POTENTIAL IMPACT OF CORPORATE CLIMATE ACTION IN INDIA

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EXECUTIVE SUMMARY

Highlights

- As the number of voluntary climate initiatives by non-state and subnational actors increases globally, a better understanding of their potential impacts can help build government confidence in implementing climate policies, create opportunities for more integrated and inclusive policy planning, and signal a push for greater ambition.
- The corporate sector in India has progressively made voluntary commitments toward climate change mitigation. However, there is little understanding of the aggregate impact of these initiatives and how they relate to emissions and mitigation efforts at the national level.
- This working paper applies the *Non-state and Subnational Action Guide (NSA Guide)* of the Initiative for Climate Action Transparency (ICAT) to estimate the aggregate impact of the voluntary climate initiatives of 50 Indian companies and understand how it relates to national greenhouse gas (GHG) emissions projections through 2030.
- We estimate that relative to a Reference Scenario—in which no initiatives beyond existing national policy mandates are adopted—the 50 Indian companies included in this analysis can reduce their GHG emissions by 13.04 percent in 2030, based on their existing voluntary commitments.
- Furthermore, the existing voluntary commitments of these 50 companies, with emissions equivalent to approximately 35 percent of India's industrial sector emissions, can reduce India's overall emissions by 1.74 to 1.95 percent in 2030 over and above national emissions trajectories that consider existing policies.

CONTENTS

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback and to influence ongoing debate on emerging issues. Most working papers are eventually published in another form and their content may be revised.

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ICAT INITIATIVE FOR Climate Action Transparency

Confederation of Indian Industry

- On disaggregating our sample set by sector, we find that companies from relatively energy-intensive sectors such as Metals, Pulp & Paper, and Cement drive over 90 percent of the overall reduction in absolute emissions, despite a lower level of ambition in voluntary targets on average, in comparison with companies from other sectors.

Introduction

The Paris Agreement recognizes the importance of subnational and non-state actions in achieving global climate goals and avoiding the worst impacts of climate change (UNFCCC 2015). According to the 2018 UNEP Emissions Gap Report, non-state and subnational action can help bridge the gap between the current level of ambition demonstrated by countries and the level of GHG emissions reduction required to limit the average global temperature rise this century to 2°C above pre-industrial levels (UNEP 2018). Globally, although states, cities, and businesses have taken considerable voluntary climate action, these initiatives are often not duly considered in national policy planning. The *Non-state and Subnational Action Guide (NSA Guide)*, developed under the ICAT, provides a systematic approach for aggregating the impacts of such non-state and subnational actions in order to better inform climate policy formulation and implementation (ICAT 2018).

Several Indian companies have committed to voluntary action on climate change mitigation, including energy efficiency, the use of renewable energy, science-based targets for GHG emissions reduction, and carbon neutrality targets. They have also adopted measures such as internal carbon pricing to help achieve such targets (Science Based Targets 2020; CDP 2020a). However, currently, there is no analysis available on the aggregate level of ambition or impact of voluntary initiatives by the Indian corporate sector or the extent to which such action can complement or support national mitigation targets. This working paper attempts to address this gap by estimating, on the basis of the *NSA Guide*, the aggregate impact of voluntary climate action by the Indian corporate sector.

About This Paper

This working paper, applies the *NSA Guide* to aggregate the potential impact of the voluntary mitigation commitments of 50 Indian companies and estimate their overall emissions reduction impact through 2030, relative to emissions in a Reference Scenario in which such initiatives are not included.

Our analysis estimates the potential impact of these voluntary commitments, which is over and above the reductions that would otherwise occur from existing policy mandates (wherever quantifiable) and extraneous changes in technology or processes over time, which are accounted for in our Reference Scenario. Furthermore, the projected emissions reductions for each company are weighted based on the likelihood that the company will achieve its committed targets.

We also compare the projected aggregate emissions reductions from the voluntary commitments of these companies with national GHG emissions projections through 2030 to understand their potential impact relative to India's overall emissions. For this, we use national emissions projections from three models that consider existing climate policies, namely, the Open Climate Network (OCN; Mitra et al. 2017), the Energy Policy Simulator (EPS v2.1.2; Energy Innovation and WRI n.d.), and the Climate Action Tracker (CAT; CAT 2019).

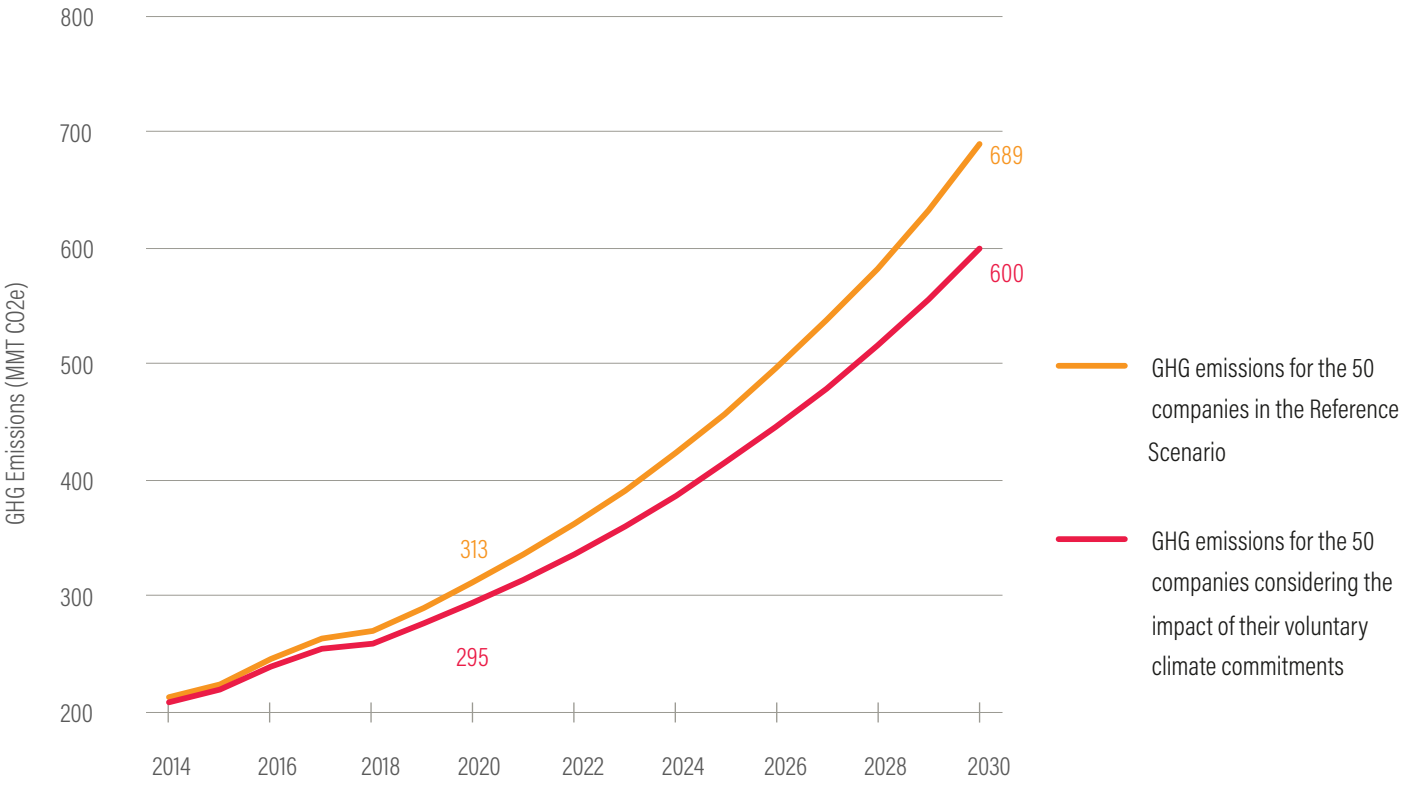
In order to ensure reliable analysis and robust results, only companies with specific, quantifiable commitments and at least three years of publicly available, third-party-audited GHG emissions data were included in the analysis. Applying these criteria to a pool of 280 Indian companies from the Confederation of Indian Industry (CII) GreenCo initiative and BSE200 (the top 200 listed companies by market capitalization in India), we arrived at the list of 50 Indian companies whose voluntary climate initiatives are considered in this analysis.

Key Findings

- **We find that the 50 Indian companies included in this analysis can reduce their GHG emissions by 5.76 percent in 2020 and by 13.04 percent in 2030 through their existing voluntary climate commitments, relative to their emissions in the Reference Scenario.** Figure ES-1 depicts the annual aggregate emissions for the 50 companies in the two scenarios from 2014 through 2030.

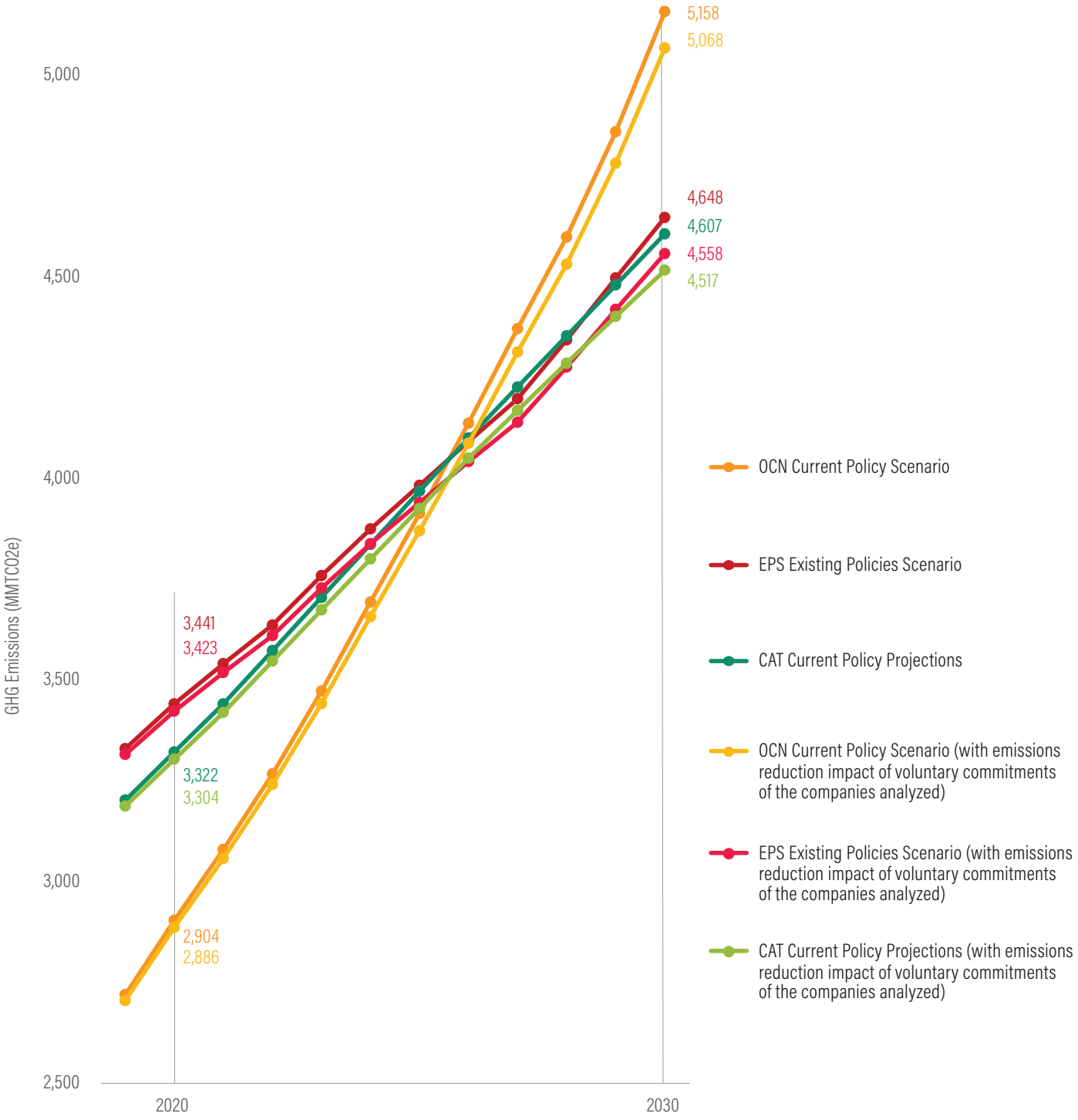
- **We find that the existing voluntary climate commitments of the 50 Indian companies can lead to a reduction of 1.74 to 1.95 percent in India's aggregate GHG emissions in 2030 over and above national emissions projections that consider existing climate policies.** Figure ES-2 depicts the potential impact of the voluntary climate commitments of these 50 companies on India's current policy emissions trajectories through 2030.

Figure ES-1 | **Potential Impact of Companies' Voluntary Climate Commitments on Their GHG Emissions through 2030**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Figure ES-2 | **Potential Impact of Companies' Voluntary Climate Commitments on National Emissions Projections through 2030**



Voluntary climate commitments by the 50 companies can reduce India's aggregate GHG emissions in 2030 by 1.74%, 1.93%, and 1.95% over and above the OCN, EPS, and CAT current policy projections, respectively.

Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent; OCN = Open Climate Network; EPS = Energy Policy Simulator; CAT = Climate Action Tracker. Emissions excluding the Land-Use, Land-Use Change, and Forestry (LULUCF) sector.
Emissions estimates in the OCN Current Policy Scenario are based on policy commitments and implementation up to 2016. The more recent CAT and EPS Current Policy Scenarios include an upward revision in renewable electricity generation projections beyond India's current NDC targets, based on subsequent policy documents, such as the National Electricity Plan 2018.
Sources: Authors. Based on raw data from (Mitra et al. 2017; Energy Innovation and WRI n.d.; CAT 2019).

- **We find that heavy industries such as Metals, Pulp & Paper, and Cement drive over 90 percent of the overall emissions reduction, despite their less ambitious emissions reduction targets on average, as compared to other sectors.** Figure ES-3 depicts the relative contribution by sector to the overall emissions reduction estimated from the voluntary climate commitments of the 50 companies in 2030.

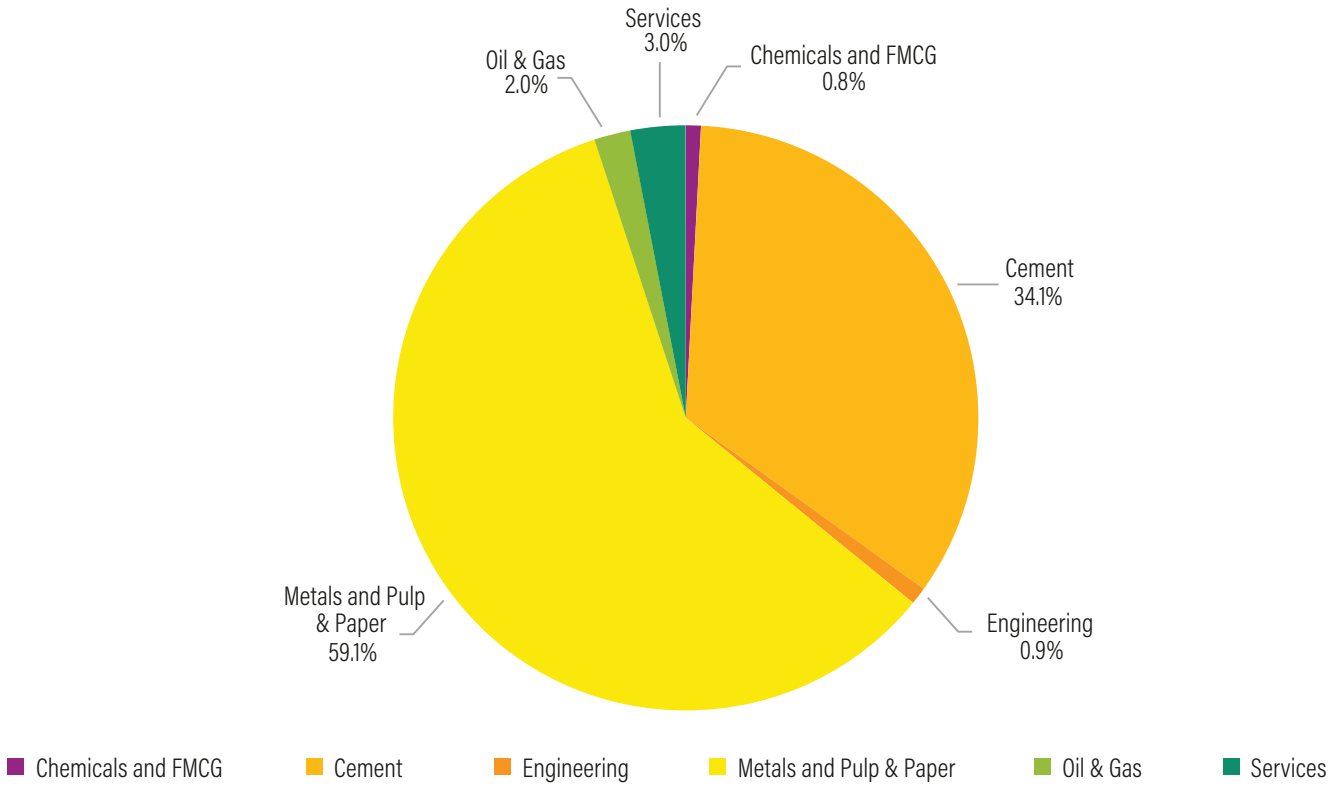
The Way Forward: Informing Better Policy Design and Planning

The impact and scale of voluntary initiatives from the corporate sector in India toward national emissions reductions have not been mapped before. Our analysis therefore serves as a starting point in this direction, even though it represents only a subset of the full scale of subnational and non-state potential in India.

The results of this paper can help improve policy planning and implementation by providing policymakers with a quantitative understanding of the mitigation potential of voluntary action within different industrial sectors in India. The availability, reliability, and heterogeneity of industry data are among the key hurdles in India for this kind of analysis. By providing insight into the data needed to quantify the impact of voluntary corporate initiatives on national emissions, the paper can also help guide policymakers' efforts to improve the quality and availability of such data for similar analyses.

A better understanding of the impact of non-state and subnational climate initiatives can, in general, enable integrated climate policy planning and action. Engagement with businesses, states, and cities can help governments to formulate inclusive and effective emissions reduction strategies. This can elicit greater action and ambition from a wider set of actors and create a virtuous ambition loop to enhance climate goals as well as performance (Dagnet et al. 2019; UN Global Compact et al. 2018). It can also encourage greater collaboration and coordination across national and subnational or non-state actors in technology, finance, and data collection, thus creating synergies that ultimately allow for deeper emissions cuts and facilitate sustainable, low-carbon growth in India.

Figure ES-3 | **Relative Contribution by Sector to Overall Emissions Reduction Estimated from Companies' Voluntary Climate Commitments in 2030**



Note: FMCG = Fast-Moving Consumer Goods.
Source: Authors.

1. INTRODUCTION

Despite the existing commitments under the Paris Agreement, global emissions have continued to rise (UNEP 2019). Global emission reductions are expected to fall short by 32 GTCO2e and 15 GTCO2e, respectively, of 1.5°C and 2°C pathways by 2050 (UNEP 2019). Avoiding the worst impacts of climate change and meeting these targets requires structural shifts in economic activities as well as increased action and engagement from all actors, including national governments, businesses, cities, and civil society (UNEP 2018). The Paris Agreement also emphasizes the role of subnational and non-state actions in responding to climate change and encourages engagement with these actors to support national governments in reaching their mitigation and adaptation goals (UNFCCC 2015).

As of January 2021, as many as 10,693 cities, 243 regions, and 4,302 companies, representing a combined 27,513 actions, have committed to mitigation or adaptation initiatives globally (Global Climate Action 2021). Mitigation efforts from these actors can have a substantial impact on national GHG trajectories and can contribute to achievement of national targets. For example, the report *Fulfilling America's Pledge* shows that actions already adopted by states, cities, and businesses will contribute to reducing U.S. emissions 17 percent below 2005 levels by 2025, approximately two-thirds of the way to the country's pledge of cutting emissions by 26–28 percent by 2025 (America's Pledge Initiative on Climate 2018). The report further shows that should these existing actions be scaled up through broader momentum, even deeper emissions cuts may be achieved.

Actions by non-state and subnational actors are often not systematically considered for national planning and decision-making on climate change. This can be due to several reasons, such as national governments not being fully aware of these actions, lack of data pertaining to such actions, or the inability to estimate the quantitative impact of these actions to inform decision-making. The *NSA Guide*, developed under the ICAT, provides a stepwise approach to identifying and assessing the impacts of non-state and subnational climate action (i.e., actions by states and regions, cities, businesses) and comparing them with national emissions projections and ambition (ICAT 2018). In this paper, we apply the *NSA Guide* in the Indian context.

1.1. India Emissions Scenario and Climate Policies

India is the third largest emitter of greenhouse gases in the world (World Bank 2019a). A growing population as well as economic development, urbanization, and industrialization have led to an increase in India's emissions by almost 80 percent between 2005 and 2014 (World Bank 2019a). At the same time, India's emissions intensity per unit of gross domestic product (GDP) fell by 21 percent in this period (MoEFCC, GoI 2018).

As India is one of the countries that are most vulnerable to the impacts of climate change (Ricke et al. 2018; Hoegh-Guldberg et al. 2018; MoEFCC, GoI 2018), managing its emissions is a key priority in the coming years (MoEFCC, GoI 2018). The Government of India has undertaken several initiatives to reduce national GHG emissions (MoEFCC, GoI 2018). The National Action Plan on Climate Change (NAPCC), adopted in 2008, provides an overarching umbrella for climate actions covering renewable energy, energy efficiency, energy conservation building codes, knowledge building, and efficient water resource management (GoI 2008).

At the international level, India's commitments include its voluntary pledge to reduce the emissions intensity of its GDP by 20–25 percent from the 2005 levels by 2020 (excluding emissions from agriculture) and its Nationally Determined Contribution (NDC) under the Paris Agreement, which includes a primary target of a 33–35 percent reduction in the emissions intensity of GDP from the 2005 levels by 2030 (MoEFCC, GoI 2018). The NDC also includes a clean energy plan to increase the country's share of non-fossil-based installed electric capacity to 40 percent by 2030 (MoEFCC, GoI 2018) and commits to creating an additional carbon sink of 2.5 billion to 3 billion metric tons of carbon dioxide through tree cover (MoEFCC, GoI 2015).

In terms of its key national policy and targets in line with its NDC commitments, India aims to add 175 gigawatts (GW) of renewable energy capacity by 2022 (MNRE, GoI 2019). Based on the National Electricity Plan adopted by the Indian government in 2018, Climate Action Tracker estimates that the share of non-fossil-based installed electric capacity in the country will reach 60–65 percent in 2030, well beyond its NDC target of 40 percent (CAT, 2019). India's Perform, Achieve and Trade (PAT) scheme, implemented since 2012 under the National Mission for Enhanced Energy Efficiency under NAPCC, is aimed at making the industrial sector more energy efficient. The scheme has achieved substantial energy savings equivalent to approximately

31 million metric tons of carbon dioxide equivalent (MMTCO2e) emissions from the first cycle and 58.3 MMTCO2e from the second cycle (BEE 2020a). Other national initiatives include Renewable Purchase Obligations, a Clean Coal Technology Initiative for coal-based power generation, and a National Afforestation Program, among others.

However, with increasing economic activity, India's emissions are set to grow in absolute terms. Despite recent economic growth, India's gross national income per capita at US$ 2,130 and CO2 emissions per capita at approximately 1.8 metric tons remain well below the global average of $ 11,569 and 4.9 metric tons, respectively (World Bank 2019b). Rapid urbanization, infrastructure development, increasing consumption, and improvements in the standard of living coupled with a growing population are set to continue to drive India's rapid economic growth, and consequently absolute emissions, despite improvements in emissions intensity. India's national emissions, excluding the Land-Use, Land-Use Change and Forestry (LULUCF) sector, are projected to increase to 4,607 MMTCO2e (CAT, 2019) to 4,648 MMTCO2e (Energy Innovation and WRI n.d.) in 2030 under recent current policy projections, as compared to approximately 2,607 MMTCO2e in 2014, per India's last national emissions inventory reported in its second *Biennial Update Report* (MoEFCC, GoI 2018).

India's industrial sector has a significant role to play in the country's economic growth as well as climate action. The industrial sector in India contributes almost 21 percent of India's total emissions, and emissions from the sector grew at a compound annual growth rate of 6.4 percent between 2005 and 2015 (Gupta et al. 2019). It also constitutes more than 50 percent of India's energy demand (MoSPI, GoI 2019) and accounts for more than 50 percent of the total electricity consumption (BP 2019). Therefore, emissions reduction within this sector, whether voluntary or through policy intervention, can have a significant impact on national emissions.

1.2. Subnational and Non-state Climate Action in India

According to data from the Global Climate Action Portal, four regions, 16 cities, and 114 companies in India have adopted climate-related initiatives as of 2019. This includes targeted mitigation or adaptation actions up to or beyond 2020, or participation in cooperative climate initiatives (Global Climate Action 2021). Climate policy at the regional (state) level in India is defined in the State Action Plans on Climate Change (SAPCCs), where the focus so far has primarily been on adaptation to climate change (Gogoi 2017). Some cities in India have also begun to include climate considerations in their urban plans as part of various international as well as domestic initiatives. For example, 5 Indian cities have joined the C40 Cities Climate Leadership Group (C40 2020), 15 have signed the Global Covenant of Mayors for Climate & Energy (GCoM 2020), and 20 cities are a part of the first round of the domestic Smart Cities Mission (MoHUA, GoI 2020). However, due to limited explicit emission reduction targets at the state or city levels and lack of consistent reporting of data pertaining to such targets, we focus our analysis on the voluntary climate initiatives of the corporate sector, which are more explicitly and better reported.

Although a majority of smaller Indian businesses, particularly Micro, Small & Medium Enterprises (MSMEs), have limited capacities to account for and manage their GHG emissions, large Indian companies have demonstrated significant voluntary action on climate. For example, Mahindra Sanyo Special Steel became the first steel company globally to set a science-based target (Science Based Targets n.d.), and, as of June 2020, as many as 42 Indian companies had committed to setting science-based targets (Science Based Targets 2020). Other initiatives include renewable energy and energy efficiency targets. Per company disclosures to CDP in 2019, 23 Indian companies reported renewable energy targets (CDP 2020a), with 5 Indian companies committing to 100 percent renewable energy (RE100 2020). In addition, 6 Indian companies have committed to doubling their energy productivity by 2030 (EP100 2020). Indian companies are also increasingly putting an internal price on carbon to meet their climate targets. In 2019, 20 Indian companies were already pricing carbon, and 31 more were planning to do so (CDP 2020b).

1.3. Need for This Analysis

Climate policy and targets, especially in India, are largely driven by decisions taken at the national level. Yet, cities, states, and the private sector can play an integral role in implementing climate action at the local level. Beyond simply complying with policies set out by national governments as applicable, these actors may undertake voluntary initiatives that go further in terms of ambition. Better understanding of such initiatives and active engagement with these actors can complement efforts to achieve national climate targets and create synergies to maximize impact. Estimating the level of

impact can also help the government track the progress of its initiatives and plan national climate policies and actions more effectively.

Despite growing awareness of climate actions by subnational actors globally, there are few data on the aggregate impact of such initiatives on national emission trajectories. This is also true in the case of India, where the availability of data pertaining to voluntary actions by subnational actors is limited, and no analysis has been attempted so far to systematically aggregate the potential impact of such efforts.

In India, national GHG inventory data are collected from a variety of sources based on the sector classifications prescribed by the Intergovernmental Panel on Climate Change (IPCC 2006) and provides an assessment of overall emissions and progress with respect to national targets. There are public platforms such as GHG Platform India that provide information on historical emissions from various sectors and states (GHGPI n.d.), as well as policy tools such as the India Energy Policy Simulator (EPS India) that provide future projections of the potential impact of various policies on emissions (Energy Innovation and WRI n.d.). However, there is no institutional mechanism or platform that currently collects or reports data on voluntary subnational initiatives.

In the specific context of the corporate sector, there is currently no regulatory requirement to report GHG emissions for companies in India, which makes accounting for voluntary initiatives difficult. Nongovernmental organizations such as the CDP collect disclosures for investors from companies on their climate mitigation efforts, including emissions reduction targets and progress on the targets as well as participation in national or international voluntary initiatives such as RE100, EP100, or the Science Based Targets Initiative (CDP 2018). However, none of these platforms provides insights into the aggregate emissions reduction potential from the implementation of these voluntary initiatives by different stakeholders or the implications of such initiatives for national emissions trajectories.

As a first step toward addressing these gaps, this paper presents an analysis of available data on existing voluntary targets by companies in India, along with their potential aggregate impact, to support decision-making and planning at the national level.

2. ASSESSMENT METHODOLOGY AND BOUNDARY

2.1. Objective of the Analysis

The objective of our analysis is to—for the first time—calculate and aggregate the projected emissions reduction impact of voluntary commitments by the Indian corporate sector. We also compare the aggregate emissions reductions from these commitments with national GHG emissions projections that consider existing policies to understand the potential impact of these voluntary initiatives relative to India's overall emissions through 2030.

The analysis follows ICAT's *NSA Guide* and demonstrates its use by applying it to the climate initiatives of the corporate sector in India.

2.2. Overview of Our Approach

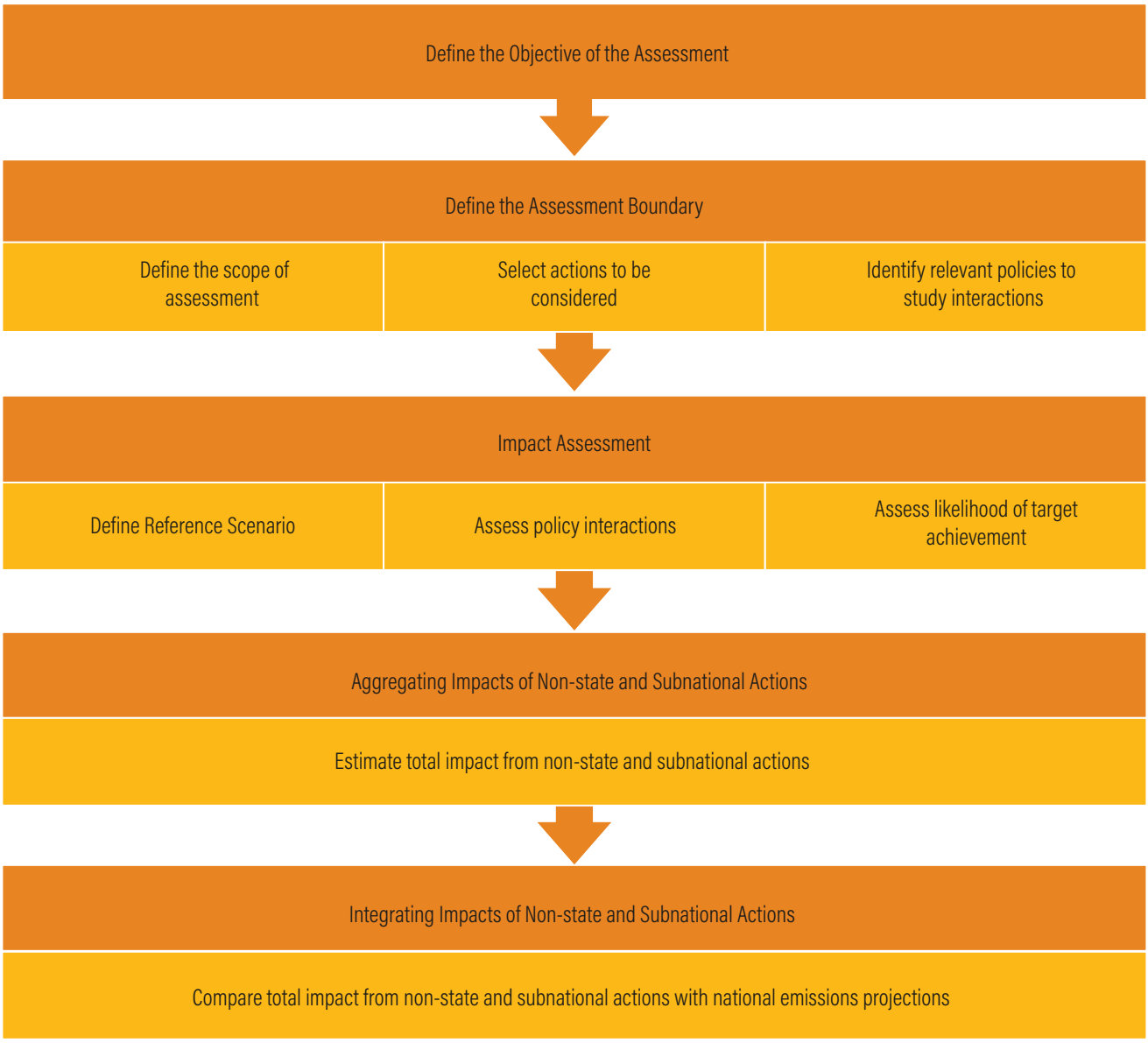
The *NSA Guide* lays out a step-wise approach for conducting an assessment of the impact of non-state and subnational climate actions, which is contextualized for our analysis as shown in Figures 1 and 2, respectively.

- As a first step, we define the objective of the assessment, which in our case is to assess the aggregate impact of voluntary climate commitments by the Indian corporate sector through 2030 (see Section 2.1).
- In the next step, we define the assessment boundary, which includes the actor group or sectors included in the analysis, actions included, GHGs and direct and/or indirect emissions covered, and the assessment period. We have included 50 companies in our analysis, covering all publicly reported voluntary initiatives that affect Scope 1 or Scope 2 GHG emissions through 2030 (see Section 2.3). These include renewable energy targets, energy efficiency targets, emission intensity targets, and absolute emission targets (see Section 2.4). Within this step, we also identify any relevant policies that affect the GHG emissions of companies and can be included in this assessment (see Section 2.5).
- The third step is to assess the individual impact of the voluntary initiatives of each company. To do so, we estimated the level of emissions of the companies through 2030 relative to a Reference Scenario that includes the impact of policies and mandates where quantifiable policy interactions and improvements over time would result in reductions independent of the voluntary initiatives undertaken by the

companies (such as improvements in the electricity grid mix and technology or process changes over the period of the analysis). The impact assessment also takes into consideration the likelihood of target achievement based on the actual progress made by each company against its committed initiatives (see Section 2.6).

- These expected emission reductions at the company level are then added in the fourth step to arrive at the aggregate impact of voluntary climate initiatives by all companies. Aggregating impacts also requires adjustment for overlaps, if any, among the impacts of the individual companies, which was not necessary in our case, given our assessment boundary (see Section 3.1).
- The final step is the integration of the aggregate impact with the national emissions trajectories. Here, we compare the aggregate impact of the voluntary initiatives of companies with national emissions projections through 2030 from three models that consider existing climate policies, thus providing an estimate of the potential reduction in national emissions from voluntary climate initiatives in the Indian corporate sector in this period (see Section 3.2).

Figure 1 | **Overview of the Approach of the *NSA Guide***



Source: Adapted from ICAT (2018).

Figure 2 | **The NSA Approach Contextualized to Our Analysis**

Source: Authors.

2.3. Assessment Boundary

Our analysis includes an assessment of the impact of voluntary climate commitments by Indian companies—that is, corporations incorporated or headquartered in India—through 2030. We focus our analysis on the corporate sector because their voluntary actions are more explicit, and data pertaining to such actions are currently better reported in comparison with other subnational and non-state actors in India. The period of analysis is limited to 2030 keeping in mind the time-frame of India's current NDC as well as that of a majority of existing corporate targets, which do not extend beyond 2030, thus making impact assessment beyond this period uncertain and difficult.

The assessment includes all publicly reported voluntary initiatives of companies that affect their Scope 1 (direct emissions) or Scope 2 (indirect emissions from purchased electricity, heat, or steam) emissions for all GHGs included in their emissions inventories. Scope 3 emissions were excluded because the GHG inventories of most companies do not comprehensively account for it, nor are Scope 3 emissions included in the majority of climate initiatives. Further, including Scope 3 emissions may lead to double counting because these emissions from one company may overlap with emissions in Scope 1, 2, or 3 of another company.

We exclude companies from the Power Generation, Fertilizer, and MSME sectors. We excluded the Power sector for the lack of voluntary targets beyond policy mandates, as well as to avoid any potential overlap of emissions, because Scope 2 emissions, which are included in many company targets or other voluntary initiatives, may overlap with Scope 1 emissions in the Power sector. The Fertilizer and MSME sectors are excluded, although they are significant contributors to India's GHG emissions, due to lack of publicly available, reliable data from these sectors.

In order to accurately and reliably assess the mitigation impact from the climate initiatives of Indian companies, we use the three criteria given in Table 1 for company selection.

We started with over 280 companies that are part of the Confederation of Indian Industry (CII) GreenCo initiative and the top 200 companies by market capitalization listed on the Bombay Stock Exchange (BSE200 companies). After accounting for the significant overlap between these two sets of companies, the combined set represents a majority share of Indian companies by market capitalization. Given this, we assumed the pool is likely to cover all Indian companies that have reliable data as well as those that are likely to have climate initiatives and targets. We then applied our first and second criteria for company selection (in Table 1), leading to a shortlist of 60 companies that have reported inventory information over at least three years. Applying the third criterion in Table 1 then led to a final list of 50 companies for the analysis. These 50 companies represented 195 MMTCO2e of direct emissions (in 2014),

Table 1 | **Criteria for Selection of Companies**

CRITERIA	DESCRIPTION	RATIONALE
Standardized GHG inventory for 3 years	The company must have undertaken a GHG inventory for at least last 3 years per the GHG Protocol (WRI and WBCSD n.d.) or an equivalent corporate standard.	In order to understand the company's baseline, emission trends, and progress on targets.
Verified, publicly available emissions	Scope 1 and Scope 2 emissions data of the company must be audited by a third party and publicly reported.	To ensure reliable and accurate company data.
Specific measurable initiatives or targets	The company must have committed to a quantifiable and time-bound target leading to emission reductions—this may include energy efficiency, renewable energy, or GHG reduction targets.	Quantifiable targets with specific base and target years are required for estimating emissions reductions from targets.

Note: GHG = greenhouse gas.
Source: Authors.

which was equivalent to approximately 35 percent of India's industrial sector emissions in 2014 (MoEFCC, GoI 2018). To ensure that all companies meeting our criteria are included in the list, we also cross-checked with lists of companies reporting to CDP, participating in the Science Based Targets Initiative, or participating in other voluntary initiatives such as RE100 and EP100 (see Table A1 in Appendix A).

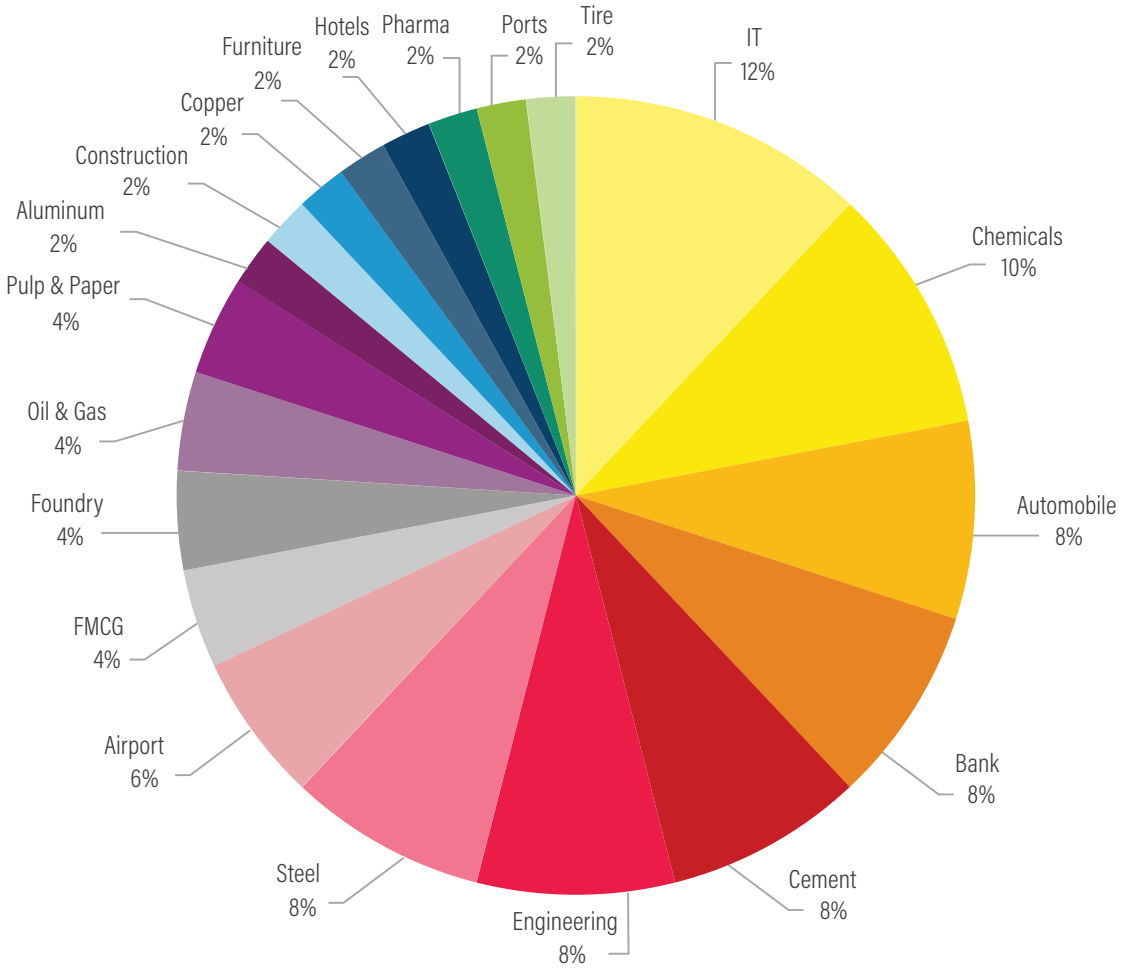
Some companies in this selected set of 50 companies have carbon neutrality targets in addition to renewable energy, energy efficiency, or other emissions reduction targets. In order to meet carbon neutrality, companies may purchase offsets, which are tradable emissions reductions occurring outside the scope of a company's emissions inventory. These can take the form of purchased carbon credits, investments in GHG mitigation projects, and so on, from within the country or from international markets. Because the source of offsets is not known and given that there is growing concern around the integrity and reliability of offsets, we exclude carbon neutrality targets from our primary analysis. However, for such companies, we do include other climate initiatives such as renewable energy, energy efficiency, or emissions reduction targets in our primary analysis. The impact of the carbon neutrality targets of these companies has been assessed separately as an additional scenario, assuming the offsets occur within India (see Section 3.3.3).

2.4. Data Profile of Selected Companies

2.4.1. Sectoral Profile

The 50 companies selected for the analysis include companies across energy-intensive and non-energy-intensive sectors such as Engineering; Metals, Pulp & Paper; Cement; Chemicals; Fast-Moving Consumer Goods (FMCG); and the Services sectors. Together they represent more than 20 subsectors, as seen from the distribution in Figure 3.

Figure 3 | **Subsector Distribution for the Companies Analyzed**



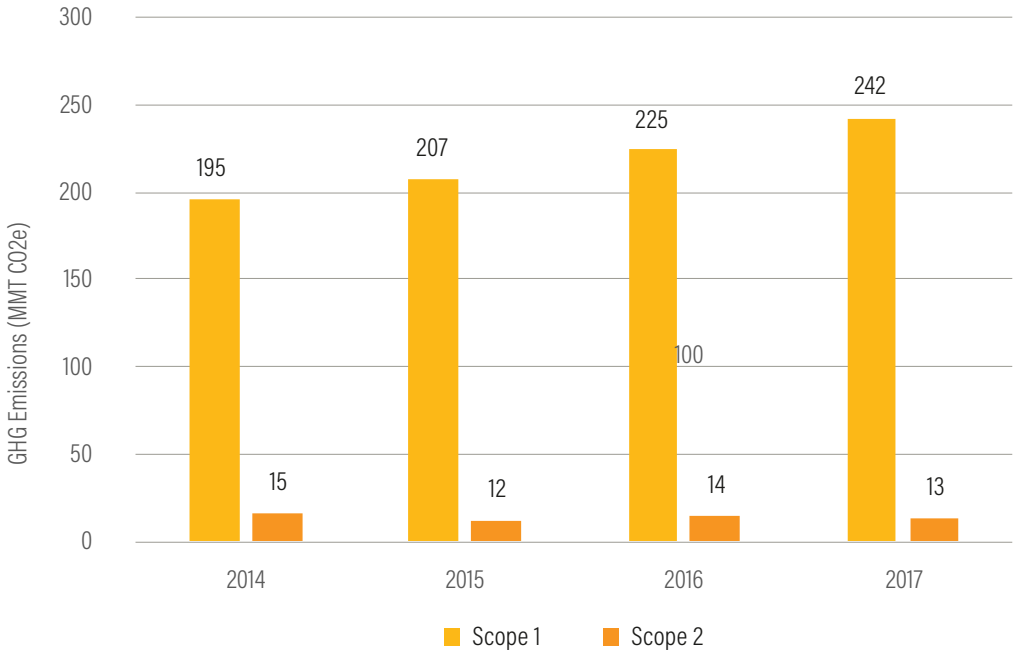
Note: FMCG = Fast-Moving Consumer Goods.
Source: Authors.

2.4.2. Emissions Profile

India's second *Biennial Update Report* highlighted that emissions from the industrial sector amounted to approximately 553 MMTCO2e in the year 2014, of which 202 MMTCO2e was from industrial processes and product use and 351 MMTCO2e from fossil fuel usage and other activities in the industrial sector (MoEFCC, GoI 2018). The direct emissions of the 50 companies selected here are thus equivalent to approximately 35 percent of India's industrial sector emissions in 2014. Figure 4 shows aggregate Scope 1 and Scope 2 emission trends from 2014 to 2017 for the 50 companies included in our analysis.

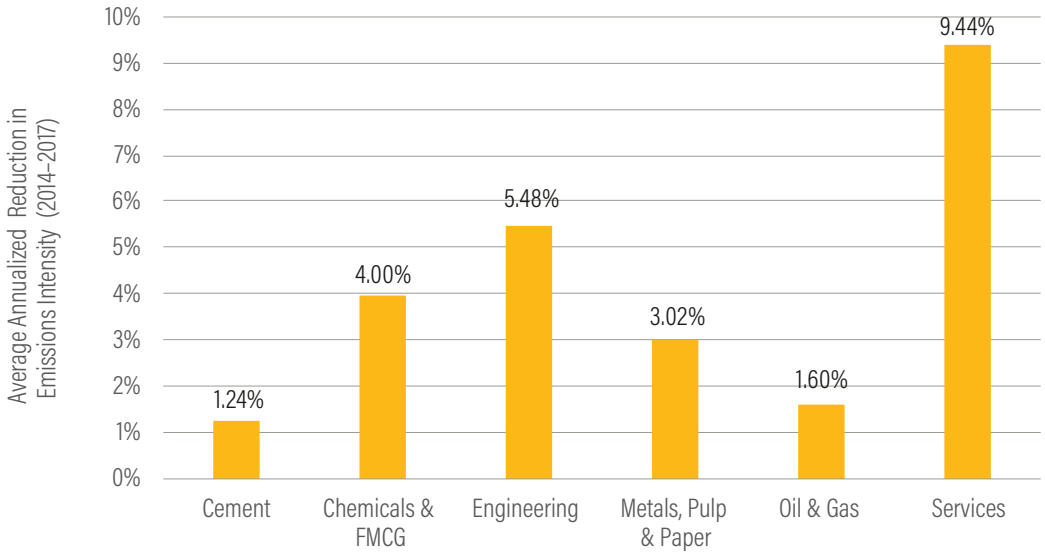
Figure 5 depicts the average annualized rate of reduction in GHG emissions intensity during 2014 to 2017 for the companies included in the analysis, grouped by sector. The sectoral subgroups demonstrated an average annualized rate of reduction in emissions intensity

Figure 4 | **Aggregate Scope 1 and Scope 2 Emissions of the Companies Analyzed**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Figure 5 | **Average Annualized Rate of Emissions Intensity Reduction by Sector for the Companies Analyzed (2014–2017)**



Note: FMCG = Fast-Moving Consumer Goods.
Source: Authors.

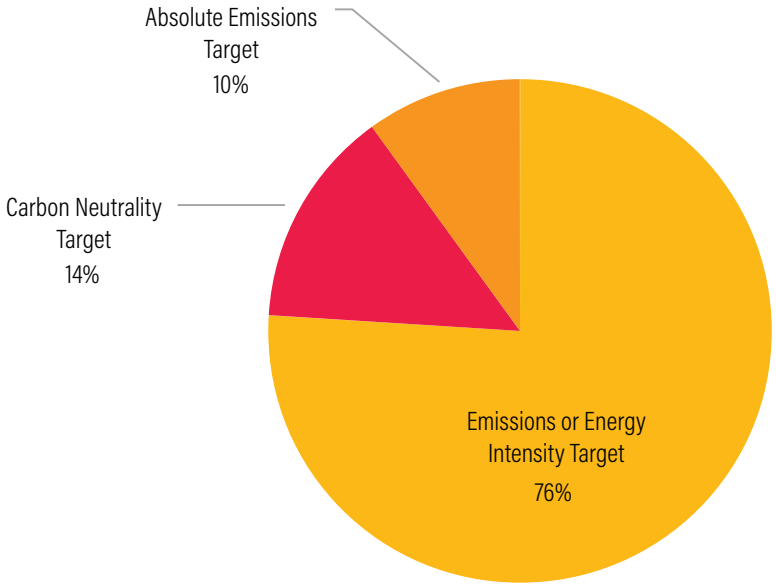
ranging from approximately 1.2 percent (Cement) to 9.4 percent (Services) during this period, with companies from the energy-intensive sectors showing a lower rate of GHG intensity reductions, on average, in comparison with companies from the non-energy-intensive sectors.

2.4.3. Target Profile

Target Type: The companies included in our analysis had set a variety of targets that lead to emissions reductions. Looking at the most ambitious target for each company, 76 percent of the companies had committed to reducing the intensity of GHG emissions, 10 percent had committed to a reduction in absolute emissions, while 14 percent of the companies had a carbon neutrality target in addition to other quantitative targets (see Figure 6).

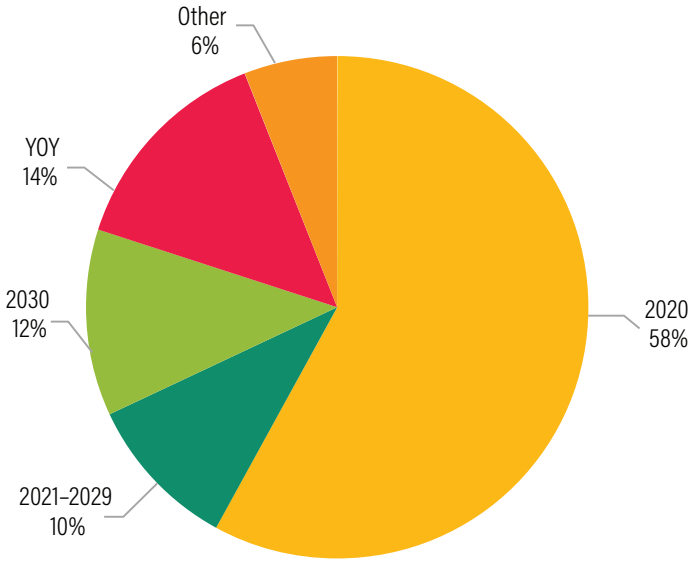
Target Year: A majority of the companies included in the analysis (58 percent) had 2020 as their target year. Ten percent of the companies had target years between 2021 and 2029, and 12 percent had target years extending to 2030. Fourteen percent of the company targets were year-on-year (YOY) targets, with no target year specified (see Figure 7).

Figure 6 | **Distribution of Targets by Target Type for the Companies Analyzed**



Source: Authors.

Figure 7 | **Target Year Distribution for the Companies Analyzed**



Note: YOY = year-on-year.
Source: Authors.

2.5. Review of Policies Impacting GHG Emissions

As a next step, we identified relevant policies and regulations that may interact with the voluntary actions of the companies and impact the emission reductions from the companies. This was done in order to quantify and isolate the impact attributable to each company's own voluntary initiatives after accounting for any possible overlap with existing government policies.

Toward this end, we first identified policies relevant to the companies and sectors included in our assessment (see Table 2) that could interact with the companies' voluntary climate initiatives.

We then identified the potential causal chains through which policies may interact with the companies' climate initiatives and the type of effect they may have. Policies can exert a variety of complex effects on the voluntary initiatives of companies. As identified in the *NSA Guide,* policies may exert a reinforcing effect, wherein they interact with voluntary initiatives to increase the overall impact; an overlapping effect, wherein policies and voluntary initiatives are complementary but do not increase the impact in aggregate; or a combination of the two. Accordingly, Table 3 summarizes the causal chain of interaction and the type of effect expected on voluntary company initiatives for each policy identified in Table 2.

Table 2 | **Policies Relevant to Voluntary Climate Initiatives of the Companies Analyzed**

NAME OF POLICY	SCOPE	POLICY EFFECT
Perform, Achieve & Trade (PAT)[a]	Energy-intensive industrial sectors	Provides energy efficiency (specific energy consumption) targets at plant level. Allows the use of tradable permits known as ESCerts to meet targets.
Standard & Labeling[b]	Energy-intensive appliances	Defines performance standards and mandates labeling of energy-intensive equipment to improve performance and encourage better consumption decisions.
Accelerated Depreciation; Generation Based Incentive; Viability Gap Funding[c]	Renewable energy projects	This group of policies provides financial incentives for investment in renewable energy projects.
Energy Conservation Building Codes[d]	Commercial buildings	Provides guidance and standards for energy efficiency measures in commercial building design and operation.
Renewable Purchase Obligation (RPO)[e]	Electricity distribution companies and industrial facilities having captive power plants or Open Access power purchase agreements	Mandates procurement of a certain minimum proportion of electricity from renewable sources. Allows the use of electricity attribute certificates known as RECs to meet targets.

Note: ESCerts = Energy Saving Certificates; RECs = Renewable Energy Certificates.
a. BEE 2017; b. BEE 2020c; c. MNRE, GoI 2019; d. BEE 2020b; e. MNRE, GoI n.d.
Source: Authors.

Table 3 | **Potential Interaction of Policies with Voluntary Climate Initiatives of the Companies Analyzed**

NAME OF POLICY	CAUSAL CHAIN OF INTERACTION	TYPE OF EFFECT
Perform, Achieve & Trade (PAT)	PAT targets specific energy consumption at the plant level. Improvement in specific energy consumption to meet a PAT target (assuming the target is not met solely by the purchase of ESCerts) would also lead to lower emissions intensity of operations. Therefore, a part of the emissions reduction toward meeting companies' own voluntary targets may result from complying with PAT targets. At the same time, PAT provides a policy signal toward improving specific energy consumption. In preparing themselves to meet future targets, PAT can also drive companies to improve their energy intensity of operations, thus reinforcing their own voluntary climate objectives and target achievement.	Overlapping as well as Reinforcing
Standard & Labeling	Enables companies to make better decisions in procuring energy-intensive equipment such as diesel generator sets, air conditioners, and so on, thereby helping them improve the overall energy efficiency, which in turn reinforces their own climate targets.	Reinforcing
Accelerated Depreciation; Generation Based Incentive; Viability Gap Funding	This group of policies provides financial incentives from the government for investment in renewable energy. This encourages adoption of renewable energy by lowering effective costs for companies, thus reinforcing their voluntary climate targets.	Reinforcing
Energy Conservation Building Codes	Enables companies to reduce their electricity consumption by providing a framework for energy-efficient design of office spaces and other commercial buildings within their operational boundary, thus reinforcing their voluntary climate targets.	Reinforcing
Renewable Purchase Obligation (RPO)	Increasing the share of renewables in the total electricity mix of a company in order to meet an RPO target (assuming the target is not met solely through the purchase of RECs) would also lead to lower emissions intensity of operations. Therefore, a part of the emissions reduction toward meeting companies' voluntary targets may result from complying with RPO targets. At the same time, the policy also encourages or reinforces voluntary adoption of renewable energy by companies, which may do so as preparation for anticipated policy targets in the future or due to improvements in the cost-effectiveness of renewable energy from economies of scale in the sector, facilitated by the policy.	Overlapping as well as Reinforcing

Note: ESCerts = Energy Saving Certificates; RECs = Renewable Energy Certificates.
Source: Authors.

Ideally, our assessment would quantify the isolated impact of voluntary company initiatives after eliminating all policy effects. However, we only account for policy impacts where data and clear causal chains allow us to quantitatively assess the impact of policies on individual companies. A limitation of our analysis is therefore that we do not fully account for policy interactions where there is an absence of clear data and linkages. Table 4 summarizes the policies included in the assessment and the rationale for the inclusion or exclusion.

Table 4 | **Inclusion of Policy Interactions in Our Assessment**

NAME OF POLICY	INCLUDED IN ASSESSMENT	RATIONALE
Perform, Achieve & Trade (PAT)	Yes	Because the policy provides quantitative targets for companies at the plant level, the impact on emission reductions can be quantitatively assessed, and overlap with company voluntary initiatives can be excluded. The reinforcing effect is still excluded because it is not possible to quantitatively assess the level of impact.
Standard & Labeling	No	Inability to quantitatively estimate the level of impact attributable to the policy relative to the company's own voluntary initiatives and targets.
Accelerated Depreciation; Generation Based Incentive; Viability Gap Funding;	No	
Energy Conservation Building Codes	No	
Renewable Purchase Obligation (RPO)	No	

Source: Authors.

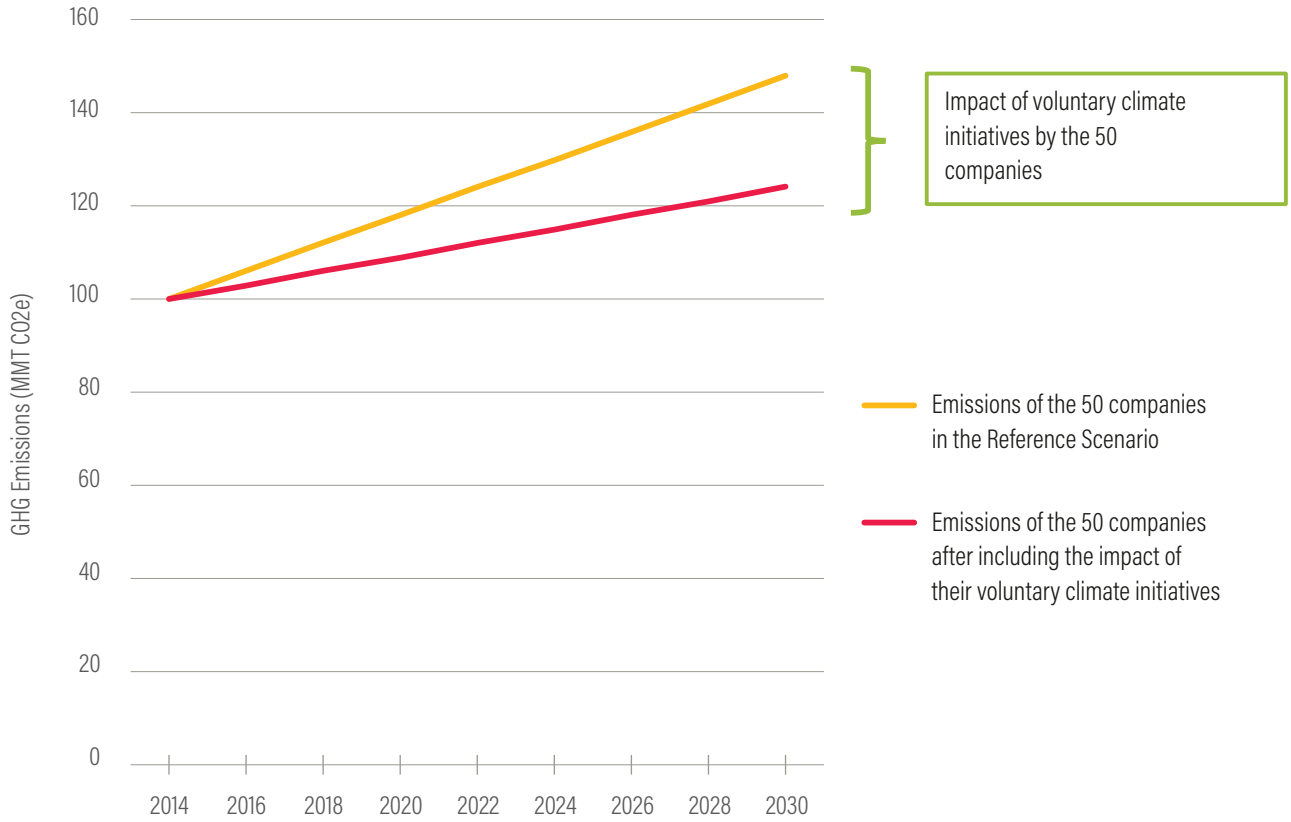
2.6. Impact Assessment and Associated Assumptions

2.6.1. Reference Scenario

In order to meaningfully quantify the impact of voluntary initiatives by the companies in our assessment, we measured the reduction in emissions from these initiatives with respect to a counterfactual scenario without such initiatives (see Figure 8). This scenario is referred to as the Reference Scenario, which may be defined as the emissions scenario for the companies through 2030 in the absence of any voluntary initiatives that lead to emission reductions. The Reference Scenario includes the impact of quantifiable policies (in our case the impact of PAT), as well as improvements over time that would result in emissions reductions independent of the additional voluntary initiatives undertaken by companies.

As a first step in arriving at the Reference Scenario, we estimated the expected emissions from a company assuming changes in its production and growth over time. In order to estimate this, we used the approaches (listed in the order of preference) in Table 5.

Figure 8 | **Approach to Quantifying the Impact of Companies' Voluntary Climate Initiatives**



Note: MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Table 5 | **Approaches to Estimate Company Emissions in Reference Scenario**

APPROACH (IN ORDER OF PREFERENCE)	TYPICAL SOURCES
Approach 1: Growth projections of revenue/production based on the company's own estimates	Company statement or annual report
Approach 2: Growth projections of revenue/production based on sectoral projections	Sectoral reports by government agencies or relevant private bodies (e.g., industry associations)
Approach 3: Growth projections of revenue/production based on extrapolation of the company's historical growth	Company annual reports of previous 3–4 years

Source: Authors.

In the second step, we included the impact from quantifiable policies, in our case PAT. To quantify the impact of this policy on the emissions of companies covered by this policy, we first calculated the average annual reduction in the specific energy consumption (SEC) of a company across PAT Cycle 1 (2012–15) and Cycle 2 (2016–19), based on the SEC targets specified for the company facilities in the two cycles.

This average annual reduction in the company's SEC was then converted into an equivalent annual reduction in specific GHG emissions using a country-specific factor of 2.7 kg CO_2 per kg of oil equivalent energy use (World Bank 2020a). The reduction in specific emissions of the company thus calculated was assumed to occur every year over the period of the analysis and translated into an absolute emissions impact, based on the company's growth projection over this period.

Finally, in the third step, we assumed a certain level of emissions reduction independent of any voluntary emissions reduction initiative. Such reductions may be due to improvements in the electricity grid mix over time or improvements due to technology changes in the industry or sector over time, which would reduce the average rate of emissions for all the companies in the sector or industry. Once again, this emissions reduction rate is selected based on the company's self-defined trajectory, an expected sectoral reduction, or historical reductions, in that order of preference. For cases where neither the company's trajectory nor the expected sectoral reduction was available, we used an annual reduction rate of 2.59 percent, which is the annualized GHG intensity reduction of the country over the last 25 years (World Bank 2020b).

2.6.2. Likelihood of Target Achievement

Companies may have committed to ambitious targets but the likelihood of achieving these targets is an area of uncertainty. In order to account for the uncertainty around actual achievement, we assessed each company based on a set of criteria that included a comparative assessment of the company's emissions performance against the expected emissions reduction rate required to meet its target as well as the existence of other publicly reported supplementary initiatives undertaken by the company that indicate a higher likelihood of meeting the target, such as adoption of a carbon price, and planned investments in energy efficiency, renewable energy, or other relevant technology.

The criteria for this assessment, along with the associated levels of target achievement assumed for the analysis, are summarized in Table 6. Based on these criteria, each company was assessed as "Likely" to meet its declared target, "Possible" to meet its declared target, or "Unlikely" to meet its declared target or commitment and its targeted emissions reductions weighted by the associated level of target achievement assumed—100, 75, or 30 percent, respectively—while calculating its emissions reduction impact for the analysis. The target achievement likelihood distribution for our set of 50 companies is given in Table 7 (see Table B1 in Appendix B for a company-wise application of the assessment criteria and results).

Box 1 | **Application of the Target Likelihood Assessment Criteria to a Company**

Example:
If a company has a target of reducing GHG emissions by 50 percent by 2030 as compared to their emissions in 2010, we assess the annual rate of emissions reduction needed to achieve the target and compare it with the actual annualized reduction achieved over the past three years. For this example, an annualized reduction of 2.5 percent is expected in order to achieve the target by 2030. Accordingly, we see the following cases:

Case 1: The company's annualized emissions reduction rate over the past three years is 1.5 percent, and the company has not implemented any other supplementary initiatives.
Likelihood: Unlikely
Assumed target achievement level: 30 percent

Case 2: The company's annualized emission reduction rate over the past three years is 1.5 percent, but it has announced investments in renewable energy and adopted an internal carbon price.
Likelihood: Possible
Assumed target achievement level: 75 percent

Case 3: The company's annualized emission reduction rate over the past three years is 2.7 percent.
Likelihood: Likely
Assumed target achievement level: 100 percent

Source: Authors.

Table 6 | **Approach for Target Achievement Likelihood Assessment**

CASE	PROGRESS ON TARGET	SUPPLEMENTARY INITIATIVES	TARGET ACHIEVEMENT LIKELIHOOD	LEVEL OF TARGET ACHIEVEMENT ASSUMED (%)
1	Annualized emissions reduction rate of the company (over the last 3 years) is less than the expected annualized reduction rate based on its target	Absent	Unlikely	30
2	Annualized emissions reduction rate of the company (over the last 3 years) is less than the expected annualized reduction rate based on its target	Present	Possible	75
3	Annualized emissions reduction rate of the company (over the last 3 years) is greater than or equal to the expected annualized reduction rate based on its target	Present or Absent	Likely	100

Source: Authors.

Table 7 | **Target Achievement Likelihood Distribution for the Companies Analyzed**

TARGET ACHIEVEMENT LIKELIHOOD SCENARIO	NUMBER OF COMPANIES
Likely	22
Possible	23
Unlikely	5

Source: Authors.

2.6.3. Level of Ambition Beyond Target Year

Although our analysis quantifies impacts through 2030, a majority of the emissions reduction targets for Indian companies in our assessment do not extend all the way to 2030 (see Section 2.4.3). In cases where actions had pre-2030 target years, we assumed continued ambition in line with the pre-2030 target beyond the target year through 2030. In other words, we assumed that the level of ambition beyond the target years would remain the same, rather than ending after a target year is reached. For example, for a company commitment with a base year of 2010 and target year of 2020 where the level of ambition required to meet the 2020 target translates to an annualized emission reduction of rate of 2 percent, we would assume the same average annualized emission reduction rate of 2 percent from 2020 onward through 2030.

This is a conservative assumption compared to a scenario where ambition increases at the end of the current commitment periods. At the same time, it is an optimistic assumption compared to a scenario where companies reduce their level of ambition beyond their current commitment periods. As investor and shareholder expectations with regard to climate action from the corporate sector increase over time, we expect most companies in our assessment to either enhance their level of ambition or at least maintain the same level of ambition. Therefore, our assumption of the same level of climate ambition continuing beyond the target year of a company until 2030 is likely to be a conservative one. However, in order to ensure robustness of our results, we include additional scenarios where we check the impact of lower and higher levels of company ambition beyond their commitment periods on our results (see Section 3.3.2).

2.6.4. Reporting Period for Company Data

Indian companies report data based on the Indian fiscal year, which runs from April 1 to March 31 of the following year. Our analysis follows the convention of attributing fiscal year data to the first of the two calendar years that the fiscal year spans, because 75 percent of the fiscal year falls within this period. For example, any company data, such as reported emissions, targets, growth projections, and so on, pertaining to the fiscal year 2014–15—that is, the period from April 1, 2014 to March 31, 2015—would be considered and presented as data for the year 2014 in our analysis.

3. RESULTS

3.1. Aggregate Impact of Voluntary Corporate Climate Commitments

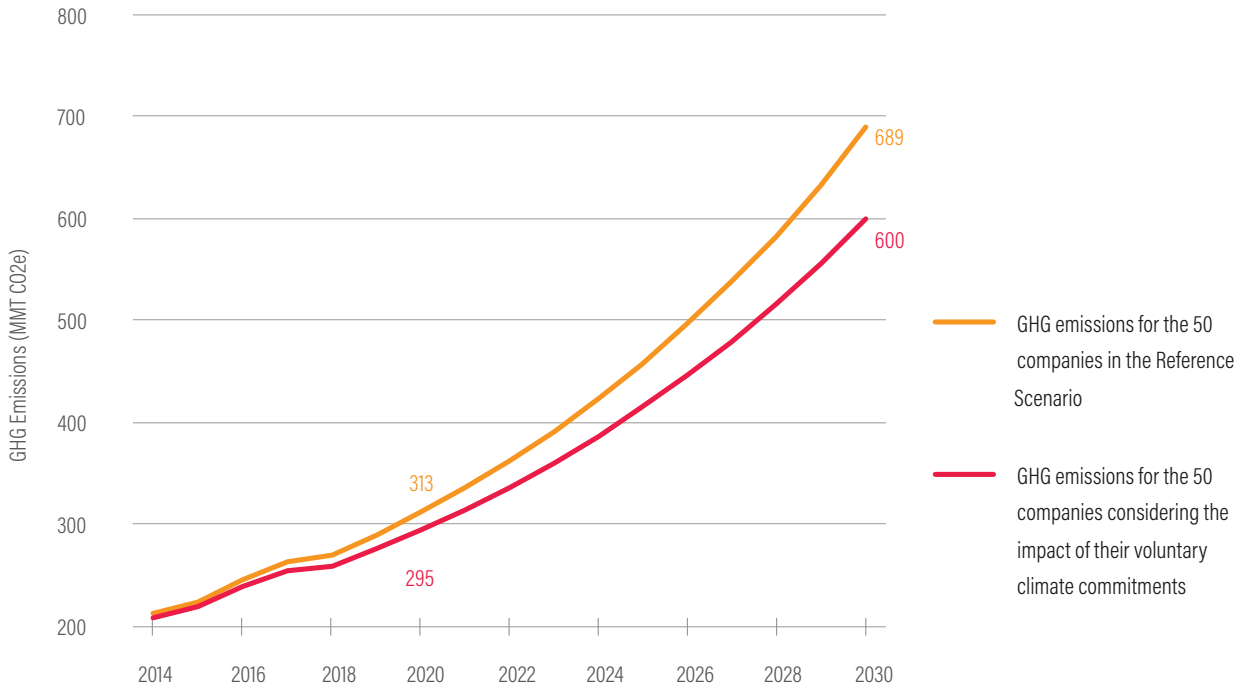
To assess the aggregate impact of the voluntary climate initiatives of the companies in our analysis, we compare their projected GHG emissions in the Reference Scenario and the projected emissions after estimating the impact of the voluntary initiatives. The difference in emissions between the two scenarios gives an estimate of the emissions reduction impact of the voluntary initiatives. GHG emissions in both scenarios were calculated for each company individually. The company-level impact estimates were then added up for the 50 companies to arrive at the total impact.

Because we have not included the Scope 3 emissions of companies in our assessment boundary, and our sample set did not include any company from the Power sector, whose Scope 1 emissions could overlap with the Scope 2 emissions of another company, no overlap in company-level emission reduction impacts was expected in our case, and no adjustment was necessary.

The annual aggregate emissions for the 50 companies through 2030 in the two scenarios are presented in Figure 9.

Table 8 gives an overview of the aggregate emissions reduction impact of the voluntary commitments of the 50 companies in 2020 and 2030, relative to the Reference Scenario (see Table C1 in Appendix C for emissions in both scenarios and the emissions reduction impact of voluntary company commitments for each year through 2030).

Figure 9 | **Aggregate GHG Emissions of the Companies Analyzed through 2030 with and without Their Voluntary Climate Commitments**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Table 8 | **Aggregate Impact of Voluntary Climate Commitments of the Companies Analyzed in 2020 and 2030**

YEAR	TOTAL EMISSIONS IN REFERENCE SCENARIO (MMTCO2e)	TOTAL EMISSIONS WITH IMPACT OF VOLUNTARY INITIATIVES (MMTCO2e)	EMISSIONS REDUCTION IMPACT (MMTCO2e)	EMISSIONS REDUCTION IMPACT (%)
2020	312.53	294.54	17.99	5.76
2030	689.40	599.52	89.88	13.04

Note: MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

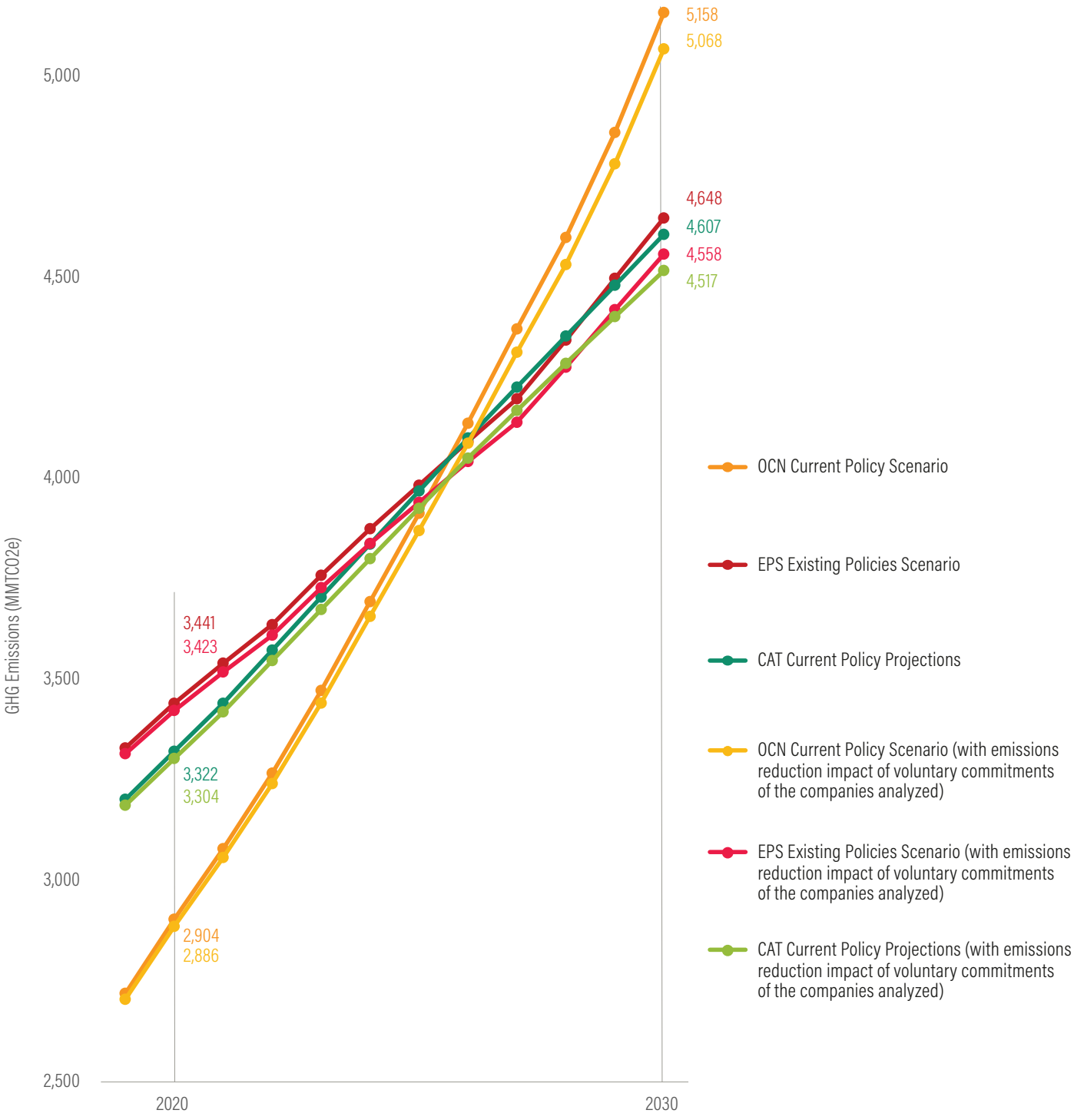
3.2. Impact of Voluntary Corporate Climate Commitments on National GHG Emissions Projections

Comparing the aggregated GHG emissions reductions of the 50 companies with the national GHG emissions projections gives us the impact of the emissions reduction from these companies relative to India's overall emissions trajectory. For this, we use India's national emissions projections from three models, which consider existing climate policies and growth projections. The models and the key assumptions used in the scenarios include the following:

- **Open Climate Network (OCN) Current Policy Scenario:** This scenario presents the combined impacts of five key policy options over the time frame 2014 to 2030 (i.e., PAT), Dedicated Freight Corridors, Clean Energy Cess (a tax levied on the production and import of coal), renewable power goals by 2022, and energy efficiency in the Services sector), and the policy parameters reflect the existing state of implementation and projected growth rates as specified in official policy documents or anticipated by sectoral experts. Each of the policy options was modeled explicitly with the existing rate of implementation for the years 2014 to 2016, and the rate of policy execution was then accelerated gradually for future years, assuming full (100 percent) implementation of each policy over time (that is, each policy realizing its planned target according to the announced timelines). Details of the modeling parameters and assumptions can be found in (Mitra et al. 2017).
- **Energy Policy Simulator (EPS v2.1.2) Existing Policies Scenario:** This scenario represents GHG emissions for India considering all current and relevant climate policies in place along with the corresponding assumptions regarding fuel mix, economic growth, and consumption. More details on the model structure are available in the technical note by Mangan et al. (2018), and the specific assumptions for the scenario are available in the online simulator (Energy Innovation and WRI n.d.).
- **Climate Action Tracker (CAT) Current Policy Projections:** The Current Policy Projections Scenario by CAT provides GHG emissions projections for India based on the scenario that covers the policies implemented at the time of estimation along with other developments such as the expected economic growth or trends in activity and energy consumption. In the Current Policy Scenario for India, the model uses the National Electricity Policy (NEP) and non-power energy-related CO_2 emissions from World Energy Outlook 2019 Current Policy Scenario. These are combined with U.S. EPA non-CO_2 projections until 2030 and extrapolation of other CO_2 emissions based on cement projections from the International Energy Agency. More details are available on the CAT India webpage (CAT 2019).

This analysis does not compare the level of ambition of these companies with respect to current policies, but instead provides an indication of the emissions reduction that can be achieved through the voluntary climate commitments of these 50 companies over and above India's national GHG emissions trajectories that consider current policies. The potential impact of the voluntary climate commitments of these 50 companies on India's current policy emissions trajectories through 2030 is shown in Figure 10.

Figure 10 | **India's National Emissions Projections through 2030 with and without the Impact of Voluntary Climate Commitments of the Companies Analyzed**



Voluntary climate commitments by the 50 companies can reduce India's aggregate GHG emissions in 2030 by 1.74%, 1.93%, and 1.95% over and above the OCN, EPS, and CAT current policy projections, respectively.

Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent; OCN = Open Climate Network; EPS = Energy Policy Simulator; CAT = Climate Action Tracker. Emissions excluding the Land-Use, Land-Use Change, and Forestry (LULUCF) sector.
Emissions estimates in the OCN Current Policy Scenario are based on policy commitments and implementation up to 2016. The more recent CAT and EPS Current Policy Scenarios include an upward revision in renewable electricity generation projections beyond India's current NDC targets, based on subsequent policy documents, such as the National Electricity Plan 2018.
Sources: Authors. Based on raw data from (Mitra et al. 2017; Energy Innovation and WRI n.d.; CAT 2019).

Table 9 | **Additional Impact of Voluntary Climate Commitments of the Companies Analyzed on Projected National Emissions in 2030**

MODELING SCENARIOS	INDIA'S EMISSIONS IN 2030		
	PROJECTED NATIONAL EMISSIONS WITHOUT NON-STATE ACTIONS (MMTCO2e)	PROJECTED NATIONAL EMISSIONS WITH NON-STATE ACTIONS (MMTCO2e)	EMISSIONS REDUCTION IMPACT OF NON-STATE ACTIONS (%)
OCN Current Policy Scenario	5,158.38	5,068.50	1.74
EPS Existing Policies Scenario	4,647.94	4,558.06	1.93
CAT Current Policy Projections	4,606.97	4,517.09	1.95

Note: MMTCO2e = million metric tons of carbon dioxide equivalent; OCN = Open Climate Network; EPS = Energy Policy Simulator; CAT = Climate Action Tracker. Emissions excluding the Land-Use, Land-Use Change, and Forestry (LULUCF) sector.
Source: Authors. Based on raw data from (Mitra et al. 2017; Energy Innovation and WRI n.d.; CAT 2019).

Integrating the emissions reduction impacts from the voluntary climate commitments of the 50 companies analyzed with the national emissions from the models above shows that the additional voluntary emissions reductions from these companies is equivalent to at least 1.74 percent of India's national emissions in 2030, as seen in Table 9 (see Table D1 in Appendix D for year-wise aggregate national emissions for each scenario through 2030, with and without the impact of voluntary company actions).

3.3. Additional Scenarios

Assessment of the overall impact includes various uncertainties, including those related to the emissions in the Reference Scenario, the likelihood of achievement of targets, as well as the level of ambition beyond the target year for companies with a target year earlier than 2030. In order to understand the impact of such uncertainties, we analyze our primary results from Section 3.1, henceforth referred to as the "Base Case," with varying values for the uncertain parameters.

3.3.1. Uncertainty of Target Achievement Likelihood

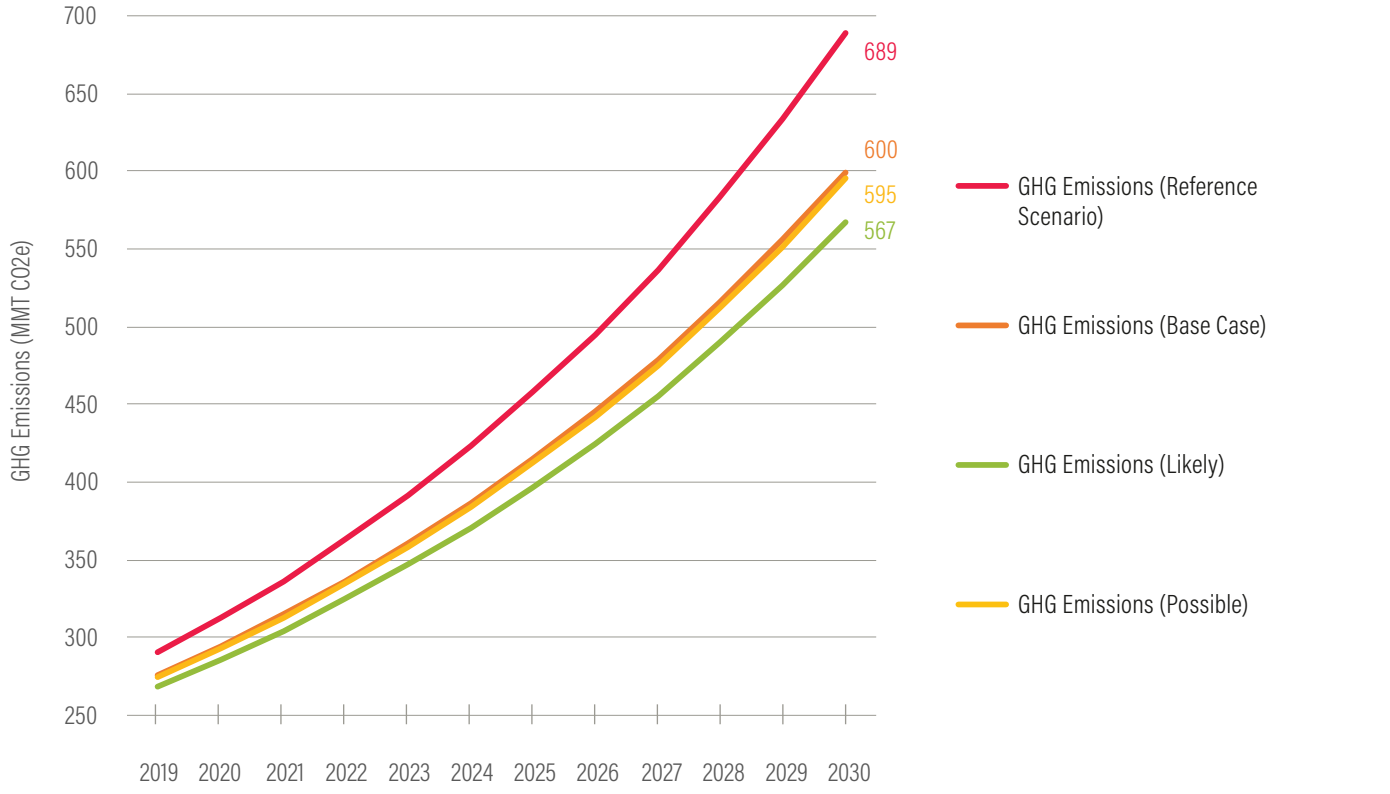
To evaluate the impact of varying assumptions regarding the likelihood of target achievement by each company, we assumed two cases:

- The likelihood of target achievement for all companies is assumed to be "Likely," that is, 100 percent of the target achieved by all 50 companies.
- The likelihood of target achievement for all companies is assumed to be "Possible," that is, 75 percent of the target achieved by all 50 companies.

We do not consider the scenario where the likelihood of target achievement for all companies is "Unlikely." This is because in our assessment of likelihood of target achievement (see Section 2.6.2) we find that only five companies among the ones analyzed are unlikely to meet their target.

Figure 11 shows the emissions reduction impact in the two cases above relative to the Reference Scenario as well as the Base Case results. Assuming that all companies are able to achieve 100 percent of committed targets, their estimated aggregate emissions in 2030 would be approximately 567 MMTCO2e, which amounts to a reduction of 17.7 percent relative to emissions in the Reference Scenario (as opposed to a reduction of approximately 13 percent relative to the Reference Scenario in the Base Case). In the case where all companies achieve 75 percent of the committed targets, we estimate aggregate emissions in 2030 to be approximately 595 MMTCO2e, a reduction of 13.7 percent relative to the Reference Scenario (as opposed to a reduction of approximately 13 percent relative to the Reference Scenario in the Base Case).

Figure 11 | **Accounting for Uncertainty of Target Achievement**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

3.3.2. Uncertainty of Level of Ambition beyond Target Year

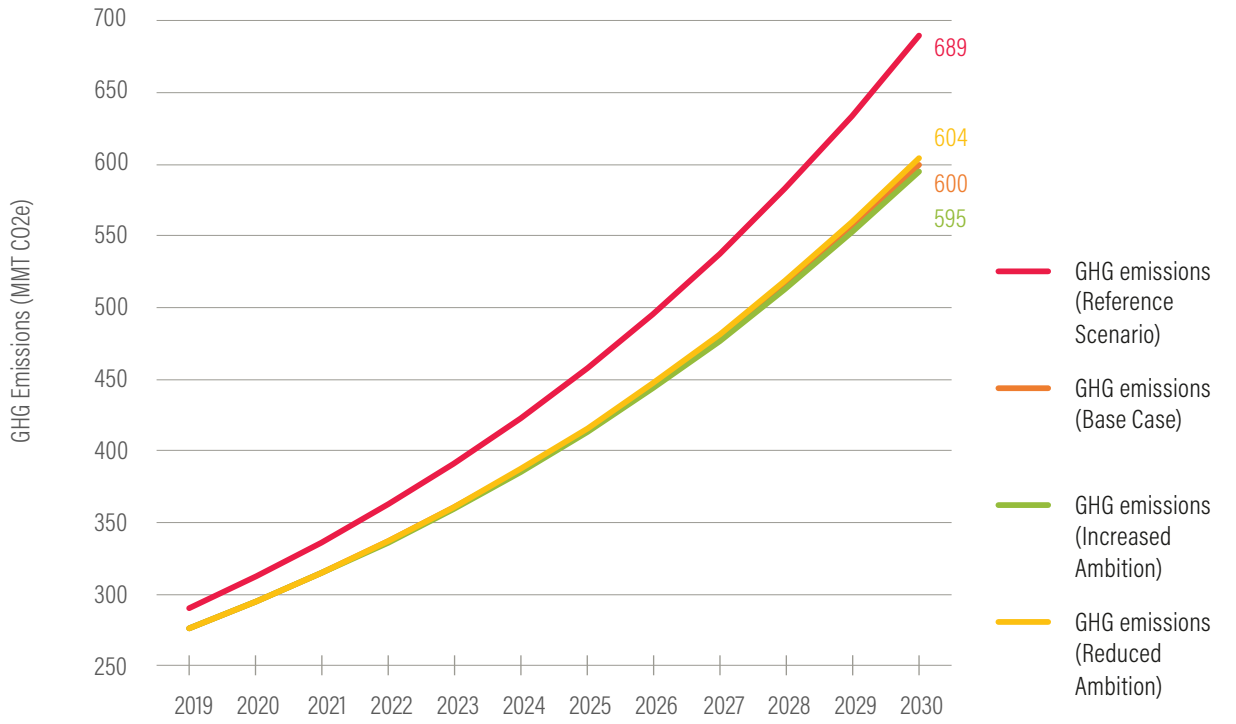
We also conducted a sensitivity analysis with regard to the continuing level of ambition for companies with pre-2030 target years. In our Base Case, we assume that companies with pre-2030 targets will continue to achieve the same level of ambition (the annualized emissions reduction rate) even after reaching the target year associated with the commitment (e.g., 2025). However, in reality, companies may increase or reduce the level of ambition in response to market or economic conditions, availability of cheaper abatement alternatives, increases in the cost of doing business, or other factors. A range of 10 percent was chosen for the sensitivity analysis based on the results of our target achievement likelihood analysis, which showed that recent performance was within 10 percent of the original level of ambition committed in their voluntary target for 49 of the 50 companies analyzed.

Figure 12 shows the aggregate impact of the voluntary climate commitments associated with a hypothetical increase or decrease in ambition after reaching target years prior to 2030. Assuming that companies increase the ambition of the GHG reduction target by 10 percent (beyond the target year, if it is earlier than 2030, and up to 2030), the estimated emissions in 2030 are approximately 595 MMTCO2e, resulting in a reduction of 13.7 percent relative to emissions in the Reference Scenario (as opposed to a reduction of approximately 13 percent relative to the Reference Scenario in the Base Case). Assuming that companies reduce the ambition of the target committed for GHG reduction by 10 percent, the estimated emissions in 2030 would be approximately 604 MMTCO2e, which is a reduction of 12.4 percent relative to the Reference Scenario (as opposed to a reduction of approximately 13 percent relative to the Reference Scenario in the Base Case).

3.3.3. Aggregate Impact Including Carbon Neutrality Targets

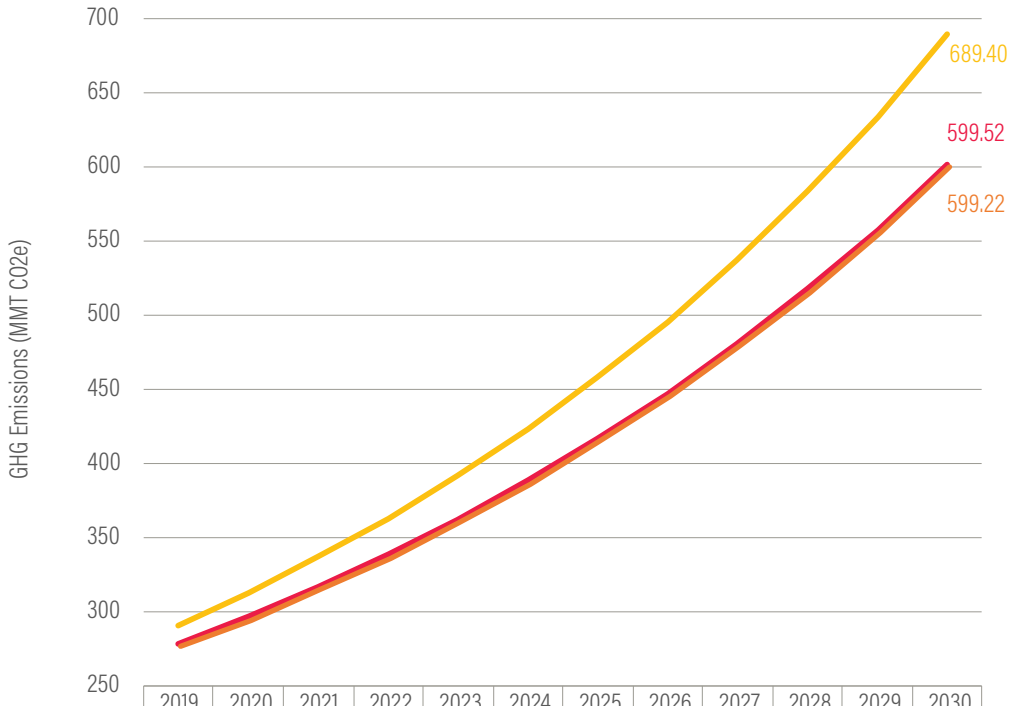
As noted in Section 2.3, our Base Case and the accompanying results (in Section 3.1) do not include the impact of carbon neutrality targets among the group of 50 companies analyzed, given the role of offsets in meeting such targets. In this scenario, we evaluate the impact of companies' achievement of net-zero targets by assuming that any offsets used to meet these goals will come from additional emissions reductions in India. Seven of the 50 companies analyzed have committed to carbon neutrality targets in addition to other climate targets. Figure 13 shows the aggregate impact of including their carbon neutrality targets, relative to the Reference Scenario GHG emissions.

Figure 12 | **Accounting for Uncertainty of Level of Ambition (±10 Percent) for Target Years Earlier than 2030**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Figure 13 | **Accounting for Inclusion of Carbon Neutrality Targets**



	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
GHG Emissions (Reference Scenario)	290.64	312.53	336.46	362.66	391.35	422.81	457.35	495.29	537.02	582.95	633.57	689.40
GHG Emissions (Base Case)	275.99	294.54	314.69	336.58	360.39	386.30	414.53	445.31	478.90	515.58	555.67	599.52
GHG Emissions (Neutrality - with offsets)	275.85	294.07	314.24	336.15	359.98	385.91	414.16	444.95	478.55	515.24	555.35	599.22

Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

Including the impact of carbon neutrality targets, the aggregate emissions in 2030 are estimated to be 599.22 MMTCO2e, a 13.08 percent reduction relative to emissions in the Reference Scenario (as opposed to a reduction of 13.04 percent relative to the Reference Scenario in the Base Case). Accordingly, we see that including these neutrality targets has a negligible impact on the overall reductions achieved in the Base Case. The reason for this is that companies that have adopted these targets fall into relatively less emissions-intensive sectors, such as Engineering and Services, that have a low impact on the overall emissions of the set of companies, which also includes emissions-intensive sectors such as Cement, Metals, and Pulp & Paper.

3.3.4. Aggregate Impact Including Companies without Quantifiable Initiatives

Company selection for our Base Case is determined by the use of the three criteria mentioned in Section 2.3. Accordingly, we identified 50 companies for our analysis in the Base Case. However, we also identified 10 companies in our sample set (of CII GreenCo and BSE200 companies) that met the first two criteria (have verified publicly available emissions inventory available for the last three years), but do not meet the final criterion of having quantifiable, time-bound targets leading to emissions reductions. For example, this includes companies with a publicly available and third-party-audited GHG emissions inventory of direct and indirect emissions based on the GHG Protocol, but with only general targets such as the following:

- Reduce GHG emissions or climate impact of operations.
- Increase the energy efficiency of operations.
- Increase the share of renewables in energy use.

Although these companies have climate performance as an objective, they do not have quantifiable or time-bound targets, and hence are not included in our Base Case. In this scenario, we assess the aggregate impact of voluntary climate initiatives for such companies along with the 50 companies already analyzed. For the purposes of this scenario, we assume that the 10 companies set a voluntary target equivalent to the average annualized emissions reduction associated with the voluntary commitments of other companies from the same sector over the period of this analysis. For example, we assume that a company in the Services sector without a measurable target reduces its emissions intensity annually by 7.72 percent, which is the average annualized rate of the reduction in emissions intensity (ambition level) over the period of the analysis of companies analyzed from this sector that meet the three criteria and are included in our analysis. The ambition level calculated in this manner for the different sectors considered in our analysis is given in Table 10.

Table 10 | **Average Level of Target Ambition of the Companies Analyzed by Sector**

SECTOR	AVERAGE ANNUALIZED REDUCTION IN EMISSIONS INTENSITY (AMBITION LEVEL) (%)
Chemicals and FMCG	7.98
Cement	1.83
Engineering	5.69
Metals and Pulp & Paper	2.85
Oil & Gas	4.89
Services	7.72

Note: FMCG = Fast-Moving Consumer Goods.
Source: Authors.

Accordingly, we see (in Figure 14) that if the 10 companies otherwise excluded from our Base Case are included, the aggregate emissions reduction impact of voluntary climate initiatives in 2030 increases to approximately 106 MMTCO2e compared with 90 MMTCO2e in the Base Case. This results in an impact of approximately 14.8 percent (as compared with approximately 13 percent in the Base Case) relative to the Reference Scenario in 2030.

4. INSIGHTS AND WAY FORWARD

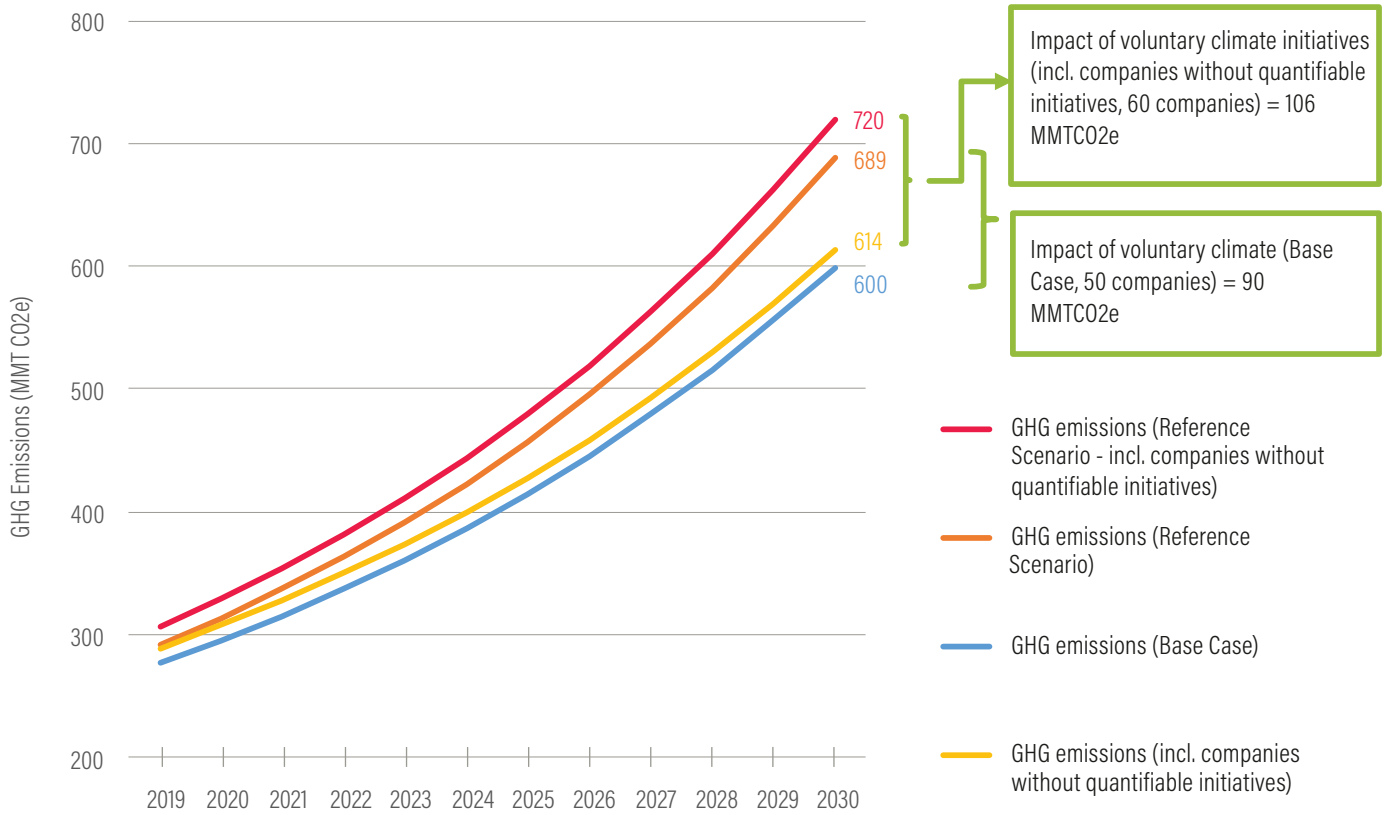
This section elaborates some key insights from our analysis as well its potential policy applications. It also identifies some limitations of our analysis that can be improved upon by similar analyses in the future.

4.1. Insights from Our Analysis

The role of India's industrial sector in national emissions reduction efforts is an important one. The sector currently contributes more than a fifth of the total national GHG emissions and constitutes more than half of the total national energy demand (see Section 1.1). Furthermore, sustained growth in this sector is crucial if India is to meet its national economic, infrastructure, and development goals.

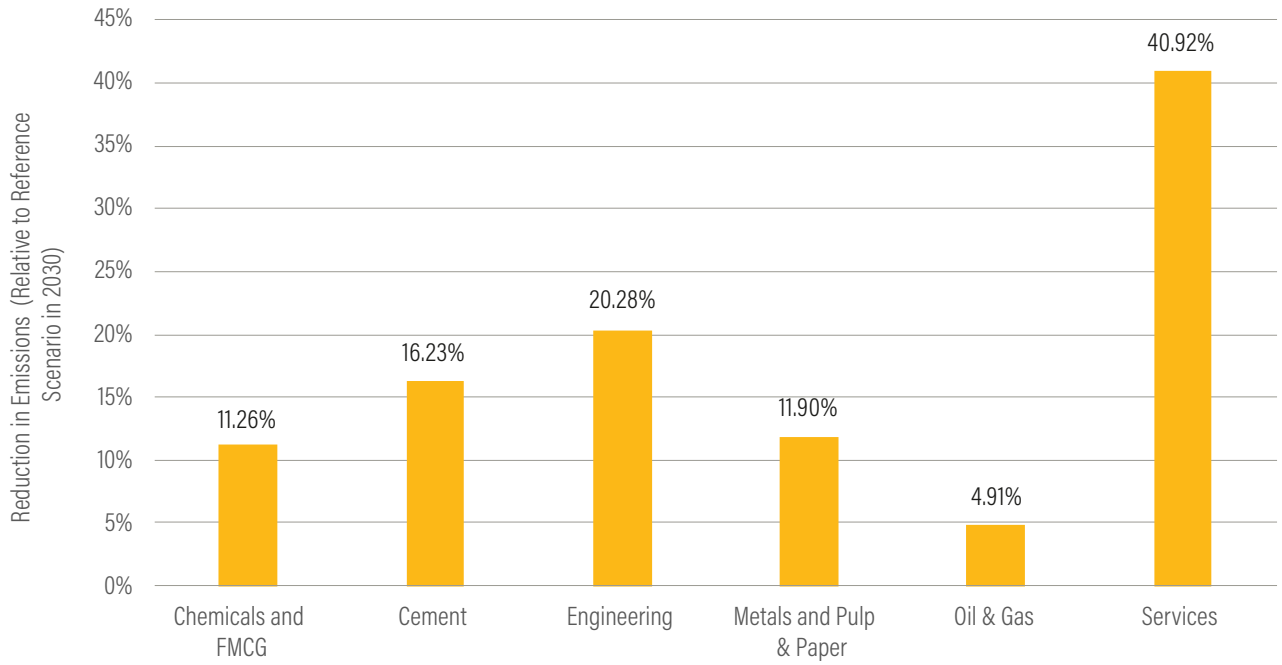
- **Role of key sectors in corporate climate performance**
  A disaggregated analysis of our set of companies by sector shows that companies from relatively less energy-intensive sectors such as the Services sector have set significantly more ambitious targets for GHG reduction and accordingly achieved a higher level of emissions reduction relative to their Reference Scenario. Figure 15 presents the percentage of reduction in estimated emissions of companies, grouped by sector, relative to emissions in the Reference Scenario in 2030.
- However, in terms of absolute emissions reductions achieved, energy-intensive sectors such as Metals, Pulp & Paper and Cement drive the overall

Figure 14 | **Potential Impact of Voluntary Climate Initiatives (Including Companies without Quantifiable Initiatives)**



Note: GHG = greenhouse gas; MMTCO2e = million metric tons of carbon dioxide equivalent.
Source: Authors.

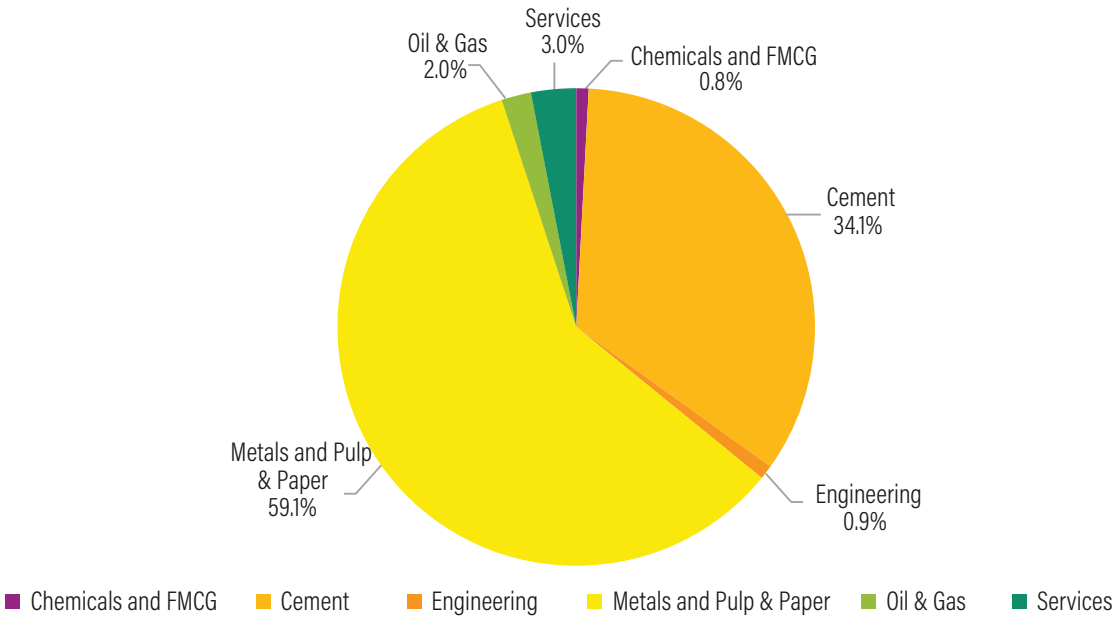
Figure 15 | **Percentage Emissions Reduction Relative to Reference Scenario Emissions in 2030 by Sector for the Set of Companies Analyzed**



Source: Authors.

emissions reduction in absolute terms, despite a relatively lower level of ambition in terms of targets. Figure 16 presents the relative contribution by sector to the total projected emissions reduction (relative to the Reference Scenario) in 2030. As can be seen in this figure, the Metals, Pulp & Paper and Cement sectors together contribute more than 90 percent of the total emissions reduction achieved in 2030 (see Table E1 in Appendix E for year-wise results for each sector through 2030).

Figure 16 | **Relative Contribution to Total Estimated Emissions Reduction in 2030 by Sector for the Set of Companies Analyzed**



Note: FMCG = Fast-Moving Consumer Goods.
Source: Authors.

It is also important to note that energy-intensive sectors, such as Metals, Paper & Pulp and Cement, which drive emissions reductions, are also mandated to improve their energy efficiency by national policies such as PAT. Although the impacts of targets under PAT have been accounted for in the Reference Scenario, as discussed in Section 2.5, such policies can potentially reinforce voluntary actions—that is, encourage proactive voluntary actions that enable emissions cuts beyond what is mandated by a policy. Therefore, further analyses of this kind can also lead to a deeper understanding of which policies play a role in accelerating voluntary action from companies.

- **Role of the corporate sector in supporting low-carbon economic growth and meeting enhanced national climate goals**
  The results of our analysis show that the voluntary actions of 50 companies with emissions equivalent to approximately 35 percent of India's industrial sector emissions can result in additional GHG emissions reductions of up to 1.95 percent of India's national emissions under current policy projections in 2030. With 10 more companies considered (see Section 3.3.4), the emissions reduction impact increases to up to 2.35 percent of the projected national emissions in 2030. Assuming that the entire industrial sector sets a similar level of ambition, we can expect potential additional emissions reductions of almost 5.6 percent of national emissions in 2030, in absolute terms. Although this is a simplistic extrapolation, it provides valuable insight into the potential of climate action from the corporate sector in India.

  Voluntary climate actions in the corporate sector can therefore make a significant contribution toward a low-carbon growth pathway for India, as the level of ambition of such actions increases and as more companies set voluntary targets.

4.2. Potential Policy Applications

Specific insights based on the results of our analysis are outlined in the previous section. At the policy level, such analyses can help policymakers in the following ways:

- **Understand data needs for better quantification of non-state or subnational impact:** Such analyses for non-state and subnational actors in India can help policymakers understand the data requirements for quantifying the emissions impact from voluntary initiatives of these actors. For example, in our analysis, we extensively used company data on emissions as well as their climate initiatives, which are currently reported by Indian companies only on a voluntary basis. This information can guide policymakers on the efforts needed to improve the availability of data for such analyses in the future, which may include institutionalizing data collection and reporting systems for Indian companies or other subnational actors.
- **Generate better emissions projections for effective climate policymaking:** Integrating the additional impact of voluntary initiatives from subnational or non-state actors into national emissions projections can help ensure that climate policy is backed by more realistic data and that national mitigation targets take into account the impact of such initiatives. The results of our analysis, limited to 50 companies with reliable data, indicate that the additional impact of voluntary actions of these companies can reduce the projected national emissions that consider existing policies by 1.74–1.95 percent in 2030. As initiatives from the corporate sector and other actors in India increase in scale and ambition, their overall impact on emissions can be significant, and therefore important to factor into policy planning.
- **Identify sectors and initiatives that need policy support:** From our analysis, we see that heavy industries and the more energy-intensive sectors drive emissions reductions for our set of companies. Even with a lower average level of ambition of voluntary actions as compared with companies from other sectors, these sectors deliver over 90 percent of the overall emission reductions. Such insights can provide policymakers with a better quantitative understanding of the ambition and mitigation potential of different industrial sectors, thereby helping in targeted policy formulation to promote or enhance climate action among groups that have high mitigation potential but lag in voluntary action, and identification of sectors where greater incentives are needed to promote or support such actions.

  Similar analyses for states and cities implementing climate initiatives can help policymakers better understand the region-wise potential to contribute to climate change mitigation, as well as help identify successful initiatives by state that can be replicated in other regions or that have the potential for scaling at the national level.

- **Plan policy in a collaborative and inclusive manner:** A better understanding of voluntary initiatives undertaken by the corporate sector can also give policymakers insights into different mechanisms for delivering efficient emissions reduction and open avenues for collaborative planning of complementary policy approaches to low-carbon growth with businesses. Similarly, collaborative policy planning across national and subnational governments can help reduce duplication of efforts and improve implementation of climate policies across national, state, and city governments.
- **Create an ambition loop to enhance climate performance:** As elaborated in UN Global Compact et al. (2018) and Dagnet et al. (2019), collaborative engagement between national governments and subnational and non-state actors can also drive greater synergies, help strengthen the data collection processes, enable transparent impact assessments, and identify recommendations on improved actions for meeting climate goals and informing the country's future climate commitments. These clear signals can further elicit an additional set of voluntary initiatives from a wider set of non-state and subnational actors, thereby driving a virtuous ambition loop fueled by transparency and collaboration.

4.3. Limitations and Way Forward

A comprehensive analysis of the impact of non-state and subnational action in India would help support more informed and integrated climate policy planning. The analysis presented in this paper is a first step toward a more comprehensive approach. By using voluntarily reported company data, we applied the *NSA Guide* to quantify the potential emissions reduction impact of the voluntary actions of 50 Indian companies. However, our analysis has some limitations owing to certain challenges that need to be addressed to enable more comprehensive analyses of non-state and subnational climate actions in India. These are as follows:

- **Availability of data:** A quantitative assessment of the projected emissions impact of voluntary actions requires that these actions be reported such that they can be translated into a quantifiable energy or emissions impact in the future. Our analysis, which relied on voluntary corporate disclosures for data, could include only a subset of companies undertaking voluntary initiatives, because the quality or specificity of data pertaining to such initiatives in voluntary disclosures was often found lacking. Another consequence of our company selection criteria was that we could not include all industrial sectors or ensure proportional representation of the sectors included in our analysis.

  In the absence of a mandatory national GHG reporting program, the availability of specific, reliable, and accurate public data from actors is a challenge that needs to be addressed. Building capacity, systems, and processes for better data monitoring, recording, and disclosures can bridge this gap and help improve the scale and accuracy of such analyses.

- **Better measurement of policy effects and interactions:** Quantifying the additional emissions reduction impact of a voluntary action requires isolating the impact attributable to such an action from that which is due to any applicable climate policy. In our analysis, we could do so only in the case of policies where data and a clear causal chain allowed us to quantitatively assess the policy impact on the emissions of individual companies. Therefore, a limitation of our analysis is that we do not fully account for policy interactions where there is an absence of clear data and linkages. In general, a bottom-up analysis such as ours does not allow estimation of policy impacts for cases where policies

  - have an indirect effect on the emissions of companies,
  - impact emissions through a financial incentive or disincentive, and
  - act in combination with other policies to impact the emissions of companies.

  Efforts toward a better understanding of causal chains of how different policies impact the GHG emissions of a company as well as modeling studies that provide measurable estimates of the impacts of different policies on different actors can improve both the availability of data for quantitatively assessing policy interactions and the accuracy of the impact estimates of voluntary actions in such analyses in the future.

- **Inclusion of a broader set of actors:** Given the limited number of quantifiable climate actions by subnational governments such as states and cities in India as well as the lack of explicit reporting, our analysis is currently limited to a subset of non-state actors, specifically companies whose voluntary climate initiatives are comparatively more explicitly and better reported. As more actors, including

states and cities, step up their climate initiatives through their state action plans or city-level planning, national governments can play a key role in supporting and enhancing their voluntary ambition if they have a better sense of the kind of potential impact these initiatives are likely to have.

Exploring opportunities for stronger linkages between state action plans with the NDC, institutionalizing relevant data collection processes within state and municipal governance structures, and a common public platform for reporting subnational data can help address this challenge in the Indian context, and allow such analyses to be extended to cover the voluntary initiatives of subnational actors in the future.

Analyses of subnational and non-state climate actions can help bridge the gap between voluntary initiatives and national climate efforts to meet global climate targets. At the same time, efforts toward improving the availability of reliable, consistent, and transparent data from subnational and non-state actors as well as a better understanding of policy effects and interactions with the voluntary actions of these actors are needed to improve the scale and accuracy of analyses of the potential impacts of voluntary actions from such actors.

An improved understanding of these impacts, along with better engagement with non-state and subnational actors through such analyses, can help facilitate more integrated and inclusive climate policy planning, enhance the ambition of climate action, and facilitate a more efficient low-carbon and sustainable growth pathway for India.

APPENDIX A: LIST OF COMPANIES INCLUDED

Table A1 lists the 50 Indian companies whose voluntary climate commitments have been considered in this analysis.

Table A1 | **Companies Included in the Analysis**

SR. NO.	COMPANY NAME	SECTOR	SUBSECTOR
1	ACC Limited	Cement	Cement
2	Adani Ports & SEZ Limited	Services	Ports
3	Ambuja Cement	Cement	Cement
4	Asian Paints	Chemicals and FMCG	Chemicals
5	Axis Bank	Services	Bank
6	Bangalore International Airport Limited (BIAL)	Services	Airport
7	Brakes India	Engineering	Foundry
8	Delhi International Airport Limited (DIAL)	Services	Airport
9	Dr. Reddy's Laboratories	Chemicals and FMCG	Pharma
10	Gas Authority India Limited	Oil & Gas	Oil & Gas
11	Godrej Consumer Products Limited (GCPL)	Chemical and FMCG	FMCG
12	Godrej Appliances	Engineering	Engineering
13	Godrej Industries Limited	Chemicals and FMCG	Chemical
14	Godrej Interio	Engineering	Furniture
15	HCL	Services	IT
16	Hindalco Aluminum	Metals and Pulp & Paper	Aluminum
17	Hindalco Copper	Metals and Pulp & Paper	Copper
18	Indian Hotel Corporation Limited (IHCL)	Services	Hotels
19	Indian Oil Corporation Limited	Oil & Gas	Oil & Gas
20	IndusInd Bank	Services	Bank
21	Infosys	Services	IT
22	JK Tyre	Engineering	Tire
23	JSW Steel	Metals and Pulp & Paper	Steel
24	Kirloskar Brothers	Engineering	Engineering
25	Kirloskar Oil Engines	Engineering	Engineering
26	L&T	Engineering	Engineering

SR. NO.	COMPANY NAME	SECTOR	SUBSECTOR
27	Mahindra & Mahindra - Automobile	Engineering	Engineering
28	Mahindra & Mahindra - Foundry	Engineering	Engineering
29	Mahindra & Mahindra - Swaraj	Engineering	Engineering
30	Mahindra Financial Services	Services	Bank
31	Mahindra Life Space Developers	Services	Construction
32	Mahindra Sanyo Special Steel	Metals and Pulp & Paper	Steel
33	Marico	Chemicals and FMCG	FMCG
34	Maruti Suzuki	Engineering	Automobile
35	Mumbai International Airport Limited (MIAL)	Services	Airport
36	Mindtree	Services	IT
37	Nippon paints	Chemicals and FMCG	Chemicals
38	Seshasayee Paper Boards	Metals and Pulp & Paper	Pulp & Paper
39	Shree Cement	Cement	Cement
40	SRF Limited	Chemicals and FMCG	Chemicals
41	Steel Authority of India Limited	Metals and Pulp & Paper	Steel
42	Tamil Nadu News Print Limited	Metals and Pulp & Paper	Pulp & Paper
43	Tata Chemicals	Chemicals and FMCG	Chemicals
44	Tata Motors	Engineering	Automobile
45	Tata Steel	Metals and Pulp & Paper	Steel
46	TCS	Services	IT
47	Tech Mahindra	Services	IT
48	Ultratech Cement Limited	Cement	Cement
49	WIPRO	Services	IT
50	Yes Bank	Services	Bank

Note: FMCG = Fast-Moving Consumer Goods.

APPENDIX B: TARGET ACHIEVEMENT LIKELIHOOD ASSESSMENT

Table B1 summarizes the results of the application of the target likelihood assessment criteria for each company included in the analysis.

Table B1 | **Results of the Target Achievement Likelihood Assessment for Each Company**

COMPANY	ANNUALIZED REDUCTION IN EMISSION INTENSITY (%)	% REDUCTION REQUIRED PER YEAR BASED ON TARGET	PROGRESS ON TARGET	SUPPLEMENTARY POLICIES	TARGET ACHIEVEMENT LIKELIHOOD
	2014 to 2017	2014 to Target Year			
Company 1	19.64	10.81	8.83	N/A	Likely
Company 2	1.37	5.00	–3.63	Yes	Possible
Company 3	2.31	4.30	–1.99	Yes	Possible
Company 4	11.54	12.17	–0.63	Yes	Possible
Company 5	1.72	1.68	0.05	N/A	Likely
Company 6	2.750	5.00	–2.25	Yes	Possible
Company 7	3.99	4.40	–0.41	Yes	Possible
Company 8	2.82	4.00	–1.18	Yes	Possible
Company 9	2.74	5.59	–2.85	Yes	Possible
Company 10	8.46	5.591	2.87	N/A	Likely
Company 11	3.67	5.59	–1.92	Yes	Possible
Company 12	4.80	4.20	0.60	N/A	Likely
Company 13	8.59	6.61	1.98	N/A	Likely
Company 14	3.37	3.89	–0.51	Yes	Possible
Company 15	1.68	2.80	–1.12	Yes	Possible
Company 16	2.58	2.03	0.55	N/A	Likely
Company 17	0.94	2.03	–1.10	Yes	Possible
Company 18	2.63	1.25	1.38	N/A	Likely
Company 19	3.60	3.03	0.57	Yes	Likely
Company 20	0.76	1.16	–0.39	Yes	Possible
Company 21	3.03	5.43	–2.39	Yes	Possible
Company 22	19.76	18.59	1.17	N/A	Likely
Company 23	5.81	5.77	0.04	N/A	Likely
Company 24	–10.77	7.41	–18.18	No	Unlikely

COMPANY	ANNUALIZED REDUCTION IN EMISSION INTENSITY (%)	% REDUCTION REQUIRED PER YEAR BASED ON TARGET	PROGRESS ON TARGET	SUPPLEMENTARY POLICIES	TARGET ACHIEVEMENT LIKELIHOOD
Company 25	5.90	10.63	–4.73	Yes	Possible
Company 26	2.17	5.45	–3.28	Yes	Possible
Company 27	1.96	7.50	–5.54	No	Unlikely
Company 28	1.86	3.00	–1.14	No	Unlikely
Company 29	1.24	2.29	–1.06	Yes	Possible
Company 30	4.23	7.54	–3.31	Yes	Possible
Company 31	15.05	12.00	3.05	N/A	Likely
Company 32	11.05	12.43	–1.38	Yes	Possible
Company 33	3.008	11.60	–8.59	No	Unlikely
Company 34	13.10	9.36	3.74	N/A	Likely
Company 35	7.94	3.17	4.77	N/A	Likely
Company 36	8.18	3.91	4.27	N/A	Likely
Company 37	10.23	9.33	0.90	N/A	Likely
Company 38	18.25	16.00	2.25	N/A	Likely
Company 39	8.80	8	0.80	N/A	Likely
Company 40	10.74	6.98	3.77	N/A	Likely
Company 41	6.70	4.50	2.20	N/A	Likely
Company 42	10.26	4.50	5.76	N/A	Likely
Company 43	12.95	12.27	0.68	N/A	Likely
Company 44	11.24	3.55	7.69	N/A	Likely
Company 45	1.70	1.74	–0.05	Yes	Possible
Company 46	1.89	4.19	–2.31	Yes	Possible
Company 47	0.40	1.12	–0.72	Yes	Possible
Company 48	0.40	1.48	–1.08	Yes	Possible
Company 49	1.15	1.55	–0.40	Yes	Possible
Company 50	3.02	3.16	–0.14	No	Unlikely

APPENDIX C: EMISSIONS SCENARIOS

Table C1 lists the annual aggregate GHG emissions of the 50 companies from 2014 through 2030 under each emissions scenario considered in the analysis.

Table C1 | **Aggregate Annual Emissions of the Companies Analyzed under Each Emissions Scenario**

Aggregate Emissions – Base Case

BASE CASE	UNITS	2014	2015	2016	2017	2018	2019	2020	2021	2022
GHG Emissions Reference Scenario	MMTCO2e	211.70	223.59	245.79	264.07	270.60	290.64	312.53	336.46	362.66
GHG emissions considering impact of voluntary climate commitments	MMTCO2e	208.58	218.52	238.69	254.63	258.89	275.99	294.54	314.69	336.58
Impact	MMTCO2e	3.12	5.08	7.10	9.43	11.71	14.65	17.99	21.78	26.08
% Impact	%	1.48	2.27	2.89	3.57	4.33	5.04	5.76	6.47	7.19

BASE CASE	UNITS	2023	2024	2025	2026	2027	2028	2029	2030
GHG Emissions Reference Scenario	MMTCO2e	391.35	422.81	457.35	495.29	537.02	582.95	633.57	689.40
GHG emissions considering impact of voluntary climate commitments	MMTCO2e	360.39	386.30	414.53	445.31	478.90	515.58	555.67	599.52
Impact	MMTCO2e	30.96	36.51	42.81	49.98	58.12	67.37	77.90	89.88
% Impact	%	7.91	8.64	9.36	10.09	10.82	11.56	12.30	13.04

Additional Scenarios

	UNITS	2014	2015	2016	2017	2018	2019	2020	2021	2022
Uncertainty of target achievement likelihood										
GHG Emissions (Likely)	MMTCO2e	207.39	216.52	235.75	250.36	253.37	269.06	286.09	304.60	324.73
GHG Emissions (Possible)	MMTCO2e	208.88	218.85	238.90	254.55	258.49	275.31	293.57	313.39	334.95
Uncertainty of level of ambition beyond target year										
GHG Emissions (Increased ambition)	MMTCO2e	208.58	218.52	238.69	254.63	258.89	275.99	294.49	314.50	336.24
GHG Emissions (Reduced ambition)	MMTCO2e	208.58	218.52	238.69	254.63	258.89	275.99	294.59	314.87	336.92
Aggregate impact including carbon neutrality targets										
GHG Emissions (Increased ambition)	MMTCO2e	208.58	218.52	238.69	254.63	258.89	275.99	294.49	314.50	336.24

	UNITS	2014	2015	2016	2017	2018	2019	2020	2021	2022
GHG Emissions (Reduced ambition)	MMTCO2e	208.58	218.52	238.69	254.63	258.89	275.99	294.59	314.87	336.92
Aggregate impact including companies without specific measurable initiatives/targets										
GHG Emissions (Reference Scenario)	MMTCO2e	224.06	236.32	259.18	278.14	285.42	306.27	329.03	353.91	381.13
GHG Emissions (including impact of voluntary commitments)	MMTCO2e	220.94	230.71	250.96	266.98	271.32	288.51	307.17	327.43	349.45

	UNITS	2023	2024	2025	2026	2027	2028	2029	2030
Uncertainty of target achievement likelihood									
GHG Emissions (Likely)	MMTCO2e	346.63	370.50	396.51	424.90	455.90	489.79	526.86	567.46
GHG Emissions (Possible)	MMTCO2e	358.40	383.95	411.81	442.21	475.43	511.76	551.54	595.14
Uncertainty of level of ambition beyond target year									
GHG Emissions (Increased ambition)	MMTCO2e	359.89	385.64	413.58	443.88	476.91	512.96	552.31	595.33
GHG Emissions (Reduced ambition)	MMTCO2e	360.89	386.98	415.51	446.77	480.91	518.24	559.08	603.80
Aggregate impact including carbon neutrality targets									
GHG Emissions (Neutrality – with offsets)	MMTCO2e	359.98	385.91	414.16	444.95	478.55	515.24	555.35	599.22
Aggregate impact including companies without specific measurable initiatives/targets									
GHG Emissions (Reference Scenario – incl. companies without a specific target)	MMTCO2e	410.95	443.63	479.49	518.88	562.18	609.84	662.35	720.25
GHG Emissions (including companies without a specific target)	MMTCO2e	373.40	399.47	427.86	458.82	492.60	529.49	569.80	613.90

Note: MMTCO2e = million metric tons of carbon dioxide equivalent; GHG = greenhouse gas.

APPENDIX D: INTEGRATION ANALYSIS

Table D1 lists India's aggregate GHG emissions from 2019 through 2030 under the OCN, EPS, and CAT current policy scenarios, with and without the impact of voluntary climate commitments of the 50 companies analyzed.

Table D1 | **National Current Policy Projections for India with and without the Impact of Voluntary Climate Commitments of the Companies Analyzed**

MODELING SCENARIO	UNITS	2019	2020	2021	2022	2023	2024
OCN Current Policy Scenario	MMTCO2e	2,719.80	2,904.44	3,079.60	3,267.25	3,472.85	3,693.90
EPS Existing Policies Scenario	MMTCO2e	3,202.25	3,321.79	3,441.32	3,573.21	3,705.09	3,836.98
CAT Current Policy Projections	MMTCO2e	2,705.15	2,886.45	3,057.83	3,241.17	3,441.89	3,657.39
OCN Current Policy Scenario (with impact of voluntary commitments)	MMTCO2e	3,315.56	3,423.30	3,518.90	3,610.47	3,728.39	3,838.52
EPS Existing Policies Scenario (with impact of voluntary commitments)	MMTCO2e	2,719.80	2,904.44	3,079.60	3,267.25	3,472.85	3,693.90
CAT Current Policy Projections (with impact of voluntary commitments)	MMTCO2e	3,330.21	3,441.29	3,540.68	3,636.55	3,759.35	3,875.03

MODELING SCENARIO	UNITS	2019	2020	2021	2022	2023	2024
OCN Current Policy Scenario	MMTCO2e	3,913.47	4,137.68	4,371.98	4,599.02	4,860.46	5,158.38
EPS Existing Policies Scenario	MMTCO2e	3,968.86	4,100.74	4,227.30	4,353.86	4,480.42	4,606.97
CAT Current Policy Projections	MMTCO2e	3,870.66	4,087.70	4,313.86	4,531.65	4,782.56	5,068.50
OCN Current Policy Scenario (with impact of voluntary commitments)	MMTCO2e	3,940.69	4,042.08	4,139.93	4,276.55	4,419.55	4,558.06
EPS Existing Policies Scenario (with impact of voluntary commitments)	MMTCO2e	3,913.47	4,137.68	4,371.98	4,599.02	4,860.46	5,158.38
CAT Current Policy Projections (with impact of voluntary commitments)	MMTCO2e	3,983.50	4,092.06	4,198.05	4,343.92	4,497.45	4,647.94

Note: MMTCO2e = million metric tons of carbon dioxide equivalent; OCN = Open Climate Network; EPS = Energy Policy Simulator; CAT = Climate Action Tracker. Emissions excluding the Land-Use, Land-Use Change, and Forestry (LULUCF) sector.

APPENDIX E: SECTORAL ANALYSIS

Table E1 lists annual GHG emissions aggregated by sector for the set of companies analyzed from 2014 through 2030 in the Reference Scenario and the Base Case.

Table E1 | **Aggregate Annual Emissions by Sector for the Set of Companies Analyzed**

		UNITS	2014	2015	2016	2017	2018	2019	2020	2021	2022
Chemicals and FMCG	Reference Scenario	MMTCO2e	6.05	4.06	6.00	6.02	6.01	6.01	6.02	6.03	6.06
	Base Case	MMTCO2e	6.05	4.05	5.89	5.83	5.74	5.67	5.61	5.56	5.52
	Impact	MMTCO2e	0.00	0.02	0.11	0.19	0.27	0.34	0.41	0.48	0.54
	Impact	%	0.00	0.44	1.75	3.17	4.49	5.73	6.88	7.94	8.88
Cement	Reference Scenario	MMTCO2e	70.13	73.15	74.67	82.34	88.03	93.83	100.00	106.57	113.57
	Base Case	MMTCO2e	67.76	69.95	70.67	77.27	81.82	86.43	91.30	96.45	101.88
	Impact	MMTCO2e	2.38	3.19	4.00	5.07	6.21	7.40	8.70	10.12	11.69
	Impact	%	3.39	4.36	5.36	6.16	7.06	7.88	8.70	9.50	10.29
Engineering	Reference Scenario	MMTCO2e	2.30	2.34	2.37	2.52	2.60	2.69	2.78	2.88	2.99
	Base Case	MMTCO2e	2.30	2.29	2.27	2.35	2.38	2.42	2.46	2.51	2.57
	Impact	Million TCO2e	0.00	0.05	0.10	0.17	0.22	0.27	0.32	0.37	0.42
	Impact	%	0.00	2.14	4.25	6.81	8.55	10.12	11.53	12.81	13.97
Metals and Pulp & Paper	Reference Scenario	MMTCO2e	115.59	125.42	143.49	151.08	153.36	166.26	180.53	196.34	213.86
	Base Case	MMTCO2e	114.84	123.71	140.82	147.44	148.88	160.32	172.86	186.63	201.75
	Impact	MMTCO2e	0.75	1.71	2.68	3.63	4.48	5.94	7.67	9.71	12.10
	Impact	%	0.65	1.37	1.86	2.40	2.92	3.57	4.25	4.94	5.66
Oil & Gas	Reference Scenario	MMTCO2e	15.44	16.29	16.76	19.56	17.82	18.93	20.10	21.34	22.66
	Base Case	MMTCO2e	15.44	16.26	16.71	19.43	17.65	18.67	19.76	20.92	22.14
	Impact	MMTCO2e	0.00	0.03	0.06	0.13	0.18	0.25	0.33	0.43	0.53
	Impact	%	0.00	0.18	0.34	0.67	1.00	1.33	1.66	1.99	2.32
Services	Reference Scenario	MMTCO2e	2.18	2.33	2.50	2.54	2.77	2.93	3.10	3.30	3.52
	Base Case	MMTCO2e	2.18	2.26	2.34	2.31	2.42	2.48	2.55	2.63	2.71
	Impact	MMTCO2e	0.00	0.07	0.16	0.23	0.34	0.44	0.55	0.67	0.81
	Impact	%	0.00	3.16	6.32	9.23	12.41	15.18	17.84	20.41	22.90

		UNITS	2023	2024	2025	2026	2027	2028	2029	2030
Chemicals and FMCG	Reference Scenario	MMTCO2e	6.09	6.13	6.18	6.24	6.31	6.40	6.51	6.63
	Base Case	MMTCO2e	5.50	5.49	5.50	5.53	5.58	5.65	5.75	5.88
	Impact	MMTCO2e	0.59	0.64	0.68	0.71	0.73	0.75	0.75	0.75
	Impact	%	9.71	10.41	10.98	11.39	11.64	11.71	11.59	11.26
Cement	Reference Scenario	MMTCO2e	121.03	128.98	137.45	146.47	156.08	166.31	177.22	188.83
	Base Case	MMTCO2e	107.63	113.71	120.13	126.92	134.10	141.69	149.71	158.19
	Impact	MMTCO2e	13.40	15.27	17.31	19.54	21.97	24.62	27.51	30.64
	Impact	%	11.07	11.84	12.60	13.34	14.08	14.81	15.52	16.23
Engineering	Reference Scenario	MMTCO2e	3.11	3.23	3.36	3.50	3.65	3.81	3.99	4.17
	Base Case	MMTCO2e	2.64	2.71	2.79	2.88	2.98	3.09	3.20	3.32
	Impact	MMTCO2e	0.47	0.52	0.57	0.62	0.67	0.73	0.78	0.85
	Impact	%	15.02	15.97	16.84	17.64	18.38	19.06	19.69	20.28
Metals and Pulp & Paper	Reference Scenario	MMTCO2e	233.30	254.88	278.87	305.56	335.27	368.37	405.28	446.46
	Base Case	MMTCO2e	218.38	236.67	256.82	279.01	303.50	330.52	360.36	393.34
	Impact	MMTCO2e	14.92	18.21	22.06	26.55	31.77	37.86	44.92	53.12
	Impact	%	6.39	7.14	7.91	8.69	9.48	10.28	11.08	11.90
Oil & Gas	Reference Scenario	MMTCO2e	24.07	25.56	27.14	28.82	30.60	32.50	34.51	36.64
	Base Case	MMTCO2e	23.43	24.80	26.24	27.77	29.39	31.11	32.92	34.84
	Impact	MMTCO2e	0.64	0.76	0.89	1.04	1.21	1.39	1.58	1.80
	Impact	%	2.65	2.97	3.30	3.62	3.94	4.27	4.59	4.91
Services	Reference Scenario	MMTCO2e	3.76	4.04	4.35	4.70	5.10	5.56	6.08	6.68
	Base Case	MMTCO2e	2.81	2.92	3.05	3.19	3.35	3.52	3.72	3.95
	Impact	MMTCO2e	0.95	1.12	1.30	1.51	1.76	2.03	2.36	2.73
	Impact	%	25.31	27.66	29.95	32.20	34.41	36.60	38.77	40.92

Note: MMTCO2e = million metric tons of carbon dioxide equivalent; FMCG = Fast-Moving Consumer Goods.

LIST OF ABBREVIATIONS	
BEE	Bureau of Energy Efficiency
BSE	Bombay Stock Exchange
CAT	Climate Action Tracker
CII	Confederation of Indian Industry
EPS	Energy Policy Simulator
ESCert	Energy Saving Certificate
FMCG	Fast-Moving Consumer Goods
GCoM	Global Covenant of Mayors
GDP	gross domestic product
GHG	greenhouse gas
GHGPI	GHG Platform India
GoI	Government of India
ICAT	The Initiative for Climate Action Transparency
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land-Use, Land-Use Change and Forestry
MNRE	Ministry of New and Renewable Energy
MoEFCC	Ministry of Environment, Forests and Climate Change
MoHUA	Ministry of Housing and Urban Affairs
MoSPI	Ministry of Statistics and Program Implementation
MSME	Micro, Small, and Medium Enterprises
MMTCO2e	million metric tons of carbon dioxide equivalent
NAPCC	National Action Plan on Climate Change
NDC	Nationally Determined Contribution
NSA Guide	Non-state and Subnational Action Guide by the Initiative for Climate Action Transparency
OCN	Open Climate Network
PAT	Perform, Achieve and Trade scheme
REC	Renewable Energy Certificate
RPO	Renewable Purchase Obligation
SAPCC	State Action Plan on Climate Change
SEC	specific energy consumption
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States dollars

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Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

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We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure that our outcomes will be bold and enduring.

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