OVERVIEW

The Effect of Multinational Enterprises on Climate Change

Supply Chain Emissions, Green Technology Transfers, and Corporate Commitments

Victor Steenbergen and Abhishek Saurav
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The world is facing an urgent need to address climate change. Without urgency in action and emissions reductions across all sectors, limiting global warming to 1.5 degrees Celsius will not be possible. According to a 2022 IPCC report, global greenhouse gas emissions need to stabilize before 2025, be reduced by 43 percent by 2030, and reach net-zero by 2050. Only through immediate and coordinated action can we limit the damages from climate change and minimize the adverse effects of rising temperatures on growth, poverty reduction, and conflict around the world.

Climate action from both the public and private sectors is vital to meet this objective and accelerate the transition. In December 2015, 195 states signed the Paris Agreement. This pact provides an international agreement on tackling climate change that sets out each country’s pledge to lower their emissions. While countries are increasingly taking steps to realize their commitments, there is a lack of consensus on how to translate global reduction targets into business-specific actions. Yet, private-sector engagement is critical to rapidly decarbonize existing supply chains and as a source of investment to accelerate the global energy transition.

This new report considers the impact of a key private sector player—multinational enterprises (MNEs)—on climate change. The report discusses the challenges and opportunities that MNEs pose to climate change mitigation by bringing together new data, empirical analysis, and the latest literature. Its findings show that a small number of MNEs are a major driver of global emissions, but also that these companies can quickly provide meaningful reforms to the emissions of their global suppliers by encouraging the use of green technologies and the adoption of sustainability standards. It also finds that MNEs offer an important source of investment for the climate transition, with an increasing share of foreign direct investment flowing into green sectors. Yet, the report also alerts us to the risk of inaction and resistance from MNEs, and it finds that many MNEs still have limited and insufficient corporate commitments to decarbonizing their own production and their supply chains.

Governments can and should do more to shape the behaviors of MNEs as part of their climate change mitigation plans, to help accelerate the climate transition. This report highlights how various policies can shape MNEs’ impact on climate change by shaping their decisions to produce, invest, and engage in their network of affiliates and suppliers. These policy approaches include better monitoring firms’ emissions,
strengthening laws and regulations, changing price signals via tax policy and fiscal support, and using persuasion to guide the actions of MNEs, among others.

The race to net-zero is on. As governments are looking for ways to accelerate their transition to low-carbon economies, governments should utilize all the analytical and policy tools they can. In this light, The Effect of Multinational Enterprises on Climate Change: Supply Chain Emissions, Green Technology Transfers, and Corporate Commitments provides a useful and timely contribution to the discussion on climate change by shedding light on multinational enterprises as a major driver of global emissions. It is our hope that this report will help guide policy makers around the world and shape World Bank Group operations going forward.

Mona Haddad

Global Director for Trade, Investment, and Competitiveness
World Bank
Foreword

For the past 23 years, CDP has been laser focused on scaling the ambition of companies, cities, states, and regions measuring, disclosing, and acting on their environmental impact. This simple yet powerful goal has led global investors, businesses, and governments to provide a wealth of measurable data.

These data are crucial to understanding how we can respond to the climate crisis. CDP has evolved to become the only global, independent, environmental disclosure mechanism. CDP’s annual cycle of interventions is now relied upon by financial institutions to make critical investment decisions, by buyers to work with their suppliers, and by policy makers to drive stronger environmental action.

From this vantage point, we can see that each company has its own story to tell. Disclosing data on emissions, water security, or deforestation is only the first step to change how a business is run for the better. This new report highlights the role that multinational enterprises (MNEs) play in promoting and guiding the urgent change that is needed.

Large MNEs can use their influence to embed low-carbon technologies in the markets in which they operate, to push their supply chains to adopt sustainability, and to finance climate mitigation and adaptation. The flip side is that they could import their high-carbon habits and exacerbate the problem.

MNEs need national governments to work together to set stronger policies that will guide action on climate and nature issues. Many countries are developing strategies to build resilience against climate change and cut greenhouse gas emissions as quickly as possible. This report shows how MNEs need to be a partner in the net-zero transition, but it also shows that many of those with the highest emissions lack a clear, long-term plan to do something about it.

One of the striking, yet unsurprising, points to come out of this latest World Bank research, which analyzes CDP data, is how a handful of large corporates, and their supply chains, are responsible for the bulk of global industrial emissions. The outsized role these companies have acts both as a risk and an opportunity to mitigate the worst impacts of climate change, and their ambitions will determine the environmental performance of many countries.
Here again is where policy makers need to step in to show MNEs the way. As the analysis makes clear, shifting their effect on climate change will require a suite of policy instruments that includes implementing better emissions monitoring; setting strong standards; developing incentives to encourage green R&D; and imposing environmental taxes.

This important work reiterates the need to engage with these companies to better understand their activities and how they can shape the future of climate action.

Nicolette Bartlett  
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This report was developed by the Investment Climate Unit of the World Bank. Mona Haddad, Global Director for Trade, Investment, and Competitiveness, and Asya Akhlaque, Finance, Competitiveness, and Innovation Global Practice Manager, provided guidance and supervision throughout.
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Main Messages

Multinational enterprises (MNEs) provide both a fundamental risk to and an opportunity for climate change mitigation. Proactive MNEs can impose sustainability standards or encourage green technology transfers that affect millions of producers and quickly reduce emissions. Yet, some MNEs may hold back emissions reduction by resisting, obstructing, or lobbying against change.

A small number of MNEs are a major driver of global greenhouse gas (GHG) emissions. This report’s analysis suggests that the direct activities and supply chains of 157 large MNEs jointly account for up to 60 percent of global industrial emissions. While 10 percent comes from MNEs’ direct activities, their supply chains account for another 50 percent of global emissions.

Most of the 157 MNEs are insufficiently committed to decarbonizing production and supply chains. Only one in four of all MNEs have committed to net-zero GHG emissions by 2050. Few have a long-term strategy (20 percent), a medium-term strategy (13 percent), or a short-term strategy (5 percent). None of the MNEs had a capital allocation strategy that aligned to net-zero emissions by 2050. The lack of short-term plans to decarbonize production and supply chains raises credibility concerns about the realism of MNEs’ long-term commitments.

Yet, MNEs can help domestic firms decarbonize by providing access to more advanced, low-carbon technology. MNEs’ production is less carbon-intensive than that of domestic firms. Firms that interact more with MNEs (via licensing, supply linkages, or joint ventures) are more likely to engage in green target-setting, monitoring, and decarbonization. This suggests MNEs can be an important part of the solution.

MNEs are increasingly shifting their new investments to green sectors and avoiding polluting sectors. Foreign direct investment (FDI) announcements in green sectors have strongly increased, rising by 700 percent between 2003 and 2021. In contrast, foreign investment in polluting sectors has declined by 80 percent over the same period. Green FDI has also overtaken FDI in polluting sectors. As a ratio, green and polluting FDIs’ share shifted from 5-to-95 percent in 2003, to 66-to-34 percent in 2021. MNEs thus offer an important source of finance for the climate transition.

Countries should actively consider MNEs in their climate change mitigation plans. This report introduces a new framework, the 5Ps, which shows how various policies can shape MNEs’ impact on climate change. The 5Ps are *patrolling* (monitoring emissions),
prescription (laws and regulations), penalties (taxes), payments (incentives and fiscal support), and persuasion (corporate commitments and information). These tools can encourage MNEs to reduce emissions-intensive production, help them shift their supply chains to lower-carbon production methods, and facilitate the transition to a low-carbon industrial structure by attracting green FDI and phasing out dirty sectors.
Overview

Introduction

The world today confronts an unprecedented climate crisis, and governments zealously seek solutions: multinational enterprises (MNEs) should play a central role. Climate change is a defining challenge of our time—posing serious threats to countries’ ability to secure past developments and sustainably achieve future improvements in living standards. So it is urgent that countries build the resilience of and be ready to adapt their people and economies to the effects of climate change in their development strategies, while also reducing greenhouse gas (GHG) emissions to mitigate damaging changes to the climate (World Bank Group 2021). The success of such strategies for global climate action will depend in part on the willingness of pivotal private actors to reform their behavior, ensuring widespread access to new technologies and increasing the global flow of investments. For each of these reasons, multinational enterprises should play a central role in climate change policy.

MNEs provide both a fundamental risk to and an opportunity for climate change mitigation. The climate ambitions of MNEs will affect the environmental performance of countries around the world. As a leading actor, proactive MNEs can impose sustainability standards or encourage green technology transfers that, in some cases, could affect millions of producers and accelerate the climate transition (Thorlakson, Zegher, and Lambin 2018). However, obstructive MNEs may equally hold back any progress to reduce a country’s emissions via inaction or by actively resisting, obstructing, or lobbying against change.

MNEs also offer an important source of finance for sustainable development by supplying countries with foreign direct investment (FDI). Fulfilling the global commitments made in the Paris Agreement on climate change and achieving the Sustainable Development Goals (SDGs) requires an acceleration in financing. The United Nations Conference on Trade and Development estimates that between US$550 billion and US$850 billion in capital investment is needed in developing countries annually to meet goals related to climate mitigation, while another US$80 billion to US$120 billion is needed for adaptation (UNCTAD 2014). The United Nations (UN) estimated an average annual SDG funding gap of US$2.5 trillion in developing countries (UNEP 2018). Together with public and other private investments, the cross-border investments of MNEs offer an important source of finance for sustainable development (OECD 2022).
The objective of this report is to study the effect of MNEs on climate change. Toward this goal, the report reviews the latest available data, conducts new empirical analysis, and summarizes pioneering literature. The report answers four key questions related to the relationship between MNEs and climate change:

- What effect do MNEs currently have on climate change, both through their own activities and through the emissions of their broader supply chains?
- How do MNEs shape the potential transfer of green technologies to domestic firms, and how do different types of interactions with MNEs stimulate such technology transfers?
- How committed are leading MNEs currently to transitioning their supply chains to net-zero emissions by 2050, and do they have long-, medium-, and short-range strategies to realize this?
- What types of policies can influence MNEs’ effects on climate change?

Box O.1 provides a brief overview of the different datasets and methodologies used in this report.

**BOX 0.1  Overview of Key Datasets and Methodologies Used**

To consider the effect of multinational enterprises (MNEs) on emissions (chapter 2), we provide new estimates aggregating firm-level data. We start with CDP’s (formerly Carbon Disclosure Project) Full GHG (Greenhouse Gas) Emissions Dataset that includes over 6,400 firms. However, not all firms in the database are analyzed, as it is currently not possible to identify the full ownership status of firms (and so, to distinguish the effect of MNEs). As an alternative, we focus analysis on 157 very large MNEs identified by Climate Action 100+, whose supply chains jointly make up most of the world’s carbon emissions. Next, to understand how the global supply chains of these firms affect each country’s emissions targets, we exploit Bureau Van Dijk’s Orbis data on MNEs’ global affiliate structure and financial performance. We use this to apportion each MNE’s global emissions based on its affiliates’ relative financial performance within the MNE. Finally, to identify each MNE’s global or country-level emission share, we then compare its global or affiliate emissions to country-level emissions from the Organisation for Economic Co-operation and Development’s (OECD) Annual Air Emission and Greenhouse Gas (GHG) Accounts.

To analyze how committed leading MNEs are to transitioning their supply chains to net-zero emissions by 2050 (chapter 4), we again focus on our analysis on the 157 very large MNEs identified by Climate Action 100+ and use their database to review the MNEs’ overall climate commitment in the long-, medium-, and short-run. To review the country-level commitment of MNEs, we continue to exploit Orbis and CDP to apportion each MNE’s global emissions to its MNE affiliates. We then consider the share of MNEs committed to a net-zero transition and weigh commitment based on their total emissions in the country.\(^b\)

(Box continues on the following page.)
We also consider how different interactions between domestic firms and MNEs shape the potential of green technology transfers to domestic firms (chapter 3). This analysis makes use of the World Bank Enterprise Survey’s new Green Module, which is available for 36 countries (2018–20) and provides data about nine green firm characteristics using firms’ strategic objectives and target setting, monitoring, and implementation measures. To consider the effect of MNE interactions, we conduct simple firm-level regressions based on foreign ownership, international supply links, and international licensing.

Table BO1.1 provides an additional summary of the various datasets and methodologies used in this report.

### TABLE BO1.1 Overview of Key Datasets and Methodologies

<table>
<thead>
<tr>
<th>Data</th>
<th>Key question</th>
<th>Methodology</th>
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<tr>
<td>• CDP’s database provides carbon emissions data for 6,400+ firms.</td>
<td>What effect do MNEs have on the emissions of their supply chains? (chapter 2)</td>
<td></td>
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| • Climate Action 100+ data identify 157 MNEs with the highest carbon emissions in the world and their overall climate commitments. |  | • Identify 157 large MNEs from Climate Action 100+ and detect their global emissions using CDP’s database.  
• Use Orbis data to identify the global ownership structure and financial information of 157 large MNEs’ to apportion global emissions across all their affiliates.  
• Estimate the global/country-level emissions share of 157 large MNEs by comparing their total emissions to OECD’s Emission and Greenhouse Gas database. |
| • Orbis provides ownership (including MNEs’ global affiliate structure) and financial information for over 140 million firms. |  |  |
| • OECD’s Emission and Greenhouse Gas database provides each country’s total and sectoral carbon emissions. |  |  |
| World Bank Enterprise Survey’s Green Economy Module provides data on nine green firm characteristics for 36 countries (2018–2020). | How do interactions with MNEs shape the potential of green technology transfers? (chapter 3) |  |

**Sources:** World Bank based on CDP 2022a, Climate Action 100+ Initiative, OECD’s database.

a. For more details, see https://www.climateaction100.org/.

b. In this case, we assume that the emissions commitment of the MNE affiliate follows the ambitions set by the headquarters. However, going forward, it would also be important to monitor/review how host countries could shape the climate ambitions from MNE affiliates to ensure they either match or exceed headquarters’ targets.
The Effect of Multinational Enterprises on Climate Change

This report builds on the research and key policy initiatives from several international organizations that have focused on the sustainable investment aspects of MNEs. This includes the Organisation for Economic Co-operation and Development’s (OECD) FDI Qualities Policy Toolkit, which provides new insights on the ways FDI affects carbon emissions, while also offering policy recommendations to help governments attract FDI that contributes to decarbonization by reducing the emissions associated with foreign investments and inducing low-carbon spillovers to domestic firms (OECD 2022). UNCTAD’s latest World Investment Reports have also included important new analysis on sustainable investment dynamics (UNCTAD 2021, 2022). To encourage investment for sustainable development, the World Trade Organization’s (WTO) investment facilitation agreement also makes explicit mention of the aim to expand and retain FDI flows to achieve sustainable development goals (WTO 2021). Other notable initiatives include a toolkit on investment facilitation for sustainable investment from the Columbia Center on Sustainable Investment (Berger, Kagan, and Sauvant 2022), and the World Investment for Development Alliance (WIDA) which is a new global platform dedicated to promoting investment for sustainable development.

This report complements the existing literature by bringing together a more detailed, firm-level perspective of the impact of MNEs on climate change and provides a new conceptual framework to scale up policy reforms. Due to data limitations, previous work on MNEs and climate change has been relatively high-level in nature. Analysis has often focused on aggregate investment flows in the energy sector (for example comparing the number of new greenfield FDI project announcements in fossil fuels versus renewables; OECD 2022), or investment in financial products related to the “environmental, social and governance” (ESG) category (UNCTAD 2021, 2022). Little work has gone into directly observing the role that MNEs have on their global carbon emissions via their supply chains. Yet, new advances in data collection at the firm level and country level have enabled new analysis and provide important insights for policy makers on how MNEs shape climate change and affect green technology spillovers to domestic firms and allow policy makers to gauge MNEs’ commitments to decarbonization. This report brings together much of these new data to provide a more detailed, firm-level perspective of the impact of MNEs on climate change. It also provides a new conceptual framework (which we refer to as “the 5 Ps”) that highlights the policy tools that can help MNEs mitigate their impact on climate change. This framework can inform policy makers, while simultaneously shaping the World Bank’s ongoing advisory services to improve countries’ investment climate.

The Effect of Multinational Enterprises on Climate Change

MNEs affect climate change via three channels: scale effects, technology effects, and composition effects. The climate change literature has often presented the activities of MNEs either as a risk to increase emissions in developing countries by shifting their polluting activities to locations with limited environmental regulation (pollution haven), or
as an opportunity to reduce emissions in developing countries by attracting cleaner technologies (pollution halo). However, this binary view is too simplistic. New analysis using micro- and macro-data on GHG emissions showcases that MNEs and FDI can simultaneously bring with them challenges and opportunities for climate change mitigation through these three key channels (OECD 2022):

- **Scale effect**: MNEs are major drivers of emissions. As they increase their production, their host country would likely also increase their total emissions.
- **Technology effect**: MNEs can diffuse low-carbon knowledge and technologies to domestic firms, which can thereby reduce a sector’s average carbon intensity and reduce emissions.
- **Composition effect**: MNEs’ FDI also changes industrial structure. This has an ambiguous effect on emissions, as FDI could shift resources toward low- or high-carbon intensity activities.

Related to the scale effect, this report finds that a small number of MNEs are a major driver of global GHG emissions (figure O.1). The total emissions of 157 large MNEs jointly account for up to 60 percent of total industrial emissions. While their own activities jointly account for (only) 10 percentage points of global industrial emissions, their supply chains could add up to another 50 percentage points of global emissions.8

**FIGURE O.1 Global Industrial Emissions of the Supply Chains of Large MNEs, 2021**

Sources: World Bank calculations based on CDP 2022a and OECD 2023.

Note: Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the firm. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the firm’s value chain (see “Bottom-Up Approaches to Estimate the Effect of MNEs on Carbon Emissions” in chapter 2). A total of 157 companies are identified based on Climate Action 100+. Each bar represents one MNE, while the lines show their own emissions as cumulative shares of global industrial emissions. CDP = formerly Carbon Disclosure Project; tCO2e = carbon dioxide equivalent; GHG = greenhouse gas; MNE = multinational enterprise; OECD = Organisation for Economic Co-operation and Development; t = tons of CO2e.
The affiliates of these 157 large MNEs make up a large share of emissions for many countries, while the most polluting sectors differ. We consider the network of MNE affiliates associated with these 157 large MNEs using Bureau Van Dijk’s Orbis database. Our estimates suggest that their activities account for 1–25 percent of emissions in 85 countries, 25–50 percent of emissions in 9 countries, 50–75 percent in 8 countries, 75–100 percent in 9 countries, and over 100 percent of emissions in 25 countries (map O.1, panel a). The energy sector tends to be the biggest polluter (via oil and gas, utility companies, or coal), but some regions dominate in transport, industrials, or consumer goods and services (map O.1, panel b).

New evidence also supports the technology effect, by finding that MNEs are considerably less carbon intensive in their production than domestic firms. Data from the CDP (formerly the Carbon Disclosure Project) Full GHG (Greenhouse Gas) Emissions Dataset find that in the case of steel, MNEs considerably overperform vis-à-vis domestic firms, producing somewhere between 18 and 48 percent fewer emissions for the same output (figure O.2, panel a). For cement, the results differ more significantly across product types. For clinkers, cement equivalent, and cementitious products, MNEs were able to produce the same goods for somewhere between 1 and 11 percent fewer emissions. Yet, in the case of low-carbon dioxide (CO₂) material, the average MNE was found to produce goods with 84 percent fewer emissions than domestic firms. Hence, while MNEs generally have a reduced carbon intensity of production in steel, for cement their advantage comes from the use of more sophisticated low-CO₂ products. Overall, we find the dissemination of production technologies used by MNEs has significant potential to reduce the emissions of domestic firms.

FDI project announcements suggest that the composition effect of MNEs is improving, with FDI increasingly shifting out of polluting sectors and into green sectors. Greenfield FDI announcements for polluting sectors have gradually declined, while FDI is increasingly moving into green sectors (figure O.3, panel a). For international mergers and acquisitions, an increase in polluting sectors was followed by a significant decline. Firms in green sectors saw a substantial rise over time, so that in 2021 the value of green sector mergers and acquisitions (M&As) overtook that of polluting sectors (figure O.3, panel b). Global investment patterns have likely shifted for three main reasons. First, investors are reacting to rapidly declining costs and significant growth potential in renewable energy generation and low-carbon manufacturing methods (IRENA 2020). Second, companies are also responding to the rising pressures brought upon them by governments and investors and shareholders to engage in lower-carbon activities (World Bank, forthcoming). Third, shareholders have started to add a carbon risk premium at the firm level, which increases the cost of capital and raises the hurdle rates on new polluting investments (Bolton, Halem, and Kacperczyk 2022; Chava 2014). Jointly, this helps explain a growing number of green and slowing number of polluting greenfield FDI and cross-border M&A announcements over time.
Decompositions further confirm that the scale, technology, and composition effects of MNEs changed over time (figure O.4). Zhang et al. (2020) suggest emissions from the global supply chains of MNEs have changed over time. They contributed to emissions between 2005 until 2011 (+20.4 percent) and 2008 until 2011 (+4 percent). The major contributing factor to this increase was the growth in the outputs of MNEs.
**FIGURE 0.2** Carbon Intensity of Production, Domestic Firms versus MNEs, 2021

![Graph showing carbon intensity of production for steel and cement production, comparing domestic firms and MNEs.]

**Source:** World Bank estimates based on CDP Corporate Response Data.

**Note:** Figures on steel production are based on 28 companies: 14 MNEs and 14 domestic firms. Figures on cement production are based on 24 companies: 14 MNEs and 10 domestic firms. The firms’ ownership characteristics (foreign/domestic) were manually identified using the Orbis’ global ownership database. CDP = formerly Carbon Disclosure Project; CO₂e = carbon dioxide equivalent; MNE = multinational enterprise.

**FIGURE 0.3** Green versus Polluting Global FDI Announcements, 2001–21

![Graph showing greenfield FDI and mergers and acquisitions, comparing polluting and green sectors.]

**Sources:** World Bank estimates using FDI markets and Refinitiv.

**Note:** Sectors classified in accordance with European Union Taxonomy for Sustainable Activities. The dotted lines provide the best-fitting trendlines. FDI = foreign direct investment.
Emissions Embodied in the Supply Chains of MNEs: Scale, Technology, and Composition Effects

(scale effect), which would cause the carbon footprints of MNEs to increase by 27.4 percent in the absence of other factors. However, MNEs have since become a net reducer of carbon emissions. From 2011 to 2014, MNEs had a 2 percent decline in emissions. From 2014 to 2016 their carbon footprint declined by 7.6 percent. During this time, the scale effect, the technology effect, and composition effect all reduced the carbon footprints of MNEs. This is partly because the volume of global FDI shrunk, while MNEs began to adopt measures to reduce the carbon intensity of their supply chains, and gradually shifted toward lower-carbon activities (Zhang et al. 2020). This, in turn, shows the important (and sometimes countervailing) effects of the three channels: scale, technology, and composition.

Multinational Enterprises and Green Technology Transfers

Domestic firms that interact more with MNEs are engaged in more green actions (figure O.5). We conducted firm-level regressions using the World Bank’s Enterprise Surveys’ green module that considers firms’ target setting, emissions monitoring, and specific actions (implementation measures) to reduce carbon emissions. We find statistically significant results that domestic firms linked to MNEs are more likely to adopt green business practices if they engage in equity partnerships (or FDI), supply links (or indirect exports), or technological licensing arrangements with MNEs, as compared to their peers without such links to MNEs. In general, international technology licensing is found to have the most sizeable effects, followed by international supply links.
The Effect of Multinational Enterprises on Climate Change

While joint ventures raise the likelihood of adopting green strategic objectives and monitoring, they generally did not increase the likelihood of domestic firms implementing measures to improve their environmental performance.

Government pressure remains a key lever for MNEs to encourage green technology transfers and increase investment in sustainability-enhancing activities. The presence of externalities and information asymmetries can distort MNE behavior and may hinder investments in green technologies or the dissemination of technologies within global supply chains. Government pressure remains key to stimulating green technology transfers. New evidence from the World Bank’s Global Investment Competitiveness Report 2021/2022 (GIC) survey suggests that firms are much more likely to invest in sustainability initiatives when experiencing pressure from governments (figure O.6).

The Climate Commitments of MNEs

In most countries, MNEs have not formally committed to transition to net-zero GHG emissions by 2050 (map O.2). In only eight countries have over 75 percent of large MNEs committed to transition to net-zero emissions by 2050, and these are all based in Europe. Another seven countries in Europe and East Asia have between 25 and 50 percent of large MNEs committed to net-zero. Most large MNEs headquartered in other regions, such as North America, South America, Africa, or the rest of Asia are all still uncommitted to net-zero by 2050.
FIGURE 0.6  Key Drivers for MNEs to Invest in Sustainability Initiatives

Note: This figure indicates the percentage of firms that are planning to increase their investment in environmentally sustainable initiatives. The number of observations = 1,060. CO₂ = carbon dioxide; EP = environmental performance; GIC = Global Investment Competitiveness; MNE = multinational enterprise.

MAP 0.2  Share of MNEs Committed to Net-Zero GHG Emissions by 2050, by Headquarters Location

Source: World Bank calculations based on Climate Action 100+ data.
Note: The 157 companies are identified based on Climate Action 100+. Numbers in parentheses are the number of countries. GHG = greenhouse gas; MNE = multinational enterprise.
To better understand the potential risks and opportunities associated with the actions of large MNEs, we categorize countries based on MNEs’ emission shares and climate commitment. From this, we derive four quadrants (map O.3):

1. **High MNE emissions share, high MNE commitment.** These large MNEs are critical but committed to change—thus forming a significant opportunity to accelerate a country’s emissions reduction. Policy makers could collaborate with such MNEs to realize their stated objectives. This is the case in eight countries (all in Europe).

2. **Low MNE emissions share, high MNE commitment.** These large MNEs are less critical as a source of emissions, but they are still committed—thus forming some opportunity for reform. Countries could leverage these MNEs’ goodwill to accelerate technology transfers that could help domestic firms decarbonize their production. We identify this for 25 countries located in Africa, Central Asia, Europe, and South America.

3. **Low MNE emissions share, low MNE commitment.** These large MNEs are neither a very critical source of emissions, nor are they very committed. This presents some risk, as polluting firms could lock the country into a high-emissions future. Yet given their limited role, there may be more urgent issues to focus on for climate mitigation. We identify 43 countries where this is the case, spread across Africa, Central Asia, Europe, and Latin America.

**MAP 0.3 Country-Level Emissions Share and Commitments to Climate Action of Large MNEs’ Affiliates**

Sources: World Bank calculations based on CDP, Climate Action 100+, OECD, and Orbis data.

Note: Map shows the emissions-weighted share of firms that have committed to net-zero emissions by 2050. Numbers in parentheses are the number of countries. CDP = formerly Carbon Disclosure Project; MNE = multinational enterprise; OECD = Organisation for Economic Co-operation and Development.
4. **High MNE emissions share, low MNE commitment.** These MNEs are a significant risk to countries’ climate change ambitions because they constitute a large share of emissions but display weak commitment for reform. To meet the country’s climate targets, policy makers have a strong case for public intervention to encourage MNEs to adopt climate reforms. Worryingly, this is the case for 60 countries (the highest share of the four quadrants), including some of the world’s most polluting countries.

Even more worrying, MNE commitments quickly decrease as firms are asked to shift their long-term strategies into long-, medium-, and short-term plans. Only one in four of all MNEs have a long-term strategy like net-zero GHG emissions by 2050 (figure O.7, panel a). Yet, the share of firms with such targets quickly drops for having a long-term strategy (20 percent), a medium-term strategy (13 percent), a short-term strategy (5 percent), or a decarbonization strategy (8 percent). None of the MNEs had a capital allocation strategy that was formally aligned to net-zero emissions by 2050. The lack of tangible plans to decarbonize production and supply chains in the short-term further raises credibility concerns about the realism of MNEs’ long-term commitments.

MNEs from high-income countries are more committed to the net-zero targets than developing countries. MNEs headquartered in high-income countries are more committed to net-zero targets (30 percent), while none of the MNEs headquartered in developing countries have formally committed themselves to net-zero targets (figure O.7, panel b). Yet the lagging nature of some big high-income countries (most notably Australia, Canada, and the United States—as shown in map O.3) illustrates that many high-income countries still face a considerable lack of MNE commitment.

MNEs in the consumer goods and services sectors are more committed than those in the industrials, transportation, or energy sectors (figure O.7, panel c). This in itself is likely also a reflection of the market structure faced by each of these sectors. For example, energy companies will face considerably more difficulty in transitioning to net-zero emissions than consumer goods sectors, and in some cases this transition is wholly unviable (for example in coal mining).

More broadly, the literature finds evidence of a deeper problem of companies intentionally giving an overly flattering representation of their climate actions (“greenwashing”). We briefly consider the causes of greenwashing and suggest how this can be avoided through more explicit external scrutiny. To limit corporate greenwashing requires more explicit initiatives to increase corporate disclosure of climate commitments and actions, greater standardization of emissions disclosure, and ideally, oversight by third-party actors to oversee and validate climate target-setting and action.
FIGURE 0.7 The Long-, Medium-, and Short-Term Commitment of 157 Large MNEs to Climate Action

a. The climate commitments of 157 large MNEs

b. The climate commitments of 157 large MNEs by headquarters’ location

c. The climate commitments of 157 large MNEs by sector

Source: World Bank calculations using Climate Action 100+ data.

Note: Long-term strategy covers the period between 2036 and 2050, medium-term strategy covers the period between 2026 and 2035, and short-term strategy covers the period up to 2025. Out of the 157 MNEs, 128 are headquartered in high-income countries, and 29 in developing countries. MNE = multinational enterprise.
Policies to Influence MNEs’ Effect on Climate Change

Policy makers can use a range of policy tools (which we refer to as the 5Ps) to help MNEs mitigate their impact on climate change and better stimulate green growth (figure O.8). The 5Ps framework provides a useful way to identify the various types of instruments available to governments to affect the impact of MNEs on climate change. These tools can encourage MNEs to reduce emissions-intensive production (scale), help MNEs shift their supply chains to lower-carbon production methods (technology), and facilitate a shift toward a low-carbon industrial structure by attracting green FDI and phasing out dirty sectors (composition). Each approach has several policy instruments to affect scale, technology, and composition channels of MNEs on climate change (table O.1).

While the 5Ps instrument could be applied to all firms, large MNEs (and their supply chains) have specific characteristics that mean they may deserve special attention through both the choice of policy instruments and careful design of climate change policies. Two main elements set MNEs apart. First, their supply chain likely accounts for a disproportionate share of a country’s emissions, so that MNEs will likely bear the brunt of most climate change policies (via any of the 5Ps). Second, MNEs often hold considerable bargaining power over host countries because they are less unrestricted than domestic firms and can threaten to shift their operations abroad (or to limit any...

**FIGURE O.8  Policy Approaches to Influence MNEs’ Effect on Climate Change (the 5Ps Framework)**

<table>
<thead>
<tr>
<th>The effect of MNEs on climate change</th>
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<tbody>
<tr>
<td><strong>Scale</strong></td>
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<tr>
<td>Change in carbon-intensive production</td>
</tr>
<tr>
<td><strong>Technology</strong></td>
</tr>
<tr>
<td>Change production methods to reduce carbon intensity</td>
</tr>
<tr>
<td><strong>Composition</strong></td>
</tr>
<tr>
<td>Shift economy to low-carbon industrial structure</td>
</tr>
</tbody>
</table>

**Domestic policy tools that address market failures to shift MNEs’ climate impact (the 5Ps)**

1. **Patrolling** (monitoring GHG emissions)

2. **Prescription** (laws and regulations)

3. **Penalties** (taxes and charges)

4. **Payments** (tax incentives and fiscal support)

5. **Persuasion** (corporate commitments)


*Note: GHG = greenhouse gas; MNE = multinational enterprise.*
future FDI). Jointly, this means that countries may want to pay special attention to MNEs in their policy framework, both through the choice of policy instruments and careful design to ensure the right balance so that MNEs (a) decarbonize their in-country supply chains, (b) collaborate more with domestic firms to encourage green transfers, and (c) do not feel so pressured that they choose to pull out of the country (and take with them particularly worthwhile capital, jobs, and technology). This report thus reviews the literature to discuss the MNE-related concerns across the 5Ps relevant for developing climate change policy.

Finally, this report calls for an active research agenda to further define how to prioritize, sequence, and implement economic policy to shape the climate change activities of MNEs. This report provides an overview of some of the latest literature, data, and economic analysis on the various challenges and opportunities that MNEs bring to climate change mitigation. It also touches on the various policy instruments available to policy makers in shaping this dynamic, via the 5Ps framework, and their relationship to scope, technology, and composition effects of MNEs. Yet there is still much that is unclear, most notably, how the various instruments complement or substitute for one another. To further inform this, box O.2 sets out a potential future research agenda on MNEs and climate change. This work will be critical going forward to guide policy makers in making the climate change transition by shaping the activities of MNEs.

### TABLE O.1 Specific Instruments to Improve MNEs’ Effect on Climate Change (the 5Ps Framework)

<table>
<thead>
<tr>
<th>Domestic policy tools</th>
<th>Objectives to improve MNEs’ effect on climate change mitigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patrolling (monitoring emissions)</td>
<td>Scale channel: Reduce carbon-intensive production</td>
</tr>
<tr>
<td>Prescription (laws and regulations)</td>
<td>Technology channel: Change production methods to reduce carbon intensity</td>
</tr>
<tr>
<td>Penalties (taxes and charges)</td>
<td>Composition channel: Shift economy toward a low-carbon industrial structure</td>
</tr>
<tr>
<td>Payments (tax incentives and fiscal support)</td>
<td>• Monitoring firm-level GHG emissions (scope 1, scope 2, and scope 3)</td>
</tr>
<tr>
<td>• Voluntary reporting standards and environmental disclosure laws</td>
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<tr>
<td>• Environmental standards</td>
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<tr>
<td>• Emission permits</td>
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<td>• Environmental taxes</td>
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<tr>
<td>• Buyout plans</td>
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<tr>
<td>• Incentives for green R&amp;D, skills training, capital upgrades</td>
<td></td>
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<tr>
<td>• Incentives for technology licensing, JVs, supplier programs</td>
<td></td>
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<tr>
<td>Persuasion (corporate commitment and information campaigns)</td>
<td>• Corporate commitment campaigns</td>
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<tr>
<td>• Corporate commitment campaigns</td>
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<tr>
<td>• Supply chain eco-certification</td>
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<tr>
<td>• ESG/Impact investing</td>
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<tr>
<td>• Investor aftercare on green reinvestment/supplier links</td>
<td></td>
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<tr>
<td>• Green investment promotion and facilitation</td>
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</tbody>
</table>

**Source:** World Bank based on literature review.

**Note:** Scope 1 emissions are direct emissions from owned or controlled sources. Scope 2 emissions are indirect emissions from the generation of purchased electricity, steam, heating, and cooling consumed by the firm. Scope 3 emissions are all indirect emissions (not included in scope 2) that occur in the firm’s value chain (see “Bottom-Up Approaches to Estimate the Effect of MNEs on Carbon Emissions” in chapter 2). ESG = environmental, social, and governance; FDI = foreign direct investment; JV = joint venture; MNE = multinational enterprise; R&D = research and development.
Overview

BOX 0.2 Future Research Agenda

Strengthen Estimates of MNEs’ Effect on Emissions by Harmonizing Top-Down and Bottom-Up Approaches

Chapter 2 provides an initial assessment of the effect of multinational enterprises (MNEs) on climate change. It argues that to better understand the role of MNEs in climate change, there could be significant benefits to harmonizing top-down and bottom-up approaches. The top-down approaches have the benefit of avoiding double-counting emissions within supply chains. Yet, they currently cannot differentiate the carbon intensity of MNEs and non-MNEs at the country-industry level. Bottom-up approaches that use firm-level data can enable estimation models to reflect the differences in carbon intensity between different groups of firms, such as between MNEs and non-MNEs, and across sectors. This type of approach would therefore utilize the best of both worlds; avoiding double counting of emissions across supply chains but incorporating heterogenous firm-level dynamics for the biggest firms across each country and industry. Jointly, this could likely provide the most accurate and realistic estimates of the role of MNEs on climate change.

Expand Firm-Level Data on Climate Change Mitigation and Adaption

Chapter 3 reflects on the role of the potential for green technology transfers. For this, it uses the World Bank Enterprise Survey’s Green Economy Module, which provides valuable insights into firms’ decisions on green strategic objectives and target setting, monitoring, and implementation measures. Yet, the data are available for only a few dozen countries, preventing more substantial analysis. Future advances in research that rely on primary data at the firm level as well as the Enterprise Survey could expand both geographical and topical coverage. For example, in addition to rolling out the Green Economy Module in more countries, the surveys should also sharpen the topical focus on climate change. This could include collecting information on the following:

- The strategies adopted by firms to raise environmental sustainability, such as management practices for production efficiency, resource use through circular economy practices, green innovation, and adoption of clean technologies, as well as the effect of such strategies on productivity and firm competitiveness;
- The current challenges faced by firms related to climate change and the potential technology and government policies that could help them adapt and strengthen their resilience; and
- The investment needs and challenges faced by firms in adopting clean technologies and practices, lowering their supply chain emissions, undertaking the process of reengineering, and other initiatives.

Monitor MNEs’ Climate Change Reform Commitments in Headquarters and Host Countries

Chapter 4 considers the climate commitments of MNEs. This mostly relied on the stated climate ambitions set out by MNEs’ headquarters, which was assumed to also apply to the MNEs’ broader affiliate structure. Going forward, this analysis can be improved in three ways.

(Box continues on the following page.)
First, there is a need to monitor the actual behavior of MNEs in closer detail and consider whether more ambitious climate commitments result in more active reforms or whether this is “cheap talk” (see “Weaknesses in Corporate Climate Reporting and Greenwashing” in chapter 4).

Second, more work is needed to consider how MNE affiliates follow the climate ambitions and actions of their headquarters, as it is possible that the emissions commitment of MNE headquarters and MNE affiliates in foreign countries differ systematically.

Third, with access to more granular data on climate change ambitions and actions, researchers could further explore what may be driving these dynamics. Of particular importance would be to consider how environmental regulation in MNE headquarters as well as host countries may shape the actions of MNEs and their affiliates.

Use Specific and Complementary Policies to Shape the Impacts of MNEs on Climate Change

Chapter 5 touches on a range of policy instruments available to policy makers in shaping the impacts of MNEs on climate change, via the 5Ps framework and their relationship to scope, technology, and composition effects of MNEs. However, climate action and achieving impact through government programs require a more nuanced understanding of the mechanisms of impact and the contextual suitability of the 5Ps. Various knowledge deficiencies prevent such advancements, including the following:

- What insights can be found related to the policy responses being adopted by developed and developing countries for climate change mitigation and adaptation?
- To what extent do policy instruments complement each other? For example, patrolling is likely an important foundation for many of the other 5Ps.
- To what extent can instruments be substitutes in realizing similar objectives by affecting levers for behavior change? For example, regulations, taxes, and subsidies offer different ways to reach the same goal, which is typically a change in agent behavior.

Toward this end, a database that sources global information and is organized per the 5Ps framework could be of great value for policy researchers as well as policy makers.


Notes

1. SDG Goal 13 relates to climate action and calls for urgent action to combat climate change and its impacts.
2. The FDI Qualities Policy Toolkit is designed to help governments identify priorities for policy reforms to strengthen FDI impacts in four SDG areas: productivity and innovation; job quality and skills; gender equality; and decarbonization.
4. Greenfield FDI refers to investments where a parent company establishes or expands a subsidiary in a foreign country—as opposed to mergers and acquisitions, which occur when a company purchases or leases an existing facility from another company.
5. Most notably CDP’s Full GHG Emissions Dataset (see “Bottom-Up Approaches to Estimate the Effect of MNEs on Carbon Emissions” in chapter 2), the World Bank’s Enterprise Survey’s Green Module (see chapter 3), and Climate Action 100+ (see chapter 4).

6. Especially the OECD’s AMNE database, as exploited by Zhang et al. (2020), Borga et al. (2022), and Zhu, Guo, and Zhang (2022). See “Top-Down Approaches to Estimate the Effect of MNEs on Carbon Emissions” in chapter 2.

7. The 5Ps are patrolling (monitoring emissions), prescription (laws and regulations), penalties (taxes), payments (incentives and fiscal support), and persuasion (corporate commitments and information).

8. This is an upper-bound estimate, based on aggregating the scope 3 emissions from MNEs. This could lead to double-counting emissions from multiple firms in the same value chain (for example, emissions from electricity use could be attributed to an energy company and a downstream metal smelting company). As such, aggregated scope 3 estimates should be interpreted with caution. Top-down approaches avoid double counting within supply chains (see “Top-Down Approaches to Estimate the Effect of MNEs on Carbon Emissions” in chapter 2.) and provide lower estimates of MNEs’ effect on climate change, but are also narrower in defining firm-level climate impacts (for example, they do not account for emissions from final consumption).

9. Because countries may partly export their carbon-intensive production abroad, MNE-based emissions can account for over 100 percent of country-reported emissions.

10. These estimates are purely descriptive and do not control for the MNEs’ larger firm size, which could drive the results. That said, the results may be underestimating MNEs’ effect on carbon intensity. This is because the sample mostly includes firms that voluntarily include themselves in CDP’s emissions database. Such firms tend to be larger and more committed to climate change mitigation and to have lower carbon intensity than the universe of firms (Bolton, Halem, and Kacperczyk 2022).

11. Long-term covers the period between 2036 and 2050, medium-term covers the period between 2026 and 2035, and short-term covers the period up to 2025.

References


CDP (formerly the Carbon Disclosure Project). 2022b. CDP Corporate Response Data.


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The Effect of Multinational Enterprises on Climate Change

Supply Chain Emissions, Green Technology Transfers, and Corporate Commitments

Multinational enterprises (MNEs) provide both a fundamental risk to and an opportunity for climate change mitigation. The climate ambitions of MNEs will affect the environmental performance of countries around the world. As a leading actor, proactive MNEs can impose sustainability standards or encourage green technology transfers that, in some cases, could affect millions of producers and accelerate the climate transition. However, obstructive MNEs may equally hold back any progress to reduce a country’s emissions via inaction or by actively resisting, obstructing, or lobbying against change.

The objective of this report is to study the effect of MNEs on climate change. Toward this goal, the report reviews the latest available data, conducts new empirical analysis, and summarizes pioneering literature. The report answers four key questions related to the relationship between MNEs and climate change:

» What effect do MNEs currently have on climate change, both through their own activities and through the emissions of their broader supply chains?

» How do MNEs shape the potential transfer of “green” technologies to domestic firms, and how do different types of interactions with MNEs stimulate such technology transfers?

» How committed are leading MNEs currently to transitioning their supply chains to net-zero emissions by 2050, and do they have long-, medium-, and short-range strategies to realize this?

» What types of policies can influence MNEs’ effects on climate change?