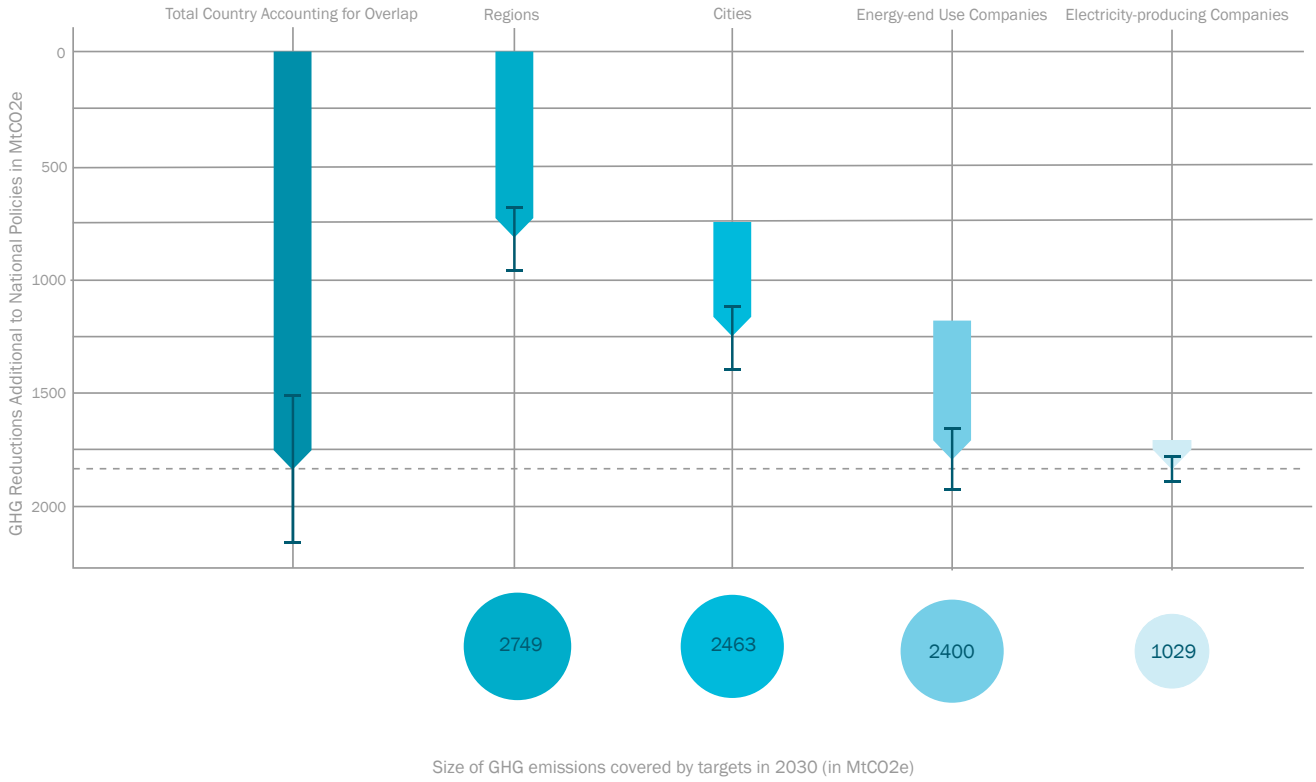


Figure 19
Fully implemented, recorded and quantified region, city and business commitments' impact on global greenhouse gas emissions by actor group (Source: this study).

to 0.7 $GtCO_2e$/year lower in 2030 than they would be with NDCs alone (Figure 18).

The implementation of individual actors' commitments would support achieving the national climate targets put forward as part of the Paris Agreement (NDCs). Individual actors' commitments could decrease the gap between current national policies and full implementation of NDCs by one third (see Figure 18).

Additional reductions relative to the current national policies scenario of each actor group (i.e., regions, cities, energy end-use companies, and electricity companies) are illustrated separately in Figure 19. This figure demonstrates the scope of 2030 total emissions covered by actor targets in each group (bottom), relative to the emissions reductions contributed through quantified and recorded commitments in our study's 10 focus regions (top). Actors that participate in climate action networks like the Global Covenant of Mayors, but do not report their emissions reduction targets, are not reflected in this quantification, but are considered in the initiatives' impacts (see next section).

3.2 POTENTIAL EMISSION REDUCTIONS FROM INTERNATIONAL COOPERATIVE INITIATIVES

Numerous countries, regional and local governments, businesses, and civil society partners work together, often across national boundaries, to address climate change through international cooperative initiatives (ICIs). We focus here on calculating the potential emissions reduction of a carefully selected subset of ICIs that lead to reducing global greenhouse gas emissions.

Approach

To determine the emissions reductions from ICIs, we first narrowed an initial list of over 300 initiatives (Climate Initiatives Platform, supplemented by own research) down to 21 cooperative initiatives, choosing those with a quantifiable goal, a potentially significant impact on emissions, and a high likelihood of implementation (Table 2).[12]

Table 2
Initiatives selected for quantitative and qualitative analysis with the estimated reductions in 2030 if goals are fully implemented and not yet accounting for overlaps.

Name of cooperative initiative	Region	Goal	Emissions reduction potential in 2030
Forestry			
The New York Declaration on Forests (NYDF)	global	2 main quantifiable targets: (1) building on the Bonn Challenge, restore an additional 200 million hectares of forest by 2030, and (2) end forest loss by 2030	(1) 1.6-3.4 GtCO2e/year (2) 2.2-4.1 GtCO2e/year
Bonn Challenge	global	Restore 150 million hectares of deforested and degraded lands by 2020	Covered above
Governors' Climate and Forests Task Force (GCFTF)	global	Reduce deforestation by 80% by 2020	Covered above
Regions & Cities			
C40 Cities Climate Leadership Group (C40)	global	Member cities have a variety of targets	0.8 GtCO2e/year [13]
Global Covenant of Mayors	global	Member cities have a variety of targets (+7000 commitments)	1.3 $GtCO_2e$/year
Under2MOU	global	A commitment by (local) governments to limit their GHG emissions by 80 to 95% below 1990 levels, or to 2 annual metric tons of carbon dioxide-equivalent per capita, by 2050. Initiative aims to have 250 members by 2020.	4.9-5.2 $GtCO_2e$/year

Buildings			
Architecture 2030	global	All new buildings and major renovations shall be designed to meet an energy consumption performance standard of 70% below the regional (or country) average/median for that building type. The fossil fuel reduction standard for all new buildings and major renovations shall be increased to: • 80% in 2020 • 90% in 2025 • Carbon-neutral in 2030	1.9-2.2 $GtCO_2e$/year
Energy efficiency			
Super-efficient Equipment and Appliance Deployment (SEAD) Initiative	global	Members to adopt current policy best practices for product energy efficiency standards	0.4-0.8 $GtCO_2e$/year
United for Efficiency (U4E)	global (focus on developing countries)	Members to adopt policies for energy-efficient appliances and equipment	1.3 $GtCO_2e$/year
Transport			
Global Fuel Economy Initiative (GFEI)	global	Half the fuel consumption of the LDV fleet in 2050 compared to 2005	0.3-0.6 $GtCO_2e$/year
Air Transport	global	Two key objectives : 1) 2% annual fuel efficiency improvement through 2050 2) Stabilize net carbon emissions from 2020	0.6 $GtCO_2e$/year
Industry and business			
RE100 initiative	global	2,000 companies commit to source 100% of their electricity from renewable sources by 2030	1.1-2.3 $GtCO_2e$/year
Science based targets (SBT) initiative	global	By 2030, 2,000 companies have adopted a science-based target in line with a 2-degree temperature goal.	2 $GtCO_2e$/year

Non-CO2			
CCAC Initiative (HFCs and methane)	global	Members to implement policies that will deliver substantial short-lived climate pollutant (SLCP) reductions in the near- to medium-term (i.e. by 2030)	3.8 $GtCO_2e$/year
Zero Routine Flaring	global	Eliminate routine flaring no later than 2030	0.4 $GtCO_2e$/year
Renewable Energy			
European Wind Initiative (EWI)	EU[14]	Wind energy to account for a 20% share of total EU electricity consumption by 2020 (33% by 2030).	0.2-0.6 $GtCO_2e$/year
Solar Europe Industry Initiative (SEII)	EU	3 strategic objectives: 1. Bring PV to cost competitiveness in all market segments (residential, commercial, and industrial) by 2020 (cost reduction); 2. Establish the conditions allowing high penetration of distributed PV electricity within the European electricity system (integration); 3. Facilitate the implementation of large scale demonstration and deployment projects with a high added value for the European PV sector and society as a whole.	0.2 - 0.6 $GtCO_2e$/year
SunShot Initiative (SSI)	North America	Drive down the cost of solar electricity to $0.06 per kilowatt-hour or $1 per watt (not including incentives)	0.2-0.6 $GtCO_2e$/year
Wind Program	North America	Generate 20% of the US electricity demand via wind energy by 2030	0.2-0.5 $GtCO_2e$/year
Africa Renewable Energy Initiative (AREI)	Africa	Produce 300 GW of electricity for Africa by 2030 from clean, affordable and appropriate forms of energy.	0.4-0.8 $GtCO_2e$/year
Global Geothermal Alliance (GGA)	global	Achieve a five-fold growth in the installed capacity for geothermal power generation and more than two-fold growth in geothermal heating by 2030	0.1-0.3 $GtCO_2e$/year

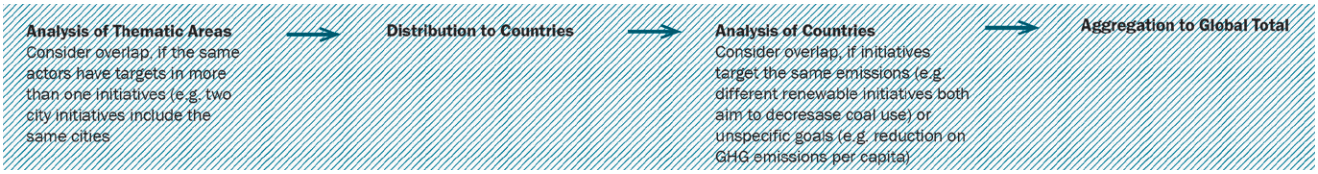


Figure 20
Steps of the analysis of international cooperative initiatives

Activities by the various actors often target the same source of emissions because they are located in the same geographical area or operate in the same sector. This analysis takes these overlaps into account for the aggregation of the impact of initiatives' GHG emissions. To accomplish this task, we analyzed the cooperative initiatives' potential impact on greenhouse gas emissions in thematic areas (e.g. sectors), such as forestry, buildings, and transport, and identified those initiatives that target the same emissions (Figure 20). This process identifies and removes overlaps from actors with targets in more than one initiative; for instance, if a city or region made commitments in several initiatives, only the most ambitious was used in the calculations.

Since our analysis also includes the impact of non-state and subnational actors for 10 large emitting regions, we distributed the emission reduction impacts of these selected cooperative initiatives to these countries and the EU. We identified overlaps for initiatives targeting the same emissions; for instance, different initiatives that focus on promoting wind and solar energy would both replace emissions from fossil fuel electricity generation. We also identified initiatives – such as city or regional initiatives – for which overall emission targets were not made explicit per sector. In these cases, we applied the simple assumptions of either no additional effect or 50% additional effect to derive an uncertainty range.

We calculated both a minimum and maximum emission reduction to account for uncertainties. For example, the potential impact from renewable energy related initiatives will depend on whether renewable energy replaces coal-fired electricity (generating the maximum possible emission reduction) or gas-fired electricity (generating the lower possible emission reduction).

After accounting for overlap on the country level, we aggregated the emission reductions that could be collectively achieved by ICIs in these 10 high-emitting regions to the global level (Figure 20).

Results and key insights

International cooperative initiatives have the potential to reduce global greenhouse gas emissions significantly beyond what is currently expected from national policies alone (Figure 21). Global emissions in 2030 would be around a third (15-23 $GtCO_2e$/year) lower than they would be from a current national policies pathway, assuming all initiatives analyzed meet their goals and such efforts do not change the pace of action elsewhere. This result would bring global emissions in 2030 into a range consistent with the

12
For a full description of the methodology, please refer the separate technical note on cooperative initiatives goals.

13
From this emissions reduction impact, ~0.67 GtCO2e comes from impact outside of our 10 key countries of study (RoW). For this reason, potential global C40 impact is comparable to our individual commitments aggregation.

14
Four initiatives apply either only to the EU or only to the USA, so are not strictly international. We nevertheless included them as they are collaborative initiatives between national / regional governments and a wide range of other actors.

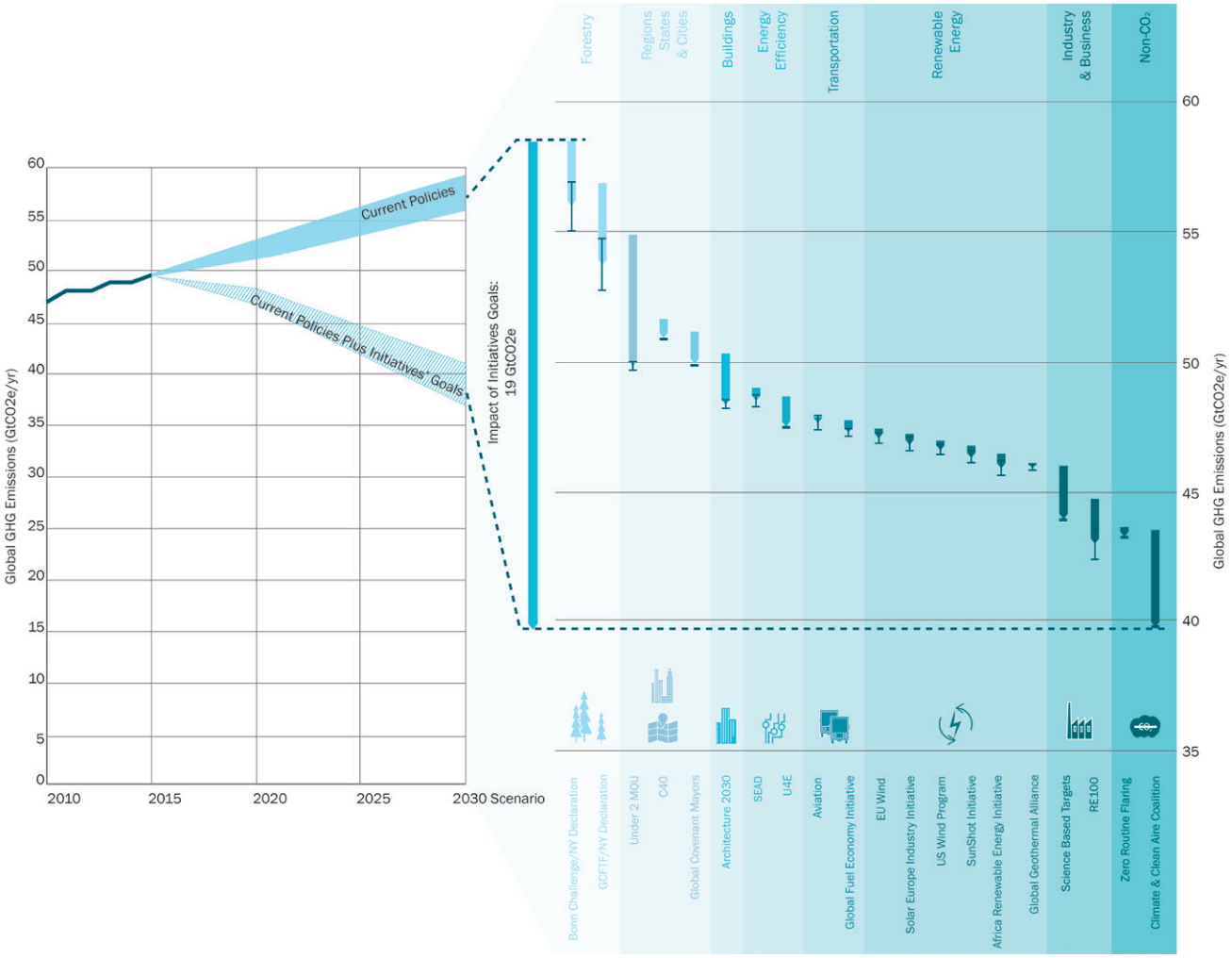


Figure 21
Potential impact of the full implementation of the goals of the 21 initiatives on global greenhouse gas emissions (sources: current policy from (Kuramochi et al., 2017), current policy plus initiatives' goal and initiatives impact: this study)

long-term goals of the Paris Agreement.

If countries also implement the Nationally Determined Contributions submitted under the Paris Agreement ("NDCs plus initiatives' goals" scenario), global greenhouse gas emissions could be within the range of what is needed to be consistent with a pathway towards limiting temperature rise below 1.5°C (Figure 22).

This high level of ambition demonstrated by cities, regions, companies, and other national, corporate, and civil society actors could accelerate or increase support of national governments to implement more ambitious national policies and Nationally Determined Contributions under the Paris Agreement.

However, it is important to keep in mind that these initiatives must fully deliver what they promise in order to realize our estimated emission reductions. We have assumed full implementation of the initiatives' goals. We included here only initiatives that give regular updates or report on their implementation progress to ensure that there is a fair chance that the goals are implemented, but a high degree of uncertainty still remains.

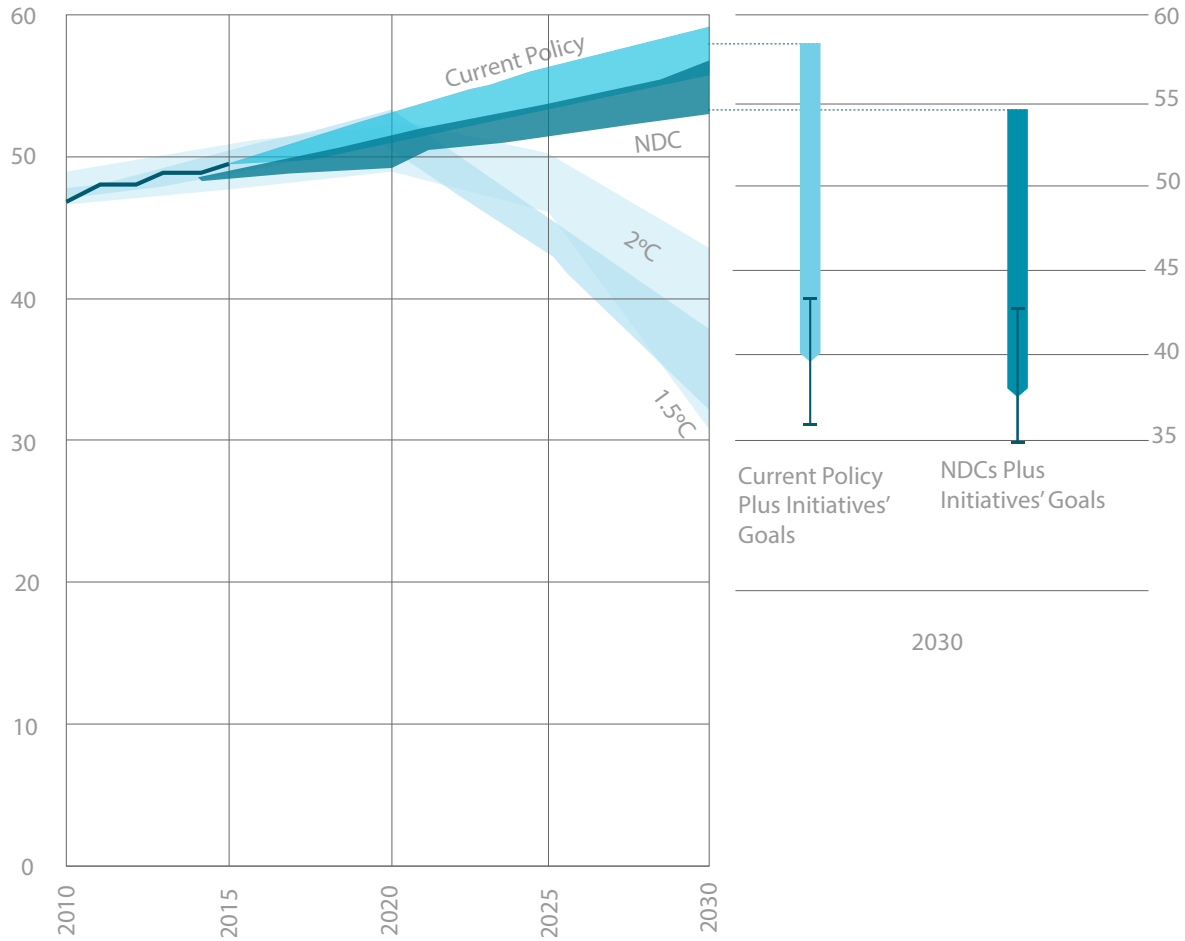


Figure 22
Sensitivity: Impact of the full implementation of the goals of the 21 initiatives on global greenhouse gas emissions if also the NDC are fully implemented (sources: current policy and NDC scenario from (Kuramochi et al., 2017), 2 °C and 1.5 °C pathways from (Kuramochi 2017), impact of initiatives: this study)

In addition to the emission reduction potential of ICIs, several trends across specific sectors also emerged in our analysis:

- **Regions, states and cities** can contribute significant reductions due to their level of ambition (i.e., some actors have committed to 2°C pathways consistent with the Paris Agreement temperature limit) and the large coverage of emissions.
- **Initiatives focused on forestry** have very high emissions reduction potential due to the current high deforestation rates, and due to the ambitious targets of many of these forestry initiatives, such as the New York Declaration on Forest's goal to end deforestation by 2030. On the other hand, uncertainties in global forest carbon emissions (and therefore potential reductions) are high.
- **Initiatives by industry and businesses** have ambitious goals, such as adopting "science-based targets" in line with the Paris goals, or supplying 100% of their electricity from renewable sources.
- **Initiatives focused on non-CO_2 emissions,** and particularly on methane, can achieve sizable reductions, on the order of multiple $GtCO_2e$/year.
- **Initiatives on renewable energy** are often initiated at a country level

or by a group of countries. For instance, several target the European Union or United States, while one focuses on Africa. Although the individual mitigation impact is small, these initiatives add up to contribute a sizable emissions reduction on the order of few $GtCO_2e$/year.

The results from this ICI quantification is substantially larger than previous estimates made earlier (Graichen et al., 2017) and (Roelfsema et al, 2018). Here we selected additional ICIs and took the growth of certain ICIs into account. Note that earlier analysis quantified potential ICIs only relative to countries' NDC levels. The largest difference with the Roelfsema et al. (2018) paper is the assumption on 100% overlap between climate action of national governments and non-state actors. Here we assumed that additional action by non-state and subnational actors is not fully accounted for by national policies, and does not change the pace of government implementation.

There are also multiple reasons for why emissions reduction impacts for ICIs are much larger than those for individual commitments:

- Goals are longer term visions about the aims that a cooperative initiative tries to accomplish, such as increased membership, while individual city, region, and company targets are analogous to national level pledges (e.g, the NDCs) that represent more concrete steps to possibly realize the longer term goals.
- Our ICI quantification calculates emissions reductions on a global scope, including also a "rest of the world" region, while our individual commitments only quantifies actors within our 10 key regions of interest.
- Our ICI quantification includes emission reduction targets in globally significant and ambitious sectors such as forestry and non-CO2 (combined 6-8 $GtCO_2e$/year), among others, whereas our individual commitments focus on energy targets.
- Almost all ICIs count national/federal governments among their members, therefore the impact is not exclusively attributable to non-state and subnational actors alone.

4

ASSESSMENT OF SUBNATIONAL AND NON-STATE CLIMATE ACTION FOR LARGE EMITTING REGIONS

In this section, we take a closer look at the impact of individual commitments made by cities, regions, and companies, as well as the impact of ICIs, on the emissions trajectories of several high-emitting countries. In each country profile below, we: (1) describe the country's climate action targets and goals (the country context); (2) characterize the quantifiable commitments – that is, the greenhouse gas emission reduction and/or renewable energy commitments – made individually by cities, regions and companies within that country; and (3) quantify the impact that city, region and company commitments and that ICIs could have on that country's emissions trajectory.[15] Total national GHG emissions include land use, land use-change and forestry (LULUCF), unless otherwise stated.

4.1 CHINA

Country Context

China is the world's most populous country, with over 1.4 billion people, and its largest greenhouse gas emitter (UNDESA, 2018; WRI, 2018). Carbon emissions at the national level declined between 2014 and 2016, largely due to falling coal consumption from ambitious cross-sector policies to tackle air pollution and increase renewable energy. Emissions then rose again in 2017, driven by rising demand for oil and gas and an increase in coal use (Climate Action Tracker, 2018a). China's subnational and non-state actors are key implementers of national climate policies that span many sectors, including commitments to tackle building energy efficiency and establish a national emissions trading system. Many subnational actors have adopted peak emission year targets, renewable energy goals, and low-carbon development policies. Companies, particularly in the electronics and technology sectors, are also taking actions to reduce their emissions.

Footprint analysis: cities, regions, and companies

Cities and Regions

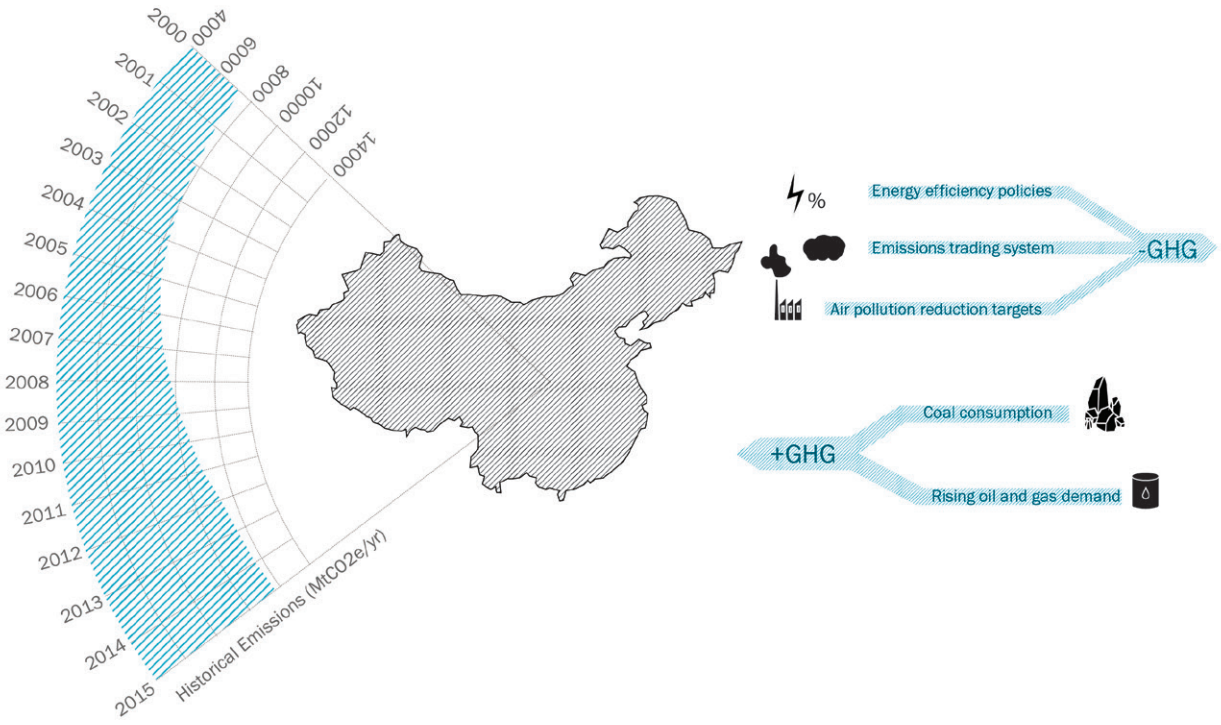
- We evaluate 20 Chinese cities and 2 provinces (Sichuan and Hainan) that have adopted peak emissions years, some as early as 2020, as part of the Under 2 MOU and Alliance of Peak Pioneering Cities (APPC). We also assess Hong Kong's quantifiable greenhouse gas emissions reduction target.

Companies

- More than 140 companies headquartered in China, representing $518 billion USD in revenue, have made quantifiable climate commitments.
- 298 of the world's largest[16] companies are based in China, with

15
The methodology used in this document is closely aligned with the ICAT non-state and subnational action guidance, but not identical. Please see the technical notes on the quantification of individual commitments and ICIs for more details on the methodology used for this assessment.

CLIMATE ACTION IN CHINA



Cities

20

Regions

2

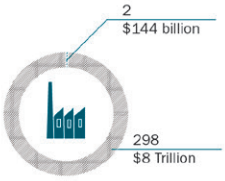
Legend

- In climate action networks
- Other
- 2 Cities
- 1 Region
- 10 Companies
- Fortune 2000/Global 500 Largest Company

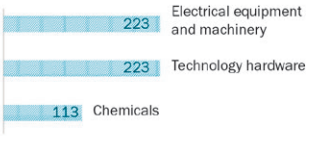
Companies

518 billion USD

140+ headquarters with 191 commitments



Sectors with Most Commitments



a combined $8 trillion in revenue. Two of these companies, with a combined $144 billion USD in revenue, have made climate commitments.

- Companies have made the most commitments in the electrical equipment and machinery (223); technology hardware (223); and chemicals (113) sectors.

Comparing subnational and non-state trajectory with national trajectory

Action from Chinese cities, provinces, and companies have already played an integral part in China's climate policy. Subnational and non-state actors are primary implementers of China's carbon intensity, energy consumption, and air pollution reduction targets, which are set at the national level through major cross-sector policies like the 12th and 13th Five-Year Plans and are reflected in China's national policies scenario. Participation in international climate action networks is limited, with only 57 cities and five regions, representing just under 16% and 20% of China's population, respectively, recorded in the Carbon*n* Climate Registry, CDP, C40 Cities, and the Under2 Coalition.

We primarily assess peak-year emissions targets for Chinese subnational actors through the APPC, formed in 2015 and part of the Under2 Coalition. It has grown from 11 to 23 Chinese cities and provinces committed to peaking their carbon emissions by or before the national timeline of 2030. These cities and provinces represent about 16.8% of China's population, 27.5% of its national GDP, and 15.6% of national carbon dioxide emissions (Fong, 2016). In 2010, eight cities and five provinces, including Tianjin, Chongqing, Guangdong and Liaoning, piloted China's national low-carbon program, developing and testing low-carbon strategies ranging from greenhouse gas inventories to low-carbon technology deployment (Ibid). A second phase of the low-carbon program saw the addition of 28 cities and one province (NCSC, 2017), followed by another 45 cities that joined the pilot program in 2017 (NDRC, 2017). In addition, five cities and two provinces tested out the carbon market before the nation-wide carbon trading scheme was launched in 2017; the scheme will also come into effect for electricity companies by 2020. Chinese companies are poised to capitalize on and help deliver this shift towards a low-carbon society. China makes and buys more solar panels than any other country in the world, has begun to dominate the creation of wind turbines, and is focused on increasing its capacity to manufacture electric cars (Bradsher, K. and Friedman, 2018).

Commitments made individually by cities, regions, and companies could reduce between 0 and 155 $MtCO_2e$/year by 2030 in addition to the current policies scenario (see Figure 23). The reductions mainly come from the collective efforts of energy end-use companies, which have the potential

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As measured by inclusion in the Global 500 and Forbes 2000 lists.

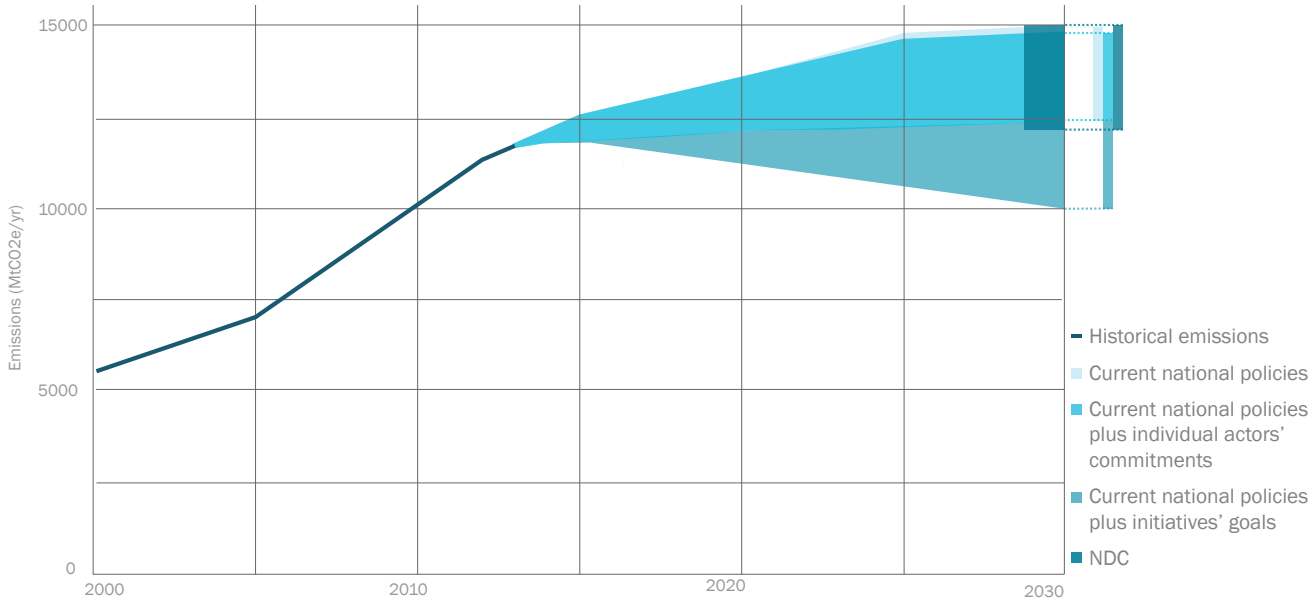

Figure 23
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for the China, including land-use change and forestry.

to reduce between 20 and 70 $MtCO_2e$/year relative to the current policies scenario (see Figure 24). These estimates assume all the commitments are fully implemented and that climate efforts elsewhere do not decrease. While these reductions seem to contribute only marginal additional reductions compared to China's current national policies scenario, this is likely due to the relatively small number of subnational actors (24 actors in total) included in the analysis. It may also reflect the incomplete assumptions regarding these actors' emissions levels in peak years, which do not factor in other APPC cities like Beijing, Guangzhou and Shenzhen, that may also have already reached their peak greenhouse gas emissions. The full scope and scale of China's non-state and subnational climate contributions is undoubtedly not being captured.

China's participation in the selected ICIs could reduce between 2,270 and 2,440 $MtCO_2e$/year, in addition to currently implemented national policies by 2030. The largest emissions reductions are expected from cities/regions ICIs (1,815 to 1,840 $MtCO_2e$/year), and Architecture 2030 (380 to 470 $MtCO_2e$/year) (Figure 25). The impact of city and region commitments is estimated to be higher for initiatives than for individual actors, as we assume participating members will make significant reductions by 2020 or 2030 while most individual commitments by cities and regions have later reduction timelines. These reductions would lead to total emissions levels of 10,100 to 12,500 $MtCO_2e$/year or 15 to 20% below the current national policies scenario in 2030. These estimates assume that all the analyzed initiatives fully achieve their goals and that their reductions do not change action elsewhere. Additional reductions from ICIs to the NDCs are projected between 770 and 2,720 $MtCO_2e$/year.

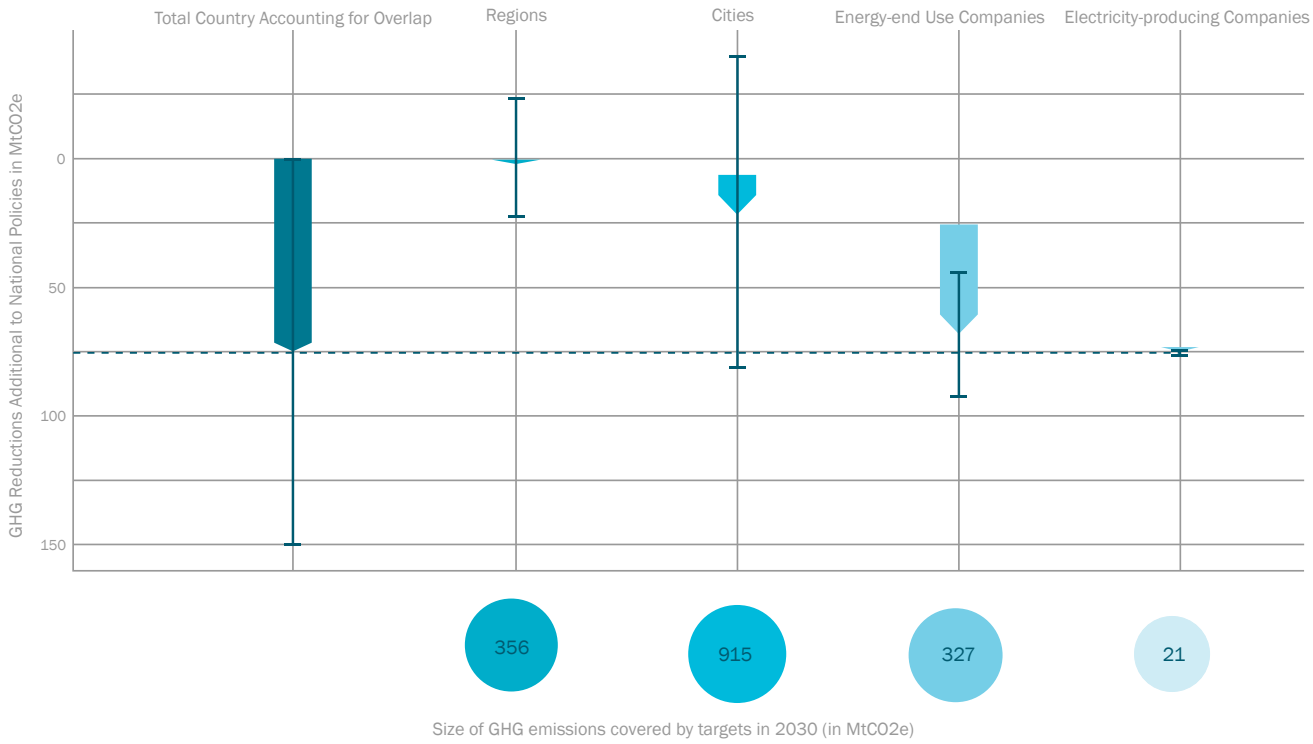

Figure 24
Potential impact of the full implementation of individual actors' commitments based on the "current national policies" scenario for the China in 2030. (Source: this study).

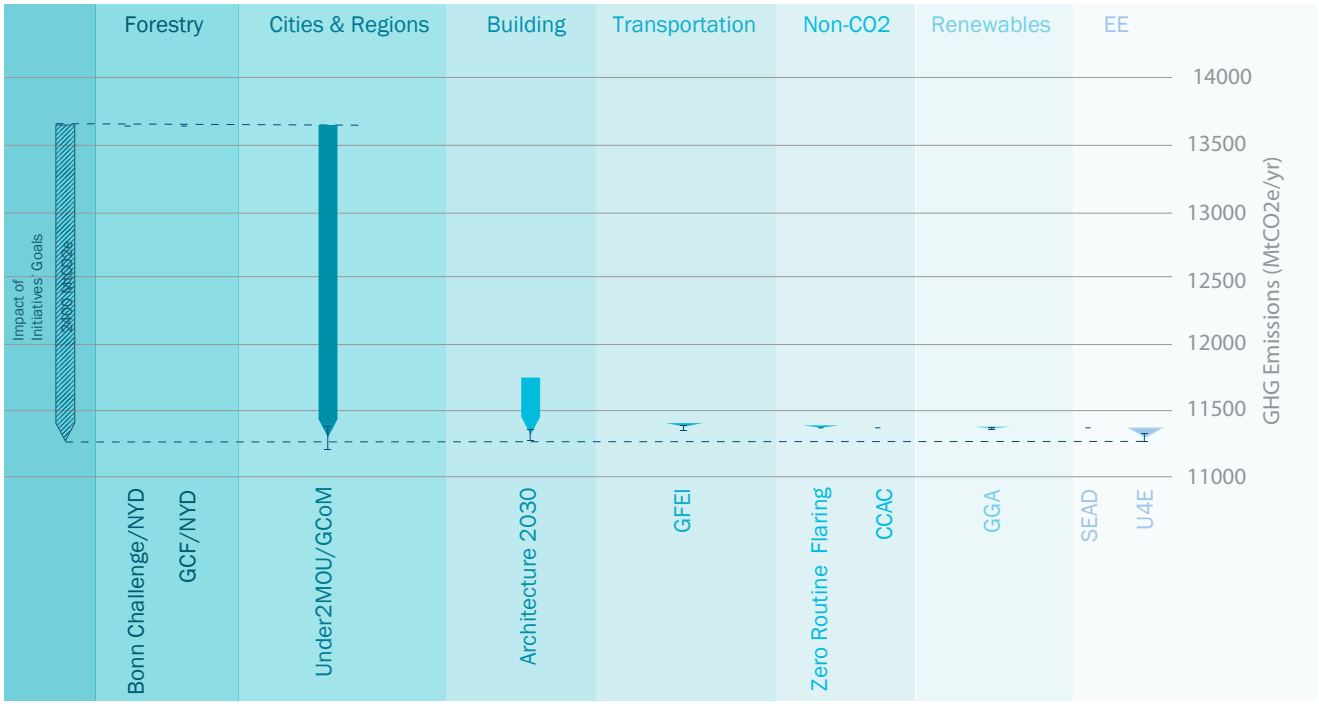

Figure 25
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for China in 2030.

China's NDC to peak its carbon dioxide emissions around 2030 has already been deemed not ambitious enough to limit warming to below 2°C, according to the Climate Action Tracker Subnational and non-state climate actions can help to inform more ambitious revisions of China's NDC.

4.2 EUROPEAN UNION

Country context

The European Union (EU28) has made considerable progress in decarbonizing its economy, lowering its greenhouse gas emissions by 23% since 1990, while more than doubling its GDP during that same time span (Gaventa et al., 2018). This shift has been supported, in part, by economy-wide, energy supply, buildings, and transport sector policies, of which the European Emission Trading System covers the largest amount of GHG emissions. To continue this progress, the EU faces challenges in shifting from incremental emissions reductions to deep decarbonization, while simultaneously addressing new challenges from climate impacts (ibid). The stakes are high: if no further action is taken and global temperature rises by 3.5°C, climate damages by the end of this century in the EU could total at least €190 billion, a net welfare loss of 1.8% of its current GDP (European Commission, 2018).

Footprint analysis: Cities, regions, and companies

Cities and regions:

- Over 6,500 cities, with a population of over 209 million, 40% of the EU's total population, have made climate commitments. Of these, just over 5,700 cities, representing a population of 180 million, 35% of the EU's total population, have made quantifiable greenhouse gas emissions reduction or renewable energy commitments.
- Over 60 regions, representing a population of 193 million, 38% of the EU's total population, have made climate commitments. Of these, 39 regions, representing a population of over 119 million, 23% of the EU's total population, have made quantifiable greenhouse gas emissions reduction or renewable energy commitments.

Companies:

- More than 1,100 companies with operations in the EU have made over 12,000 climate commitments. Of this group, more than 750 are headquartered in the EU representing a combined $6.9 trillion USD in revenue.
- 410 of the world's largest[17] companies are based in the EU, with a combined $10 trillion USD in revenue. 26% (107) of these companies, with a combined $3.1 trillion USD in revenue, have made climate action commitments.
- Companies have made the most commitments in the banks, diverse

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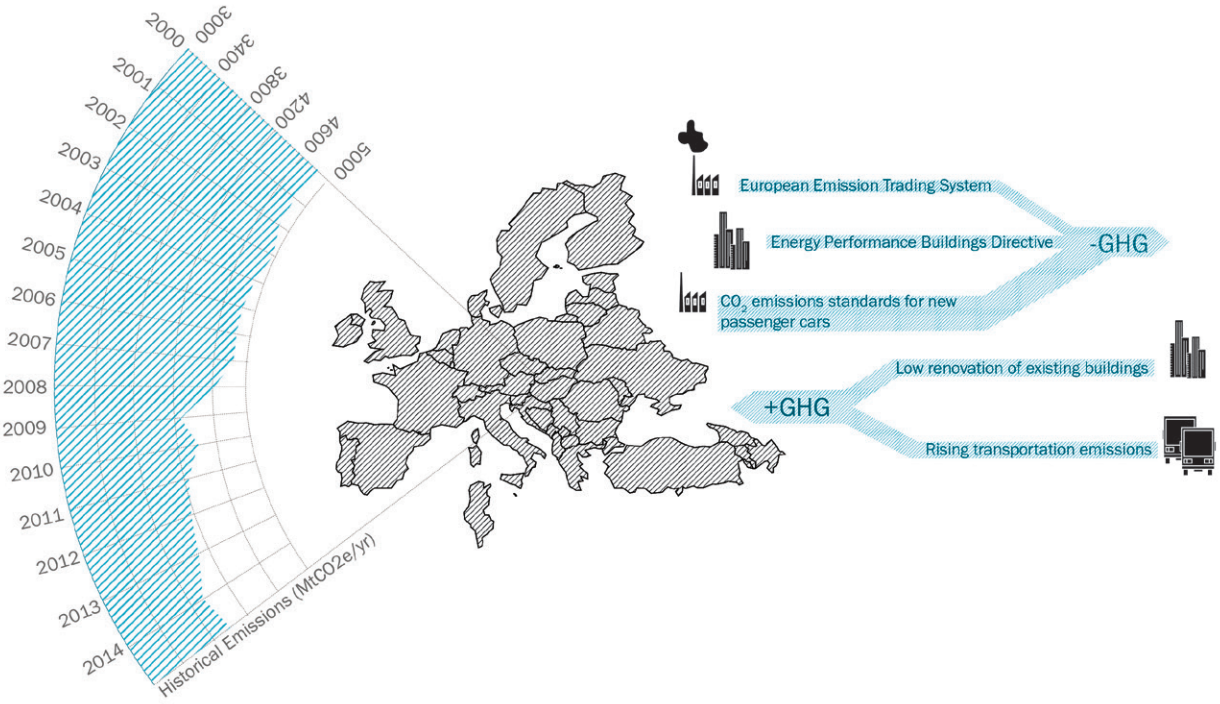
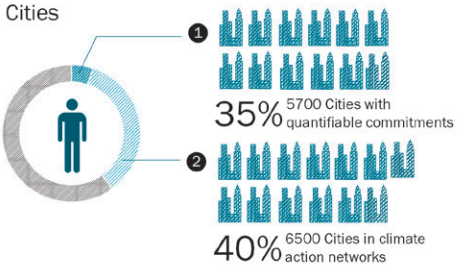
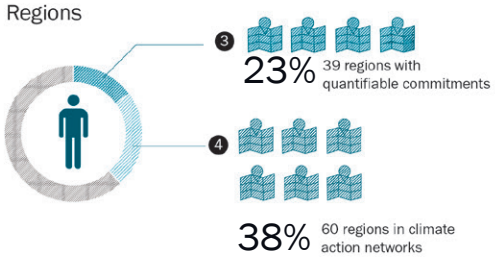
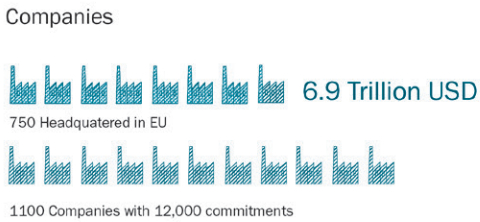
As measured by inclusion in the Global 500 and Forbes 2000 lists.

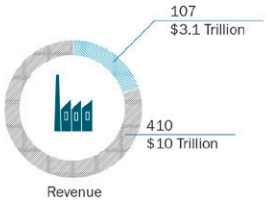
CLIMATE ACTION IN THE EUROPEAN UNION











financials, and insurance (1118); electrical equipment and machinery (921); and consumer durables, household and personal products (911) sectors.

Comparing subnational and non-state trajectory with national trajectory

Subnational and non-state actors are poised to help the EU accelerate its response to climate change. Nearly three-fourths (380 million) of the EU's population resides in urban areas (UNDESA, 2018), and a growing number of cities and regions have pledged climate action, through platforms such as the EU Covenant of Mayors. An increasing number of companies operating in the EU are also taking climate action, often turning to renewable energy to reduce emissions and save on energy costs and developing products and services that also help their customers avoid greenhouse gas emissions (CDP, 2017) .

Based on currently implemented policies, total GHG emissions are projected to annually decrease by 0.6 to 1.4% between 2015 and 2030 (Kuramochi et al., 2017) to 3,175 to 3,580 $MtCO_2e$/year. Individual city, region, and company commitments could reduce between 230 and 445 $MtCO_2$/year by 2030 compared to the current policies scenario, resulting in emissions of 2,950 to 3,135 $MtCO_2$/year, assuming all quantified commitments are fully implemented, and such efforts do not decrease efforts elsewhere (see Figure 26).

Our dataset of individual non-state and subnational actors together account for roughly 50% of the EU's total GHG emissions today—commitments include 39 regions, over 5,700 cities and over 6,000 companies (including utilities). For the EU analysis we did not consider the member's state-level targets. Of the cities, about 240 are in regions that also have made emission reduction commitments.

Selected ICIs operating in the EU could reduce between 980 - 1,970 $MtCO_2e$/year beyond the current policies scenario by 2030, if they are fully implemented and do not offset efforts elsewhere. The largest additional reductions are expected from the EU Wind Initiative (227 - 560 $MtCO_2e$/year), the SEII (159 to 614 $MtCO_2e$/year), the Climate and Clean Air Coalition (262 $MtCO_2e$/year), and the Architecture 2030 (187 to 206 $MtCO_2e$/year) initiatives (see Figure 28).

These emission levels are close to the level that would result from implementing the EU's NDC target of 40% emissions reduction in 2030, relative to 1990 levels, which is 3,320 MtCO2e/year (excluding LULUCF) (Kuramochi et al., 2017) and 3,050 MtCO2e/year (including LULUCF) (based on projections from Forsell et al. (2016) Parties submitted Intended Nationally Determined Contributions (INDCs. Additional reductions from ICIs to NDCs are projected to be between 740 and 1820 $MtCO_2e$/year. If fully implemented, the goals of the ICIs in which the EU is participating

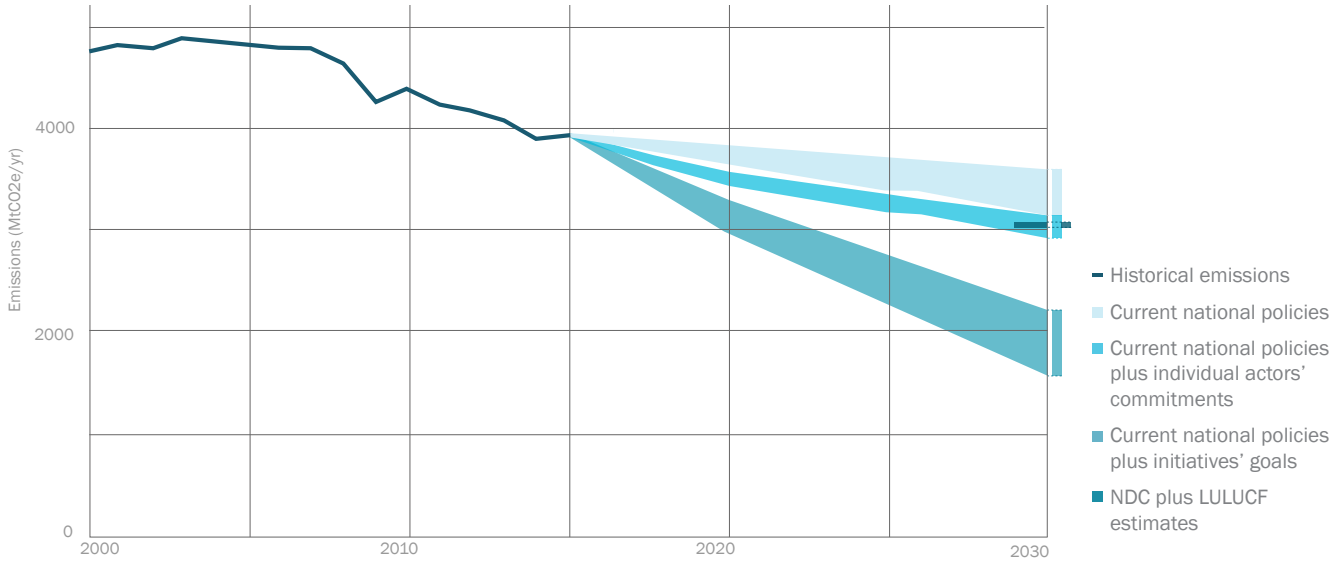


Figure 26
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for the EU, including land-use change and forestry. NDC is supplemented with land-use change and forestry emissions estimate by Forsell et al. (2016) Parties submitted Intended Nationally Determined Contributions (INDCs.

would bring emission levels beyond those expected from NDC to levels between 1,650 and 2,390 $MtCO_2e$/year in 2030.

If we look at specific groups of actors with individual commitments, the largest absolute reductions are expected from regional commitments. These regions represent 23% of EU population, and 26% of 2015 CO_2e emissions, and almost 50% of these regions are located in Germany, France or the Netherlands. The cities with commitments represent 17% of total EU population in 2015, and almost 50% of total GHG emissions. The potential reductions (before overlap) by 2030 to the current policies scenario are between 185 and 285 $MtCO_2e$/year for regions, between 40 and 110 $MtCO_2e$/year for cities, between 60 and 130 MtCO2e/year for electricity end-use companies, and -25 and 35 $MtCO_2e$/year for electricity production companies. Due to geographical overlap, the total reductions are between 30 and 115 $MtCO_2e$/year lower than the sum of the reductions per actor group. Also, 55 cities and 241 companies have put forward renewable energy targets, but only 24 city and 177 company commitments could be quantified, due to lack of sufficient information.

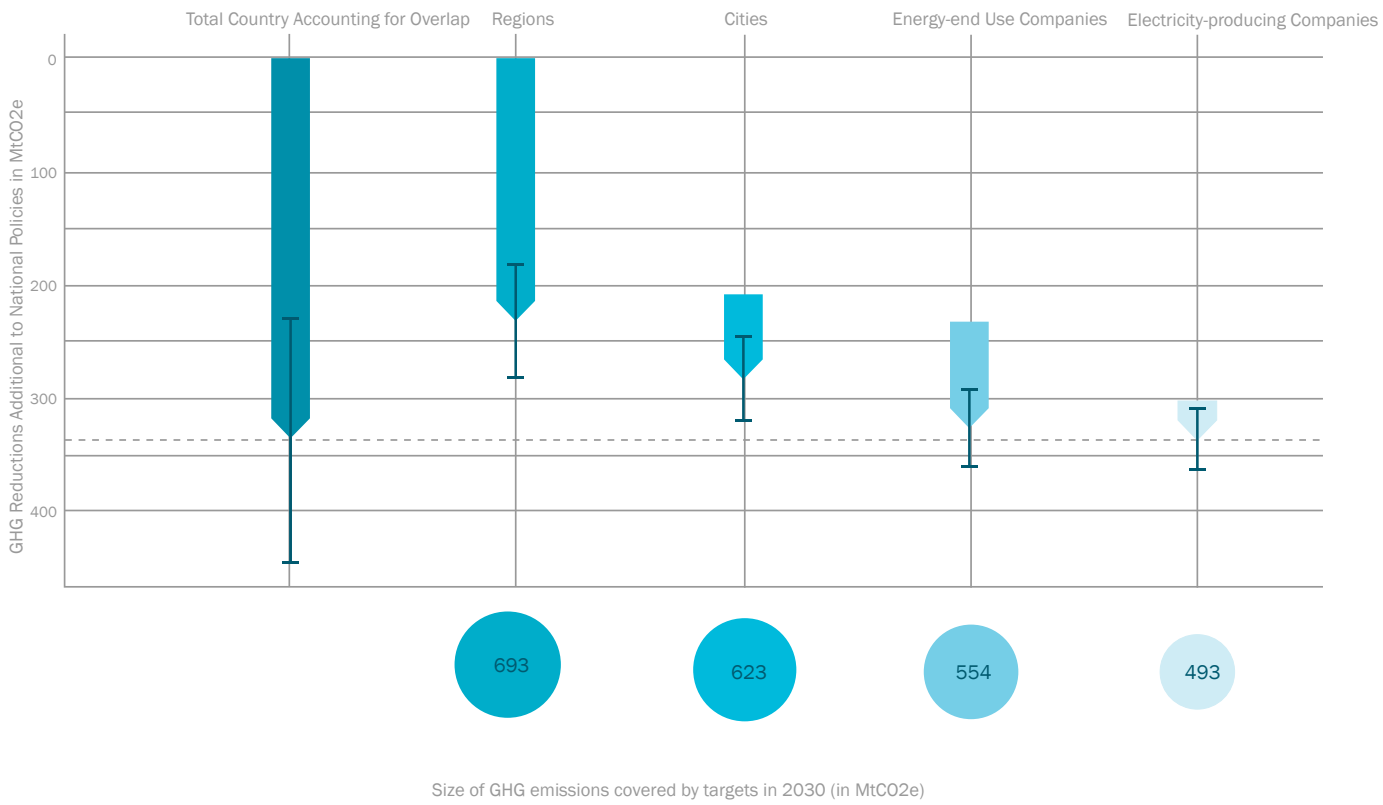


Figure 27
Potential impact (minimum and maximum estimates) of the full implementation of individual actors' commitments based on the "current national policies" scenario for the EU in 2030. (Source: this study).

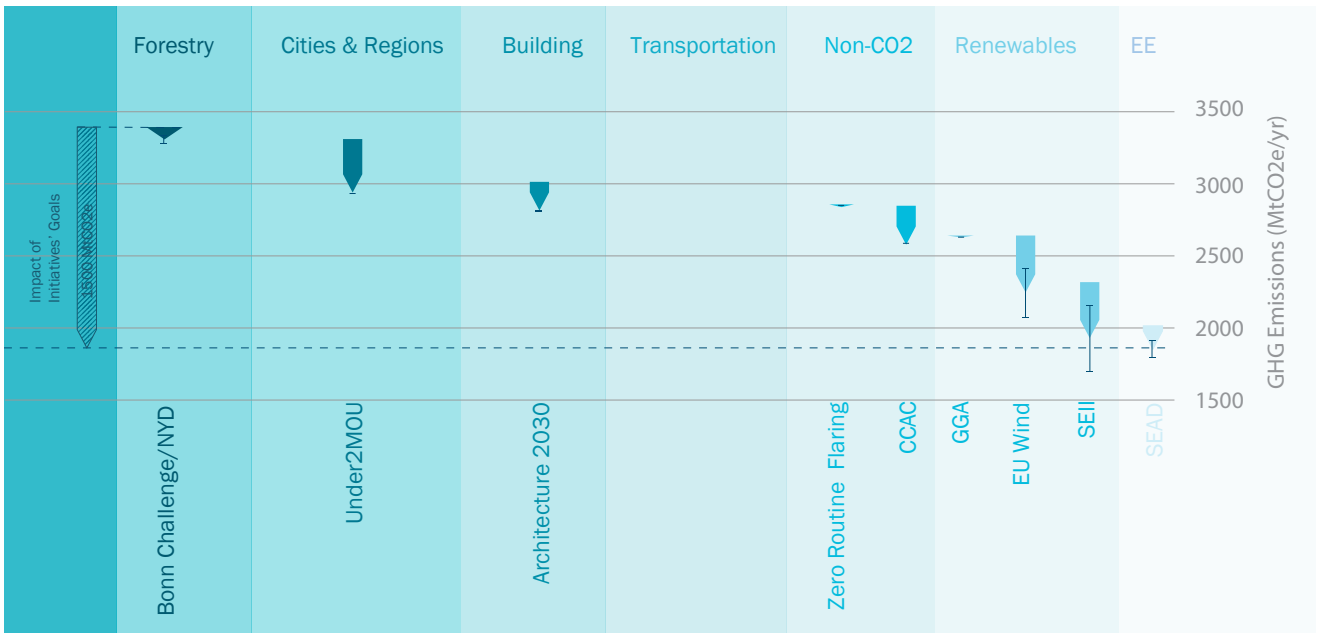


Figure 28
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for the EU in 2030.

4.3 UNITED STATES

Country context

In the United States (US), the second largest GHG emitting country in the world, total GHG emissions (including LULUCF) have been gradually decreasing since 2007. In 2016, US emissions fell by 1.9% compared to 2015 and were at a level of 5.7 GtCO2e/year, according to the most recent greenhouse gas inventory by the US Environmental Protection Agency (U.S. EPA, 2018). In 2017, energy emissions continued to fall for the third year in a row, with natural gas and coal usage both declining, contributing to overall energy-related emissions being 14% below 2005 levels.

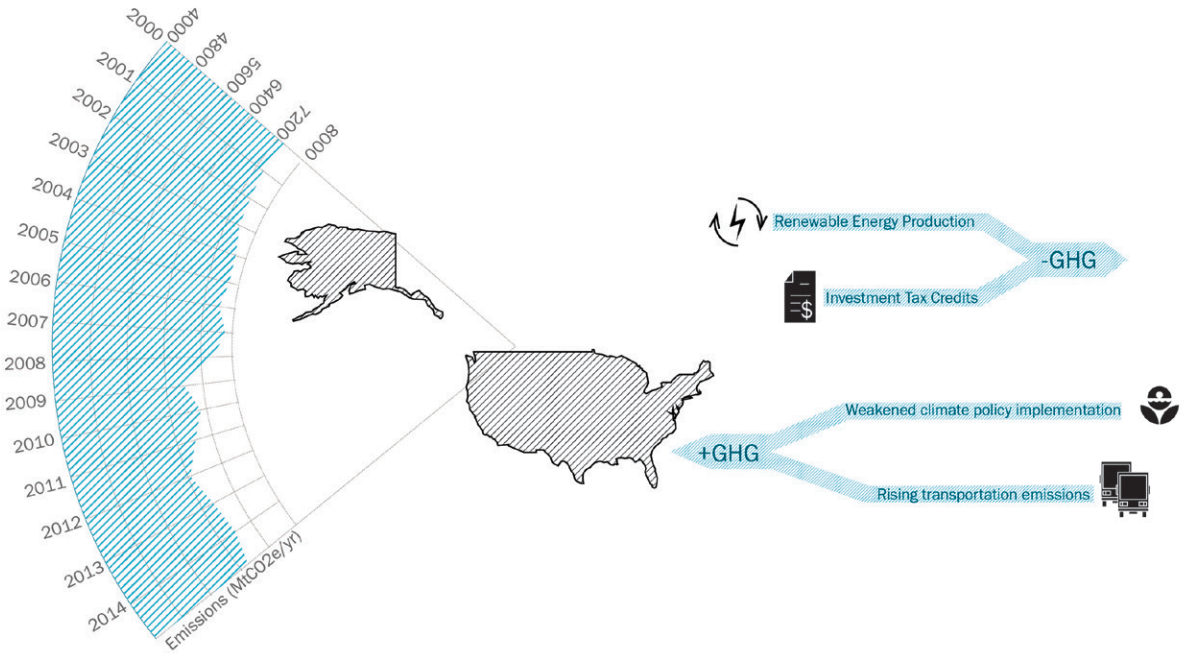
The Trump Administration has pursued several policy rollbacks, including a weakening of the Clean Power Plan (Friedman and Plumer, 2018) and of vehicle fuel efficiency standards (U.S. Environmental Protection Agency, 2018). Despite these setbacks, many key policies remain, including renewable energy production and investment tax credits (Jensen and Dowlatabadi, 2017), and with falling costs and more favorable state policies, renewables are booming. However, the pace of decarbonization has slowed from 2016 to 2017. US transportation emissions are rising; in 2017, surging travel resulted in an increase of US aviation emissions of 9.2 million metric tons (Houser and Marsters, 2018), and in 2016, the transportation sector overtook the electric power sector to be the largest source of US emissions. Total vehicle miles traveled in the US also continued to rise in 2016, and this will likely be exacerbated by the EPA's attempted roll-back of fuel economy standards (U.S. Environmental Protection Agency, 2018). These developments increase the need for both expanded subnational and non-state leadership and a renewed federal commitment to addressing climate change.

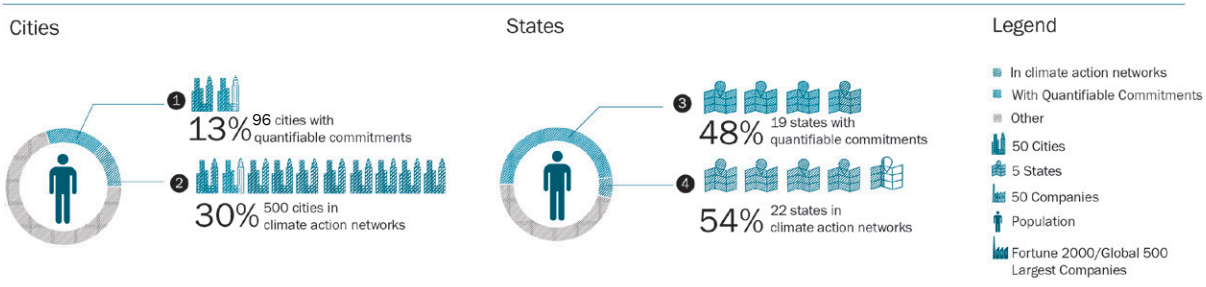
Footprint analysis: cities, regions, and companies

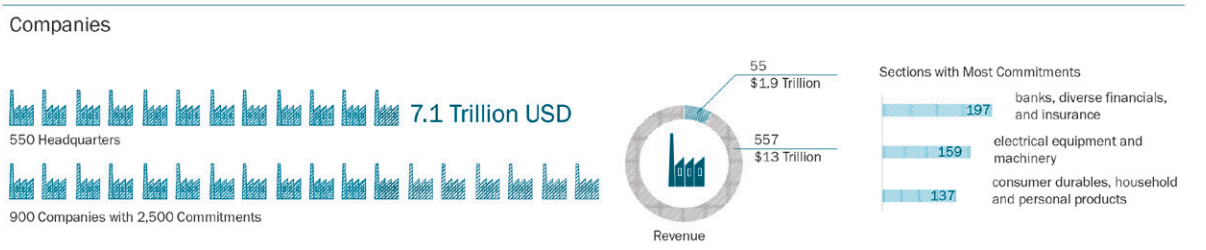
Cities and regions:

- Nearly 500 cities, with a population of over 100 million, 30% of the US population, have made climate commitments (these include 10 the US's 20 largest cities). Of these, 96 cities, representing a population of more than 43 million, 13% of the total US population, have made quantifiable greenhouse gas emissions reduction or renewable energy commitments.
- 22 states, with a population of 175 million, 54% of the US population, have made climate commitments. Of these, 19 states, with a population of 156 million, 48% of the US population, have made quantifiable greenhouse gas emissions reduction or renewable energy commitments.

CLIMATE ACTION IN THE UNITED STATES







Companies:

- More than 900 companies with operations in the US have made over 2,500 climate commitments. Of this group, more than 550 are headquartered in the U.S., representing a combined $7.1 trillion USD in revenue.
- 577 of the world's largest[18] companies are based in the U.S., with a combined $13 trillion USD in revenue. 10% (55) of these companies, with a combined $1.9 trillion USD in revenue, have made individual climate action commitments.
- Companies have made the most commitments in the banks, diverse financials, and insurance sector (197); electrical equipment and machinery sector (159); and consumer durables, household and personal products sector (137).

Comparing subnational and non-state trajectory with national trajectory

At the subnational level and in the business sector, there are many important and encouraging movements emerging. 16 US state governments have stated their will to pursue the objectives of the Paris Agreement under the US Climate Alliance (Ronayne, 2017; United States Climate Alliance, 2018). California Governor Jerry Brown and Former Mayor of New York Michael Bloomberg have also launched "America's Pledge," an initiative that is moving forward with the "country's commitments under the Paris Agreement — with or without Washington" with over 2,700 signatories from both public and private sectors (America's Pledge, 2017). The growth of renewable energy is continuing at unprecedented rates (Gibbens, 2017).

The potential impact of these non-state and subnational actors' commitments in the US can be substantial: the full implementation of recorded and quantified individual commitments by states, cities and businesses are expected to reduce emissions by 670 to 810 $MtCO_2e$/year by 2030 compared to the current national policies scenario (see Figure 29). Our results also show that the gap between the 2025 NDC target range (26-28% below 2005 levels) and the current national policies scenario projections can already be narrowed to half or even less through full implementation of recorded and quantified non-state and subnational actors' commitments.

Our analysis of individual actors' commitments includes 19 states and Washington DC, more than 90 cities and over 1,200 commitments from companies (including utilities) together accounting for 38% of total GHG emissions in 2015. All of the US Climate Alliance states with quantifiable emissions reduction targets as of end-August 2018 (United States Climate Alliance, 2018) and 10 of the 20 largest cities nationally in terms of

18
As measured by inclusion in the Global 500 and Forbes 2000 lists.

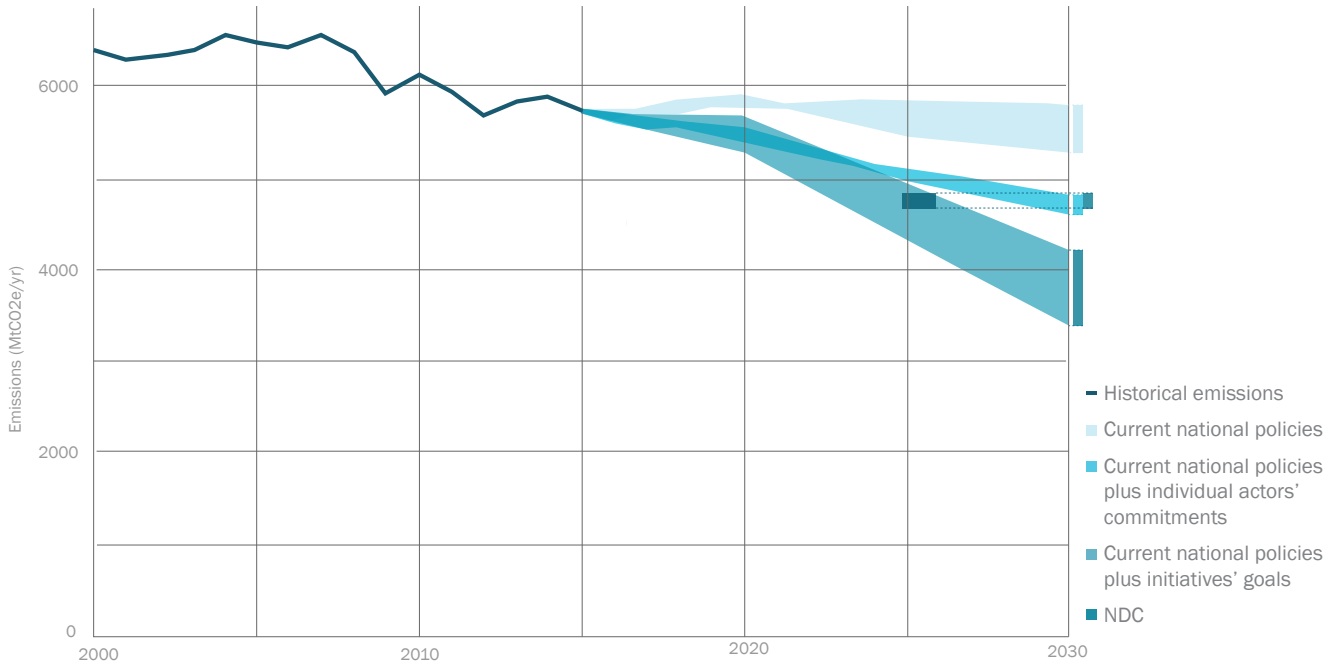


Figure 28
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for the EU in 2030.

population are included in the analysis.

Potential reductions are even larger if the goals of ICIs are considered. Our analysis also shows that many initiatives expect major participation of subnational and non-state actors from the US to achieve their goals through coverage of emissions, energy consumption and production, or the number of signatories. If the analyzed initiatives fully achieve their goals and such efforts do not change the pace of action elsewhere, the United States' participation in the selected ICIs could potentially reduce emissions between 1,080 and 2,340 $MtCO_2e$/year, bringing the country to emission levels between 3,400 and 4,190 $MtCO_2e$/year by 2030. This is equivalent to a 25% to 39% emissions reduction by 2030 compared to the United States' current national policies scenario and could achieve or overachieve its NDC target. The largest additional reductions are expected from the initiatives of cities, i.e. Under2MOU, C40 and Global Covenant of Mayors (0 to 280 $MtCO_2e$/year), SunShot Initiative (200 to 610 $MtCO_2e$/year), and the US Wind Initiative (210 to 500 $MtCO_2e$/year) (Figure 31).

If we assume full implementation of NDCs, additional reductions from ICIs to the US NDC are projected to be between 1,130 and 1,970 $MtCO_2e$/year in 2030. If fully implemented, the goals of the ICIs in which the US is participating would bring emission levels beyond those expected from NDC to levels between 3,620 and 4,270 $MtCO_2e$/year.

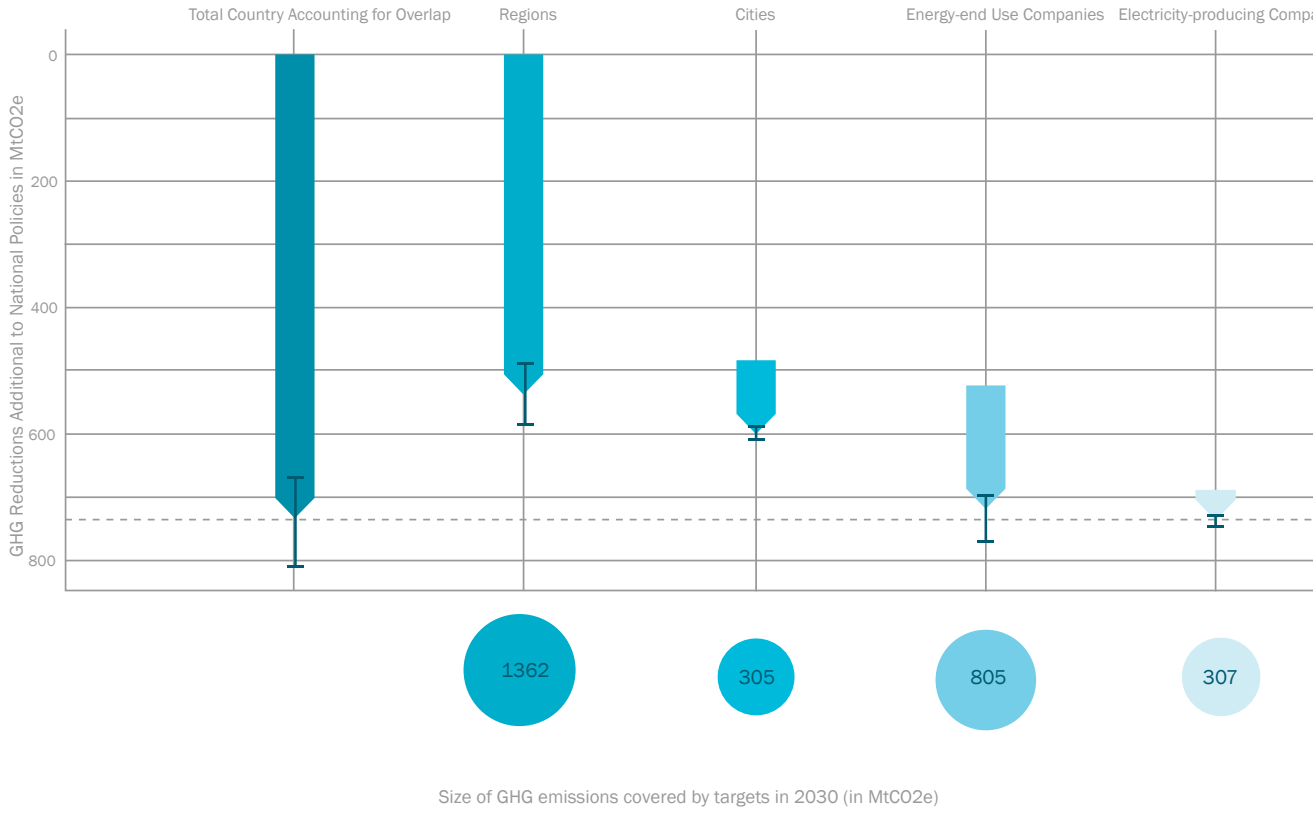


Figure 30
Potential impact (minimum and maximum estimate) of individual actors' commitments fully implemented based on the "current national policies" scenario for the United States in 2030. (Source: this study).

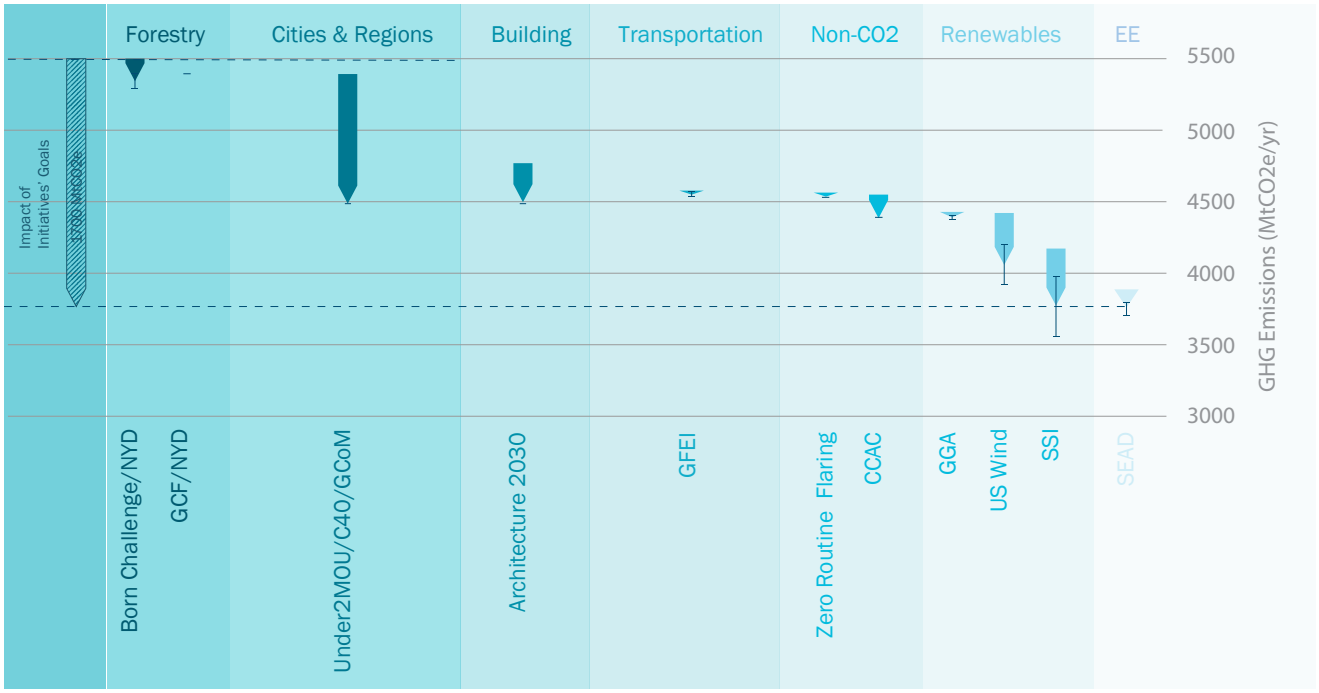


Figure 31
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for the United States in 2030.

4.4 BRAZIL

Country context

Brazil's emissions have fallen substantially over the past decade since peaking in 2004, making it an emerging leader in global climate change efforts (Climate Transparency, 2017). This decline has been driven largely by policies targeting the land use and forestry sector, such as the Brazilian Forest Code, which aims to reduce deforestation; the Low-carbon Agriculture Plan, which targets the agriculture sector's emissions; and the National Biodiesel Programme and Ethanol Blending Mandate support the increase of biofuels (Kuramochi et al., 2017). Recently, energy use surpassed agriculture and land use as the largest source of the country's emissions (WRI, 2018). A number of polices target the sector, including the 10-year National Energy Expansion Plan to grow renewable electricity, and tools such as capacity auctions in the power sector, and ethanol and biodiesel mandates in the transport sector, which aim to foster increased uptake of renewable energy sources (IEA, 2016; Climate Action Tracker, 2018b). Complementing these ambitious forestry and renewable energy programs with a phase out of fossil fuel subsidies and ambitious efficiency and emissions targets would further accelerate Brazil's progress towards its climate goals (Climate Transparency, 2017).

Footprint analysis: cities, regions, and companies

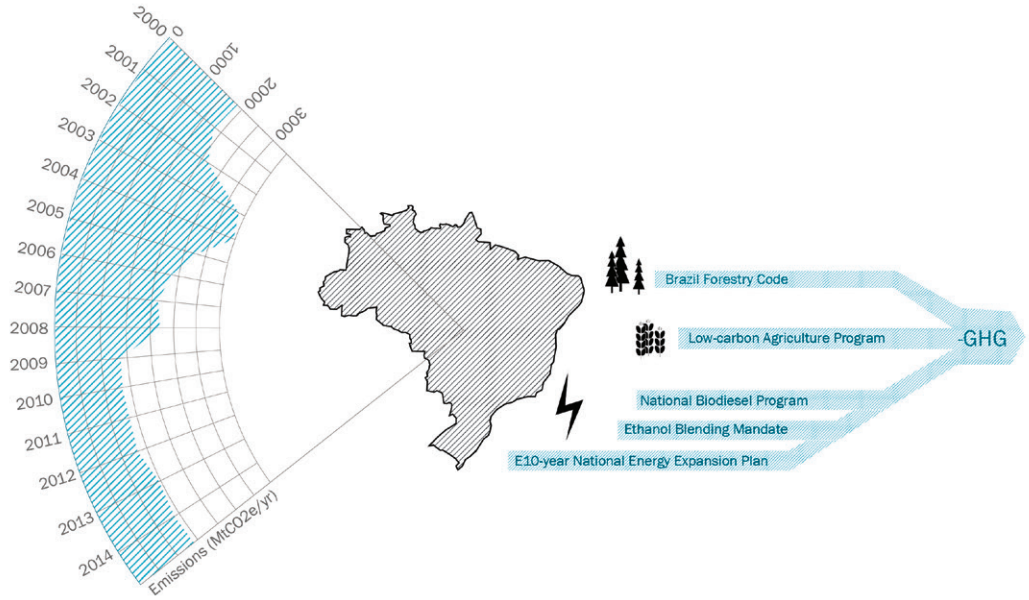
Cities and regions:

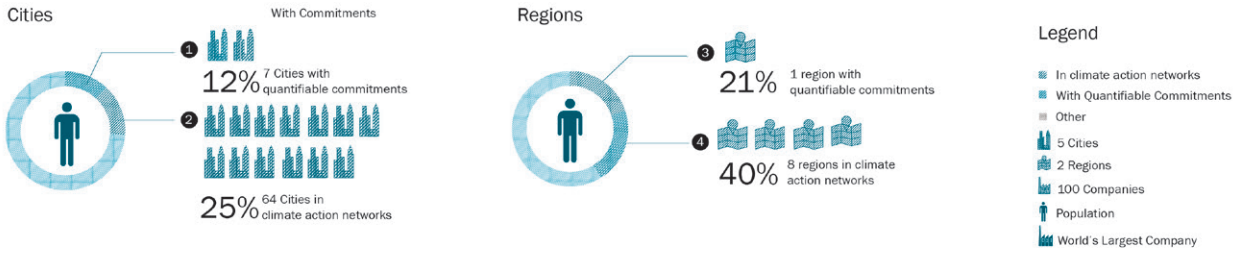
- 64 cities, with a population of 53 million, 25% of Brazil's total population, have made climate commitments. Of these, seven cities, with a population of 24 million, accounting for 12% of Brazil's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.
- Eight regions, with a population of nearly 85 million, 40% of Brazil's total population, have made climate commitments. Of these, one region, São Paulo, with a total population of 44 million, accounting for 21% of Brazil's total population, has made a quantifiable greenhouse gas emissions reduction or renewable energy commitment.

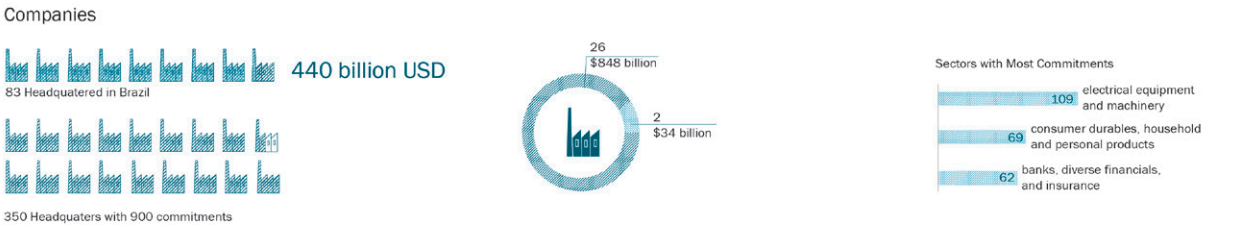
Companies:

- More than 350 companies with operations in Brazil have made over 900 climate commitments. Of this group, 83 are headquartered in Brazil, representing a combined $440 billion USD in revenue.
- 19 of the world's largest[19] companies are based in Brazil, with a

CLIMATE ACTION IN BRAZIL







combined $485 billion USD in revenue. Two of these companies, with a combined $34 billion USD in revenue, have made individual climate action commitments.

- Companies have made the most commitments in the electrical equipment and machinery sector (109); consumer durables, household and personal products sector (69); and banks, diverse financials, and insurance sector (62).

Comparing subnational and non-state trajectory with national trajectory

A relatively small but impactful cohort of Brazil's subnational actors have set climate goals. Over 85% of Brazil's population currently lives in cities, creating one of the largest urban populations in the world, and making cities a crucial partner in achieving the country's climate goals (Kahn and Brandão, 2015). Efforts to reduce emissions in urban mobility, energy use in residential and commercial buildings, and waste management in cities could contribute significantly to lowering Brazil's emissions (ibid). Many Brazilian cities have taken especially ambitious action around transport. Brasilia has modernized its public bus fleet and implemented a Bus Rapid Transit system, significantly reducing both local pollutants and emissions, while the city of São Paulo has installed over 479 km of bus lanes and 303.0 km of bike lines (Zottis, 2015). Brazil's regions also act across a variety of sectors; the state of São Paulo aims to reduce its carbon emissions 20% below 2009 levels by 2020, through a mix of clean transportation, sustainable biofuels, forest protection, as well as through providing financial support to green municipalities within its boundaries (Network of Regional Governments for Sustainable Development, 2018).

Over 600 companies operating in Brazil have made climate commitments, perhaps driven by the risks climate change poses to industries, such as agriculture, manufacturing, and commodity-based exports, that the country's economy relies heavily on (Assad et al., 2013; Carlucci, 2015)Brazil has 5 million farms of which 85% are small holders and 16% are large commercial farms occupying 75% of the land under cul- tivation. In 2009, Brazil enjoyed a positive agricultural trade balance of $55 billion. In the second quarter of 2010, Brazil's econo- my recorded 8.8 percent growth with agri- culture making a major contribution (11.4 percent. Addressing climate change also seems to generate particularly high value for companies; a We Mean Business Coalition study of companies operating in Latin America and the Caribbean found that energy efficiency measures powered 90% of business's carbon emission reductions, and that companies operating in this region achieved a higher than average internal rate of return (of 16.7%) on these activities (We Mean Business, 2014).

The total GHG emissions (including LULUCF) in the current national policies scenario are projected to reach 1,205 and 1,445 $MtCO_2e$/year by 2030 (Kuramochi et al., 2017). The potential impact of individual

19 As measured by inclusion in the Global 500 and Forbes 2000 lists.

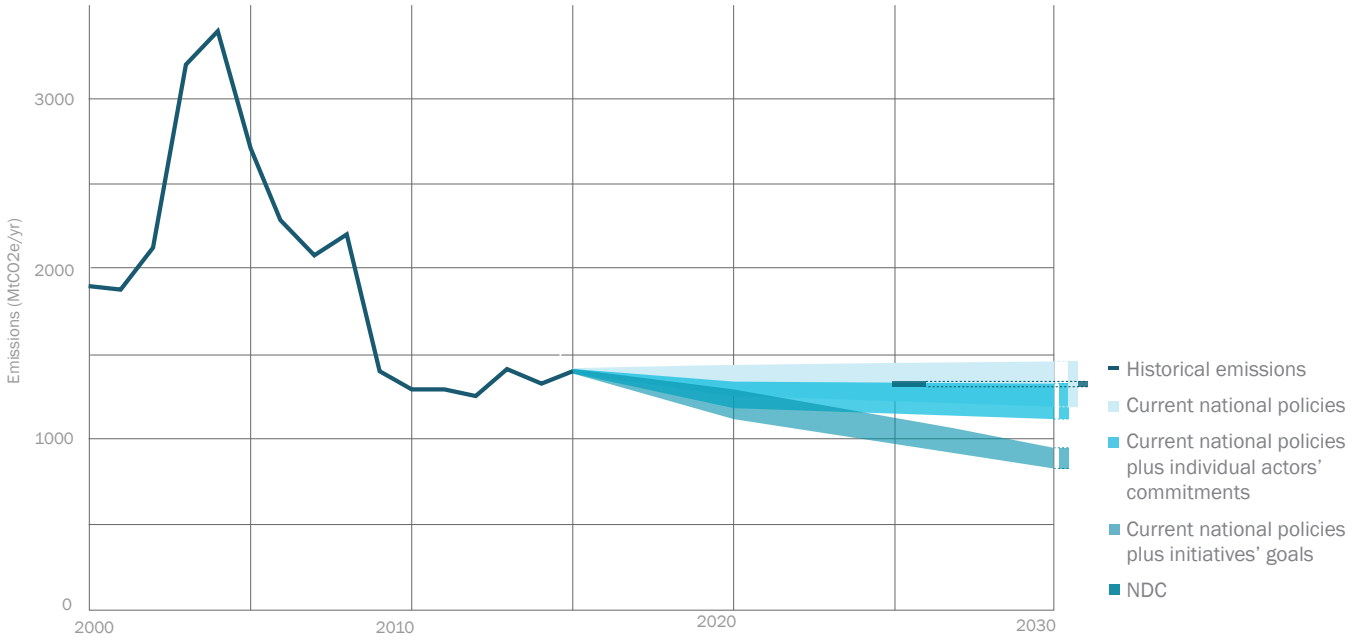


Figure 32
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Brazil, including land-use change and forestry.

non-state and subnational actors is to reduce between 75 and 130 $MtCO_2e$/year compared to the current national policies scenario, assuming all quantified commitments are fully implemented, and such efforts do not change the pace of action elsewhere (see Figure 32). This would lead to emission levels between 1,135 and 1,315 $MtCO_2e$/year in 2030.

Participation of Brazil in global cooperative initiatives is expected to result in 370 to 500 $MtCO_2e$/year by 2030 reductions compared to the current national policies scenario, assuming all quantified commitments are fully implemented, and such efforts do not decrease efforts elsewhere. The largest reductions are expected from the New York Declaration of forests and Bonn Challenge, for which total additional reductions are projected at around 70 $MtCO_2e$/year (see Figure 33).

The NDC of Brazil aims to reduce GHG emissions (including LULUCF) by 37% relative to 2005 by 2025, but also includes an indicative contribution of 43% reduction relative to 2005 by 2030. Although the implementation of current policies is already close to achieving the NDC, additional reductions from individual non-state and subnational actor reductions would make Brazil fully achieve its NDC by 2030. Additional reductions from ICIs to the Brazil NDC are projected between 250 and 730 $MtCO_2e$/year by 2030.

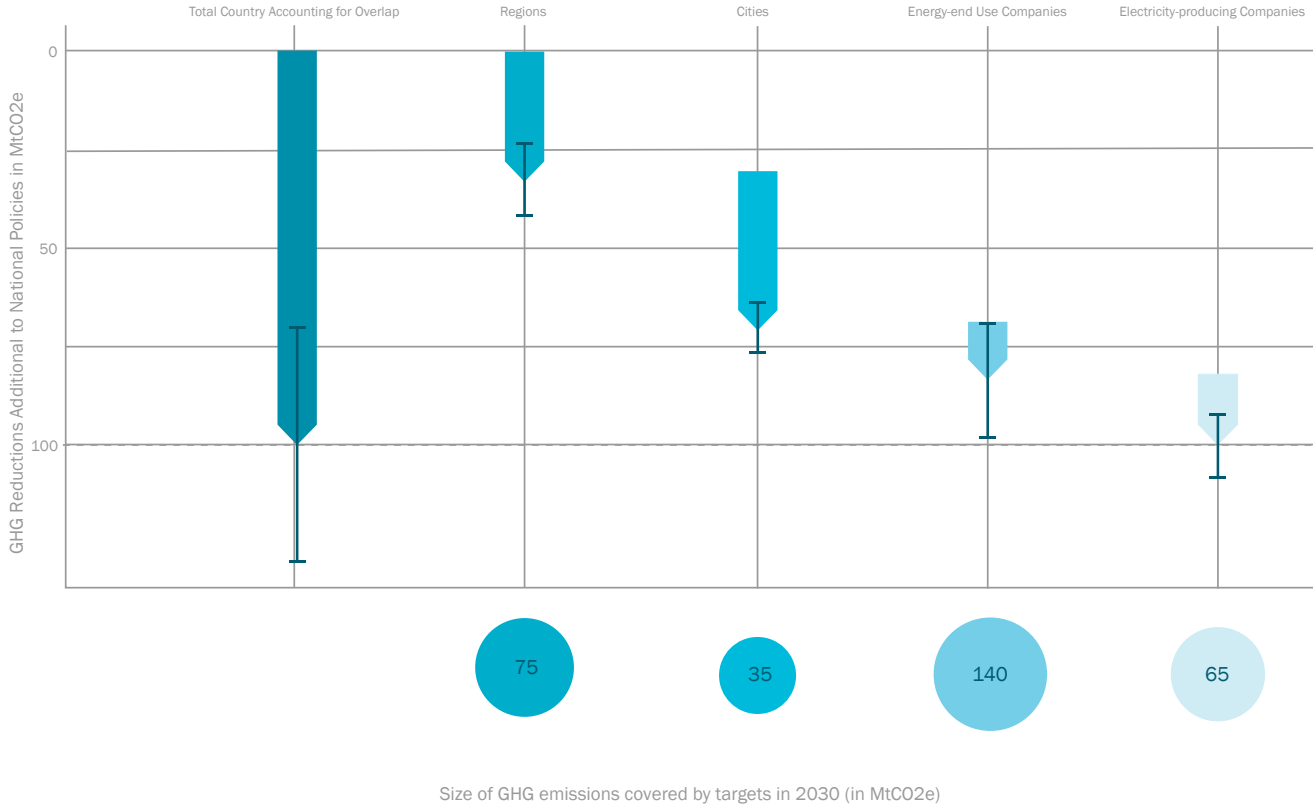


Figure 33
Potential impact (minimum and maximum estimate) of individual actors' commitments fully implemented based on the "current national policies" scenario for Brazil in 2030. (Source: this study).

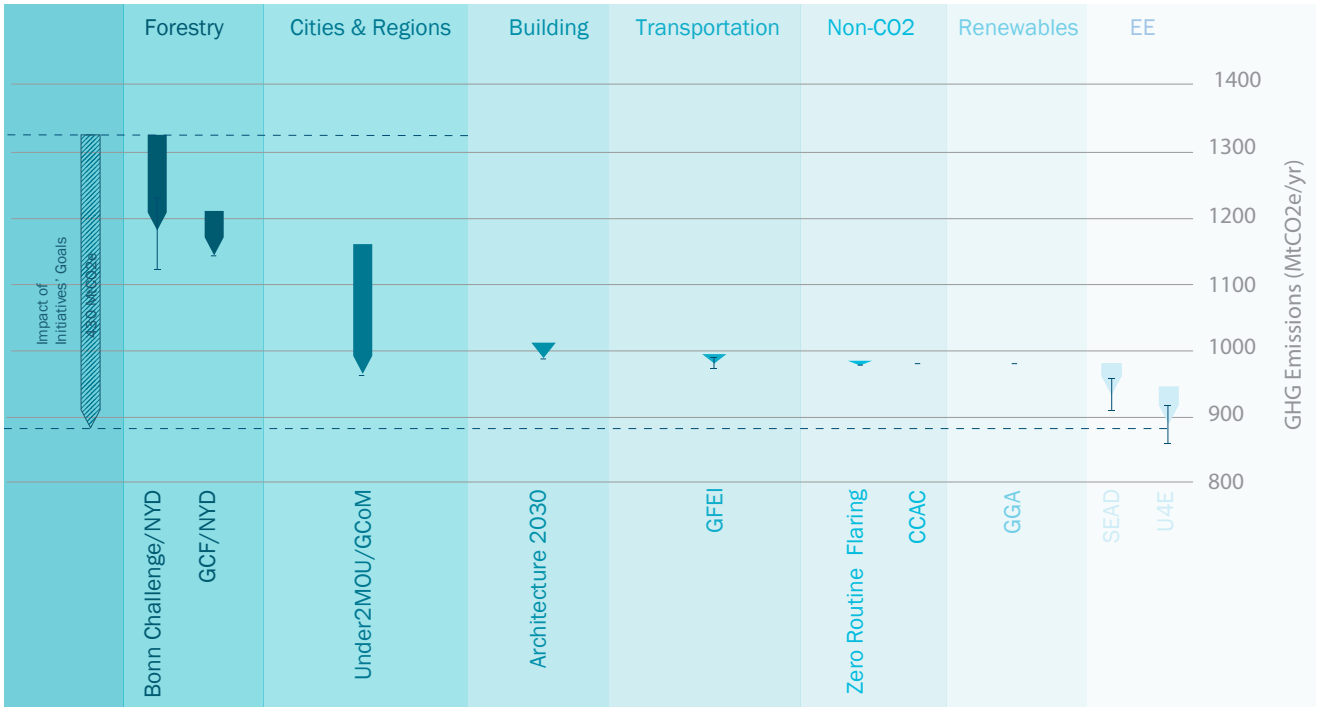


Figure 34
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario for Brazil in 2030.

4.5 INDIA

Country context

India's population reached 1.3 billion people in 2015, making it the second most populous country in the world (UNDESA, 2018). Their rapidly growing population and economy make it likely to host the fastest-growing electricity market of any of the world's biggest economies (IEEFA 2015, Climate Action Tracker 2018a). Already, the country has surpassed its goal of adding 10 GW of solar power capacity by 2017, with 12.2 GW of utility-scale solar PV capacity installed as of March 2017 (Bridge to India, 2017). The National Solar Mission aims to grow this total to 175 GW of renewable energy capacity by 2022 (Indian Ministry of New and Renewable Energy, 2015), forming one of the largest expansions of renewable energy programs in the world. Though coal remains a dominant part of its primary energy supply (Climate Transparency, 2017), the rapid growth of renewable energy, and a decline in coal imports and coal power plant development suggest that the country's transition to a low-carbon energy system continues to gain momentum (CDP, 2017c). India has also emerged as a leader in the transport sector, announcing a complete ban on new fossil fuel-driven cars after 2030, the only G20 country to do so (Climate Transparency, 2017; Climate Action Tracker, 2018a).

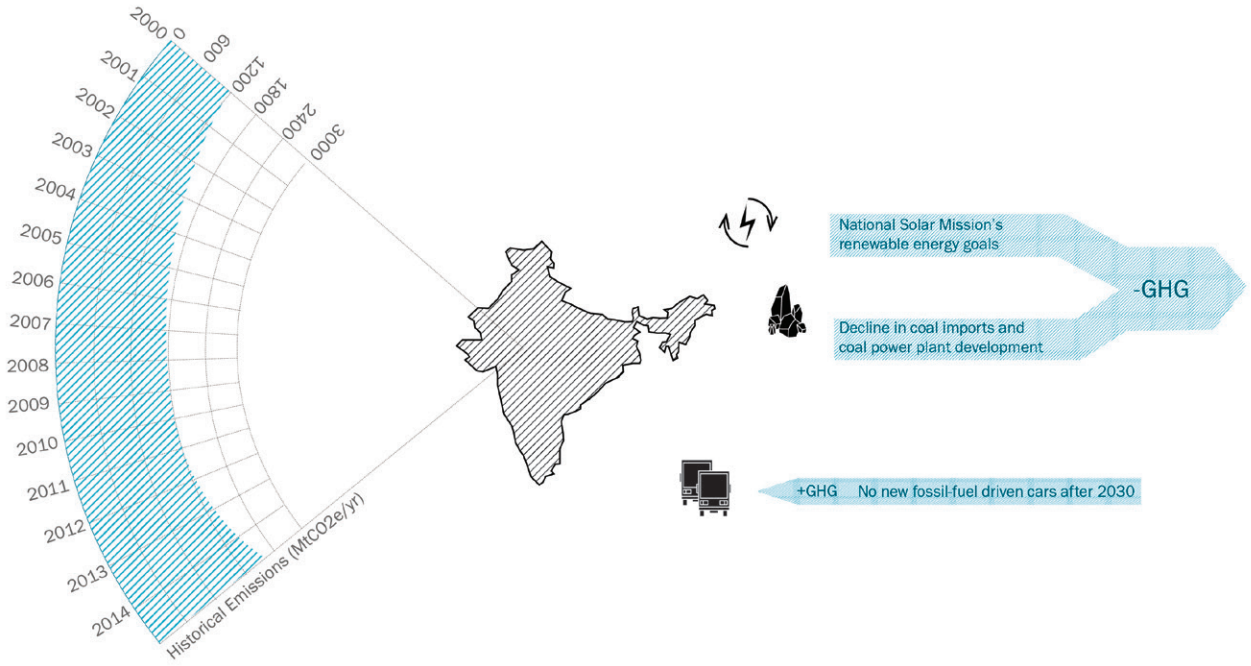
Footprint analysis: cities, regions, and companies

Cities and regions:

- 24 cities, with a total population of 54 million, just over 4% of India's total population, have made climate commitments. Of these, one city (Rajkot), representing a population of 1.4 million and accounting for just over 0.1% of India's total population, has made a greenhouse gas emissions reductions or renewable energy commitment.
- Three regions, Chhattisgarh, Gujarat, and Telangana, with a population of just under 121 million, about 9% of India's total population, have made climate commitments. None of these regions have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

Companies:

- More than 350 companies with operations in India have made over 900 climate commitments. Of this group, 58 are headquartered in India, representing a combined $281 billion USD in revenue.
- 58 of the world's largest[20] companies are based in India, with a combined $685 billion USD in revenue. 17% (11) of these companies,


2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
0
600
1200
1800
2400
3000
Historical Emissions (MtCO2e/yr)
National Solar Mission's renewable energy goals
Decline in coal imports and coal power plant development
-GHG
+GHG
No new fossil-fuel driven cars after 2030


Cities
4% 24 cities in climate action networks
0.1% 1 city with GHG Emission Commitments
Regions
9% 3 Regions in Climate Action Networks
Legend
In climate action networks
With Quantifiable Commitments
Other
2 Cities
1 Region
50 Companies
Population
Fortune 2000/Global 500 Largest Companies
Companies
281 billion USD
58 headquatered in India
350 Companies with 900 Climate Commitments
11
$152 Billion
58
$685 Billion
Revenue
Sectors with Most Commitments
99 the electrical equipment and machinery
90 software and services
62 automobiles and components

with a combined $152 billion USD in revenue, have made individual climate action commitments.

- Companies have made the most commitments in the electrical equipment and machinery sector (99); software and services sector (90); and automobiles and components sector (62).

Comparing subnational and non-state trajectory with national trajectory

Cities, regions, and companies have been instrumental in driving India's climate action forward. There has been slow but steady growth in the number of companies pursuing low-carbon investment opportunities and managing carbon risks; in the world's fastest-growing economy, this leadership has the potential to be especially impactful and to serve as a test case and model for other businesses and economies (CDP, 2018). Along with strong state-level action, businesses have played a crucial role in implementing India's solar goals. India's rapid projected urban growth -- two-thirds of the buildings that will exist in India in 2030 have yet to be built (Khosla, 2017) – makes the stakes of its urban development particularly high. Several national-level programs, such as the Transit Oriented Development Policy, Green Urban Mobility Scheme, Smart Cities, and Livability Index for Cities aim to facilitate coordination across different cities and government offices, as well as with the private sector and civil society (Ibid).

In the current national policies scenario, total GHG emission levels increase to a level between 4,020 and 5,125 $MtCO_2e$/year by 2030 (Kuramochi et al., 2017). The potential impact of individual non-state and subnational actors is to reduce between 225 and 255 $MtCO_2e$/year by 2030 compared to the current national policies scenario, assuming all quantified commitments are fully implemented, and such efforts do not change the pace of action elsewhere (see Figure 35). This would result in emission levels between 3,795 to 4,875 $MtCO_2e$/year. Our dataset with individual commitments contains 339 commitments from companies and one city (Rajkot). In addition, 15 companies have put forward renewable energy commitments.

India's participation in global cooperative initiatives is expected to reduce between 280 and 490 $MtCO_2e$/year by 2030 compared to the current national policies scenario assuming all quantified goals are fully implemented, and such efforts do not change the pace of action elsewhere. These reductions mainly come from the city and regional initiatives (135 $MtCO_2e$/year), Architecture 2030 (183 $MtCO_2e$/year), and United for Efficiency initiatives (68 to 160 $MtCO_2e$/year) (see Figure 35). This would lead to total GHG emissions levels in the 'current national policies plus initiatives goals' of 3,700 to 4,600 $MtCO_2e$/year, 8-13% below the current policy scenario in 2030.

20
As measured by inclusion in the Global 500 and Forbes 2000 lists.

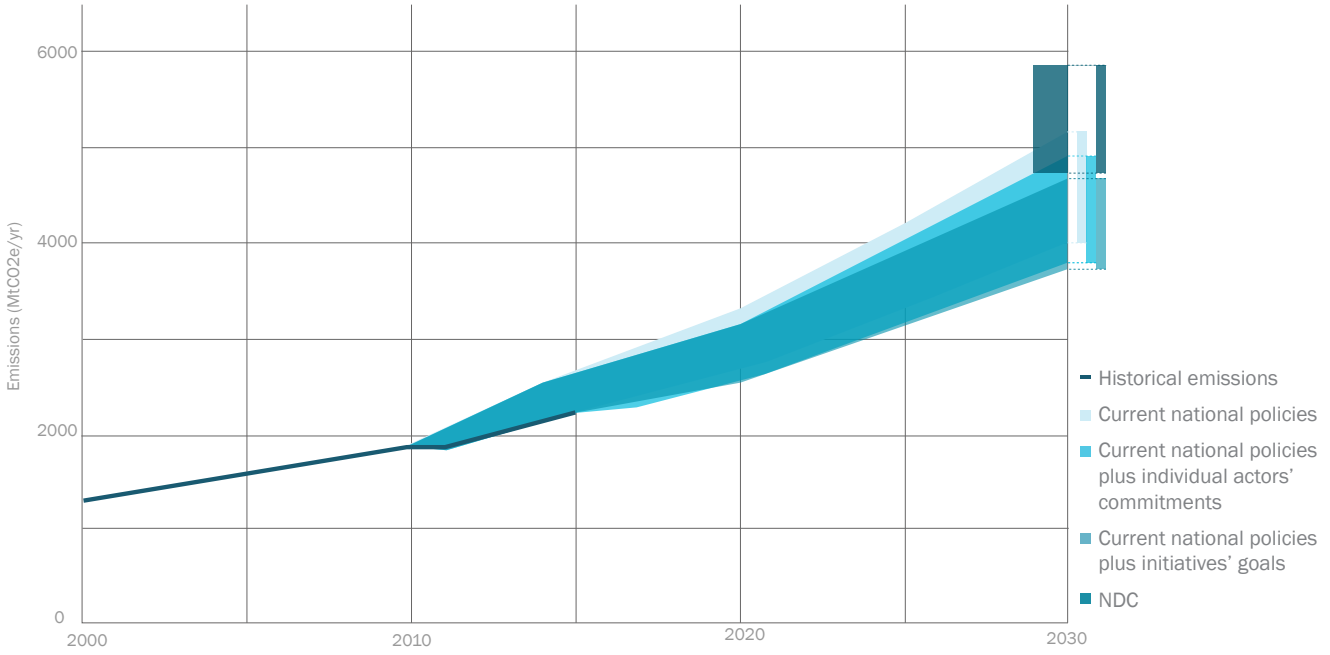


Figure 35
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario for India (Kuramochi et al, 2017), including land-use change and forestry.

India's current national policies have set it on a trajectory to deliver – and likely overachieve – the targets put forward in its NDC (Climate Action Tracker, 2018a). By 2030, India's NDC aims to reduce the emissions intensity of its GDP by 33-35% below 2005 levels use forest and tree cover to create a 2.5–3 GtCO2e/year carbon sink; and phase out the sale of diesel or petrol-powered vehicles should be sold in India (Ibid). If non-state and subnational actor commitments would be assessed relative to NDCs, instead of current national policies, additional reductions are projected between 460 and 770 $MtCO_2e$/year. Moreover, full implementation of global initiatives' goals for India, would bring emission levels beyond those that can be expected from NDCs to approximately 4,040 to 4,470 $MtCO_2e$/year.

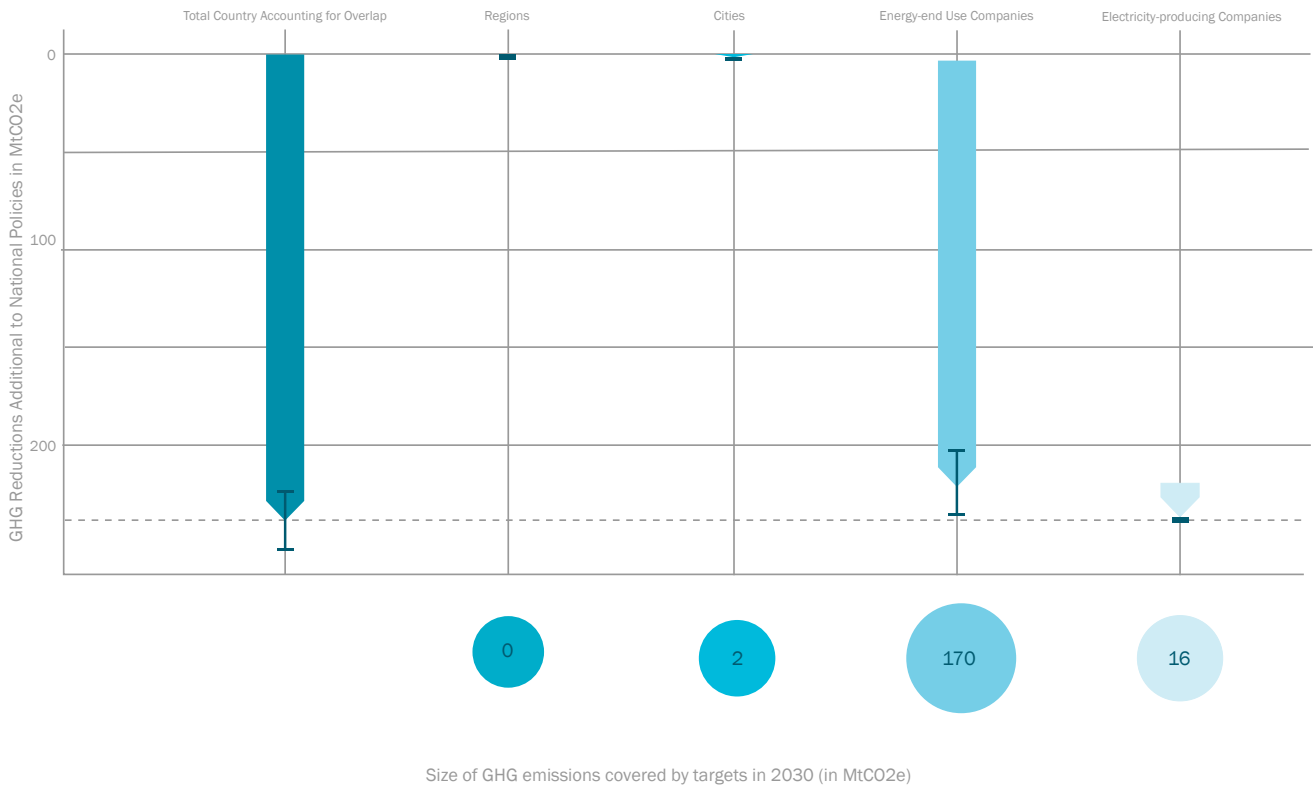


Figure 36
Potential impact (minimum and maximum estimate) of individual actors' commitments fully *implemented commitments based on the "current national policies" scenario for India in 2030. (Source: this study).*

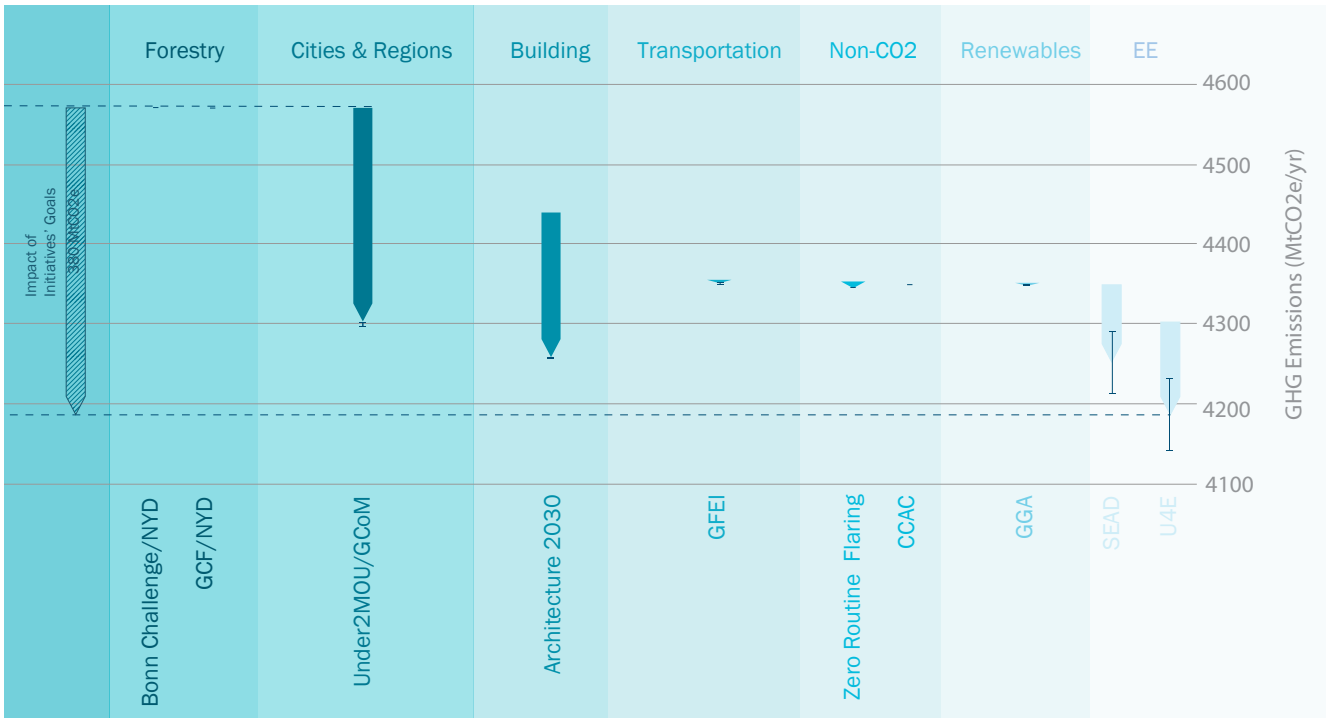


Figure 37
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for India in 2030.

4.6 INDONESIA

Country context

Indonesia is the fourth largest global emitter of greenhouse gas emissions, primarily due to significant emissions from its forestry sector. Indonesia has developed a number of policies to curtail its sizeable LULUCF emissions, including the Forest Moratorium (Kuramochi et al., 2017) which suspends the issuing of new licenses to use forest and peatland and covered 66 million hectares (163 million acres) as of November 2016 (Reuters, 2017). Despite these efforts, the country still maintains the highest deforestation-related emissions among G20 countries (Climate Transparency, 2017). Though Indonesia's forestry-related emissions remain substantial, they seem to have peaked, while its overall emissions grew at their fastest rate yet between 2012 and 2014, driven largely by rising energy-related emissions (Climate Action Tracker, 2018a). Indonesia has made progress in phasing out fossil fuel subsidies, although they remain high, while the country's investment attractiveness for renewable energy and overall renewable energy capacity remain low (Climate Transparency, 2017).

Footprint analysis: cities, regions, and companies

Cities and regions:

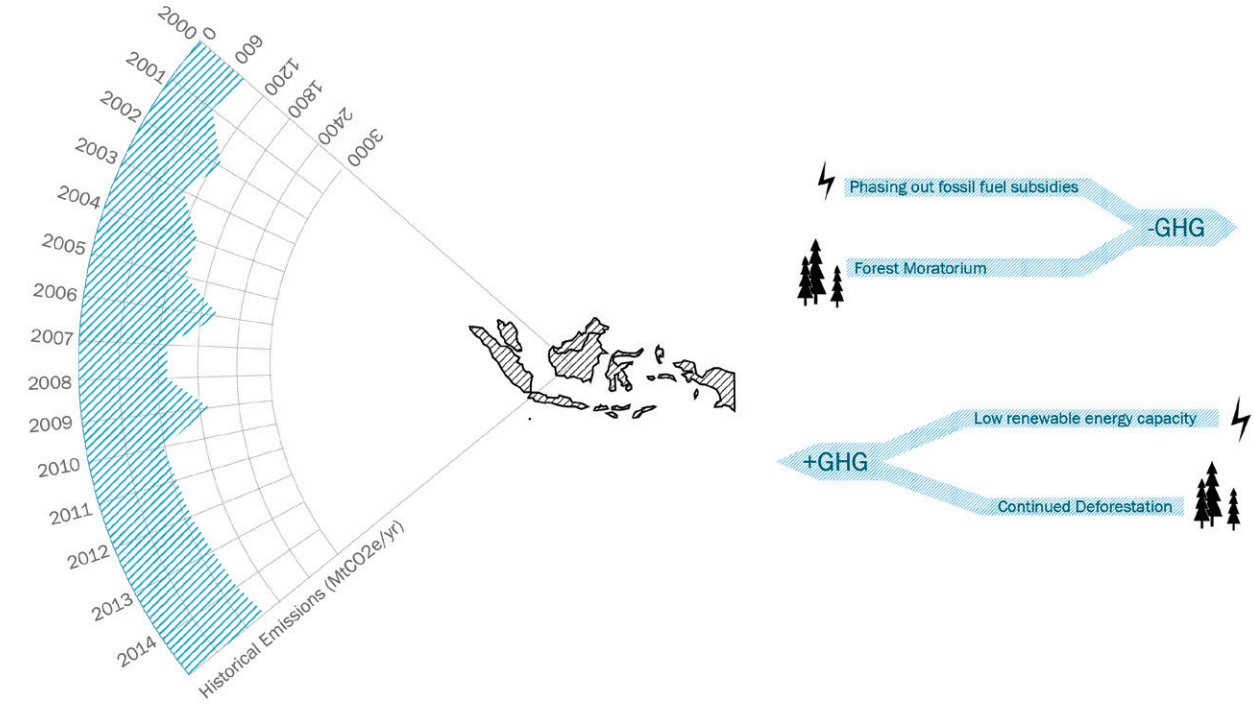
- 22 cities, with a population of over 29 million, 11% of Indonesia's total population, participate in climate action networks. Of these, six cities, Balikpapan, Bandung, Bogor, Semarang, Jakarta, and Cimahi, representing a population of 16.6 million, 6% of Indonesia's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.
- 3 regions, East Kalimantan, South Sumatra, and West Kalimantan, with a population of over 18 million, 7% of Indonesia's total population, participate in climate action networks. None of these regions have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

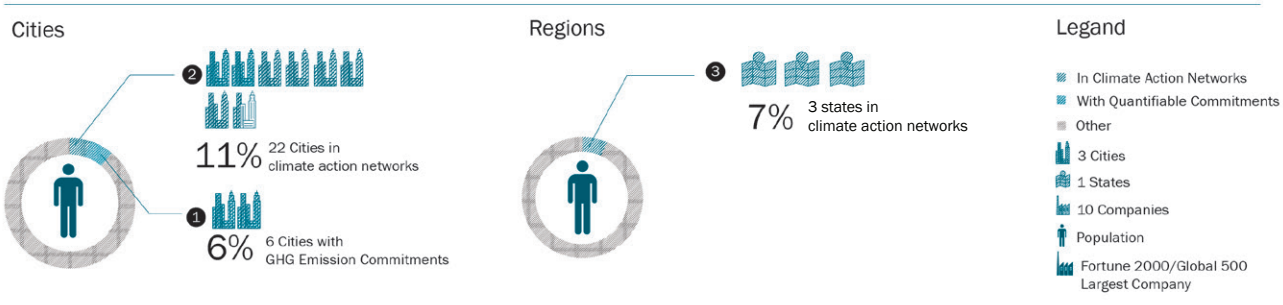
Companies:

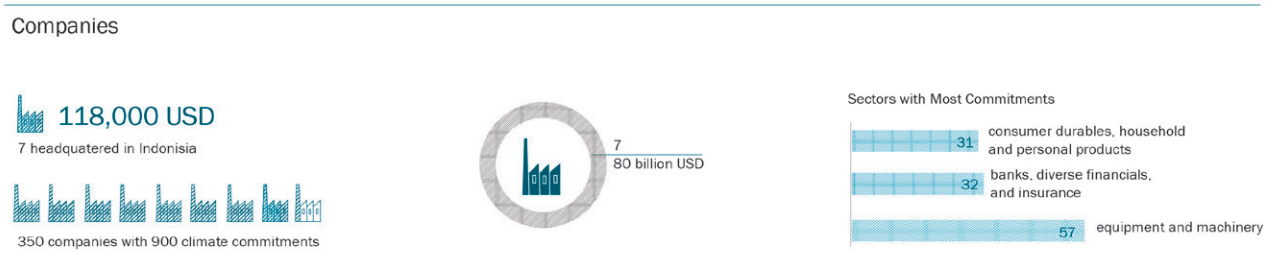
- 183 companies with operations in Indonesia have made over 450 climate commitments. Of this group, seven are headquartered in Indonesia representing a combined $118,000 USD in revenue.
- Seven of the world's largest[21] companies are based in Indonesia, with a combined $80 billion USD in revenue. None of these companies have made individual climate action commitments that are captured in our database.

21
As measured by inclusion in the Global 500 and Forbes 2000 lists.

CLIMATE ACTION IN INDONESIA







- Companies have made the most commitments in the electrical equipment and machinery sector (57); banks, diverse financials, and insurance sector (32); and consumer durables, household and personal products (31) sector.

Comparing subnational and non-state trajectory with national trajectory

Expanding subnational and non-state engagement could help catalyze deeper emissions reductions. Indonesia's 34 provinces will be largely responsible for delivering its proposed emissions reductions (Utami, Juliene and Ge, 2016). The national climate plan mandates all provinces to develop a local greenhouse gas reduction plan (WRI, 2016), and many participate in forums such as the Governors' Climate and Forests Task Force, which discusses ways to promote low emission rural development and reduce emissions from deforestation and land-use (REDD+). Since Indonesia's deforestation stems largely from its role as the world's largest palm oil producer (BusinessWire, 2017), companies operating in this sector could play a powerful role in addressing this source of emissions. Additionally, as Indonesia's population continues to grow and gather in urban areas, strategies the address climate change and promote sustainable develop could help the country both mitigate and adapt to climate change.

Total GHG emission in the current national policies scenario are projected to increase by 2030 to levels between 2,065 and 2,140 $MtCO_2e$/year. The potential impact of non-state and subnational actors is a reduction of around 205 $MtCO_2e$/year compared to the current national policies scenario by 2030, assuming all quantified commitments are fully implemented, and such efforts do not change the pace of action elsewhere (see Figure 38).

The potential impact for Indonesia of participation in global cooperative initiatives is to reduce between 770 and 1,430 $MtCO_2e$/year compared to the current national policies scenario, assuming all quantified goals are fully implemented. These reductions would bring Indonesia to emission levels between 700 and 1,290 $MtCO_2e$/year by 2030. Large reductions are possible in the forestry sector, and Indonesia is part of the Bonn Challenge, New York Declaration of Forests and the Governors' Climate and Forest Task Force (see Figure 37). In addition, the potential of the Global Geothermal initiative is to reduce around 90 $MtCO_2e$/year reductions compared to the current national policies scenario. This would decrease Indonesia's emissions by 37% to 65% below the current policy scenario by 2030.

The NDC target for Indonesia aims to reduce total GHG emissions (including LULCUF) with 29% relative to a business-as-usual scenario by 2030. If the global initiatives would be fully implemented, emission levels could reach between 1,370 and 2,010 $MtCO_2e$/year, approximately reaching Indonesia's NDCs.

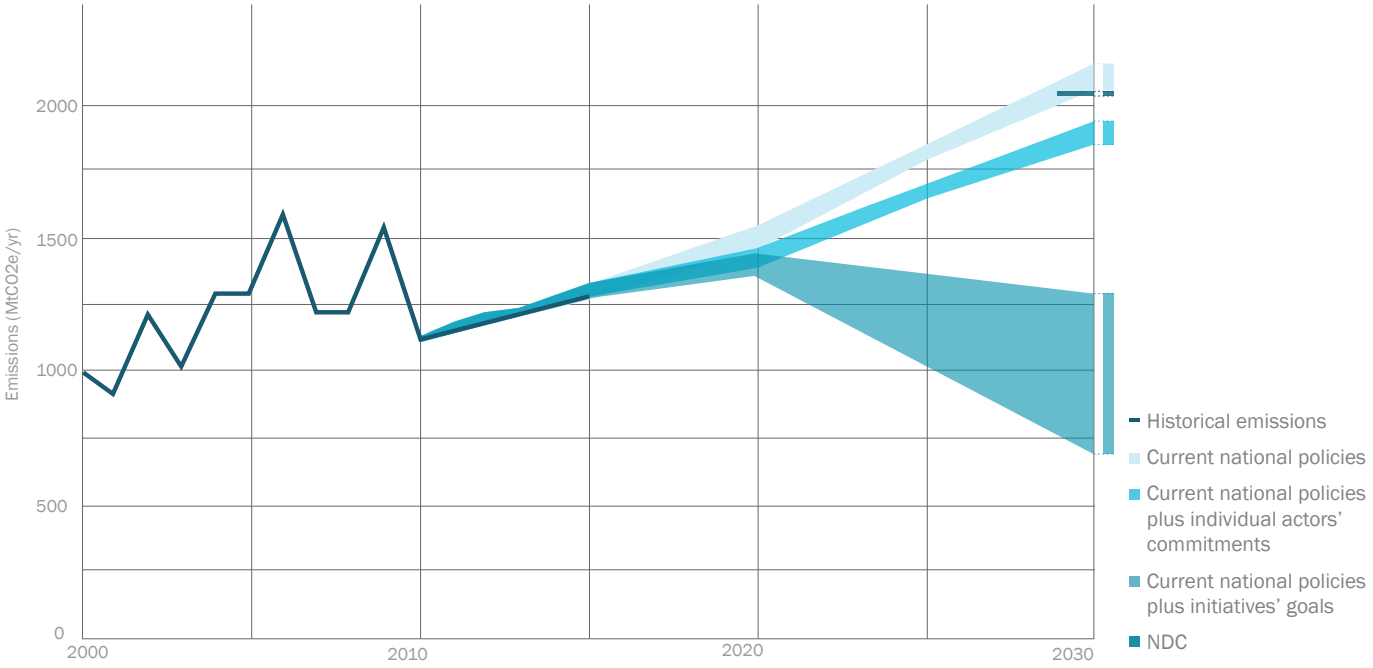


Figure 38
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Indonesia, including land-use change and forestry.

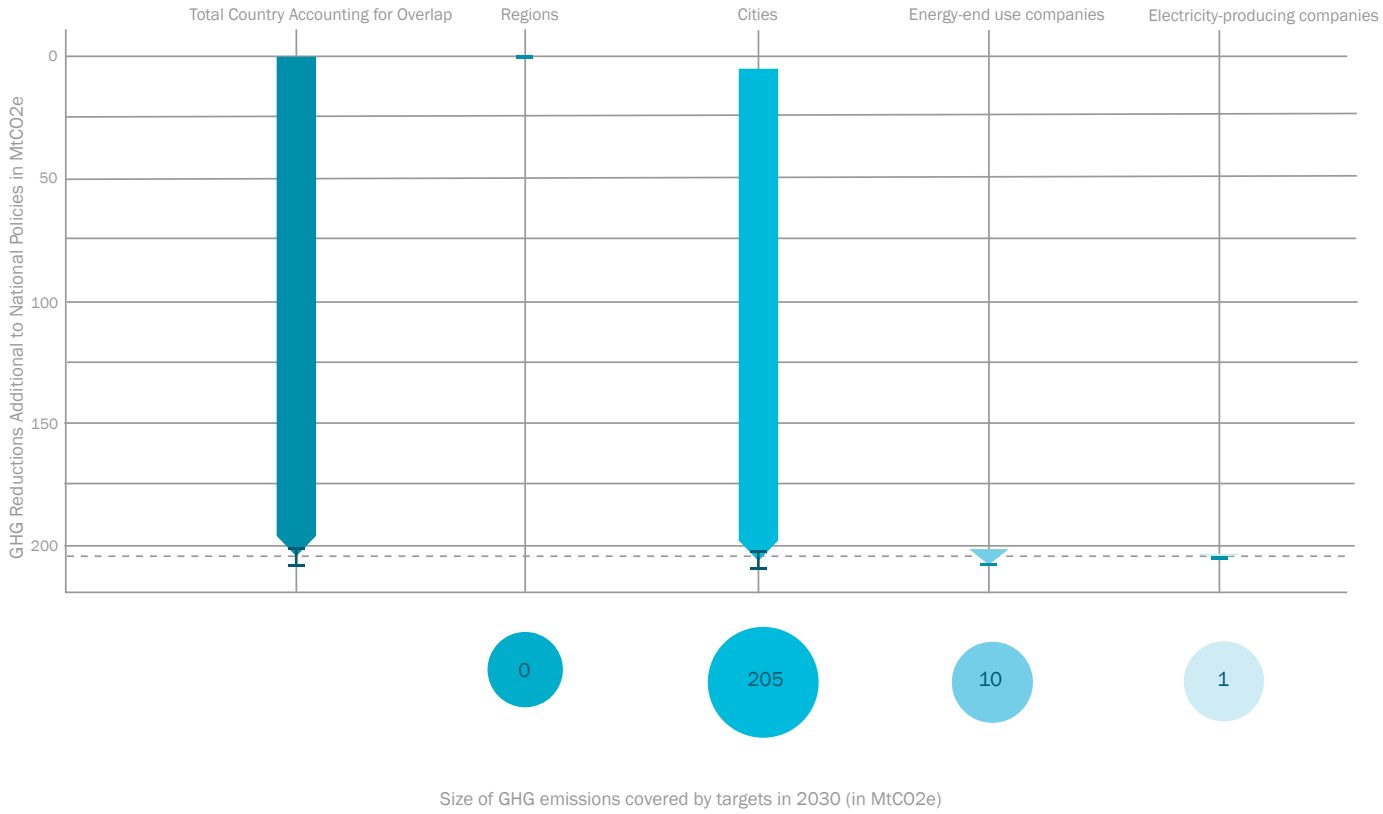


Figure 39
Potential impact (minimum and maximum estimate) of individual actors' commitments fully implemented based on the "current national policies" scenario for Indonesia in 2030. (Source: this study).

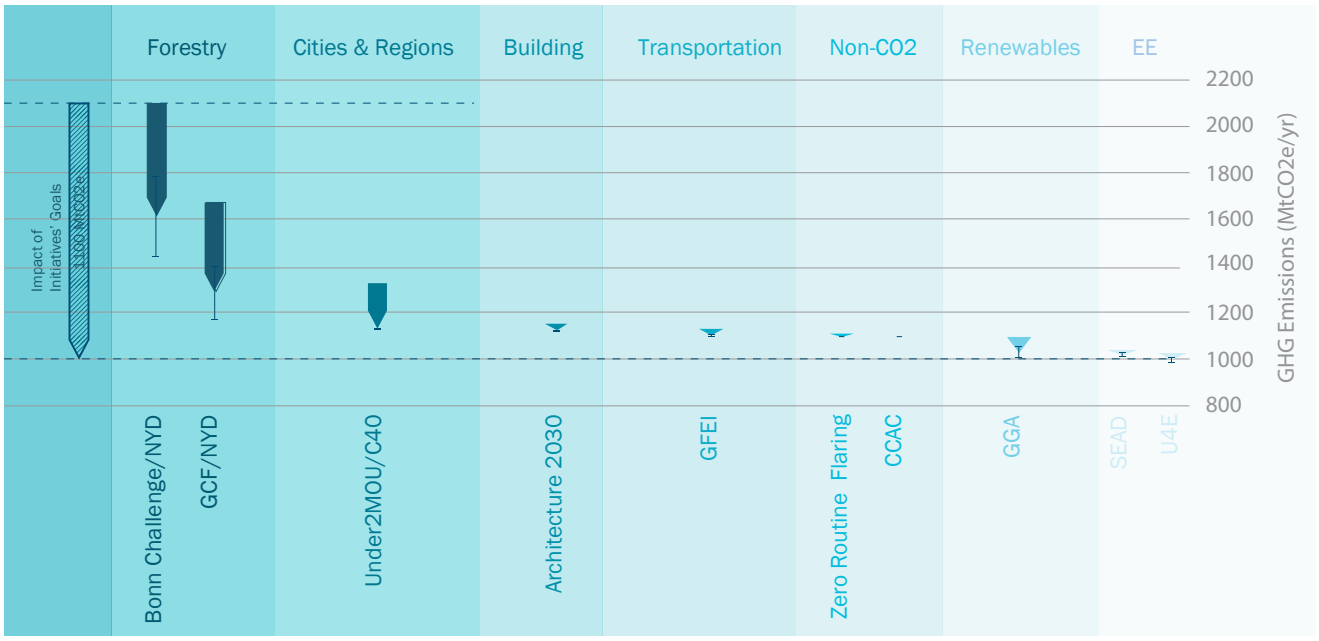


Figure 40
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario for Indonesia in 2030.

4.6 JAPAN

Country context

Japan is the fifth largest GHG emitting country in the world. Its emissions increased by about 100 $MtCO_2e$/year in 2013, compared to 2010, due to the replacement of nuclear power with coal-fired power following the 2011 Fukushima nuclear accident. Emissions have fallen since 2013, mainly due to reduced electricity demand (Climate Action Tracker, 2018a). Though Japan has relied on nuclear energy as an alternative to fossil fuels, renewable energy has grown over recent years, and might help accelerate its decarbonization. Policies like the Renewable Energy Act, which established a feed-in tariff and funding for distribution networks, have helped grow the share of renewable energy in the total electricity generation from 8.8% in 2010 to 15% in 2016 (Renewable Energy Institute, 2018).

Footprint analysis: cities, regions, and companies

Cities and regions:

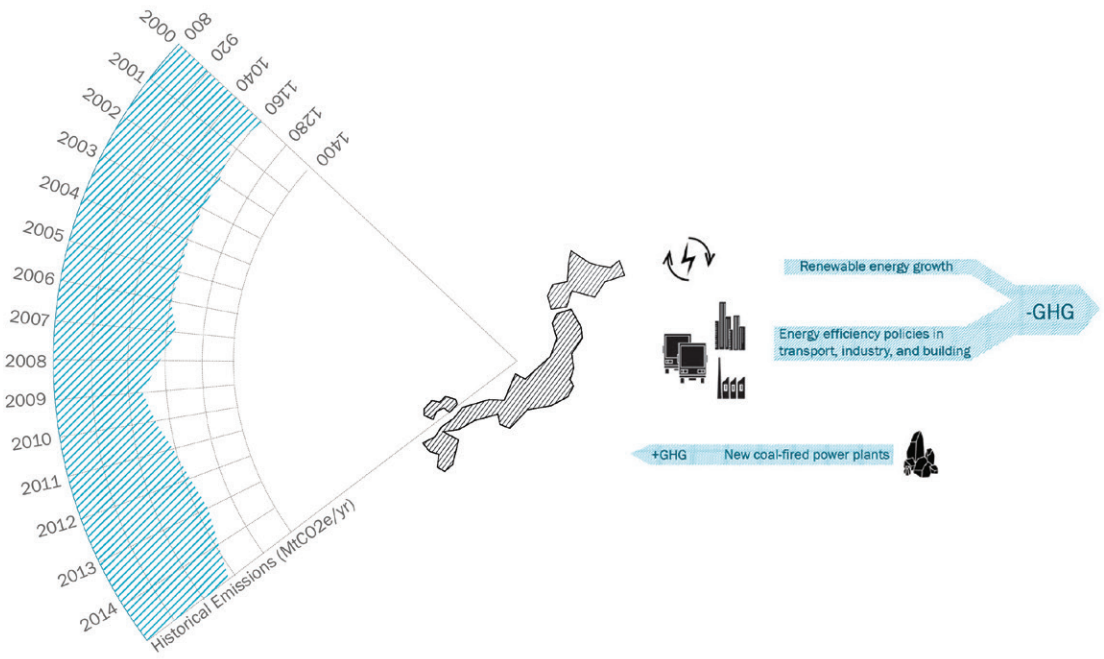
- Just over 100 cities, with a total population of population of 78 million, 61% of Japan's total population, participate in climate networks. Of these, 61 cities, with a population of nearly 59 million, 46% of Japan's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.
- 26 regions, with a total population of nearly 71 million, 56% of Japan's population, have made climate commitments. Of these, 13 regions, with a total population of 33 million, 26% of Japan's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

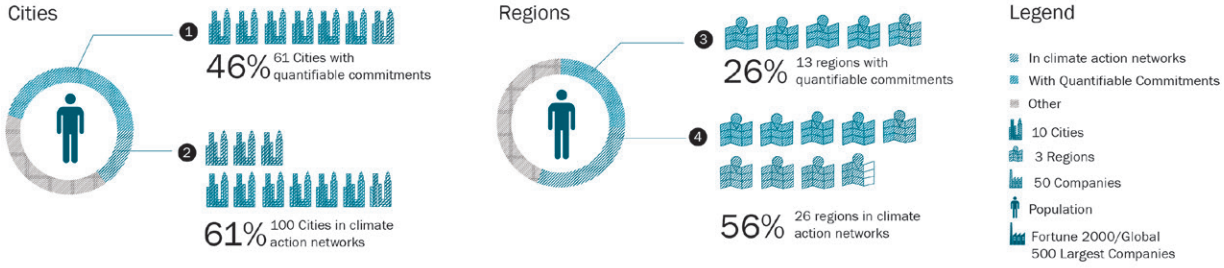
Companies:

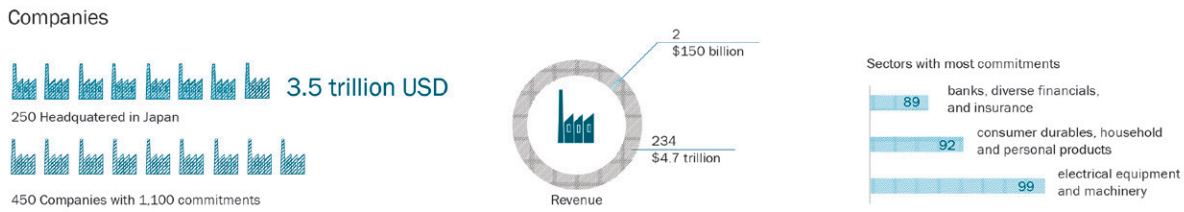
- More than 450 companies with operations in Japan have made over 1,100 climate commitments. Of this group, more than 250 are headquartered in Japan, representing a combined $3.5 trillion USD in revenue.
- 234 of the world's largest[22] companies are based in Japan, with a combined $4.7 trillion USD in revenue. Two of these companies, with a combined $150 billion USD in revenue, have made individual climate action commitments.
- Companies have made the most commitments in the electrical equipment and machinery sector (99); chemicals sector (92); and banks, diverse financials, and insurance sector (89).

22
As measured by inclusion in the Global 500 and Forbes 2000 lists.

CLIMATE ACTION IN JAPAN







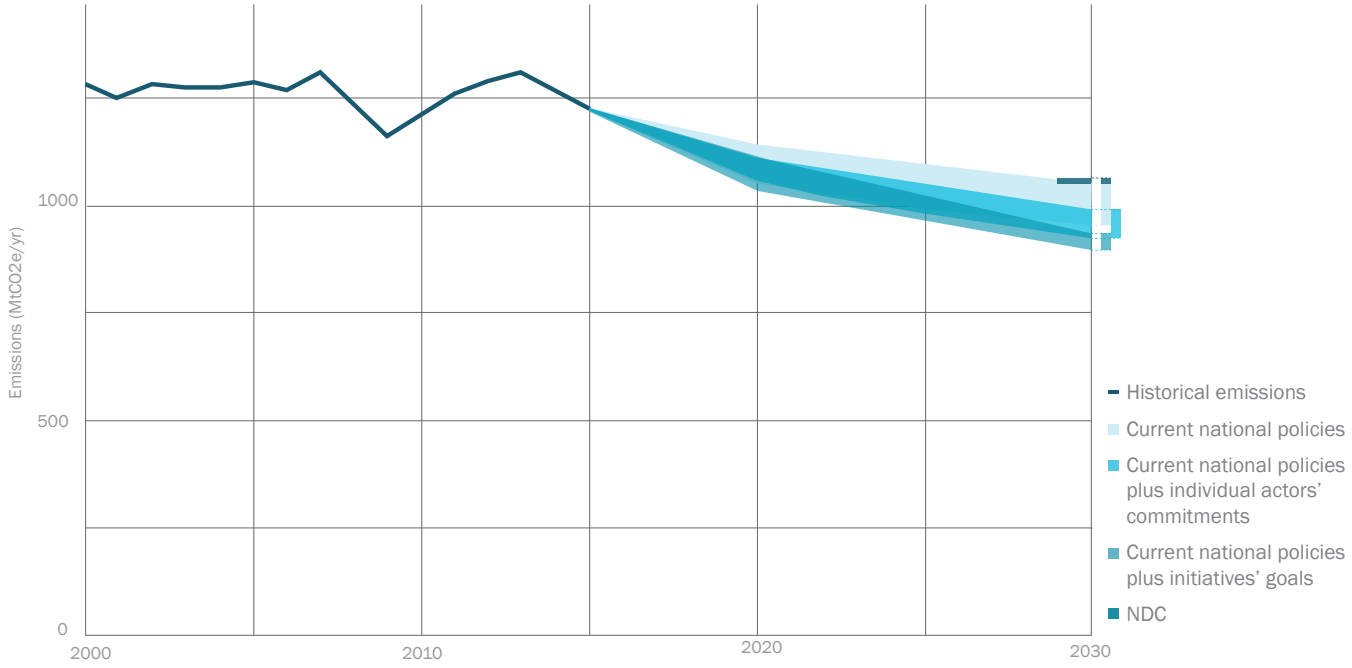


Figure 41
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Japan, including land-use change and forestry (and credits estimates for the NDC).

Comparing subnational and non-state trajectory with national trajectory

As of August 2018, the commitments from non-state and subnational actors in Japan are not as prominent as in the US and the EU, both in terms of the target levels and the coverage of emissions. In Japan the business sector is comparatively more active than the subnational actors in terms of GHG emissions reduction commitments, with nearly 900 companies covered in our analysis.

The potential impact of individual commitments is relatively small, they add between 25 and 55 MtCO2e/year to the current national policies scenario by 2030. But, potential reductions from ICIs can be substantial in Japan, about 60 to 120 MtCO2e/year in 2030 or 2 to 13% of current emissions, when the goals are assumed to be achieved. These commitments will contribute to securing Japan's achievement of its NDC target (26% below 2013 levels in 2030). Compared to Japan's NDC scenario, emission reductions from fully implemented ICIs are projected between 40 and 100 $MtCO_2e$/year by 2030.

The largest potential is found in the SEAD initiative (21 - 48 $MtCO_2e$/year), under which the countries aim to adopt current policy best practices for product energy efficiency standards. Substantial emissions reduction potential is also identified for the Architecture 2030 initiative (around 25 MtCO2e/year), which aims for efficient energy use in buildings as well as in cities initiatives (up to 30 MtCO2e/year).

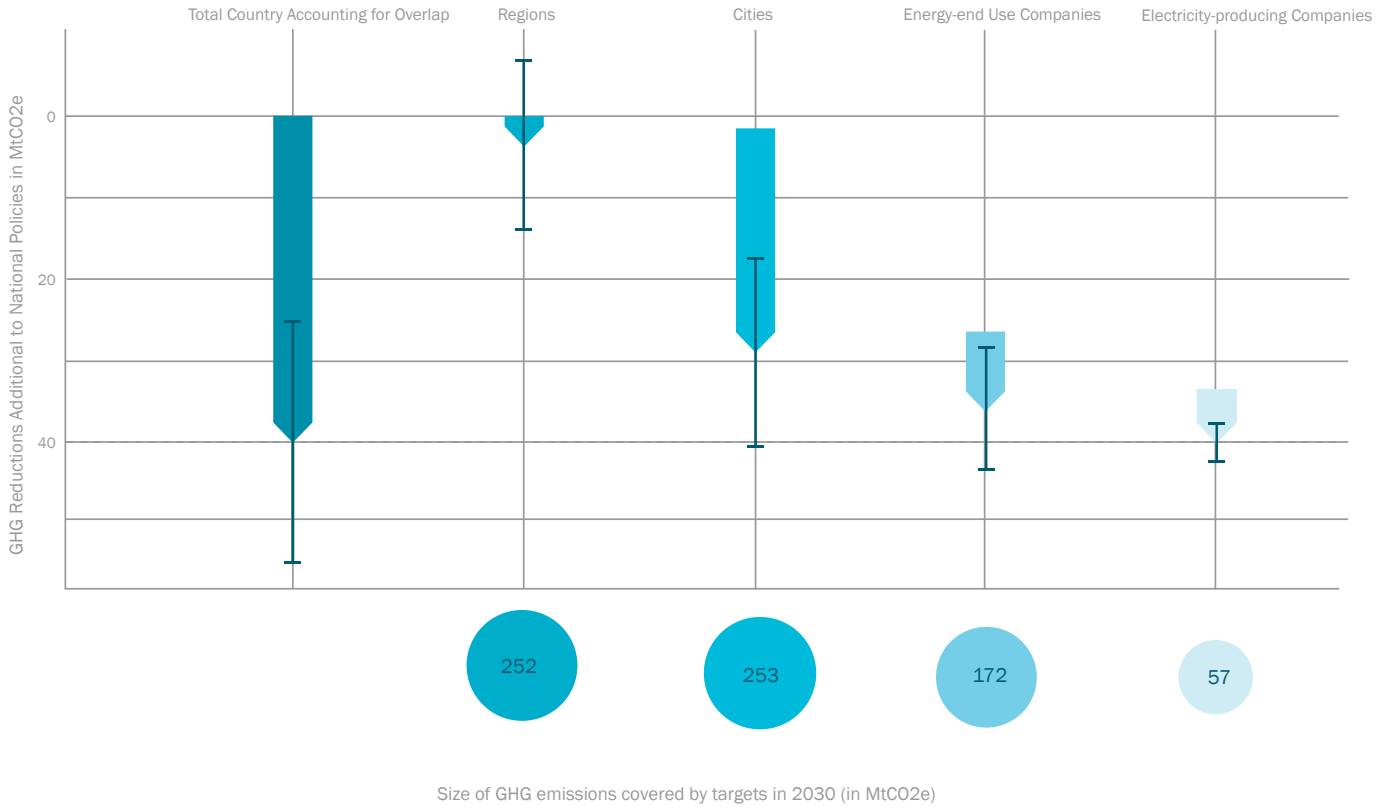


Figure 42
Potential impact (minimum and maximum estimate) of individual actors' commitments fully implemented based on the "current national policies" scenario for Japan in 2030. (Source: this study).

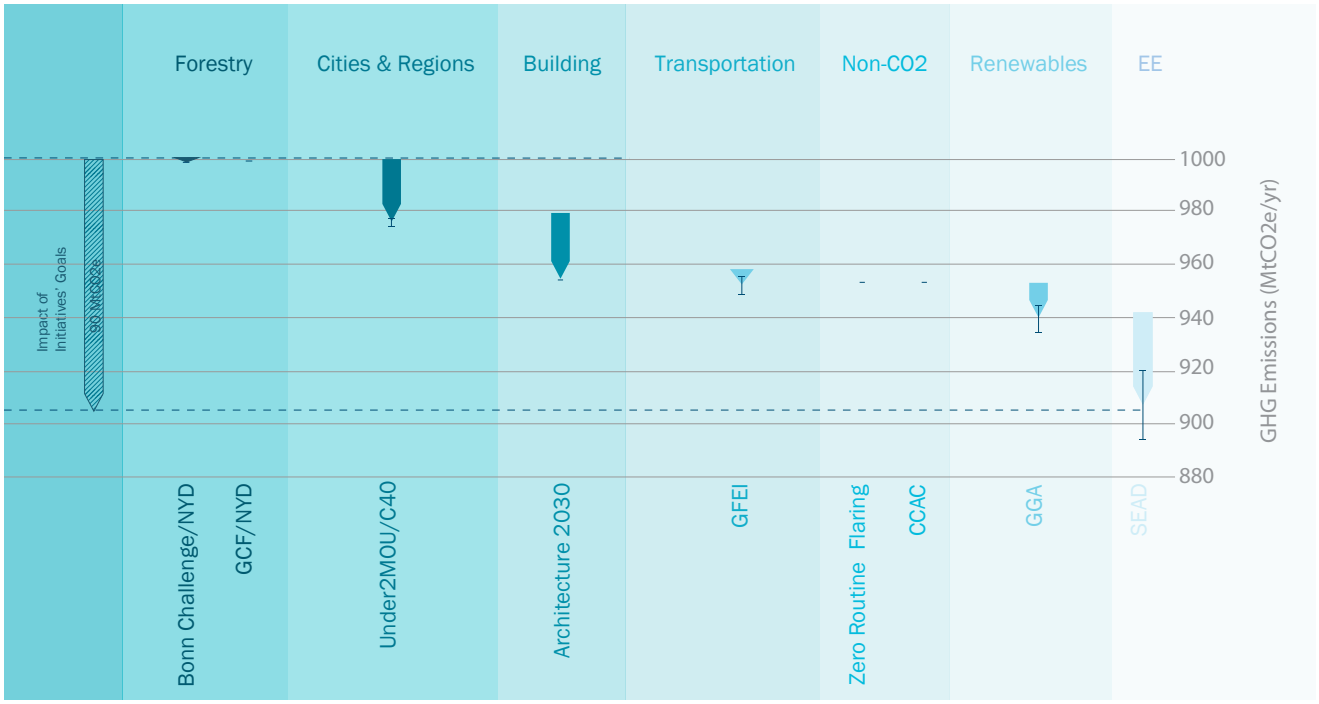


Figure 43
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Japan in 2030.

4.7 MEXICO

Country context

Mexico's emissions have shifted from being driven primarily by agriculture and LULUCF to being tied to energy-related emissions (Climate Action Tracker, 2018a). The country has increased its renewable energy capacity significantly (Climate Transparency, 2017), but further growth could accelerate its progress towards decarbonization. Mexico has set clean energy targets of 30% by 2021, and 35% by 2024 (Kuramochi et al., 2017), and could have the potential to generate up to 46% of its electricity, or 280 terawatt-hours (TWh), from renewable sources each year. Policies that facilitate expanded infrastructure, grid integration, and the uptake of renewable energy to heat and fuel buildings, industry, and transport could help accomplish this key shift in Mexico's highest emitting sector (IRENA, 2015).

Footprint analysis: cities, regions, and companies

Cities and regions:

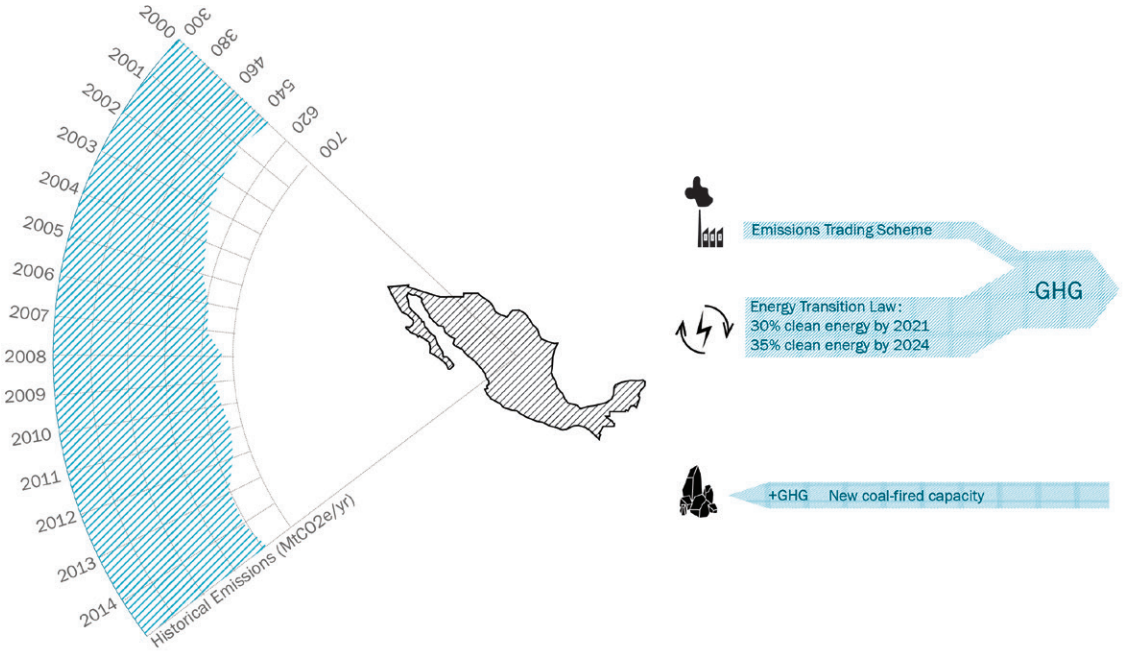
- 56 cities, with a population of 31 million, 24% of Mexico's population, participate in climate action networks. Of these, 8 cities, representing a population of 15 million, accounting for 12% of Mexico's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.
- Nine regions, with a population of 46 million, 36% of Mexico's population, have made climate commitments. Of these, one region, Jalisco, with a population of 8 million, 6% of Mexico's population, has made a quantifiable greenhouse gas emissions reductions or renewable energy commitment.

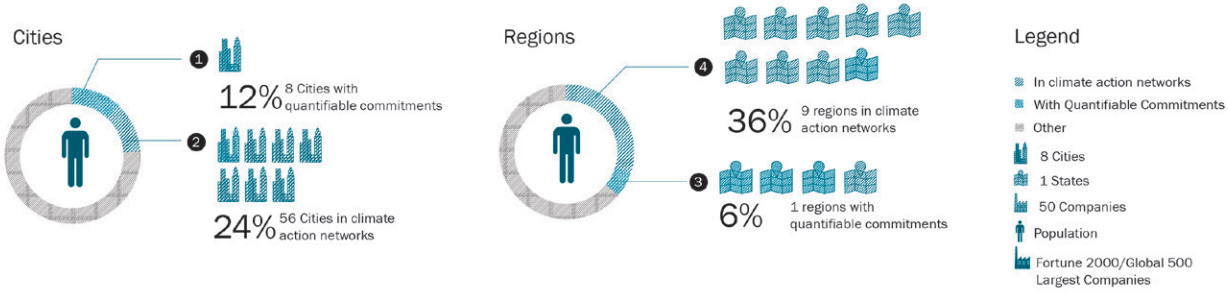
Companies:

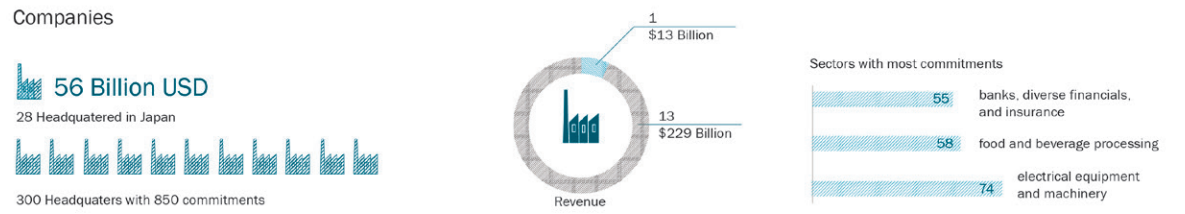
- More than 300 companies with operations in Mexico have made over 850 climate commitments. Of this group, 28 are headquartered in Mexico, representing a combined $56 billion USD in revenue.
- 13 of the world's largest[23] companies are based in Mexico, with a combined $229 billion USD in revenue. One of these companies, with $13 billion USD in revenue, has made an individual greenhouse gas emissions reductions or renewable energy commitment.
- Companies have made the most commitments in the electrical

23
As measured by inclusion in the Global 500 and Forbes 2000 lists.

CLIMATE ACTION IN MEXICO







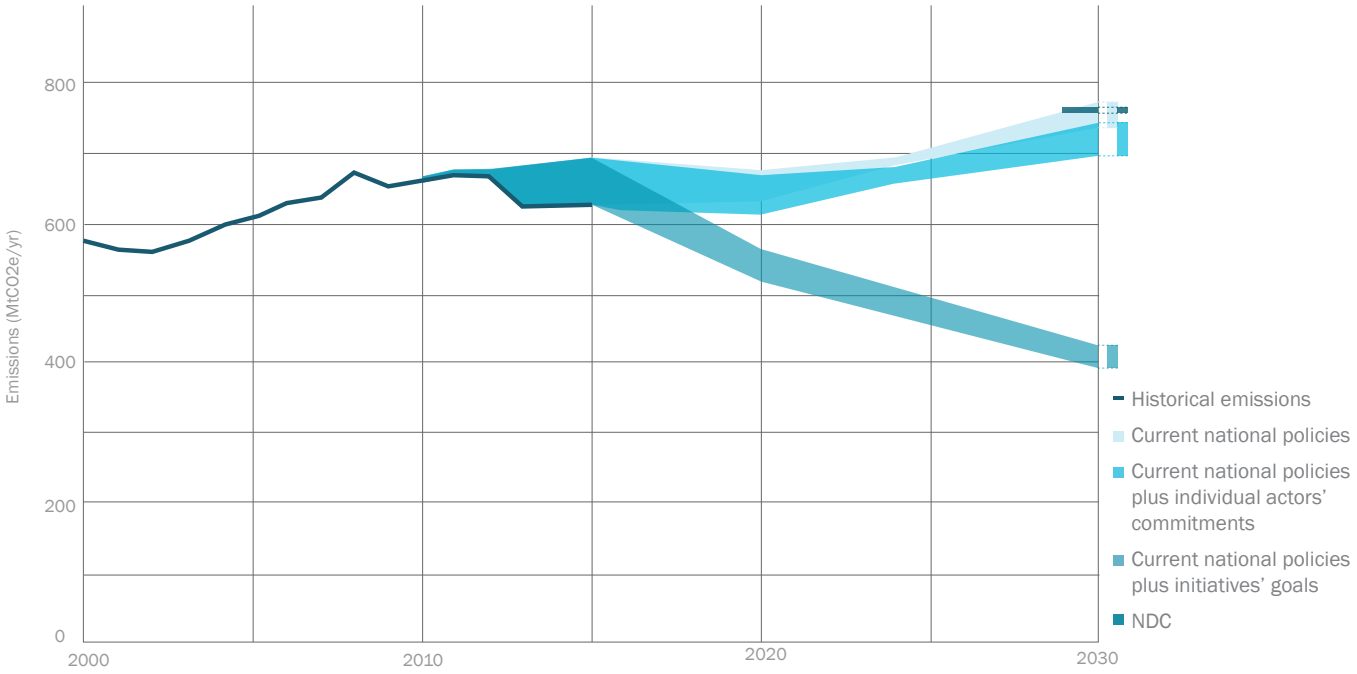


Figure 44
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Mexico, including land-use change and forestry (and credits estimates for the NDC).

equipment and machinery sector (74); automobiles and components sector (58); and food and beverage processing (55) sector.

Comparing subnational and non-state trajectory with national trajectory

While subnational and non-state action in Mexico is substantial, it has room to grow and strengthen further. Though some of the country's largest cities – including Mexico City – have made ambitious commitments, this constitutes under one-fourth of the total urban population in the country. While 13 of the world's largest companies are based in Mexico, just one of these has made a quantifiable commitment captured within the CDP database. This may be due to a lack of national imperative for businesses to make such commitments; unlike most G20 countries, Mexico has no energy efficiency standards in the industry sector (Climate Transparency, 2017), Some national programs for business do exist. Mexico instituted a mandatory Emissions Trading Scheme that starts with a 3-year pilot phase in August 2018. The national carbon market is expected to include between 400 and 700 companies (Climate Action Tracker, 2018a).

Total GHG emissions in the current national policies scenario are projected to increase to levels between 745 and 770 $MtCO_2e$/year by 2030. The potential impact of non-state and subnational actors is to reduce between 30 and 40 $MtCO_2e$ by 2030 compared to the current

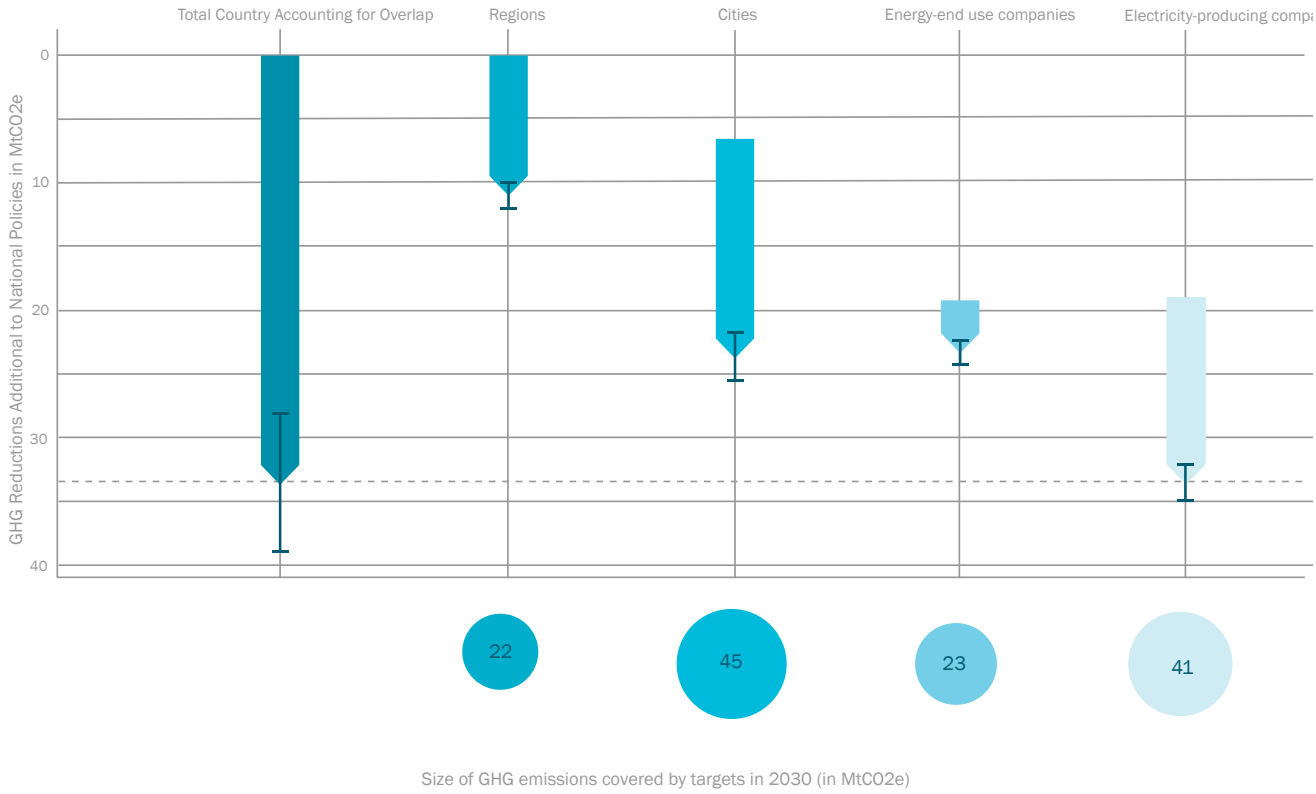


Figure 45
Potential impact (minimum and maximum estimate) of individual actors' commitments fully implemented based on the "current national policies" scenario for Mexico in 2030. (Source: this study).

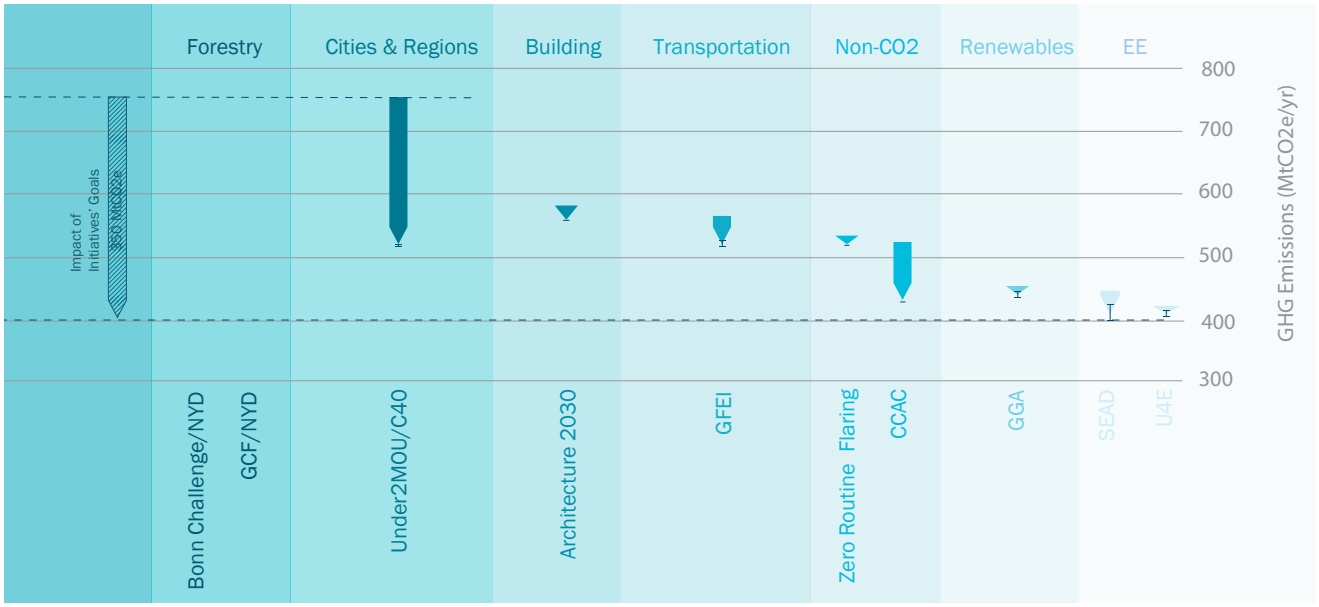


Figure 46
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Mexico in 2030.

national policies scenario, assuming all quantified commitments are fully implemented, and such efforts do not change the pace of action elsewhere. (See Figure 44).

The potential impact of participation in global initiatives is a reduction compared to the current national policies scenario between 340 and 350 $MtCO_2e$/year in 2030, assuming all quantified goals are fully implemented. The largest reductions are expected from participation in the C40, GCoM and Under2MoU (100 - 140 $MtCO_2e$/year) where the coverage is already very high in comparison with other countries and is therefore assumed to stay stable and Climate and Clean Air Coalition (around 95 $MtCO_2e$/year by 2030) (see Figure 41).

Mexico's NDC aims to reduce GHG emissions by 22% (unconditional), and by 36% (conditional) compared to a business-as-usual scenario by 2030. If fully implemented, the initiatives goals would bring emission levels for Mexico in the range of what can be expected from the NDC, with a further emissions reduction impact between 170 and 240 $MtCO_2e$/year in 2030.

4.8 RUSSIA

Country context

Russia signed but remains the only big emitter that has yet to ratify the Paris Agreement, intending to do so in 2019 or 2020 (Davydova, 2017; Climate Action Tracker, 2018a). Its implementation of efforts to increase renewable energy and energy efficiency have likewise remained slow, with its national energy strategy still centered on fossil fuels (Climate Transparency, 2017). The country's emissions have been on a downward trajectory since the collapse of the Soviet Union, but efforts to shift to a fully decarbonized economy have not yet begun in earnest. This is partly due to objections from high-carbon businesses, such as coal and metallurgy, as well as the continued development of fossil fuels, while the country's economy remains closely tied to the oil and gas industry (Kokorin, 2016; Davydova, 2017). However, there is a growing recognition that climate change also threatens Russia's economy; climate-related economic damage in the Moscow region, which holds roughly 20 million people is expected to reach $4.3 billion per year by 2025 (Davydova, 2017). Accelerating the ratification of the Paris Agreement and creating a more robust path towards a strong 2030 target would help avoid some of the most costly impacts of global temperature rise (Climate Action Tracker, 2018a).

Footprint analysis: cities, regions, and companies

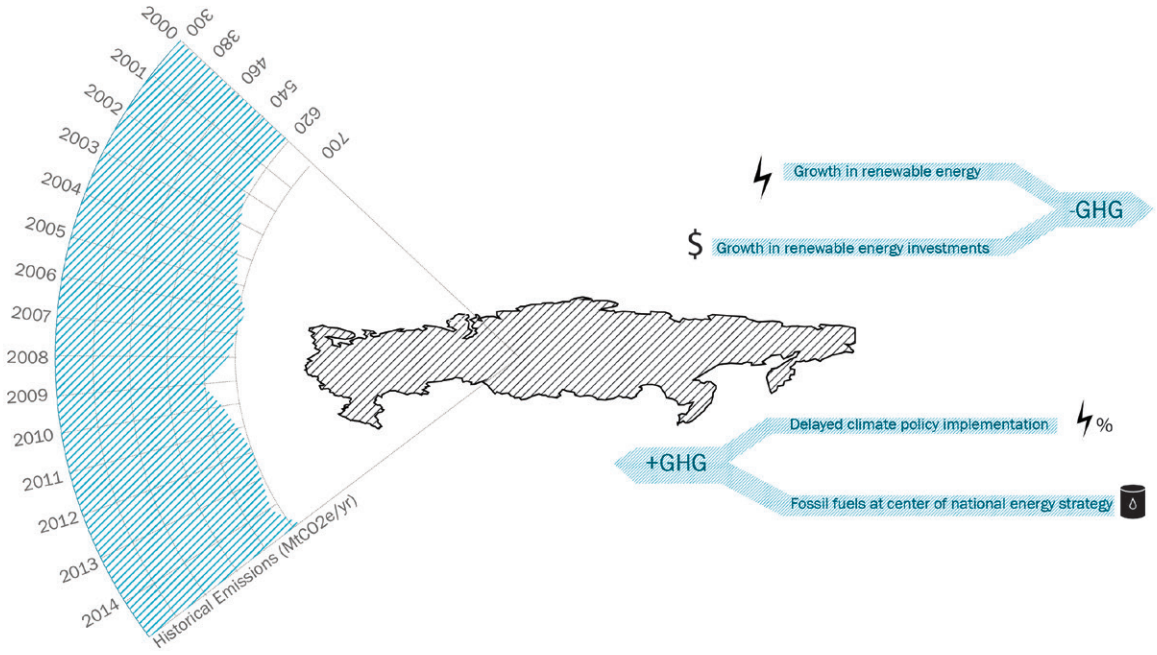
Cities and regions:

- Three cities (Moscow, Khabarovsk Krai, and Rostov-on-Don) representing over 14 million, accounting for 10% of Russia's population, participate in climate action networks, but none of these actors record quantifiable emissions reductions commitments that could be assessed for the individual actor analysis.

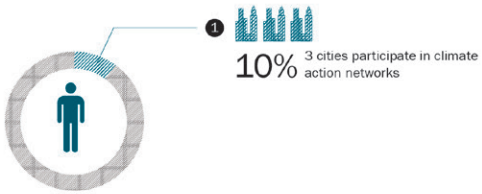
Companies:

- 13 companies in Russia participate in climate action networks, but none have made quantifiable emissions reductions commitments captured in our database.
- 25 of the world's largest[24] companies are based in Russia, with a combined $570 billion USD in revenue. None of these companies has made an individual climate action commitment captured in our database.

24
As measured by inclusion in the Global 500 and Forbes 2000 lists.



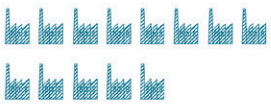
Cities



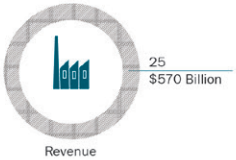
Legend

- In climate action networks
- With Quantifiable Commitments
- Other
- 8 Cities
- 50 Companies
- Population
- Fortune 2000/Global 500 Largest Companies

Companies



13 companies in Russia participate in climate action networks, but none have made quantifiable emissions reductions commitments captured in our database.



Comparing subnational and non-state trajectory with national trajectory

Climate action at the subnational and non-state actor level also remains the lowest among the high-emitting countries this report considers. There are no individual regions or cities and scant companies with emission reduction or renewable commitments in our dataset, which is not additional to the current national policies scenario. However, Russia does participate in global cooperative initiatives. The emissions in the current national policies scenario in 2030 are between 2,240 and 2,270 $MtCO_2e$/year. The potential reduction of these initiatives in Russia is between 280 and 350 $MtCO_2e$/year in 2030 compared to the current national policies scenario. The largest reductions are expected from participation in the Architecture 2030 (95 - 105 $MtCO_2e$/year) and the Super-Efficient Equipment and Appliance Deployment Initiatives (90 to 200 $MtCO_2e$/year) (see Figure 47). This would bring emissions to levels between 1,830 and 1,910 $MtCO_2e$/year or 12 to 16% below the current national policy scenario in 2030 (see Figure 48).

In the NDC, Russia aims to limit GHG emissions to 70-75% of 1990 levels by 2030, which would decrease emissions to levels between 2,950 and 3,140 $MtCO_2e$/year, also depending on the accounting of land use emissions. If the goals of the global initiatives are fully achieved in Russia, this would bring emission levels beyond those that can be expected from NDCs with an estimated additional emissions reduction impact between 520 and 610 $MtCO_2e$/year.

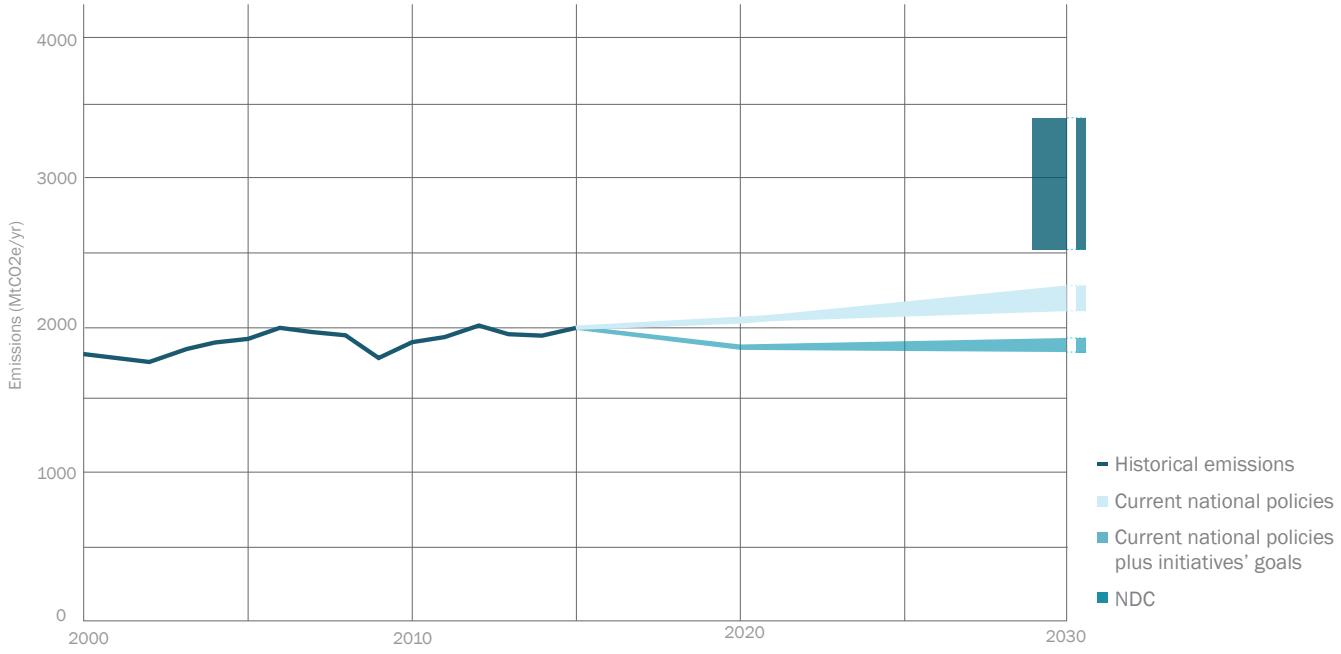


Figure 47
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Russia, including land-use change and forestry (and credits estimates for the NDC).

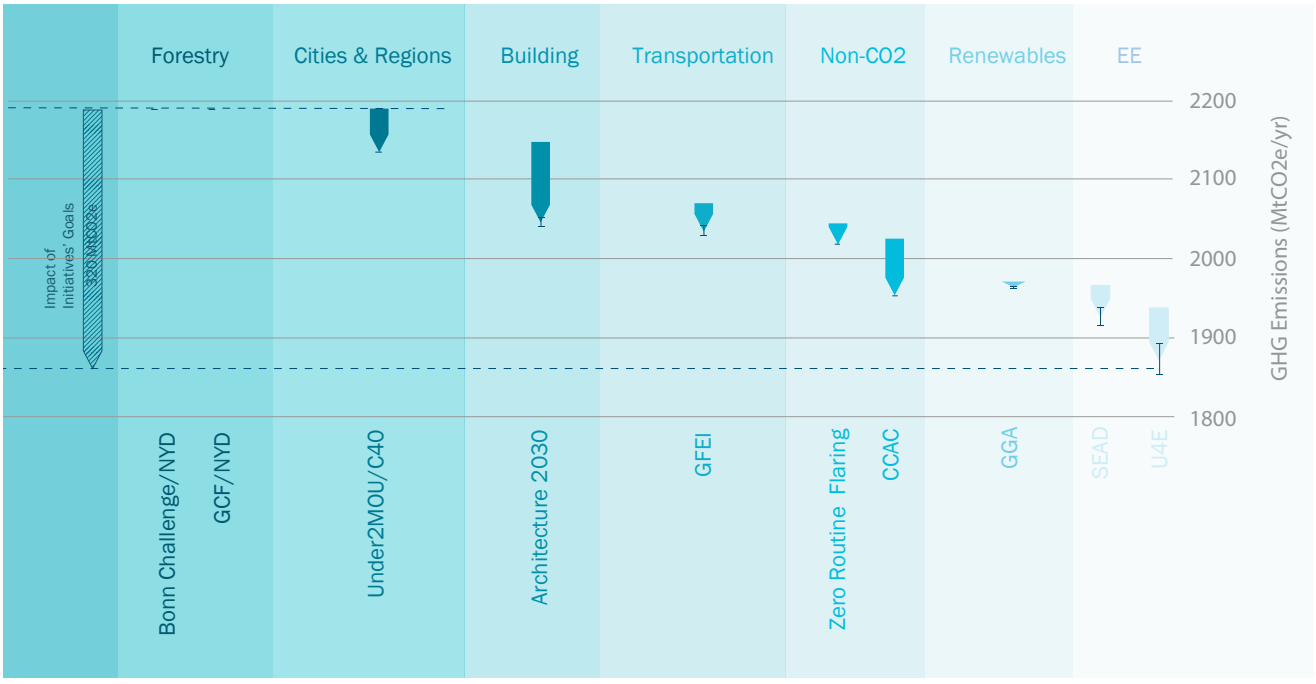


Figure 48
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for Russia in 2030.

4.10 SOUTH AFRICA

Country context

South Africa's progress in reducing emissions will be closely tied to its economic and energy infrastructure; mining and heavy industry form a significant part of the country's economy, and in 2015, 92% of its electricity was generated from coal (IEA, 2017). While South Africa has set a strong renewable energy target, aiming to reach a renewable capacity target of 17.8 GW in 2030, many coal-fired plants are also planned and under construction (Climate Action Tracker, 2018a). Several key climate policies – the Department of Energy's Integrated Resource Electricity Plan and the Government's Carbon Tax and – have been delayed for two years, adding to the uncertainty around the county's emissions pathway (Climate Action Tracker, 2018b).

Footprint analysis: cities, regions, and companies

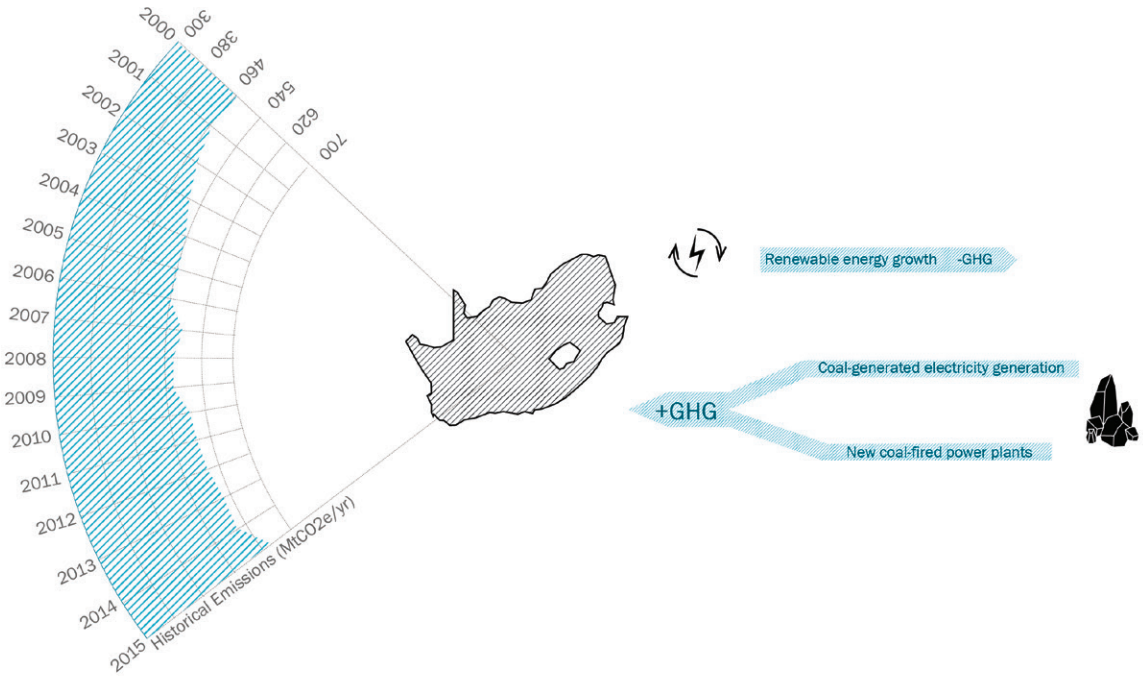
Cities and regions:

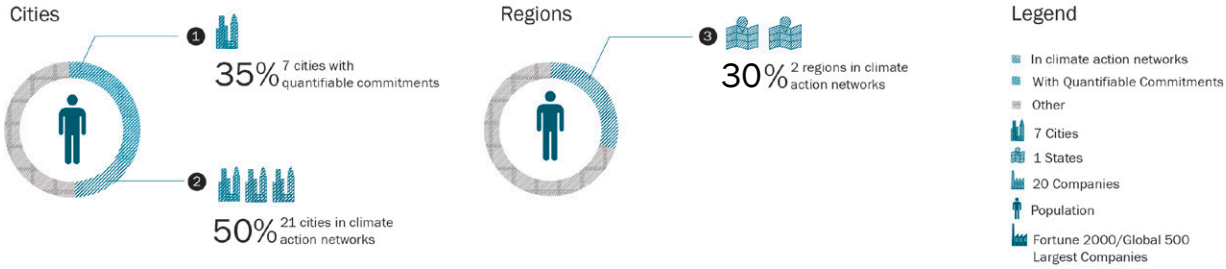
- 21 cities, with a population of over 28 million, accounting for 50% of South Africa's population, have made climate commitments. Of these, 7 cities, with a population of over 19 million, accounting for 35% of South Africa's total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.
- Two regions, with a population of 17 million, just over 30% of South Africa's population, have made climate commitments. Neither of these regions have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

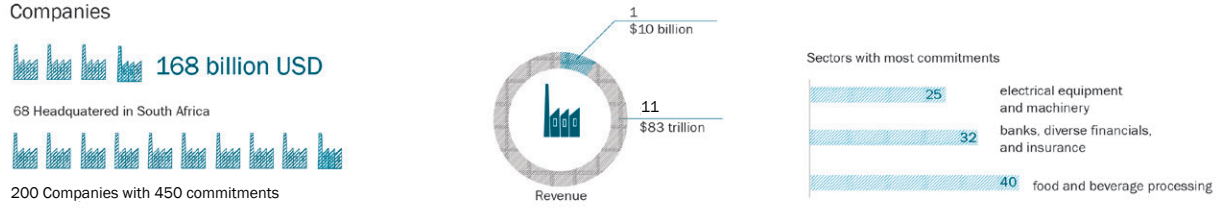
Companies:

- 200 companies with operations in South Africa have made over 450 climate commitments. Of this group, 60 are headquartered in South African, representing a combined $168 billion USD in revenue.
- 11 of the world's largest[25] companies are based in South Africa, with a combined $83 billion USD in revenue. 1 of these companies, with $10 billion USD in revenue, has made an individual climate action commitment.
- Companies have made the most commitments in the food and beverage processing sector (40); banks, diverse financials, and insurance sector (32); and electrical equipment and machinery sector (25).

25
As measured by inclusion in the Global 500 and Forbes 2000 lists.


2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
300
380
460
540
620
700
Historical Emissions (MtCO2e/yr)
Renewable energy growth -GHG
+GHG
Coal-generated electricity generation
New coal-fired power plants


Cities
1
35% 7 cities with quantifiable commitments
2
50% 21 cities in climate action networks
Regions
3
30% 2 regions in climate action networks
Legend
In climate action networks
With Quantifiable Commitments
Other
7 Cities
1 States
20 Companies
Population
Fortune 2000/Global 500 Largest Companies


Companies
168 billion USD
68 Headquatered in South Africa
200 Companies with 450 commitments
1
$10 billion
11
$83 trillion
Revenue
Sectors with most commitments
25
electrical equipment and machinery
32
banks, diverse financials, and insurance
40
food and beverage processing

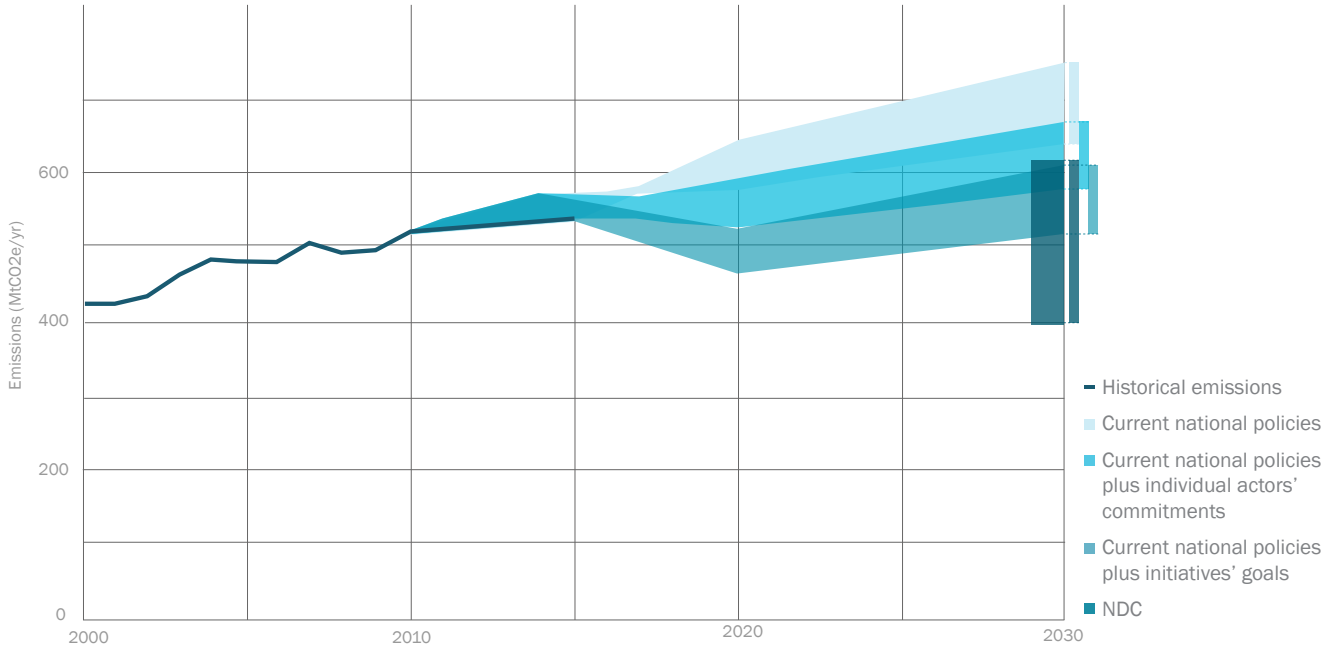


Figure 49
Potential impact of the full implementation of individual actors' commitments and the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for South Africa, including land-use change and forestry.

Comparing subnational and non-state trajectory with national trajectory

Subnational and non-state action has gained momentum over the past decade. Projects that reduce emissions while strengthening communities' resilience to climate change impacts have risen since 2011 and are often implemented through collaborations between local government and non-profit organizations, other government agencies, research institutes and the private sector (Local Government Programme 4 Climate Change, 2016). A 2015 analysis found that approximately half of all municipalities address climate change or sustainable energy in their development plans, and that municipalities including funding for climate change or sustainable energy projects in their budgets has nearly doubled between 2012 and 2015 (Ibid).

The total GHG emissions (including LULUCF) in the current national policies scenario are between 645 and 745 $MtCO_2e$/year by 2030. Seven cities and 200 companies have pledged individual reduction commitments, and the potential impact is to add additional reductions between 65 and 80 $MtCO_2e$/year to the current national policies scenario. In addition, the potential impact of the global cooperative initiatives' goals, in which South Africa is participating, is projected to reduce between 120 and 140 $MtCO_2e$/year in 2030 compared to the current national policies scenario, assuming all quantified goals are fully implemented. This would decrease emissions to a level between 520 and 600 $MtCO_2e$/year, or 16 to 22% below the current national policy scenario in 2030. The largest reductions are expected from the C40, GCoM and Under2MOU initiatives

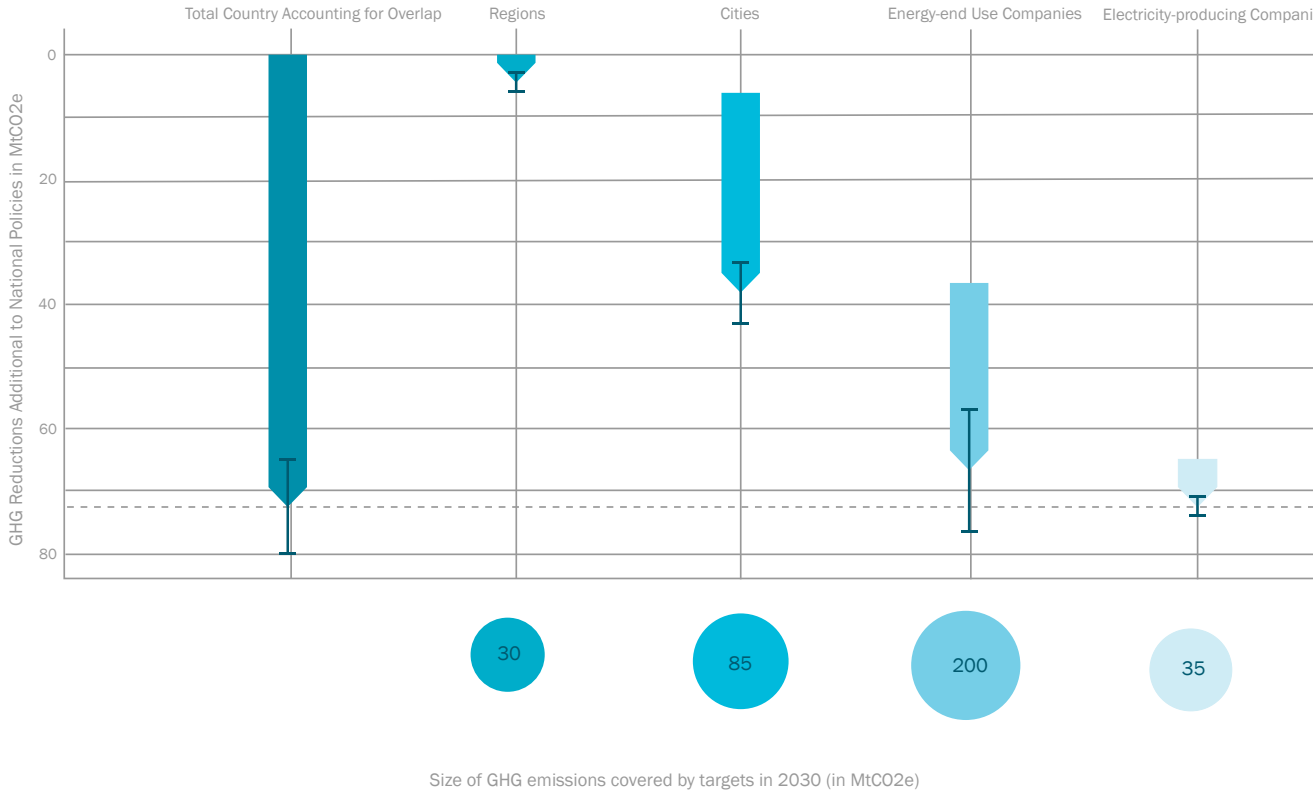


Figure 50
Potential impact (minimum and maximum estimate of individual actors' commitments fully implemented based on the "current national policies" scenario for South Africa in 2030. (Source: this study).

Figure 51
Potential impact of the full implementation of initiatives' goals based on the "current national policies" scenario (Kuramochi et al, 2017) for South Africa in 2030.

(10-47 $MtCO_2e$/year) and the African Renewable Energy Initiative (25 to 60 $MtCO_2e$/year) (see Figure 49).

In its Nationally Determined Contribution, South Africa aims to limit greenhouse gas emissions, including those from land use, land use change and forestry (LULUCF) to between 415 and 631 $MtCO_2e$/year during 2025–2030 (equivalent to a 19-82% increase on 1990 emissions, excluding LULUCF) (Climate Action Tracker, 2018a). Analysis from Climate Action Tracker suggests that South Africa is likely to meet its NDC goal, but that the goal will fall short of aligning the country with the temperature reduction targets of the Paris Agreement. If fully implemented, the participation in global cooperative initiatives would bring South Africa an estimated emissions reduction between 70 and 170 $MtCO_2e$/year beyond the NDC. This would bring South Africa to emission levels between 460 and 570 $MtCO_2e$/year in 2030, beyond the upper limit of the NDC but not beyond the lower limit.

4.11 REST OF THE WORLD

Across the rest of the world, over 850 cities, with a population of nearly 375 million, accounting for more than 8% of their countries' total population, participate in climate action networks. Of these, more than 280 cities, with a population of over 117 million, accounting for more than 2.6% of their countries' total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

Over 38 regions, with a population of over 124 million, accounting for 2.8% of their countries' total population, participate in climate action networks. Of these, 8 regions, with a total population of 38 million, accounting for nearly 1% of their countries' total population, have made quantifiable greenhouse gas emissions reductions or renewable energy commitments.

Almost half of our quantified initiatives' impact is captured outside of our 10 key regions. In the rest of the world, global cooperative initiatives can reduce total GHG emissions by 6.7-10.2 $GtCO_2e$ in 2030 when compared to each countries' national current policies scenario, assuming all quantified goals are implemented. In terms of sector-specific results, 40-50% of the total impact comes from forestry initiatives (Bonn Challenge/New York Declaration of Forests/Governors' Climate and Forests Task Force: 2.6-5.1 $GtCO_2e$). Non-CO2 initiatives, CCAC and Zero-Routine Flaring, carry the second largest GHG reduction impact of 1.5 $GtCO_2e$ and 0.3 $GtCO_2e$ respectively. In addition, United for Efficiency (0.7-1.0 $GtCO_2e$), Architecture 2030 (0.6-0.8 $GtCO_2e$), and the African Renewable Energy Initiative (0.3-0.8 $GtCO_2e$) would contribute further significant GHG reductions by 2030. Alternatively, when compared to each countries' NDC scenarios, global cooperative initiatives have the potential to reduce GHG emissions by 5.7-8.2 $GtCO_2e$ in 2030.

On individual actors' commitments, data was also collected for nine regions that covered 770 MtCO2e/year as well as for 261 cities that covered 560 $MtCO_2e$/year in 2015. Under commitments, regions' and cities' emissions were projected to reduce emissions by 32% and 29% compared to 2015, respectively. The net emissions reduction impact of these commitments was not calculated due to lack of data to quantify the overlaps of different commitments.

5

CONCLUSIONS

This preliminary study has demonstrated the potential for cities, states and regions, and companies to significantly contribute to global greenhouse gas emissions reductions. For individual climate commitments, these contributions could lower greenhouse gas emissions around 1.5 to 2.2 GtCO2e/year lower in 2030, compared to current national government policies alone. For international cooperative initiatives (ICIs), the contributions could be much greater, as much as 15-23 GtCO2e/year lower in 2030, compared to the current national government policies alone. Collectively, these efforts can help bring the world closer to achieving global climate goals of containing temperature rise within 1.5/2°C of warming.

These achievements, however, assume complete implementation of all individual and ICIs commitments to reduce greenhouse gas emissions, and should be interpreted with caution and uncertainty.

RECOMMENDATIONS

The potential additional emissions reductions from cities, states and regions, and businesses has the opportunity to narrow, and perhaps even close, the gap between the world's current emissions pathway and the emissions reductions needed to reach the long-term goals of the Paris Agreement. To realize this impact, we make several recommendations for cities, states and regions, businesses and national and international policymakers:

- *There is an urgent need to operationalize the full range of climate commitments to realize the full scope of ambition available.* The large range of impact between committed individual city, region, and business emission reductions (1.5-2.2 GtCO2e/year in 2030) and the goals of international cooperative initiatives (15-23 GtCO2e/year in 2030) shows that there is an urgent need to operationalize the full scope of ambition and translate these into on the ground commitments.

- *More ambitious individual commitments are needed to achieve the Paris Agreement's goals of containing global temperature rise below 2 and 1.5 degrees C.* Existing research highlights areas where climate action is especially urgent and impactful (Climate Action Tracker, 2016; Figueres, C., Schellnhuber, H. J., Whiteman, G., Rockström, J., Hobley, A., & Rahmstorf, 2017) America's Pledge, 2018). Many opportunities for climate action also generate significant economic returns and help safeguard public health (Shindell et al., 2012; West et al., 2013; New Climate Economy, 2015).This knowledge could help motivate and guide efforts to accelerate climate action. Efforts like the Science-Based Targets Initiative are assisting companies in determining which commitments align with trajectories to achieve 1.5/2-degrees C goals. More analogous tools that identify overlaps and gaps in action for all actors would help maximize goal-setting to achieve the most ambitious reductions possible. These tools would

also be useful in helping actors identify further opportunities for longer-term action, as we found the vast majority of city, state and region, and company climate action is focused on near-term (pre-2020) action that will expire in a few short years.

- *Collaboration at all levels is required to realize the emission reduction potential demonstrated in this report.* The 15-23 additional $GtCO_2e$/year in 2030 reduction potential represents synergistic efforts between a multitude of national, subnational and non-state actors, including financial institutions and investors. Previous studies (Michaelowa & Michaelowa 2017; Pattberg et al. 2012) emphasize the role of finance in ensuring partnerships for sustainable development and collective initiatives are implemented. Other studies suggest (Andonova, Hale and Roger, 2017; Hsu, Weinfurter and Xu, 2017) the role national governments can play in supporting and facilitating non-state actor initiatives through top-down policy support, coordination among other subnational and non-state actors, and finance.

- *To improve confidence in future analysis of non-state and subnational actor and collective initiative impacts, the global community of actors, analysts, and policymakers must work to address:*

  1) Data Reporting and Consistency

  Cities, states and regions, and companies have made an impressive number of commitments, recorded through multiple membership platforms and networks. Incomplete data result in only a fraction of these efforts being analyzed. Because no central repository or database of non-state and subnational climate action exists, each network adopts unique criteria for participation and reporting (Chan et al. 2015, Widerberg & Stripple 2016). . Data that are reported may not always be well-suited for aggregation analysis, particularly when key information such as baseline emissions, emissions scopes (i.e., Scope 1 versus Scope 2), and inventory emissions are unavailable. While climate commitments often target goals besides mitigation, such as adaptation or capacity-building, strengthening data reporting and availability would give the world a more accurate stock-take of the full range of subnational and non-state climate efforts. Data collection from CDP was crucial for our assessment of companies' commitments. Non-state actor networks and disclosure platforms play a critical role in transparency, insights, and climate action. Ongoing reporting, data collection and data management is particularly important for tracking implementation of commitments.

  2) Tracking Implementation of Climate Action

  In both our analysis of individual actions and international cooperative initiatives, we assume 100 percent implementation

of stated goals and targets. This assumption, however, is quite uncertain, as there is often very sparse data reported on implementation and progress. Previous studies (Hsu et al., 2015; Chan et al., 2018) have found that few cooperative initiatives in the climate change and sustainability domains have established monitoring and reporting mechanisms. Many initiatives are at an early stage of development, which may partially account for a lack of monitoring data, and preliminary explorations suggest many initiatives are on track to deliver their expected outputs (Chan et al., 2018). However, these initiatives' success is not a foregone conclusion: 10 years after the 2002 World Summit on Sustainable Development, 43 percent of announced "Partnerships for Sustainable Development" performed poorly and many did not produce assessable outputs (Pattberg et al., 2012)

Future aggregation analyses could provide greater uncertainty analysis using ex-post evaluations of progress achieved and results obtained. Some networks, including the EU Covenant of Mayors and CDP platforms, provide information on actors' progress towards achieving their stated goals. Additional information on good practices and where challenges arise would also be useful to facilitate learning across networks and actors.

3) Gaps in Geographic and Sectoral Action

This report primarily focused on city, region, and company action from 10 high-emitting regions. Data available to assess individual commitments in these regions was limited, particularly in high-emitting sectors and geographies. The data suggests that most individual commitments and ICIs either originate or occur in developed countries, and particularly in the European Union and North America. Greater levels of data availability in these regions almost certainly also play a key role in highlighting action there. Developed country actors also lead a majority of the ICIs (Chan, Falkner, et al., 2015; Bansard, Pattberg and Widerberg, 2016; Chan et al., 2018), although implementation in low-income countries has been rising over the last few years. Additionally, in some cases, such as China, national policies may supersede ICIs and climate action networks as platforms that encourage and monitor climate commitments, which could also explain the lack of substantial additional city, region, and company impact in China.

The representation of different forms of climate action and participation of actors across different sectors also varies. Community-wide and cross-sectoral emission reductions commitments are well-represented amongst subnational actors, but more specific actions targeting high-emitting sectors like transport and buildings are not well-reflected in current efforts.

Additionally, the ICIs' analysis shows significant reductions coming from the land-use, forestry as well as non-CO_2 gas sectors. Commitments in these sectors, particularly on the individual scale, are lacking.

As this report has shown, participation and momentum for city, state and region, business as well as collective initiatives is diverse and growing. The potential for these efforts to make significant contributions is measurable, but the window to translate these commitments into real action is closing. Implementation will require coordinated effort and support on all levels to realize the goals of the Paris Agreement. Realizing these additional impacts also rest on maintaining or overachieving the ambition currently captured in national policies and non-state and subnational climate actions. If national governments, ICIs, or city, region or business commitments are removed or reduced, the potential estimated in this report will be lost. To avoid this scenario, review cycles and key political moments presented through the Talanoa Dialogue, Global Climate Action Summit, and annual UNFCCC COP meetings will be critical in reviewing and evaluating commitments – what they have promised, delivered, and have yet to be achieved.

Cities: Administrative units that pledge commitments to a climate action platform, and which include municipalities, towns, urban communities, districts, and counties defined by the actors themselves.

Climate action by subnational and non-state actors: Any kind of activity that is directly or indirectly aimed at reducing GHG emissions or driving adaptation and resilience that is led by these actors. Actions can be pursued individually (by one sub-national or non-state actor) or cooperatively in the form of initiatives (by a group of actors, including non-state and/or sub-national actors).

GLOSSARY

Commitments by subnational and non-state actors: Planned climate action as well as action currently under implementation, which has been publicly announced. Commitments can be put forward and pursued individually (by one sub-national or non-state actor) or cooperatively in the form of initiatives (by a group of actors, including non-state and/or sub-national actors).

International Cooperative Initiative (ICI): Collaborative efforts to address climate change among countries, NGOs, academia, international organizations, states, regions, cities, businesses and investors.

Non-state actor: Any actor other than a national and sub-national government. This includes private actors, such as companies and investors, civil society and international organizations, among others.

Non-state and sub-national action: Any kind of activity that is directly or indirectly aimed at reducing GHG emissions and that is led by non-state and sub-national actors. Actions can be put forward and pursued individually (by one sub-national or non-state actor) or cooperatively in the form of initiatives (by a group of actors, including non-state and/or sub-national actors).

Non-state and sub-national commitments: Planned non-state and sub-national action which have been publicly announced. However, in contrast to the non-state and sub-national actions, implementation of the action is not yet underway. In practice though, the difference between commitments and action is often not clear. For example, planning how to implement a target could be considered an action. This report therefore considers both existing actions underway and planned commitments.

Scope 1 emissions: Direct emissions resulting from owned or controlled sources. See www.ghgprotocol.org for further details.

Scope 2 emissions: Indirect emissions resulting from purchased electricity, heat or steam. See www.ghgprotocol.org for further details.

Scope 3 emissions: Other indirect emissions not included in Scope 2 that are in the value chain of a reporting actor, including both upstream and downstream sources. See www.ghgprotocol.org for further details.

States and regions: Larger administrative units that are generally broader in population and in scope than cities. They usually have separate governing bodies from national and city governments but encompass lower administrative levels of government; often, they are the first administrative level below the national government. Regions can also include councils of subnational governments acting together.

Sub-national actor: Any form of government that is not a national government, such as cities, states, provinces and regions.

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