Governing Climate Change in Brazil – A Governance Gap Analysis of Selected Cases

by

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Abstract

Enacted in 2009, the National Policy on Climate Change (PNMC) is a milestone in the institutionalisation of climate action in Brazil. It sets greenhouse gas (GHG) emission reduction targets and a set of principles and directives that are intended to lay the foundations for a cross-sectoral and multilevel climate policy in the country. However, after more than a decade since its establishment, the PNMC has experienced several obstacles related to its governance, such as coordination, planning and implementation issues. All of these issues pose threats to the effectiveness of GHG mitigation actions in the country.

By looking at the intragovernmental and intergovernmental relationships that have taken place during the lifetime of the PNMC and its sectoral plans on agriculture (the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture [ABC Plan]), transport and urban mobility (the Sectoral Plan for Transportation and Urban Mobility for Mitigation and Adaption of Climate Change [PSTM]), this exploratory qualitative research investigates the Brazilian climate change governance guided by the following relevant questions: how are climate policy arrangements organised and coordinated among governmental actors to mitigate GHG emissions in Brazil? What might be the reasons behind how such arrangements are established? What are the predominant governance gaps of the different GHG mitigation actions examined? Why do these governance gaps occur?

Theoretically grounded in the literature on multilevel governance and coordination of public policies, this study employs a novel analytical framework that aims to identify and discuss the occurrence of four types of governance gaps (i.e. politics, institutions and processes, resources and information) in the three GHG mitigation actions (cases) examined (i.e. the PNMC, ABC Plan and PSTM). The research results are twofold. First, they reveal that Brazil has struggled to organise and coordinate governmental actors from different policy constituencies and different levels of government in the implementation of the GHG mitigation actions examined. Moreover, climate policymaking has mostly been influenced by the Ministry of Environment (MMA) overlooking the multilevel and cross-sectoral approaches required for a country's climate policy to mitigate and adapt to climate change, especially if it is considered an economy-wide Nationally Determined Contribution (NDC), as the Brazilian one is.

Second, the study identifies a greater manifestation of gaps in politics (e.g. lack of political will in supporting climate action), institutions and processes (e.g. failures in the design of institutions and policy instruments, coordination and monitoring flaws, and difficulties in building climate federalism) in all cases studied. It also identifies that there have been important advances in the production of data and information for decision-making and, to a lesser extent, in the allocation of technical and financial resources in the cases studied; however, it is necessary to highlight the limitation of these improvements due to turf wars, a low willingness to share information among federal government players, a reduced volume of financial resources and an unequal distribution of capacities among the federal ministries and among the three levels of government.

A relevant finding is that these gaps tend to be explained by a combination of general and sectoral set aspects. Regarding the general aspects, which are common to all cases examined, the following can be mentioned: i) unbalanced policy capabilities existing among the different levels of government, ii) a limited (bureaucratic) practice to produce a positive coordination mode within cross-sectoral policies, iii) the socioeconomic inequalities that affect the way different governments and economic sectors perceive the climate issue (selective perception) and iv) the reduced dialogue between national and subnational governments on the climate agenda (poor climate federalism). The following sectoral aspects can be mentioned: i) the presence of path dependencies that make the adoption of transformative actions harder and ii) the absence of perceived co-benefits that the climate agenda can bring to each economic sector (e.g. reputational gains, climate protection and access to climate financial markets).

By addressing the theoretical and practical implications of the results, this research provides key insights to tackle the governance gaps identified and to help Brazil pave the way to achieving its NDCs and net-zero targets. At the theoretical level, this research and the current country's GHG emissions profile suggest that the Brazilian climate policy is embedded in a cross-sectoral and multilevel arena, which requires the effective involvement of different levels of political and bureaucratic powers and the consideration of the country's socioeconomic differences. Thus, the research argues that future improvements of the Brazilian climate policy and its governance setting must frame climate policy as an economic development agenda, the ramifications of

which go beyond the environmental sector. An initial consequence of this new perspective may be a shift in the political and technical leadership from the MMA to the institutions of the centre of government (Executive Office of the President of Brazil) and those in charge of the country's economic policy (Ministry of Economy). This change could provide greater capacity for coordination, integration and enforcement as well as for addressing certain expected gaps (e.g. financial and technical resources). It could also lead to greater political prioritisation of the agenda at the highest levels of government. Moreover, this shift of the institutional locus could contribute to greater harmonisation between domestic development priorities and international climate politics. Finally, the research also suggests that this approach would reduce bureaucratic elitism currently in place due to climate policy being managed by Brazilian governmental institutions, which is still a theme of a few ministries and a reason for the occurrence of turf wars.

Zusammenfassung

Das 2009 verabschiedete nationale Klimagesetz (PNMC) war ein Meilenstein für die Institutionalisierung von Klimaschutzmaßnahmen in Brasilien. Es legt die Ziele für die Reduzierung der Treibhausgasemissionen (THG) sowie eine Reihe von Grundsätzen und Richtlinien fest, die die Grundlage für eine sektorübergreifende und mehrstufige Klimapolitik im Land bilden. Mehr als ein Jahrzehnt nach seiner in Kraftsetzung stößt das PNMC jedoch auf verschiedene Hindernisse in Zusammenhang mit seiner Ausführung, wie z. B. die Koordination, Planung und Umsetzung. All diese Probleme gefährden fortwährend die Wirksamkeit der Maßnahmen zur Verringerung der Treibhausgasemissionen im Land.

Durch die Untersuchung der inner- und zwischenstaatlichen Beziehungen, die seit des Bestehens des PNMC und den damit einhergehenden Sektorplänen für Landwirtschaft (Sektorplan zur Minderung und Anpassung an den Klimawandel für die Konsolidierung einer kohlenstoffarmen Wirtschaft in der Landwirtschaft - ABC-Plan)und für Verkehr und urbane Mobilität (Sektorplan für den Verkehr und die urbane Mobilität zur Minderung und Anpassung an den Klimawandel - PSTM) , untersucht die vorliegende explorative qualitative Forschung die Governance der brasilianischen Klimapolitik anhand der folgenden relevanten Fragestellungen: *Wie sind die klimapolitischen Maßnahmen zur Minderung der Treibhausgasemissionen in Brasilien organisiert und zwischen den staatlichen Akteuren koordiniert? Was könnten die Gründe für die Art und Weise der gewählten Organisationsform sein? Was sind die vorherrschenden Governance-Lücken bei den untersuchten THG-Minderungsmaßnahmen? Was sind die Gründe für die Entstehung dieser Lücken*?

Auf der theoretischen Grundlage der Literatur über Multi-Level-Governance und über die Koordinierung öffentlicher Maßnahmen wird in dieser Studie ein neuartiger analytischer Rahmen verwendet, der darauf abzielt, das Auftreten von vier Arten von Governance-Lücken (Politik, Institutionen & Prozesse, Ressourcen und Informationen) in den drei untersuchten THG-Minderungsmaßnahmenbündeln (PNMC, ABC-Plan und PSTM) zu identifizieren und zu diskutieren. Dabei konnten im Ergebnis zwei wesentliche Governance-Lücken identifiziert werden.

Erstens zeigt die Studie, dass sich Brasilien schwer tut, Regierungsakteure aus verschiedenen Politikbereichen und von verschiedenen Regierungsebenen zu

organisieren und zu koordinieren, um die betrachteten THG-Minderungsmaßnahmen umzusetzen. Gleichzeitig wird die Klimapolitik hauptsächlich vom Umweltministerium (MMA) gestaltet, das die für eine Klimapolitik erforderlichen Mehrebenen- und sektorübergreifenden Ansätze zur Minderung und Anpassung s Landes an den Klimawandel vernachlässigt, insbesondere da es sich - wie in Brasilien - um einen wirtschaftübergreifendes (economy wide), national festgelegten Beitrag (NDC) handelt.

Zweitens stellt die Studie fest, dass sich in allen untersuchten Fällen immer größer werdende Lücken in der Politik (z. B. mangelnder politischer Wille zur Unterstützung von Klimaschutzmaßnahmen), in den Institutionen und Prozessen (z. B. Versäumnisse beim Design von Institutionen und politischen Instrumenten; Koordinierungs- und Überwachungsmängel; Schwierigkeiten beim Aufbau eines „Klimaföderalismus“) zu beobachten sind. Gleichwohl zeigen die Erkenntnisse aus den untersuchten Fällen, dass es auch wichtige Fortschritte bei der Erhebung von Daten und Informationen für eine Entscheidungsfindung und - in geringerem Maße - bei der Zuweisung technischer und finanzieller Ressourcen gegeben hat. Dennoch ist es notwendig, die Begrenztheit dieser Verbesserungen zu benennen, die auf Kompetenzstreitigkeiten, eine geringe Bereitschaft zum Informationsaustausch zwischen den Akteuren der Bundesregierung, ein geringes Volumen an finanziellen Ressourcen und eine ungleiche Verteilung der Personalkapazitäten zwischen den Bundesministerien und zwischen den drei Regierungsebenen zurückzuführen sind.

Eine wesentliche Erkenntnis der vorliegenden Arbeit ist, dass die zuvor beschriebenen Lücken vorwiegend durch eine Kombination von allgemeinen und sektoralen Aspekten zu erklären sind. Zu den allgemeinen Aspekten, die in allen untersuchten Fällen identifiziert wurden, gehören: i) unausgewogene politische Kapazitäten zwischen den verschiedenen Regierungsebenen; ii) eine mangelnde Verwaltungspraxis zur Schaffung eines positiven Koordinationsmodus innerhalb sektorübergreifender Politiken; iii) die sozioökonomischen Ungleichheiten, die sich auf die Art und Weise auswirken, wie verschiedene Regierungen und Wirtschaftssektoren das Klimaproblem wahrnehmen (selektive Wahrnehmung); iv) der eingeschränkte Dialog zwischen nationalen und subnationalen Regierungsebenen über die Klimaagenda (schwacher „Klimaföderalismus“). Als sektorale Aspekte können genannt werden: i) das Vorhandensein von Pfadabhängigkeiten, die die

Befürwortung von transformativen Maßnahmen erschweren; und ii) der (unzureichend) wahrgenommene Zusatznutzen, den die Klimaagenda jedem Wirtschaftssektor bringen kann (z. B. Reputationsgewinn, Klimaschutz, Zugang zu Klima-Finanzmärkten).

Indem die Forschungsarbeit die theoretischen und praktischen Implikationen der Ergebnisse anspricht, liefert sie wichtige Erkenntnisse, um die identifizierten Governance-Lücken zu schließen und Brasilien dabei zu helfen, den Weg zur Erreichung seiner NDCs und Netto-Null-Ziele zu gestalten. Auf theoretischer Ebene und vor dem Hintergrund des aktuellen Treibhausgasemissionsprofils des Landes empfiehlt die vorliegende Arbeit, dass die brasilianische Klimapolitik als eine sektorübergreifende und vielschichtige politische Agenda implementiert wird, die eine effektive Beteiligung verschiedener politischer und Verwaltungs- Ebenen sowie eine Berücksichtigung der sozioökonomischen Unterschiede des Landes erfordert. Daher argumentiert die Studie, dass künftige Verbesserungen der brasilianischen Klimapolitik und ihrer Rahmenbedingungen, die Klimapolitik als eine wirtschaftliche Entwicklungsagenda verstehen müssen, deren Auswirkungen über den Umweltsektor hinausgehen. Eine erste Konsequenz dieser neuen Perspektive ist eine Verlagerung der politischen und technischen Führung vom MMA zu den Institutionen des Regierungszentrums (Casa Civil) und der Wirtschaftspolitik des Landes (Wirtschaftsministerium). Dieser Wechsel könnte größere Kapazitäten für die Koordinierung, Integration und den Vollzug, sowie für die Schließung bestimmter erwarteter Lücken (z. B. finanzielle und technische Ressourcen) schaffen. Sie könnte auch zu einer stärkeren politischen Priorisierung der Agenda auf den höchsten Regierungsebenen führen. Außerdem könnte diese Veränderung der institutionellen Verankerung zu einer stärkeren Harmonisierung zwischen den nationalen Entwicklungsprioritäten und der internationalen Klimapolitik beitragen. Schließlich deutet die Untersuchung auch darauf hin, dass dieser Ansatz die bisherige verwaltungstechnische Zentralisierung reduzieren würde, da die Umsetzung der Klimapolitik in den brasilianischen Regierungsinstitutionen immer noch ein Thema einiger weniger Ministerien ist und mit Ressortstreitigkeiten einhergeht.

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Table of Contents

List of Abbreviations

AAE	Strategic Environmental Evaluation
ABC	Low Carbon Agriculture
ANAC	Civil Aviation National Agency
ANTAQ	Waterway Transports National Agency
ANTT	Terrestrial Transports National Agency
ASEAN	African Union and the Association of Southeast Asian Nations
ATER	Technical Assistance and Rural Extension
BNDES	Brazilian Development Bank
BRICS	Brazil, Russia, India, China and South Africa
BRT	Bus Rapid Transit
BUR	Biennial Update Reports
C40	C40 Cities Climate Leadership Group
Casa Civil	Executive Office of the President of Brazil
CB27	Environment Secretaries Forum of the Brazilian Capital Cities
CBD	Convention on Biological Diversity
CBI	Climate Bond Initiative
CCAMCH	Steering Commission on Meteorology, Climatology and Hydrology Activities
CDM	Clean Development Mechanism
CELAC	Community of Latin American and Caribbean states
CENABC	National Executive Commission of the ABC Plan
CEPEA-Esalq/USP	Center for Advanced Studies in Applied Economics of the University of São Paulo

CET	Certified Emission Reductions
CETESB	São Paulo State Environmental Company
CF 88	Constitution of the Federative Republic of Brazil
CGAT	Climate Governance Analytical Tool
CGMGC	General Coordination on Global Climate Change
CH_4	Methane
CIDES	Inter-ministerial Commission on Sustainable Development
CIM	Inter-ministerial Committee on Climate Change
CIMA	Inter-ministerial Commission on the Preparation for the United Nations Conferences on Environment and Development
CIMGC	Inter-ministerial Commission on Global Climate Change
CN	National Communication
CNA	National Confederation on Agriculture
CNPE	National Council on Energy Policy
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalent
COFA	Steering Committee of the Amazon Fund
CONAMA	National Council on Environment
COP	Conference of Parties
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
COVID-19	Coronavirus Disease 2019
DPCD	Directorate of Deforestation Tackling Polices
EMBRAPA	Brazilian Company on Agriculture Research
EPL	Planning and Logistic Company S.A.
ESG	Environmental, Social and Governance
EU	European Union

EUR	Euro
FAO	Food and Agriculture Organization
FBMC	Brazilian Forum on Climate Change
FBN	Biological Nitrogen Fixation
FEEMA	Rio de Janeiro State Foundation on Environmental Engineering
FGTS	Guarantee Fund for Length of Service
FP	Planted Forests
Fundo Clima	National Fund on Climate Change
G20	Group of Twenty
G8	Group of Eight
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEx	Executive Group of the Inter-ministerial Committee on Climate Change
GHG	Greenhouse Gas
GIZ	German Corporation for International Cooperation GmbH
GT Inventario	Working Group on GHG Inventories
GT Registro	Working Group on Emissions Registry
GV Agro	Center for Agribusiness Studies of the Getúlio Vargas Foundation
HTM	Hierarchy-type Mechanism
IBDF	Brazilian Institute of Forestry Development
ICAO	International Civil Aviation Organization
ICLEI	Local Governments for Sustainability
IDB	Inter-American Development Bank

ILPF	Crop–Livestock–Forest Integration
IMO	International Maritime Organization
iNDC	Intended Nationally Determined Contribution
IPCC	Intergovernmental Panel on Climate Change
LULUCF	Land Use, Land-Use Change and Forestry
MAPA	Ministry of Agriculture
MBRE	Brazilian Market for Emission Reduction
MCid	Ministry of Cities
MCT	Ministry of Science and Technology
MCTI	Ministry of Science, Technology and Innovation
MCTIC	Ministry of Science, Technology, Innovation and Communication
MDA	Ministry of Agrarian Development
MDB	Multilateral Development Banks
MDIC	Ministry of Development, Industry and Trade
Mercosur	Southern Common Market
MF	Ministry of Finance
MINFRA	Ministry of Infrastructure
MLCG	Multilevel Climate Governance
MLG	Multilevel Governance
MMA	Ministry of Environment
MME	Ministry of Minning and Energz
MRE	Ministry of Foreign Affairs
MRV	Monitoring, Reporting and Verification
MT	Ministry of Transportation
MTM	Market-type Mechanism
N_2O	Nitrous Oxide

NAFC	Federative Articulation Unit for Climate
NAMA	Nationally Appropriate Mitigation Action
NDA	National Designated Authority
NDC	Nationally Determined Contribution
NGO	Nongovernmental Organisation
NPM	New Public Management
NTM	Network-type Mechanism
OECD	Organisation for Economic Co-operation and Development
PAC	Acceleration Growth Program
PBMC	Brazilian Panel on Climate Change
PDE	Decennial Energy Plan
Plano Clima	National Plan on Climate Change
Plataforma ABC	Multi-institutional Platform for Monitoring of Greenhouse Gas Reductions in Agriculture and Livestock
PMR	Project for Market Readiness
PMUs	Urban Mobility Plans
PNA	National Adaptation Plan
PNLT	National Plan of Logistics and Transports
PNMA	Environment National Policy
PNMC	National Policy on Climate Change
PNMU	National Policy on Urban Mobility
PNR-GEE	National Program for Reporting GHG Emissions
PPA	Pluriannual Plan
PPCDAm	Action Plan for the Prevention and Control of Deforestation in the Legal Amazon

PPCERRADO	Action Plan for Prevention and Control of Deforestation and Forest Fires in the Cerrado Biome
PPI	Investment Partnership Programme
Proagro	Agricultural Activity Guarantee Programme
PRONAF	Family Farming National Programme
PSTM	Sectoral Plan for Transportation and Urban Mobility for Mitigation and Adaption of Climate Change
REDD+	Reducing Emissions from Deforestation and Forest Degradation
Rede Clima	Brazilian Network Research on Global Climate Change
RIO 92	United Nations Conference on Environment and Development
RPD	Recovery of Degraded Lands
SAF	Agroforestry System
SDG	Sustainable Development Goal
SEEG	Greenhouse Gas Emission and Removal Estimating System
SEMA	Special Secretary of Environment
SEPLAN	Secretary of Planning, Budgeting and Coordination of the Brazilian Presidency
SICOR	Rural Credit and Proagro Operations System
SIGABC	Governance System of the ABC Plan
SIRENE	National Emissions Registry System
SISNAMA	Environment National System
SMCF	Secretary of Climate Change and Forests
SMCQ	Secretary of Climate Change and Environmental Quality
SMMARE	Modular System for Monitoring Action and GHG Emissions Reductions
SPD	No-till Farming System
SPE	Secretary of Economic Policy

SR15	Special Report on Global Warming of 1.5°C
TDA	Animal Waste Treatment
UNCTAD	United Nation Conference on Trade and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Program
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
USA	United States of America
USD	United States Dollar
VLT	Light Rail Vehicle
WB	World Bank Group
WWF	World Wildlife Fund
ZARC	Agricultural Climate Risk Zoning

List of Figures

List of Tables

Chapter 1 – Introduction

1.1 Background

In recent years, countries have gained noticeable incentives to mitigate and adapt to climate change. For instance, the number of national climate change–related laws and policies reached 854 acts in 2016 versus only 54 initiatives in 1997. Nearly half of these acts have established emission reduction targets, meaning that 75% of global emissions are the target of some type of reduction goal (Grantham Research Institute on Climate Change and the Environment, 2016).

The Paris Agreement, established in December 2015, consolidated international political efforts in regard to climate action, and it can be considered the first global commitment that put developed and developing nations together to undertake efforts to address climate change. To implement the Paris Agreement, countries will submit, and periodically update, their Nationally Determined Contribution (NDC) to put forward actions to tackle climate change and avoid an increase greater than 2℃ of the global average temperature compared with the pre-industrial temperature (UNFCCC, 2017).

Despite these recent developments in international climate politics, the concentration of carbon dioxide (CO_2) in the atmosphere has reached the critical level of 400 ppm for the first time in about five million years (NASA, 2013), with this figure being 13% higher than that in 1992 when the United Nations Framework Convention on Climate Change (UNFCCC) was established. Moreover, under the Paris Agreement, the total stock of NDCs submitted so far is affecting only one-third of the emissions reductions required by 2030 to reach the climate goals (UNEP, 2017). Altogether, such figures suggest that current climate action is not enough to avoid an increase above 2℃ in the global average temperature, as stated in the Paris Agreement, and is far from reaching a more ambitious target of limiting the increase to1, 5℃, as recommended by the best available science (IPCC, 2018a).

Many reasons might be behind this low level of ambition and effectiveness regarding climate initiatives, including the following:

i) The existence of different groups of interests in favour of and against the climate agenda

ii) The power relations existing within the policy arena, which are especially relevant in fossil fuel–dependent countries

iii) The lack of coherence between a country´s global commitments vis-à-vis its domestic policy priorities

iv) The level of political priority that is given by national and subnational governments to climate policies when they hit a more complex development agenda

v) The complexity of the multilevel decision-making and coordination process

Despite the accomplishment of important milestones (e.g. the Kyoto Protocol, the Bali Road Map and the Paris Agreement), in the past years at the global level of climate action, the efforts to tackle climate change now rely much more on the way climate action is addressed in terms of governance, policies and institutions by nation-states and their governments. As Ostrom (2009) stressed, '"global solutions" negotiated at a global level, if not backed up by a variety of efforts at national, regional, and local levels, however, are not guaranteed to work well' (p. 4). The relevance of governments in tackling climate change has become further accentuated with the establishment of the Paris Agreement since it adopts a bottom-up approach in which countries are responsible for designing, implementing and reviewing their own NDCs throughout the years.

As explained later in Chapter 2 of this dissertation, multilevel climate governance (MLCG) has evolved in a multitude of horizontal and vertical public policy fields and levels of political power, and it can be understood as a system that is integrated by government authorities, international organisations, nongovernmental entities, business stakeholders and several other interest groups, with a plurality of interlinkages and entry points (Jänicke, 2017). In this broad view of climate governance, the following three types of analytical approaches can be taken to understand how governments take part in climate action: i) climate governance with governments; ii) climate governance without governments and iii) climate governance by governments. This research focuses on the third approach (climate governance by governments) and on the issues that dysfunctionalities within this perspective can generate in a country´s promotion of different actions (policies and plans) for greenhouse gas (GHG) mitigation.

Governments have a unique position in climate action, since they have key capabilities that no other actors may have, such as rule-making and rule-enforcing capabilities (Setzer & Nachmany, 2018). Being relevant actors in economic life directly (e.g. via public expenditure) and indirectly (e.g. via mobilising long-term transformations), governments are key to mainstream mitigation and adaptation in a country´s set of public policies vis-à-vis the different domestic priorities, levels of capacity and political ideologies that tend to coexist in a country's climate policymaking arena. Furthermore, the relevant governmental arena for climate action is populated by several actors. In addition to the different levels of jurisdiction (national and subnational), there are also different policy fields (e.g. energy, transport, agriculture and finance), where players have key responsibilities to tackle climate change domestically.

The above-mentioned aspects indicate that climate policy is a pressing issue evolving into cross-sectoral and multilevel issues that pose domestic governance and coordination challenges for nation-states and their governments. In this regard, two aspects are of critical relevance. The first concerns the operationalisation of climate governance at the national government level and the interplay between different ministries and agencies at this level (intragovernmental relationships). This is especially relevant 'in the post-Paris period, in which there is an increased reliance on states' ambitions and on their capacity to establish and implement ambitious policies, mobilising subnational and non-governmental actors' (Setzer & Nachmany, 2018, p. 58).

The second aspect is related to the interplay between the national and subnational levels of government (intergovernmental relationships) in a country-specific context, this is a key issue that must be solved to overcome the different bottlenecks that may undermine climate action within a country, for example, a lack of policy integration and coherence, different capabilities, and regional and socioeconomic differences that may exist among different levels of government, especially in federalism regimes such as those observed in Brazil.

In summary, dysfunctionalities in this climate governance by governments can generate or exacerbate different types of gaps that may undermine a country's GHG mitigation actions. As described in the analytical framework presented in Chapter 3 of this dissertation, there are four gaps: i. politics; ii. institutions and processes; iii.

resources and iv. information. A political gap is related, for example, to a lack of political will for climate action, while an institution and process gap can be linked to issues on policy integration and coherence of climate action within a country. Resource gaps include financial and budgetary constraints that prevent investments in mitigation and adaptation projects. Lastly, there remain information gaps, which are related to lack of data, studies and monitoring systems to help the whole decision-making process and the implementation of climate policies and plans (Andrade, 2022).

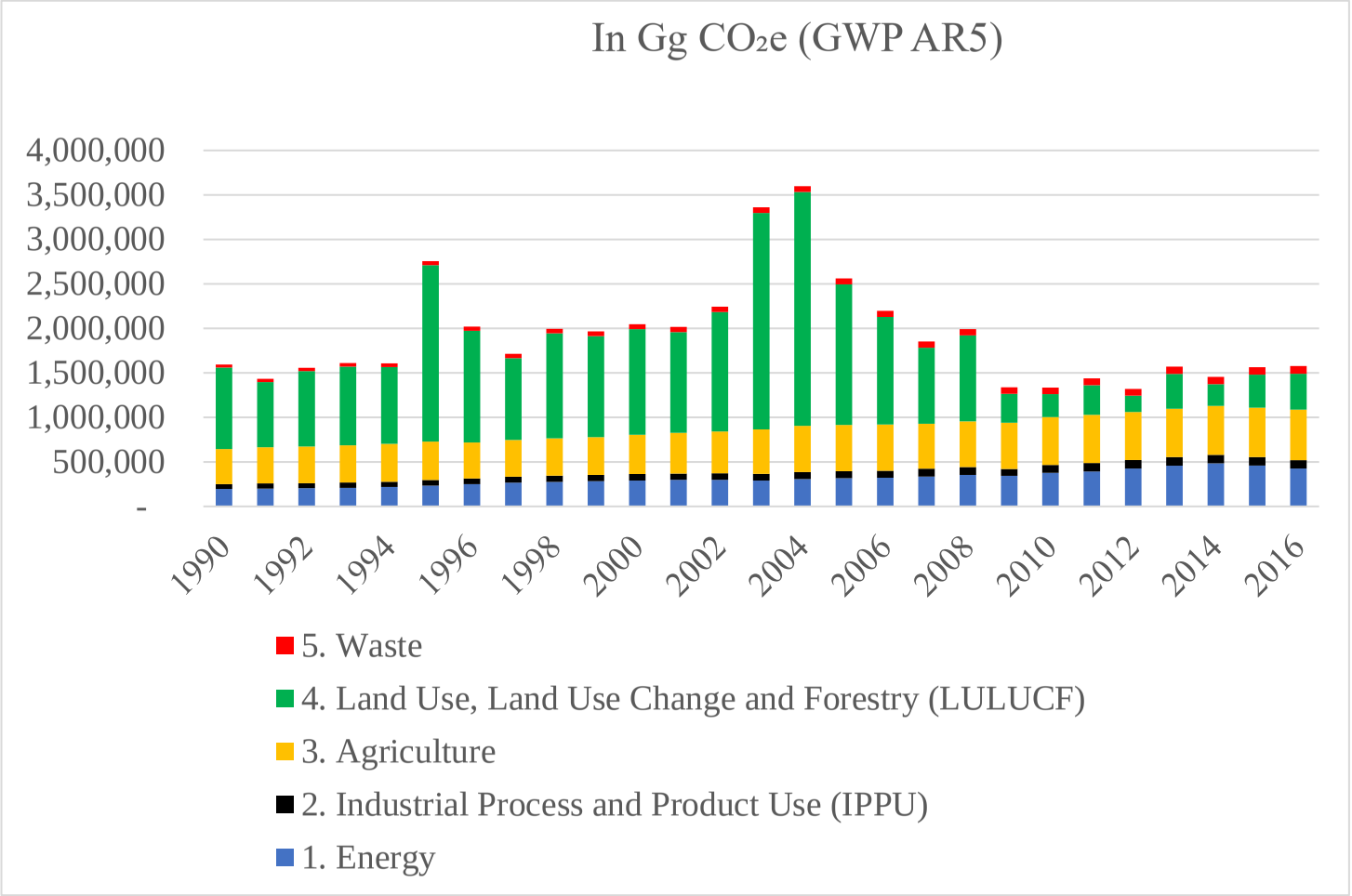
1.2 Problem statement and the aims of the research

As one of the biggest emerging economies, Brazil is a key player in global efforts to address climate change. For instance, considering GHG emissions from land use, land use change and forestry (LULUCF), the country is currently the sixth biggest emitter worldwide (Climatewatch, n.d.). Moreover, taking into account the cumulative emissions from 1851 to 2021, a recent study suggest Brazil is the fourth biggest GHG releaser (Evans, 2021). Additionally, together with the so-called Global South, this South American nation is in the group of countries that are showing a growing trend of carbon emissions in the upcoming decades (Fuhr, 2021).

To understand the Brazilian domestic challenges regarding the climate agenda, it is important to briefly summarise the country's economic profile and how this influences its GHG emissions. Brazil has a diversified economy, with important primary, secondary and tertiary sectors. From the production of agricultural and mineral commodities to the manufacture of industrial products and the provision of services in urban centres, the three sectors (primary, secondary and tertiary) are not only relevant to the country's economic growth but also have an impact on the domestic profile of GHG emissions.

As Figure 1 suggests, Brazilian emissions are basically distributed in three main areas, as follows: i) energy, ii) agriculture and iii) LULUCF. The graph provides two major takeaways: first, there was a sharp drop in LULUCF emissions in the indicated period. Second, emissions from the energy and agriculture sectors have been increasing in both absolute and relative values.

Figure 1 – The Brazilian greenhouse gas emissions from 1990 to 2016.

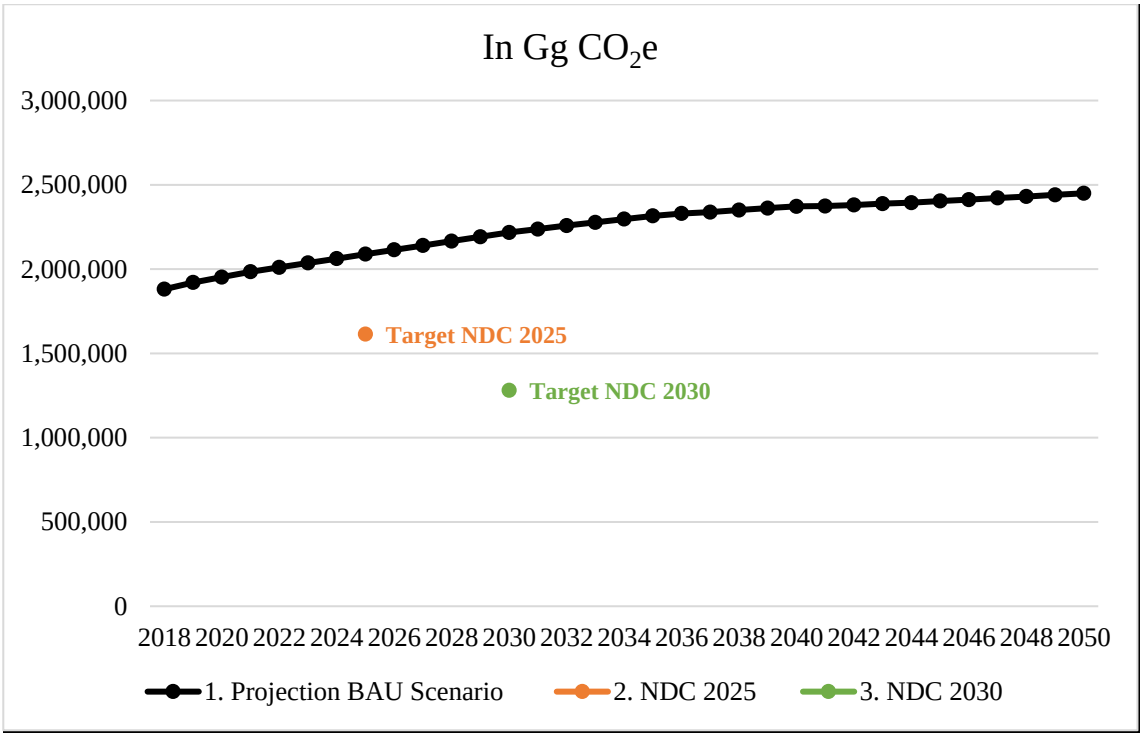


Source: MCTI (n.d.)

From the end of the 2000s, the better relative distribution between energy, agriculture and LULUCF emissions occurred mainly due to the sharp decline in deforestation in the country, which was the result of a successful programme to combat deforestation in the Amazon biome (the Action Plan for the Prevention and Control of Deforestation in the Legal Amazon [PPCDAm]). In parallel, the 2000s are also characterised by the boom of agricultural and mineral commodities in the global market as well as by an expansion of the internal consumption market, which brought direct consequences in terms of the energy consumption of families and companies. Within this context of greater sectoral distribution of GHG emissions, the National Policy on Climate Change (PNMC, in Portuguese) was enacted at the end of 2009.

In addition to the changes observed in the profile of Brazilian emissions, the Brazilian government's official estimates for GHG emissions for the next three decades suggest that, in a business-as-usual scenario, Brazil will continue to increase its GHG emissions, as shown in Figure 2. The comparison of this trend in light of the absolute emission reduction commitments assumed in the NDC for 2025 and 2030, as well as the indication of reaching carbon neutrality (net-zero) by mid-century, suggests that Brazil will not achieve its commitments under the Paris Agreement if current business-as-usual conditions remain, which indicates the need for greater effectiveness of the country's climate action in promoting GHG emission reductions (Climate Action Tracker, 2021; Climate Transparency, 2021).

Figure 2 – Estimates of the Brazilian greenhouse gas emissions from 2018 to 2050.



Source: MCTI (2021)

Currently, the country's main climate policy of national scope, the PNMC, is undoubtedly one of the main means that Brazil must use to reach its international commitments mentioned above as well as to induce the necessary changes to put the country on track to achieving a low-carbon economy. Within this context, two relevant aspects must be equally considered while adopting the 'climate governance by governments' analytical approach, which are as follows: i) the cross-sectoral profile of the Brazilian emissions and ii) the political–administrative organisation of the country.

Regarding the cross-sectoral profile of the Brazilian emissions, it is clear from observing Figure 1 that the current and trending situations are greatly distributed among three large sectors (LULUCF, agriculture and energy). This differs from the profile observed in the early 2000s and the years before when LULUCF emissions (especially emissions from deforestation) were responsible for almost 75% of the country's emissions. This is a fundamental aspect in discussing Brazilian climate governance, not only from the point of view of the origin of Brazilian emissions but also considering how different the relevance of each sector (and related policies) was in the year when the PNMC was launched (2009) from what it is nowadays. In

summary, the current GHG emissions profile is more cross-sectoral than it was years ago, and this implies that the PNMC is much more embedded in a more diverse arena of governmental stakeholders than it was years ago, especially if this is contrasted with the period when emissions from deforestation were predominant.

In addition to the cross-sectoral GHG profile of Brazilian emissions, another relevant context for the functioning of the PNMC concerns the political–administrative organisation of the country (a federalism regime with three levels of government – union, state and municipality, in addition to the Federal District). The way the federalism regime works is critical for the PNMC for two reasons. First, some relevant governmental roles for the functioning of the PNMC and its sectoral plans are decentralised to the subnational levels (states and municipalities). This is the case, for example, of most actions related to public passenger transport and urban mobility. Second, capabilities, resources and willingness to deal with climate action vary largely among different levels of government in Brazil. There are various reasons for this, such as socioeconomic inequalities found in different states and cities, the relationship between regional and local economies, and natural resource exploitation. Moreover, in relation to the regional differences found in Brazil, the fact that the country has six different biomes (i.e. the Amazon, Atlantic Forest, Caatinga, Cerrado, Pampas and Pantanal) is another important background aspect that influences the dynamics of the relationship between the different levels of governments of the country regarding climate policy.

This complex political, economic, social and ecological scenario offers challenges to the PNMC (or any policy that may replace it in the future) regarding different aspects, including the following: i) channelling financial and technical resources to climate action, ii) enhancing institutions and coordination, iii) matching different national priorities (e.g. reducing poverty, unemployment and inequality levels as well as improving the country's economic productivity levels) with mitigation and adaptation, iv) building dialogue among different (state and non-state) stakeholders and v) internalising international agreements into the domestic policy mix. What all these aspects suggest is that Brazil faces an even greater challenge in terms of the governance required to deal with all of the surrounding cross-sectoral and multilevel issues highlighted above.

Within this challenging context, the way that Brazilian governmental stakeholders participate and get organised in the PNMC is the most critical aspect of the climate governance debate in the country, not only due to their rulemaking and rule-enforcing features but also because they can enable or undermine the participation of the non-state actors within this process as well as undermine even the overall achievements of the climate policy. In this regard, the discussion of the 'climate governance by governments' for the Brazilian context has two main issues: first, the intragovernmental relationships among the different governmental actors that comprise the Brazilian federal government; and second, the intergovernmental relationships between the federal government and the state and municipal governments.

The first issue stands out because the federal government is the focal point for international climate negotiations under the UNFCCC. Moreover, it is within the federal government sphere that public organisations with the greatest competencies related to the PNMC lie, either in the general overseeing of the policy (through the climate collegiate bodies and coordinating ministries) or in the affairs of the different sectoral plans that compose the PNMC (which are carried out by the sectoral ministries). At this point, it is important to highlight that the brief history of the PNMC shows a conflicting relationship among some federal ministries, in which episodes of turf wars and sectoral protection regarding the imposition of GHG reduction targets have been noted (Senado Federal, 2019).

With regard to the intergovernmental relationships between the federal government (national level) and the state and municipal governments (subnational level), this interplay tends to be valuable for a climate policy of national scope, as the PNMC is proposed to be. As highlighted before, due to Brazil's federalism regime, many relevant competencies for the full implementation of the PNMC are decentralised to the state and municipal levels, which often have public administrations with capacities below those necessary for the full exercise of actions related to the PNMC or other mitigation and adaptation policies. Furthermore, considering the spatial distribution of the country's productive and consumptive organisation across different regions, the dynamics of the relations between federal and state/municipal governments tend to become a success or failure factor, even for the design and implementation of sectoral reduction targets foreseen under the PNMC.

Despite the importance of understanding how intragovernmental (within the federal government) and intergovernmental (between the federal government and the state and municipal governments) relationships work within Brazilian climate governance, there is a gap in terms of the lack of more in-depth studies about these interplays and what they entail for the operation and results of the country's climate policy. However, the few analyses that have touched on Brazilian climate governance suggest that the different interactions that occur within the government are problematic and tend to be part of the explanation for problems related to integration, coordination, effectiveness and transparency found in the PNMC's lifetime. There is also little evidence on the extent to which sectoral specificities, within this 'climate governance by governments' context, may explain why certain sectoral mitigation plans under the PNMC are more successful than others (Senado Federal, 2019; Speranza, Romeiro, & Biderman, 2017; Unterstell, 2017).

In this sense, this dissertation aims to investigate Brazilian climate change governance by adopting the climate governance by governments lens mentioned above. By employing the literature on multilevel governance and the coordination of public policies as the theoretical background, this study has a twofold objective. First, it seeks to understand how the different governmental interplays have occurred within the PNMC and its sectoral plans on agriculture (the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture [ABC Plan]) and transport and urban mobility (the Sectoral Plan for Transportation and Urban Mobility for Mitigation and Adaption of Climate Change [PSTM]). Although primarily focused on the intragovernmental relationships among the federal government stakeholders (e.g. federal ministries and governmental agencies), this research also pays attention to the intergovernmental relationships between the federal government (national level) and the state and municipal governments (subnational level). Second, it seeks to identify and explain how and why different governance gaps arise in each case examined ('mitigation action') and to find out whether the failure of the intragovernmental and intergovernmental relationships examined ('climate governance by governments') could be one of the reasons for the manifestation of these gaps.

1.3 Research questions

To meet the research aims, the following questions are posed:

> Q1. How are climate policy arrangements organised and coordinated among governmental actors to mitigate GHG emissions in Brazil? What might be the reasons behind how such arrangements are established?
>
> Q2. What are the predominant governance gaps in the different GHG mitigation actions examined? Why do these governance gaps occur?

The first research question (Q1) aims to explore how the Brazilian climate governance was constructed and how it works. By explaining the historical, institutional and political conditioning factors as well as the actors involved (leaders, followers, possible veto-players, etc.), this question engenders discussion about the way the different governmental stakeholders are positioned and how relevant intragovernmental and intergovernmental relationships are taking place within the functioning of the PNMC and its sectoral plans.

The second question (Q2) intends to identify, for each of the cases examined, the occurrence of different climate governance gaps, which, according to the analytical framework of this research presented in Chapter 3, can be revealed in four aspects (i.e. politics, institutions and processes, resources and information). This question is also intended to examine the factors that explain these gaps, how they differ between the cases and whether failures in climate governance by governments could be one of the explanations for them.

1.4 Relevance of the study

The amount of literature on climate governance has been growing over the years. Despite this growth, noted through the profusion of articles, dissertations and books on the subject from the most diverse of perspectives (e.g. international governance, national governance, subnational governance and transnational governance), research on domestic climate governance in the Global South is still limited, especially when compared with the analyses carried out for the Global North. In this sense, a relevant aspect of this research is that it reduces the gap in studies dedicated to the Global South, whose emissions show a growth trend over the next decades. Moreover, although Brazil is relevant for the global emissions scenario and has considerable

domestic complexity that covers political, economic, social and environmental aspects, studies on Brazilian climate governance are still limited, even when compared with those on other Global South countries. In this sense, a second relevant aspect of this study is that it reduces the deficit of information and analysis on Brazilian climate governance.

Furthermore, by approaching governance from a government's perspective within the discussion of Brazilian climate governance and presenting evidence on how several interactions occur within the federal government institutions and among the different levels of government in different arenas of climate action (i.e. the PNMC, ABC Plan and PSTM) the study brings unprecedented and extremely relevant academic and practical evidence to the discussion of MLCG and governmental relationships within the country, an aspect of critical relevance nowadays when Brazil is preparing to implement its commitments under the Paris Agreement.

These three cases are of great relevance for enabling low carbon transformation in Brazil. First, the PNMC is the first national policy exclusively dedicated to addressing climate change, and it proposes to address the problem by adopting an approach which is intended to be cross-sectoral and multilevel. Second, the sectoral plans to be investigated are supposed to be of key relevance to enabling sectoral transformation towards sustainability. For instance, the PSTM is supposed to foster low-carbon transformations with the transportation of passengers and freight. Moreover, the ABC Plan aims to escalate the adoption of low-carbon agricultural techniques in the Brazilian agricultural sector, making it more sustainable and reducing the expansion of the agricultural frontier towards forest areas.

Finally, through the development – and application to selected cases – of its analytical framework, this study also brings important theoretical contributions to the construction of assessment frameworks for climate governance at the domestic level, not only for the Brazilian context but also for all other countries that need to identify the challenges and organise their different levels of government, policies, coordination and integration instruments, financial resources and data for decision-making regarding climate action.

1.5 Dissertation outline

This dissertation adopts an exploratory qualitative research approach to answer the research questions posed and is structured into six chapters, as follows: this first chapter presented the research topic and aims, the research questions and the relevance of this research to the literature. Chapter 2 presents a literature review on multilevel governance and on coordination of public policies, which comprise the theoretical background adopted for the development of the analytical framework to carry out the research. The third chapter presents the methodology, research design and analytical framework that will be employed to assess the cases. The fourth chapter describes the institutional evolution of the environmental and climate agenda in Brazil and highlights the challenges related to governmental relationships, federalism and cross-sectoral aspects that Brazil's climate action faces.

Chapter 5 presents the empirical part of the research in which the three cases (the PNMC, the PSTM and the ABC Plan) are presented, analysed and discussed. This chapter comprises five sections: Section 5.1 introduces the chapter. Section 5.2 is dedicated to the PNMC case, while Sections 5.3 and 5.4 address the PSTM and the ABC Plan, respectively. Section 5.5 is dedicated to cross-case comparisons. Finally, Chapter 6 presents he main research conclusions, including a summary of the findings, the answers to the research questions, theoretical and methodological considerations about the research results, implications for policymakers and the research's limitations.

Chapter 2 – Governance and Coordination: A Literature Review

2.1 Introduction

This chapter presents a literature review on the main topics of MLCG and public policy coordination, including the key concepts and challenges. These two strands of literature are the theoretical lens through which my analytical framework (presented in Chapter 3) and case analysis (presented in Chapter 5) are based. As my research is mainly focused on governance by governments and the related intragovernmental and intergovernmental relationships that take place in climate governance, special attention is paid to the different interplays that might take place between governmental stakeholders at the same or different levels of government in regard to climate policy.

First, this section highlights the cross-sectoral and multilevel profile of climate policies. Then, it addresses the main roles of national and subnational governments in this governance context and the expected challenges and difficulties that are likely to be observed in such policy arrangements. The second part of this chapter presents an overview of the literature on the coordination of public policies, beginning with the different definitions of coordination and going through the difficulties of policy coordination and the availability of mechanisms and instruments to mitigate or overcome such constraints. This twofold perspective (multilevel governance and coordination of public policies) is of critical importance to provide the right theoretical background to build the analytical framework and carry on the analysis of the different cases of climate policymaking and its related intragovernmental interplays in the upcoming chapters.

2.2 The cross-sectoral and multilevel governance profile of climate change policies

Climate change is a cross-cutting issue whose causes and consequences cannot be addressed by a singular level of governance or policy sector (Gupta, 2007). On the one hand, it is influenced by GHG anthropogenic emissions from various sources (e.g. deforestation, fossil fuel consumption and cattle), reflecting its cross-sectoral development perspective (Schmitz, 2016). On the other hand, the impacts of climate

change, as well as GHG emissions, are unbalanced in terms of their geographic distribution (within countries and over countries), which also leads us to understand climate change as a political issue that touches upon different levels of political and governmental power (Bernstein & Hoffmann, 2018).

All of these features create a policy environment where national and subnational governments as well as international and transnational organisations are simultaneously involved in the governance of policies to tackle climate change (Naess et al., 2015). This can be understood as a 'glocal' policy issue (Gupta, 2007), which is naturally embedded in a polycentric context of decision-making (Bernstein & Hoffmann, 2018; Jordan et al., 2018) and can be benefited or undermined by different policy fields and levels of government (Naess et al., 2015; Schmitz, 2016).

2.3 Lessons from the multilevel governance scholarship to the studies of climate policy

Multilevel governance (MLG) is part of the political science response to investigating the phenomenon of authority diffusion, which has also been investigated under other conceptual terms, including i) multilateral cooperation and global governance (within the international relations scholarships), ii) decentralisation (federalism scholarships) and iii) polycentric governance (public policy scholarships), as pointed out by Hooghe and Marks (2003). Originally described as a 'system of continuous negotiation among nested governments at several territorial tiers – supranational, national, regional and local' (Hooghe & Marks, 2003, p. 234) within the context of European Union (EU) studies, it has largely been employed in studies of the various linkages between actors and policies of different levels and economic sectors to explain the patterns of climate change policies (Jänicke, 2017; Jordan al, 2018).

Despite the growing literature in regard to the reallocation of authority 'upward, downward and sideways from central states' (Hooghe & Marks, 2003, p. 233) , concerning multilevel issues, there is not a consensus about how MLG should be ideally organised. For instance, Hooghe and Marks (2003) categorised MLG into two types: MLG type I has a limited number of levels (e.g. national, regional and local) in which general functions and jurisdictions are set. Its rationale surrounds issues of federalism, and membership intersections are not the rule. However, MLG type 2 is related to specific issues or tasks, where the number of specialised jurisdictions and

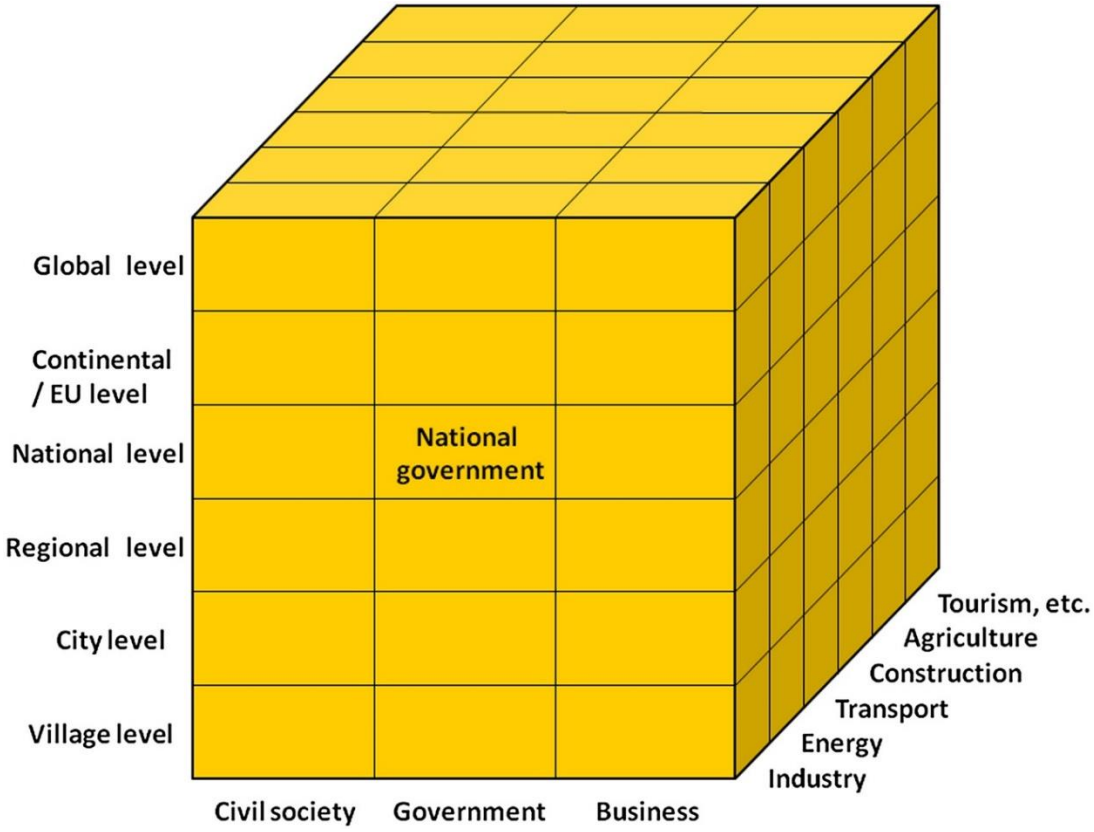
their levels of scale are huge. The intersection between these different jurisdictions tends to be the rule. For the case of climate change governance, such a variety of interpretations tends to be helpful since it allows scholars to employ MLG according to the aim of their investigation.

Since this research aims to explore climate governance from an intragovernmental perspective (i.e. to problematise the intragovernmental interplay within the national government [functional specialisation] and between the national and subnational governments [federalism relations]), these two types of governance (MLG type I and MLG type II) could be simultaneously employed during the analysis. Thus, the MLG analytical lens tends to be a useful framework when attempting to narrow or close the gaps among different line ministries as well as between distinct levels of government through the employment of vertical and horizontal coordination and cooperation tools (Corfee-Morlot et al., 2009). The next subsection highlights the constellation of actors and policy process nuances that are usually found in this policymaking arena.

2.3.1 An overview of actors, processes and state roles in multilevel climate governance

The MLCG has evolved in a multitude of horizontal and vertical public policy fields and levels of political power. For instance, MLCG (Jänicke, 2017), or polycentric climate governance (Jordan et al., 2018; Ostrom, 2010), spans from global to subnational levels, relying on formal and informal networks and policy channels (di Gregorio et al., 2019). This makes climate policy a wicked issue that is difficult to govern via a single level of political power or by one specific economic sector in most countries (Gupta, 2007; Schmitz, 2016). It can be understood as a system that is integrated by government authorities, international organisations, nongovernmental entities, business stakeholders and several other interest groups, with a plurality of interlinkages and entry points (Jänicke, 2017), as depicted in Figure 3.

Figure 3 – The layers of multilevel climate governance.



Source: Janicke (2017, p. 110)

The global level of climate governance is established by several mechanisms, such as treaties, conventions and international organisations (Obergassel et al., 2015). This level of governance is strongly influenced by the UNFCCC regime and the Intergovernmental Panel on Climate Change (IPCC) but is not limited to them (Jänicke, 2017). For instance, many other United Nations agencies, such as the United Nations Environment Program, the United Nation Conference on Trade and Development, the Food and Agriculture Organization and the United Nations Development Programme as well as country economic forums (e.g. Group of Eight [G8] and Group of Twenty [G20]) tend to provide relevant support to enhance climate action and influence international negotiations on the subject (Dorsch & Flachsland, 2017; IPCC, 2015).

Multilateral development banks (MDBs), such as the World Bank Group and the Inter-American Development Bank, are also relevant actors on that level of governance, not only in financing affairs but also in building countries' institutional capacities to tackle climate change (IADB, 2020; World Bank, 2021). Furthermore, it is also worth

highlighting the growing participation in recent years of some sectoral international organisations in the global efforts of climate change mitigation, such as the International Civil Aviation Organization (ICAO, 2020) and the International Maritime Organization (IMO, 2020), whose sectors are not fully addressed by countries' NDC commitments.

The regional (or continental) level of climate MLG can be understood as the political organisations that represent different regions of the world (Jänicke, 2017). The EU, the Southern Common Market (Mercosul in Portuguese), the Community of Latin American and Caribbean States, the African Union and the Association of Southeast Asian Nations tend to play certain roles in regard to the supranational common issues of their respective regions, which naturally include climate change. However, Jänicke (2017) argued that the institutional capacities are weak in most of these regional arrangements, apart from the EU, which is institutionally and politically empowered to play decisive roles in the dynamics of climate policymaking within its member countries and green transition strategies (European Council, 2022; Richardson and Mazey, 2015; Skjærseth, Bang, & Schreurs, 2013).

Although this locus of climate governance seems to be less developed when compared to other levels, it has a huge potential to be explored, particularly in regard to regional trade agreements, which would foster mechanisms and incentives for GHG emission reductions and establish regional platforms for climate action (IPCC, 2015). For instance, the ongoing trade agreement negotiation between the EU and the Mercosul, one of the longest trade negotiations in recent decades and pays special attention to how countries involved in this trade negotiation are dealing with the international and domestic commitments in regard to climate change (European Commission, 2019; European Council, 2020). Regional governance also plays an important role related to carbon trade schemes, such as the one established between the states of California (US) and Quebec (Canada) (ICAP, 2020).

The national level of the MLCG is an important piece of this system, not only due to countries' responsibilities in regard to climate policies but also because it does play a decisive role in regard to climate action patterns of other layers of MLCG, such as the international and subnational layers. National governments are key actors in regard to the development of climate policies, like any other development policy.

It is this level of governance, which lies on most of the necessary regulation, funding capacity and political leadership, that is likely to influence all other levels of climate governance at the country level (national and subnational) (Setzer & Nachmany, 2018). It is also where institutional capacities (including the coordination and the enforcement instruments) tend to be more developed. The main actors of international negotiations and enablers of climate global networks are usually linked to this tier of governance (Jänicke, 2017). Moreover, it is at the national government tier that a greater part of the public opinion and pressure is usually channelled in regard to the successes and failures of a country's performance in addressing climate change.

The state and city levels are placed in the subnational tier of the MLCG. They can play key roles in climate change mitigation and adaptation for many reasons. First, it is at these layers of governance that many national regulations and policies should be implemented. Second, in many cases, subnational actors (especially at the city level) have direct responsibilities in several relevant areas for climate action, such as urban mobility, land use, waste and housing (IPCC, 2018b; Romero-Lankao et al., 2018). For instance, 70% of GHG emissions related to energy consumption come from urban centres (IPCC, 2015). These figures help the understanding of why the role of the subnational level of climate governance in addressing climate change has been explored in the literature in recent years (Belali et al., 2018) and why the Paris Agreement text mentions the relevance of subnational governments in tackling climate change (UNFCCC, 2015).

In the MLCG system discussed by Jänicke (2017), there is also the village level, which includes rural/local communities, as well as the so-called 'micro-level' of individuals. Despite such levels having been neglected for a long time, the author argued that there is a growing interest in the literature about the opportunities and potential that such levels provide to the debate on climate policies, such as innovative low carbon practices (e.g. the 'smart villages' activities and car-sharing experiences in many communities) (Jänicke, 2017). By the author's definition, it is also possible to consider within this layer community movements the 'Fridays for Future' formed by school teenagers as well as spontaneous sustainable consumption campaigns carried out by consumers.

All of the MLCG layers described above play important roles in addressing climate change mitigation and adaptation, especially under the Paris Agreement regime, whose

functioning rationale relies on the ability of each party to set its GHG mitigation contributions over the years. This is a noticeable change when compared with the top-down approach observed in the Kyoto Protocol regime, in which the international tier of the MLCG plays the main role (Jordan et al., 2018).

Nevertheless, within these constellations of actors and layers, two emerge as key actors for the success of the Paris Agreement to pave the way for low carbon transitions worldwide and enhance the entire system of MLCG, which mainly covers the national and subnational levels of the government of a country (Setzer & Nachmany, 2018), since governments (and their officials and representatives) have a unique and fundamental position in both international and national constituencies to influence the climate agenda (Huitema et al., 2018).

On the one hand, any global negotiated solution will struggle if not backed up and internalised through actions taken by the national and subnational governments (Ostrom, 2009). On the other hand, the national level of government usually serves as the main enabler and financer of mitigation and adaptation measures, also being responsible for providing coordination and mobilising other relevant governance actors (both state and non-state actors) to adopt mitigation and adaption measures (Dorsch & Flachsland, 2017; Setzer & Nachmany, 2018).

Despite the prevalence of global ambitions to tackle climate change, domestic intragovernmental relations within an MLCG environment do not always function appropriately for reasons ranging from power struggles to the different visions and priorities of each sector in the climate policy arena. A country's intragovernmental affairs in climate politics can be also seen as a multilevel environment in itself, since even within a specific economic sector, different levels and actors – with different capacities and interests – tend to coexist. This aspect, if multiplied by the number of economic sectors relevant to the climate policy mix of a country, makes it clear how difficult intragovernmental relationships tend to be within the scope of a country's climate policy. Despite this, the governance challenges at the national and subnational levels are usually underappreciated by the climate governance literature (di Gregorio et al., 2019; Setzer & Nachmany, 2018).

In a nutshell, the way national and subnational governments build and implement climate policies and interact among themselves in regard this subject tends to be critical for the success of the MLCG system, including not only the international

commitments in regard to climate action but also the enhancement of the participation and effectiveness of other layers of the MLCG (e.g. the non-state stakeholders in the climate policy cycle) to enable the country to deliver better climate policies (Hooghe & Marks, 2003; Setzer & Nachmany, 2018; Skelcher, Mathur, & Smith, 2005).

2.4 Intragovernmental governance and coordination issues at the national and subnational levels of climate policy

Governing and coordinating climate policies in a country context have proved challenging for countries no matter what governmental structures they have (e.g. Federalism or Unitarianism) (Jordan et al., 2019; Skjærseth et al., 2013). For instance, climate policymaking touches upon classical thoughts related to agenda setting and why some policies prevail over others. It comprises different features of climate policymaking, such as the following: i) the existence of conflicts of interests (e.g. winners and losers in the transition to a low carbon economy), ii) the way the policy process is set in a specific country context and iii) the availability of resources and political will to carry out climate change mitigation and adaptation actions (Charbitt, 2011; Gordon, 2015; Kingdon, 2011).

Due to its cross-sectoral profile, climate policies' success depends on the way different sectoral policies are integrated and distinct levels of government are coordinated to integrate their respective actions in a country's climate policy. As Gupta (2007) argued, despite being an agenda with closer ties to environmental policymaking, climate mitigation and adaptation usually go beyond the competence limits of environmental ministries. They concern several policy sectors, such as agriculture, energy, housing and transport. All of these sectors are naturally under the auspices of other ministries and even other levels of government, depending on the governmental and political structure in question. These features tend to bring the governance of climate policies into a multi-nodal policy arena in which several bottlenecks may arise during the GHG mitigation action's lifetime (Gupta, 2007; Jordan et al., 2018; Worker, 2016; Worker & Palmer, 2021).

At the national level, the 'division of labour' of the required actions to meet climate goals, such as GHG emission reductions, is usually spread over many different ministries, and this has led to some points of attention that, if not addressed, will erode the whole climate policymaking process. First, in a landscape where different policy

actors are simultaneously operating, the allocation of responsibilities must be clear to avoid gaps or overlaps in governmental action, which tends to be challenging for many governments (Gupta, 2007). A second issue that usually arises in such a context concerns the unbalanced capacities to deal with climate issues that different governmental organisations and levels of government have. This tends to lead to a situation of selective perception about the problem, undermining the quality of the climate policy (Hustedt & Seyfried, 2016).

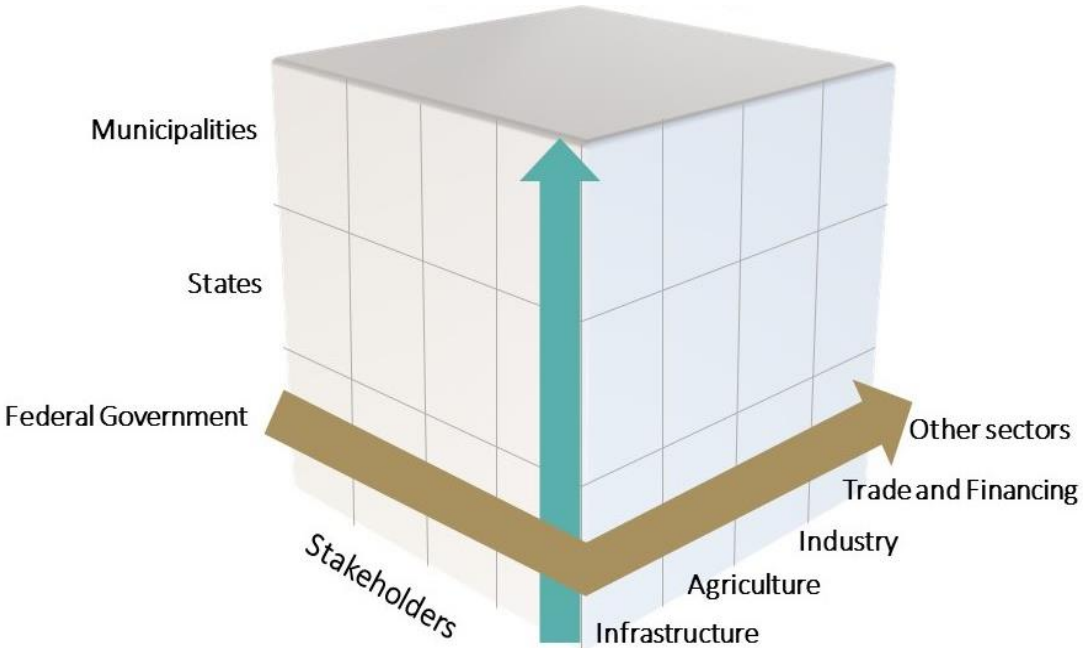
However, in regard to the disruptive characteristic of climate change policies, it should be noted that the agenda is likely to face opposition from various areas. For instance, path dependencies and consolidated power structures around a fossil-fuel-based economic sector, as well as cultural, social and even urban planning issues, may prevent countries adopting a more proactive position in regard to climate action, making low carbon transition more difficult to achieve (Bernstein & Hoffman, 2018; Schmitz, 2016; Worker, 2016).

Moreover, hostilities against climate policies may arise in a bureaucratic context, especially when pre-established policies and budget distributions are rearranged among different ministries and governmental entities. Such disputes within governmental structures cause many negative consequences within the bureaucracy, such as turf wars (Hustedt & Seyfried, 2016) and a low willingness to share relevant information among ministries and agencies (Charbit, 2011). In this context, some authors argue that the formation of climate-friendly coalitions within government as well as the effective participation of the centre of government in climate policy coordination provide relevant solutions to mitigate these conflicts (Brazil, 2016; Schmitz, 2016; Senado Federal, 2019).

Another common issue usually faced by national governments is related to the coherence of their GHG emission reduction commitments set at an international level vis-à-vis their respective domestic policy setting. These are two sides of the same coin, since the success of the international commitments will strongly depend on the way the country's institutional dynamics are set (Jordan et al., 2018). For instance, in federal systems, such as those in Brazil, the United States of America (US) and Canada, the national GHG emission reduction goals will require buy-in from the different subnational levels of the government, which may have different interests in regard to the climate agenda (Gordon, 2015). As Figure 4 suggests, policy alignment

between the national and subnational levels of government cannot be taken for granted. The absence of this may generate policy incoherence, as highlighted in the literature, since there are too many players and sectors in the game, even when considering only the intragovernmental relationships (Basso, 2019; Jordan et al., 2018; Schreurs, 2017; Skjærseth et al., 2013).

Figure 4 – The domestic layers of multilevel climate governance for federalist systems.



Source: Author's elaboration adapted from Jänicke (2017).

Based on the multiple intragovernmental relationships drawn in the figure, it is possible to say that the reasons for incoherence and misalignment of climate policies within and between different levels of a government go beyond potential opposition to the climate agenda. The way as policy formulation, planning and implementation are set can undermine climate governance. First, in many policy fields, the role of regional and local governments in promoting climate change mitigation and adaptation might be much more relevant than that in the hands of national governments (Gordon, 2015). This is not only because some policies usually carried out at the subnational level (e.g. urban mobility, housing, land use and territorial planning) have much to contribute in terms of climate benefits but also because local governments are at the 'street level' (Lipsky, 2010), which allows them to have a better understanding of the local context

and requirements to properly design and implement policies than central governments have (Gupta, 2007).

In this governance context, vertical decentralisation of climate policymaking with its correlated coordination mechanisms, especially in federalism contexts, tends to be of critical importance (Gordon, 2015). However, the decentralisation process is far from free of problems, and many issues are expected to arise. First, in a case where climate policy competencies are decentralised to regional and local governments, the role of the central government is often unclear (Gupta, 2007). Second, decentralisation usually happens without previous enhancement of local capacities (e.g. financial and technical) to deal with climate policies, which limits the ability of the new incumbents to promote effective actions (Charbit, 2011).

Moreover, in federalist contexts, subnational actors might assume critical relevance for climate action in a situation where the leadership of the national government has been weakened or abruptly interrupted. This potential leadership strength of the subnational government is a relatively new field of investigation in climate governance. Some authors have already pointed out such a possibility, such as Jordan et al. (2018) for the American and Canadian cases. However, whether the regional and city levels of government will have enough policy capacities to fulfil the policy vacuums left by national governments, in the long run, remains unclear in the literature, especially in regard to the Global South (van der Heijden, 2018).

All of these issues that occur during the lifetime of a climate policy tend to reinforce the need for a functional system of climate governance, in which finding ways to coordinate and integrate all of these different policy sectors and governmental stakeholders is key to achieving different climate goals within a policy (e.g. GHG mitigation, resilience building, enabling of financial flows for low carbon projects, achieving transparency and matching international commitments and domestic priorities) (Averchenkova & Bassi, 2016; Brunner et al., 2012). In this sense, governments that correctly understand and apply the core elements of coordination in a multilevel climate policy environment are more likely to shape effective climate governance, which can make them better positioned to mitigate the gaps that tend to occur in MLCG contexts (Andrade, 2022; Charbitt, 2011).

2.5 Core elements of policy coordination in multilevel governance contexts

Coordination is one of the foundations of a result-oriented governance system, being one of the four administrative capacities[1] that a government should pursue to address wicked issues (Lodge & Wegrich, 2014). It is an action used to counterbalance some negative effects related to decentralisation and specialisation (Danken, 2017), enhance policy coherence within and among different levels of government (Peters, 2003) and maintain the quality of public service delivery during times of budget constraint (Beuselink, 2008).

As a mantra often heard in the discussion of MLG environments, coordination is a complex topic that comprises different features, all of which are of critical relevance to MLCG systems and conceptualised in different ways. For instance, the holistic view of cooperation among coordinating was accurately presented by Perri 6 et al. (2012) in their definition of coordination as 'the development of ideas about joint and holistic working, joint information systems, dialogue between agencies, processes of planning, making decisions' (p. 33).

In its turn, the need for coordination to manage interdependencies among actors and actions has been highlighted by many researchers in their respective definitions of coordination (Alexander, 1995; Koop & Lodge, 2014; Malone & Crowston, 1994). Moreover, the definition of coordination presented by Gordon (2015) is useful for climate policy, since the author frames coordination within the governance perspective:

> I define coordinated climate governance as the coming together of jurisdictional actors around common objective(s) with respect to emissions mitigation, renewable energy production/consumption, or energy efficiency, as well as interlocking policies through which joint objectives are pursued (e.g. a national strategy, plan or legislative framework). (p. 123)

Another important feature highlighted in the literature is related to the need for coordination to mitigate conflicts, since it can be understood as 'a process of inter-

[1] Discussing the administrative capabilities that governments should have to strengthen their problem-solving capacities to address wicked issues (such as climate change), Lodge and Wegrich (2014) pointed out four types of capacities, namely, delivery, regulatory, coordination and analytical.

organizational conflict-resolving, which becomes manifest in certain coordination techniques', as stated by Hustedt and Tiessen (2006, p. 5). From a theoretical to a practical perspective, coordination is also about finding the right incentives and mechanisms to make coordination happen in the real world. In this sense, the following definition provided by Bouckaert, Peters and Verhoest (2010) stresses this feature in a very assertive way:

> Instruments and mechanisms that aim to enhance the voluntary or forced alignment of tasks and efforts of organizations within the public sector. These mechanisms are used to create a greater coherence, and to reduce redundancy, lacunae, and contradictions within and between policies, implementation or management. (p. 16)

In a nutshell, each of the above definitions has a different approach and presents different features related to coordination (e.g. conflict mitigation, interdependencies and performance). However, broadly speaking, they tend to converge in relation to its final purpose as the alignment 'of different organizations towards [a] common task, to enhance coherence and to reduce redundancy, duplication and contradiction', as Danken (2017, p. 11) summarised.

Despite this list of conceptualisation and scholarship, coordination is still a long-standing concern in public administration, being a frequent topic on the agenda of administrative reforms, especially in the contexts of pronounceable disaggregation, fragmentation and specialisation, as many researchers have suggested (Danken, 2017; Halligan, 2010; Peters, 2018; Wegrich & Stimac, 2014; Wollmann, 2003). For the specific case of climate policies, it can be considered a decisive issue not only in the country context but also regarding the global concertation of nations working to tackle climate change. This is because 10 of the 18 top GHG emissions countries are federations, in which coordination is a key variable to getting different levels of government working in harmony (Gordon, 2015). The reasons why governments struggle to achieve effective and functional coordination are addressed in the next subsection.

2.5.1 Why is coordination difficult?

Jennings and Krane (1994) classified coordination failures into the following three major categories: i) political reasons, ii) organisational reasons and iii) technical and

juridical reasons. The political reasons that undermine appropriate levels of coordination arise specifically in cases of coalition governments, especially when key ministries for a specific policy agenda are governed by different political parties. Similar situations happen in federative systems, where subnational governments are administered by opposing political parties at the national level (Peters, 2018).

Political issues may also arise due to the presence of competition between different bureaucratic groups. For instance, turf wars, a situation in which bureaucrats perceive themselves in permanent competition with others over resources, power and political support, is one of the most documented threats to governmental coordination (Herrera, Reuben, & Ting, 2014; Hudson, Hardy, & Wistow, 1999; Hustedt & Tiessen, 2006; Peters, 2018).

Moreover, in the case of coordination of cross-sectoral policy programmes with noticeable transformative potential (like climate policies tend to have), some governmental actors may also adopt uncooperative behaviours to block changes against the status quo, for example, by not sharing relevant information for decision-making. This tends to be seen as a response to the pressures that these groups receive from their policy constituencies, which aims to preserve favourable predetermined conditions for those sorts of stakeholders. This type of practice might undermine the quality of coordination (Jennings & Krane, 1994; Peters, 2018).

Organisational difficulties are rooted in the different goals, professional orientations, structures, processes and financial capabilities that tend to coexist in governmental structures (Hudson et al., 1999), which can undermine common goals even when different organisations adopt joint commitments and efforts (Pressman & Wildavsky, 1984). In some cases, these organisational struggles appear naturally, such as in episodes of selective perception where decision-makers tend to understand the problems and the ways to address them according to their respective activities, goals, beliefs and ideologies. A lack of a holistic view of the whole policy process (Dearborn & Herbert, 1958; Peters, 2018) as well as a mismatch between the principal and the agent (MacDonald, 2015; Moe, 1984) tend to be consequences of that issue.

Additionally, the literature shines a light on the fact that some flagships of the New Public Management (NPM) approach, such as specialisation and performance management (at the departmental level), might lead to negative effects in terms of coordination if this aspect is not fully considered and addressed while undertaking

decentralisation movements (Ling, 2002; Peter, 2018). Instead of challenging management innovations suggested by the NPM school, some scholars have looked at empirical responses that governments could employ to mitigate coordination and integration gaps in the context of specialisation and decentralisation movements (Bouckaert et al., 2010; Hood, 2005).

For instance, the UK's joined-up-government approach (Christensen & Lægreid, 2007; Performance and Innovation Unit, 2000) and whole-of-government approach (Santiso, Lafuente, & Martin, 2013) are attempts to enhance horizontal and vertical coordination and mitigate clashes between different policy sectors. As Christensen and Lægreid (2007) stressed, these are clear 'responses to the problem of increased fragmentation of the public sector and public services and a wish to increase integration, coordination, and capacity' (p. 1,060).

Finally, the third bottleneck for better governmental coordination is the juridical and technical barriers faced by policymakers. These issues are usually related to ordinary bureaucratic aspects, such as legal restrictions on the use of funds, compliance and accountability (Peters, 2018). Moreover, different federal and state regulations related to similar policy issues may hinder possibilities of better coordination in some sectors, especially in federative contexts where administrative and political powers are spread over different levels of government (Jennings & Krane, 1994).

Moreover, the difference between negative and positive coordination should be stressed. Both are considered self-coordination forms that are differentiated by their level of ambition and the way they are reached (Danken, 2017). The term positive coordination is usually referred to as 'an attempt to maximize the overall effectiveness and efficiency of several governmental policies by exploring and utilizing the joint strategy options of several ministerial portfolios', while negative coordination is understood as a situation in which 'any new policy initiative designed by a specialized subunit within the ministerial organization will not interfere with the established policies and the interests of other units' (Scharpf, 1994, p. 38). In a nutshell, while negative coordination tends to avoid turf wars and produce faster decision-making outputs, positive coordination is more time-consuming (a clear constraint for the timing of politics), but it tends to generate better integration between different policies and programmes as well as enhance transformational approaches (Bouckaert et al., 2010; Danken, 2017; Peters, 2018; Wegrich & Štimac, 2014).

This overview of the barriers that prevent or undermine coordination illustrates how challenging the topic is for many governments. A key aspect for tackling most of these problems is the successful employment of the right incentives and other mechanisms and instruments that the literature suggests improve coordination, which will naturally enhance the quality of the whole governance system. The next subsection points out some of the mechanisms and instruments that governments usually employ to overcome such barriers in their attempts to attain coordination in the public sector.

2.5.2 An overview of mechanisms and instruments used to achieve coordination

Governments tend to employ various approaches and instruments to achieve better coordination. Their success in doing so is a critical aspect of enhancing intra-agency cooperation and policy integration and achieving better governance. This tends to be even more important in a multisectoral and multilevel context, as the climate policy arena tends to be. Bouckaert et al. (2010) classified these different approaches into the following three types of coordination mechanisms:

i) Hierarchy-type mechanisms (HTMs) are based on authority, dominance, the allocation of tasks, lines of control and accountability
ii) Network-type mechanisms (NTMs) are based on mutual interdependencies and trust as well as the creation of common values and strategies between partners
iii) Market-type mechanisms (MTMs) are based on competition and exchange between actors through the establishment of incentives to improve performance

Hierarchy-type mechanisms are the most traditional type of coordination mechanism. They are based on top-down and formal control components and, many times, are synonymous with coordination (Wegrich & Štimac, 2014). This type of mechanism is related to the Weberian theory of bureaucracy, where the division of labour, procedures and authority is emphasised (Bouckaert et al., 2010). Hierarchy-type mechanisms are usually adopted by central units, where a more holistic or systemic approach is frequently demanded (Peters, 2018).

However, HTMs could be undermined by two recurrent problems, as follows: i) motivational issues, related to the risk of vested interests; and ii) informational risk,

referring to the way information flows (or not) from the sectoral levels to the core of the decision making setting, which could undermine the quality of information available to make decisions within coordination spheres (Scharpf, 1994; Wegrich & Štimac, 2014).

The concept of the MTMs lies in the understanding that markets are places where individuals (or organisations) act to maximise their benefits, which can also generate positive outcomes for the whole community. The bases of interactions are exchange and competition. Within the public sector, MTMs are not limited to traditional market forces (e.g. price mechanisms) but also touch on the role of the government in regulatory issues as well as in the employment of market principles, such as competition, to foster better coordination. This type of mechanism emphasises the importance of competition, results-based contracts and performance incentives as strategies to achieve better control and output from public organisations (Beuselink, 2008; Bouckaert et al., 2010; Danken, 2017; Peters, 2015).

Finally, there are the NTMs, which is a concept recently investigated by the scholarship on coordination (McGuire & Agranoff, 2011; Peters, 2015; Powell, 1990). An NTM is usually voluntary and based on common values, trust and consensus (Wollman, 2003), with its main bases of interaction being cooperation and solidarity. In this type of mechanism, the government acts as a network enabler and manager. These features make this mechanism more likely to succeed in bottom-up-rooted situations, such as in networks nurtured by civil servants. Governments can also deliberately act as network enablers, especially in a cross-cutting and multilevel context, where coordinated action between different state and non-state actors is required (Bouckaert et al., 2010; Peters, 2015, 2018).

Nevertheless, some pitfalls in relying exclusively on network mechanisms should be highlighted, such as the following: i) the weak scope of network authorities, ii) power asymmetries among the components of the network and iii) the vested interests hindered by some solutions driven by network mechanisms (McGuire & Agranoff, 2011). The existence of trust among the participants is also difficult to observe, especially when considering the potential rearrangements of bureaucratic power and budget allocation among the network participants.

The mechanisms of coordination discussed above provide a good entry point into the dynamics of coordination, but they tend to be quite abstract, as Bouckaert et al. (2010)

argued. The authors also pointed out different instruments to be used to attain better levels of coordination. These instruments are the concrete actions that governments should take to coordinate their policies. They are divided into two categories, that is, i) management instruments and ii) structural instruments.

Some of these instruments are directly linked to a specific coordination mechanism. This is the case, for example, with strategic management established through a top-down approach, coming directly from the decisions of high-level authorities within the governmental structure, which is derived from the HTM approach. Meanwhile, interactive, bottom-up strategic management tries to apply the ideas of NTMs. Finally, result-oriented financial management focused on incentives is a clear attempt to translate MTMs into practical applications.

However, there are coordination instruments that reconcile different mechanisms (or approaches). This is the case, for example, of instruments involving consultation or peer review, which reconcile HTMs with NTMs, and coordination instruments involving inter-organisational learning (e.g. training and internal job marketing) and the management of information between different stakeholders, which link the ideas of MTMs and NTMs. Table 1 provides an overview of these instruments and the coordination mechanisms behind them.

Table 1 – Coordination instruments

Instrument(s)	**Underlying mechanism(s)**	**Related sources(s) of coordination capacity**
Management instrument(s)		
1. Strategic management (planning and evaluation). Dependent on the primary objective and process	NTM, HTM	–
1.1. Bottom-up and interactive strategic management	NTM	Bargaining, information, mutual co-optation
1.2. Top-down and unilateral strategic management	HTM	Authority, power

2. Financial management (budgeting, accounting and auditing). Dependent on the objective and focus	HTM, MTM and NTM	-
2.1. Traditional input-oriented financial management systems	HTM	Authority, power, bargaining
2.2. Results-oriented financial management systems focused on incentives for units	MTM	Bargaining
2.3. Results-oriented financial management systems oriented towards information exchange and consolidation according to policy portfolios	NTM	Information
3. Inter-organisational learning: culture management (by means of training, rotation, career management and the internal job market), competence and information management	Mainly NTM and MTM	Information, norms, mutual co-optation
4. Procedural instruments concerning mandated consultation and review	Mainly HTM and NTM	Authority, bargaining, information
Structural instrument(s)		
5. Reshuffling of competencies: organisational merger or splits, centralisation (decentralisation)	Mainly HTM	Authority, power
6. Reshuffling of lines of control	Mainly HTM	Authority, power
7. Establishment of a specific coordinating function or entity, lines of control	Mainly HTM	Authority, power

8. Regulated markets: internal markets, quasi-markets, voucher markets and external markets	Mainly MTM	Authority, bargaining, information
9. Systems for information exchange	Mainly NTM	Information
10. Advisory bodies and consultative/deliberative bodies	Mainly NTM	Bargaining, information, mutual co-optation
11. Entities for collective decision-making	Mainly NTM	Bargaining, information, mutual co-optation
12. Common organisations (partnership organisation)	Mainly NTM and HTM	Bargaining, information, norms, mutual co-optation
13. Chain-management structures	Mainly NTM	Bargaining, information, norms, mutual co-optation

Source: Author's elaboration adapted from Bouckaert et al. (2010).

Understanding the dynamics of the public policy sector where these mechanisms and instruments will be applied is of the utmost importance to understand and apply the right approach at the right time. In climate policy, which involves all of the complexity of multilevel and multisectoral governance, the appropriate use of all of these instruments is of fundamental importance for the functioning of intragovernmental relations within climate governance. There is no 'silver bullet' or predefined solution in this regard, since the use of that set of instruments will also be very country-based and dependent on the local political and institutional conditions under analysis.

2.6 Conclusion

The most notable feature of climate policies is their cross-sectoral profiles. This aspect makes climate governance a wicked MLG problem, where different levels of power (e.g. international, regional, national, subnational and local) play decisive roles. This policy arena is embedded in a multitude of horizontal and vertical interlinkages, in which outputs have impacts on many fronts, such as political, economic, social and environmental, to name a few.

As discussed in this literature review, the various interplays of intragovernmental relations at the domestic level of climate governance (within the ministries at the national level of government and between the national and subnational levels of government) is a key area in which to enhance the effectiveness of climate-related policies. This is not only because this is where the accountability of a country's contributions to the global joint response to tackle climate change lie but also because it is in this type of interplay that the main regulatory, technical and financial capabilities to enhance climate action in a country context are placed.

However, the interplays between the national and subnational levels of government and the intra-ministerial affairs are challenging for many reasons, including the following: i) the existence of conflicts of interests, ii) the way the policy process is framed, iii) the availability of resources and iv) the lack of political will to carry out transformative actions. These struggles may occur even when the political will to tackle climate change is present. In this sense, one important aspect to be scrutinised in the study of climate governance is how governments can attain and sustain coordination and improve governance in such a wicked context (Gordon, 2015).

To discuss and analyse MLCG arrangements within the governmental sphere, it is necessary to understand how the theory of coordination of public policies, in combination with the MLG literature, can help us analyse climate policy and its main pitfalls in regard to its governance. Therefore, this chapter also discussed key aspects of coordination, including the different modes of coordination, the challenges of the topic and how different mechanisms can be employed to overcome coordination and integration issues. Altogether, the theories of MLG and public policy coordination comprise the theoretical background that allowed me to navigate the assessment of the different cases that will be addressed later in this dissertation. They also allowed me to develop my analytical framework (to be presented in the next chapter) and the concept of MLCG that I adopted to carry out this study, which is as follows: the formal and informal orchestrated exercises of power and policies that happen within the governmental sphere with the aim of formulating and implementing mitigation and adaptation policies in a country-specific context.

Chapter 3 – Research Design and Methodology

3.1 Introduction

Despite the growing importance of the Global South's contributions to the world's GHG emissions, the literature on climate governance and the intra- and intergovernmental relationships that this governance setting requires is still very focused on the countries of the Global North (Dubash, 2021). There is still little knowledge about how governments in developing countries are organising themselves at the domestic level to make climate policies more effective.

Brazil is one of the main GHG emitters of the Global South, a group of countries that also includes China, India, Indonesia and South Africa among others (Fuhr, 2021). Despite that, the amount of literature on Brazilian climate governance, especially when considering the governance by governments perspective, remains low, and the literature does not cover all aspects of the Brazilian climate policy arena. For instance, the few research works about the topic have mostly addressed the relationship between climate change and deforestation. Studies aiming to investigate the links between climate and sectoral policies, such as agriculture and transportation, are very few.

The lack of this type of research is puzzling for two basic reasons. First, the current profile of GHG emissions has become more cross-sectoral than it was when the PNMC was enacted in 2009. Thus, researchers should consider more stakeholders from different sectors. In terms of intra- and intergovernmental interplays, this leads to a need for more effective involvement of several federal ministries and of the state and municipal governments in the PNMC arena. Second, due to Brazil's economy-wide NDC and the commitment to reach net-zero by 2050, the Brazilian government, especially at the federal level, will need to make considerable efforts in terms of planning, coordination and integration of the different sectoral policies and enhance the relationships with subnational governments to successfully implement its international commitments. This leads to the need for more evidence and literature about the different types of governmental relationships (intra- and intergovernmental interplay) that take place while Brazil governs its climate policy, that is, the PNMC.

3.2 Research approach and case selection

Aiming to solve the issue of a lack of literature on Brazilian climate governance, I adopted a qualitative approach aiming at unravelling the topic and understanding its historical formation process, as well as its functioning and dynamics within the governmental institutions of this governance setting (governance by governments). By adopting an exploratory approach and a perspective of climate governance focused on the different types of governmental interplay (governance by governments, which includes intra- and intergovernmental relationships), I aim to identify different governance gaps within the cases examined, providing better evidence about these type of relationships within the Brazilian climate governance setting.

Assuming that governments are a key a player within the MLCG setting, my research focused on the governmental relations that take place in each of the GHG mitigation actions examined (the PNMC, PSTM and ABC Plan). I was primarily interested in understanding the intragovernmental relationships between the different ministries and agencies involved with the PNMC and its sectoral plans during the lifetime of these actions. Within the same policy scope, I also looked at the way the federal government interacted with the state and municipal governments (intergovernmental relationships) while designing, implementing, monitoring and evaluating the actions. On top of that, I examined the manifestation of different gaps during the lifetimes of these mitigation actions and assessed whether failures in the governmental relationships studied could be one of the reasons for the occurrence of the gaps.

To meet the research aims and answer the research questions presented in Chapter 1, I carried out exploratory research of three relevant case studies to reduce Brazilian's GHG emissions. By evaluating these three cases, this research examined how the governmental institutions within the Brazilian climate change governance framework have worked through formal and informal arrangements in different contexts.

The first case examined the PNMC, which is the country's first national policy aiming to address climate change that explicitly refers to the cross-sectoral and multilevel perspectives to do so. This national case is relevant because it provides useful insights into the way climate policymaking works within a governance context in which several governmental stakeholders are supposed to effectively get involved throughout the preparation and implementation of different sectoral plans, as well as the way the

federal government has handled different managerial issues within a cross-sectoral and multilevel setting, which includes coordination, integration, financial and informational aspects.

Furthermore, this research selected two sectoral cases related to the promotion of GHG mitigation in the transport and agriculture sectors. The reason for picking these two economic sectors was because both are relevant in terms of GHG emissions as well as the importance of their activities to the Brazilian GDP. On the one hand, the agriculture sector is the largest GHG emitter in the country and an important player in the global chain of food production, which makes it one of the main institutions responsible for the successive positive trade balance the country has had in the past years. It is important to highlight that this case study of the agriculture sector is focused on the objectives of the ABC Plan, which are to scale up the adoption of low-carbon agricultural techniques in a larger portion of agriculture in Brazil in addition to making the sector more adapted to climate change. The study, therefore, does not directly address LULUCF emissions from the conversion of forests into agricultural areas. However, this relationship tends to be affected by the way agriculture is practised in the country: it is expected that the greater the dissemination of low-carbon agricultural techniques, the lower the pressure for the conversion of forests (deforestation) into agricultural lands tends to be.

On the other hand, the transport sector is the main institution responsible for CO_2 emissions from the burning of fossil fuels, being accountable for 48.4% of the total emissions of the Brazilian energy sector in 2016. Altogether, the agriculture and transport sectors represented 47.2% of the Brazilian emissions in 2016, the last year of the annual series presented in the most recent GHG inventory submitted by Brazil to the UNFCCC. Moreover, when considering the projections of Brazilian GHG emissions for the upcoming decades, both sectors are assumed to grow despite the actions taken so far to curb emissions in them.

The unity of analysis is the PNMC, enacted in 2009, and its sectoral plans related to the agriculture (ABC Plan) and transportation (PSTM) sectors. The time boundary of this study ranged from 2009, the year of establishment of the PNMC, to 2020, when Brazil submitted the second version of its NDC with GHG reduction targets for 2025 and 2030. It also considered previous years, before the launch of the PNMC, to identify the political, institutional and technical circumstances that led to the establishment of

the climate bill. Table 2 summarises the three cases studied, for which the main actors and relevant policies are highlighted.

Table 2 – List of cases.

Case	**Type of governmental interplay (examples of issues to be observed)**	**Key actors (non-exhaustive)**	**Relevant policies (non-exhaustive) and expected transformations**
PNMC	*Intragovernmental relationships* • The interplay between federal ministries and agencies • Coordination and integration of actions • Cross-sectoral allocation of technical and financial resources • Different ministerial perceptions about climate policy and GHG mitigation *Intergovernmental relationships* • The interplay between the federal government and the state and municipal governments • Links between the PNMC and the state climate policies	• Executive Office of the President of Brazil • MMA • Ministry of Finance • Ministry of Science, Technology and Innovation • Ministry of Foreign Affairs • CIM (climate body)	• Multiple sectoral and economic policies • To mainstream the climate change perspective in different policy sectors • To enhance multilevel climate governance

		• Executive Group of the Inter-ministerial Committee on Climate Change (climate body)	
PSTM	*Intragovernmental relationships* • The interplay between the federal ministries responsible for drawing and implementing the sectoral plan (Ministry of Transportation [MT], and Ministry of Cities [MCid]) • The interplay between the federal ministries (MT and MCid) in charge of the PSTM and the federal ministries and consultative bodies in charge of the PNMC (Executive Office of the President of Brazil, MMA, Inter-ministerial Committee on Climate Change [CIM] and GEx) *Intergovernmental relationships* • The interplay between the federal ministries in charge of the PSTM and the transport and urban mobility secretariats of the subnational levels (state and municipal)	• MT • MCid	• National Policy on Urban Mobility • National Plan on Logistics and Transports • To unleash low carbon transformations and sustainable practices in the transport of people and freight

ABC Plan	*Intragovernmental relationships* • The interplay between the federal ministries responsible for drawing and implementing the sectoral plan (Ministry of Agriculture [MAPA] and Ministry of Agrarian Development [MDA]) • The interplay between the federal ministries in charge of the ABC Plan (MAPA and MDA) and the federal ministries and consultative bodies in charge of the PNMC (Executive Office of the President of Brazil, MMA, CIM and GEx) *Intergovernmental relationships* • The interplay between the federal ministries in charge of the ABC Plan and the agriculture secretariats of the subnational levels (state and municipal)	• MAPA • MDA • Executive Office of the President of Brazil • Brazilian Company on Agriculture Research	• Harvest Plan (*Plano Safra*) • Rural Credit Insurance System (*Seguro de Crédito Rural*) • Forest Code (*Código Florestal*) • To spread the adoption of low carbon agriculture techniques in the Brazilian agriculture sectors

3.2.1 Theoretical aspects of the case study design

Yin (2014) brought forth a twofold definition of case studies, which covers the scope and features. Regarding its scope, a case study is a method of inquiry that 'investigates a contemporary phenomenon (the case) in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident' (Yin, 2014, p. 13), while the features remind the researcher that they need to deal with different variables of interest, which result in different sources of evidence.

To pick the most appropriate method for their investigation, the researcher should bear in mind the following three main conditions: i) the type of research question that they aim to address, ii) the level of control that they have over the events and iii) the focus on contemporary or historical events (Yin, 2014). The table below summarises the most appropriate methods considering the W-question being examined.

Table 3 – Types of research questions and methods.

Method	**Form of the research question**	**Requires control of behavioural events?**	**Focuses on contemporary events?**
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case study	How, why?	No	Yes

Source: Yin (2014)

Since my exploratory research aims to answer the questions *how* and *why* and because I aim to understand a contemporary event (the current way climate policy is taking shape in Brazil), which does not require control of behavioural events, the case study

seemed to be the appropriate method of investigation for my research based on Yin's (2014) decision matrix depicted above.

3.3 Analytical framework

I developed the analytical framework of this research based on the literature on MLG and coordination of public policies, which was presented and discussed in Chapter 2. Titled the Climate Governance Analytical Tool (CGAT), this analytical framework aims to identify and explain different types of issues (called 'governance gaps' in this research), which occur during the lifetime of a specific GHG mitigation action. For this research, GHG mitigation can be understood as any policy or governmental plan that intends to curb GHG emissions.

The CGAT was built for this qualitative research on climate governance, which adopts an exploratory approach. It comprises a two-step process. In the first step, it maps the governance architecture of the GHG mitigation action examined while in the second step, it identifies and analyses the different climate governance gaps that manifest throughout the lifetime of the GHG mitigation examined.

In the first step (mapping of the governance architecture), the following tasks are undertaken:

i) Identification of the main governmental actors in the process
ii) Identification of the relevant institutional roles related to GHG mitigation action in analysis
iii) Identification of the relevant formal and informal governance arrangements for the GHG mitigation action

In the second step, a governance gap analysis is run. This step is based on an adaptation of the analytical framework presented by Charbit (2011) which also aims to analyse governance gaps, but for a context beyond climate policy. This author developed an analytical framework to employ it as a diagnostic tool for coordination and capacity challenges in decentralised contexts of policymaking. It is composed of seven governance gaps, as depicted in the table below.

Table 4 – Charbit's (2011) list of governance gaps.

Type of Gap	Issues
Information gap	Asymmetry of information between stakeholders
Capacity gap	The insufficient scientific, technical and infrastructural capacity of local actors, particularly for designing appropriate strategies
Funding gap	Unstable or insufficient revenues undermining effective implementation of responsibilities at the subnational level or for crossing policies
Policy gap	Sectoral fragmentation across ministries and agencies
Administrative gap	The mismatch between functional areas and administrative boundaries
Objective gap	Different rationalities creating obstacles to adopting convergent targets
Accountability gap	Difficulty ensuring the transparency of practices across the different constituencies

Due to the features and challenges of climate policies, this model is not robust enough to achieve my research aims and answer the questions formulated. For instance, it does not address political issues (e.g. lack of political will), which are important for the success of transformative climate policies. It is also limited in the treatment of the information gap since it focuses specifically on the issue of information asymmetry. It does not go into, for example, how information and data for decision-making are produced. The further novel innovation presented by CGAT is to frame the resource discussion in a broader way that deserves a separate analysis. Thus, the resource gap

analysis framed in the CGAT is not limited to the discussion of the lack of financial resources but also deals with issues on the allocation of technical and human resources within the climate action being investigated.

Therefore, I decided to use the rationale of Charbit's model to develop my specific analytical framework. Thus, instead of running a seven-gap analysis, the CGCAT runs an analysis of the following four gaps: i) politics, ii) institutions and processes, iii) resources and iv) information. This adaptation was made not only because of the nature of climate policies but also for the following reasons: first, I decided to include a specific gap analysis on politics to assess to what extent the existence of political leadership is a key element in the success of the GHG mitigation actions studied. This gap has to do with the literature on agenda setting and the politics of attention, which highlight that a specific policy has better chances of success when it receives support from the political levels of governments (Jones & Baumgartner, 2005; Kingdon, 2011).

The institutions and processes gap was included to identify the extent to which institutions and policy processes are set or rebuilt to provide better conditions for climate policymaking and implementation, covering to some extent the issues raised in the policy, administrative and objective gaps of Charbit's (2011) model. In its turn, the resource gap assesses the ways a government works to mitigate or overcome the various types of resource restrictions (e.g. financial, budgetary and technical) and to address those types of issues. Finally, the information gap deals with the issue of a lack of information that undermines decision-making and transparency processes; in Charbit's (2011) model, this is treated separately. The table below summarises the aims and the likely issues to be observed in each of the governance gaps during the analysis.

Table 5 – Climate governance gaps: description and rationale.

Gap	**Aim**	**Issues to be observed in the gap assessment**
Gap 1 – Politics	To assess the strength of political support for the GHG mitigation action	Presence of political leadership
		Engagement of high-level ministerial staff
		Political attention to GHG mitigation in analysis vis-à-vis the other governmental and ministerial priorities (e.g. budget allocation and political discourse
Gap 2 – Institutions and processes	To assess how institutions and policy processes are shaped and implemented in the GHG mitigation action	GHG emission reduction targets
		Governmental arrangements for coordination and monitoring
		Distribution of institutional competencies among different governmental stakeholders
		Engagement of different levels of government
Gap 3 – Resources	To assess what the main constraints are in terms of finance, budget and	Availability and allocation of financial resources to implement the GHG mitigation action

	technical capabilities in the GHG mitigation action	Availability and allocation of technical and human resources to implement the GHG mitigation action
		Engagement of public financial institutions in support of the GHG mitigation action
Gap 4 – Information	To assess the availability and the usage of data and relevant information for decision-making and management of the GHG mitigation action	Existence of data and information (GHG inventories, sectoral studies) to inform decision-making and monitoring
		Sharing of information and data between the relevant governmental stakeholders for the GHG mitigation action
		Documentation and registration of information and relevant decisions in regard to the GHG mitigation action assessed

Source: Author's elaboration.

As can be inferred from Table 5, gap 1 (politics) aims to examine the extent of political leadership throughout the lifetime of the GHG mitigation action and whether the presence (or absence) of this gap could be useful in explaining the success and failures related to the case under analysis. In its turn, gap 2 (institutions and processes) intends to examine to what extent institutions and policy processes have been set or reframed to enable policymaking, implementation, monitoring and enhanced coordination and integration of GHG mitigation. Issues such as bottlenecks for institutional development, bureaucratic disputes, and lines of coordination and control are addressed within this gap.

Gap 3 (resources) examines the main resource gaps (e.g. financial, technical and human) within the case assessed and to what extent the government has been able to reduce or overcome these different types of resource restrictions during the lifetime of GHG mitigation. Finally, gap 4 (information) intends to evaluate the availability of technical information (e.g. GHG inventories and GHG estimates) for decision-making and to what extent this information has been managed and shared among the governmental actors and used to enhance transparency and create better conditions for decision-making and monitoring in the case examined.

The employment of the CGAT in the analysis helped this researcher to identify several aspects related to climate governance in Brazil, including the following: i) what the governance gaps faced by the Brazilian national government are in the different cases investigated, ii) why these governance gaps are happening, iii) how, if at all, the national government has worked to address them and iv) how coordination strategies and instruments have been employed to reduce these governance gaps. In doing so, this research avoids getting trapped in a purely normative or prescriptive bias and enhances its reality-based analytical approach, which can be employed in different case studies no matter their level of complexity or maturity.

3.4 Data collection

A case study is a method of research that can employ various approaches to collect data, such as interviews, participant observations, field studies and document analyses (Hamel et al., 1993). In this research, I employed various techniques to collect data, information and evidence from primary and secondary sources. From the initial desk research stage, I gathered secondary data from the literature review of existing

analyses and research on the PNMC and its sectoral plans. In addition to screening government websites and NGO homepages, I also used the bibliographic databases Scopus Web of Science and Google Scholar to search for secondary data.

In addition to reviewing academic sources, I also obtained key data from screening official documents (such as legislation, plans and governmental programmes) and transcripts of speeches made by authorities. A further source of information was a content analysis of the records of the meetings of the Inter-ministerial Committee on Climate Change (CIM) and the Executive Group of the Inter-ministerial Committee on Climate Change (GEx). In this case, the collection of data from the CIM meeting was particularly difficult, since several meetings of the body were not made public. However, the meeting notes of the GEx were publicised on the MMA's website, which made the collection of data easier. The analysis of these meeting notes was also helpful to identify key institutions and potential interviewees for the field trip stage.

The second phase of data collection consisted of carrying out semi-structured interviews, which took place during two field trips to Brazil (the first in January and February 2020 and the second from December to March 2021). It should be noted that during this period, the world was undergoing the COVID-19 pandemic, which imposed several restrictions in terms of travel and social contact. Thus, some of the interviews were conducted through online meeting platforms such as Skype, Microsoft Teams and Zoom. Invitations were sent to 55 people, and in total, interviews were conducted with 47 people, as listed in Table 6. To protect the identity of the participants, their names are not shown in the list.

Table 6 – List of interviewees.

Position	**Group**	**Code**	**Date of the interview**	**Mode of interaction**
Professor and former National Climate Change Secretary	A	A1	July 2020	Skype
Researcher	A	A10	March 2021	Skype
Professor and Former National Climate Change Secretary	A	A2	February 2020	Onsite

Researcher	A	A3	February 2020	Onsite
Professor	A	A4	February 2020	Onsite
Professor	A	A5	February 2020	Onsite
Professor and Former National Climate Change Secretary	A	A6	February 2020	Onsite
Professor	A	A7	February 2020	Onsite
Professor and Former State Environment Secretary	A	A8	February 2020	Onsite
Researcher	A	A9	April 2021	Skype
Former Federal Minister	G	G1	March 2021	Skype
Policy Specialist	G	G10	February 2020	Onsite
Policy Manager	G	G11	February 2020	Onsite
Former Federal Minister	G	G12	February 2020	Onsite
Policy Specialist	G	G13	February 2020	Skype
Federal Minister	G	G14	February 2020	Onsite
Policy Manager	G	G15	February 2020	Onsite
Policy Specialist	G	G16	February 2020	Onsite

State Regulatory Agency Director	G	G17	February 2020	Onsite
Federal Minister	G	G18	February 2020	Onsite
Policy Manager	G	G19	July 2020	Skype
Policy Advisor	G	G2	March 2021	Onsite
Policy Manager	G	G20	November 2019	Skype
Policy Advisor	G	G21	March 2021	Onsite
Policy Specialist	G	G22	March 2021	Skype
Policy Manager	G	G3	March 2021	Skype
Policy Specialist	G	G4	July 2020	Skype
Policy Managers	G	G5 and G6	February 2020	Onsite
Former Federal Minister	G	G7	February 2020	Onsite
Policy Specialist	G	G8	February 2020	Onsite
Policy Specialist	G	G9	February 2020	Onsite
Activist	NG	NG1	March 2021	Skype
Activist	NG	NG2	October 2020	Skype
Researcher	NG	NG23	November 2021	Skype
Activist	NG	NG24	November 2021	Skype

Activist	NG	NG3	February 2020	Onsite
Activist	NG	NG4	February 2020	Onsite
Manager	NG	NG5	February 2020	Skype
Policy Specialist	NG	NG6	February 2020	Onsite
Activist	NG	NG7	November 2019	Skype
Former Federal Ministry	P	P1	February 2020	Onsite
Manager	P	P1	March 2021	Skype
Policy Specialist	P	P2	February 2020	Onsite
Policy Specialist	P	P3	February 2020	Onsite
Financial Specialist	P	P4	April 2021	Skype
A – academia, G – government, NG – nongovernmental organisation and P – private sector				

To select the participants to be interviewed, I considered the relevance of their past or current roles throughout the lifetime of the GHG mitigation action to be examined. As I also sought to understand the dynamics of the interaction between climate policy and transport and agriculture policies, I applied the same reasoning to identify the participants to be interviewed in these two policy sectors. In the end, I was able to obtain a set of interviewees representing the different types of actors involved with climate policy, which included ministers of state of environment and finance, former secretaries and government technicians who were or still are involved with the topic,

and experts from academia and the private sector, as well as relevant actors from the environmental movement in the country.

Given the exploratory nature of my research, the employment of semi-structured questionnaires proved to be the right decision. This allowed me to have certain flexibility so that in addition to obtaining the information I understood to be relevant at the beginning of my research, there was also room for the interviewees to make additional statements and bring up important themes/topics that, in the end, allowed for a deeper understanding of themes not directly explained in existing analyses and brought forth important inputs for the analytical part of the research. Concerning the interview procedure, the interviewees signed a consent form for participation in the research, having been informed that the information would be treated anonymously, without disclosure of their names in any part of the text of this thesis or future work that this will generate.

All interviews were recorded and are currently being stored electronically on my personal computer. These records were used to double-check the written notes that I made during the conversations. To facilitate the subsequent analysis of the information collected, I organised the data collected into the four major groups contained in my analytical framework (i.e. policy, institutions and processes, resources and information). Regarding the anonymity of the interviewees, the audio records and names of the interviewees were not shared with any third parties, including the advisors of this research. It is important to note that in some cases, given the sensitivity of the information being handled, I offered interviewees the possibility of making their statements off the record, and this proposition was accepted by some interviewees. It seemed important to provide this possibility of making statements off the record, especially in those cases involving public sector employees with whom I spoke. At the end of the interviews, I left space for the interviewees' closing remarks, giving them the opportunity to go into points not covered in my questionnaire that they considered important for the governance gap analysis. In addition, I also asked for the names of potential interviewees (snowballing), which helped refine the list of interviewees.

3.5 Limitations

This study advanced a subject that has been little explored in the literature, that is, the search for a better understanding of how Brazilian climate governance has been

working in regard to its intra- and intergovernmental arrangements and under which bases the coordination of different policies and relevant programmes for mitigation occurs. By adopting an exploratory approach, this research covers part of this gap. The closing of this gap is, however, partial – especially when considering the relationships between climate policy and relevant sectoral policies – since I limited the scope of my analysis to the PNMC and two specific economic sectors (agriculture and transport). In this sense, it is important to consider that the extrapolation of the research results to other economic sectors should be taken with reservation, even though some conditions (exogenous and from the PNMC itself) tend to affect all relevant sectors of the Brazilian economy regarding GHG mitigation.

In a nutshell, although this research proposal was carefully prepared, there were limitations that I had to deal with during the research, which were mainly related to the following issues: i) the lack of literature on climate governance for the Global South, especially in regard to the effectiveness of the different coordination instruments that could be employed in such a multilevel policy arena and ii) the possibility of biased and incomplete views of the interviewees, which may have been related to, for example, i) the time lapse between the time of the interview and the time during which the interviewee was directly involved with the policy and ii) partial views derived from the mindset of the interviewee. These limitations could be addressed, albeit partially, through the triangulation of information at a later stage after data collection.

3.6 Conclusion

This chapter described the methodology and the novel analytical framework employed in this qualitative research. Adopting an exploratory approach, this research examines three case studies (identified as GHG mitigation actions), which are equally relevant for Brazilian climate action. The cases selected were the PNMC (national policy), the PSTM (transportation) and the ABC Plan (agriculture). They were chosen due to their relevance for promoting GHG mitigation in the country, their economic relevance and the several governmental relationships that took place during each of these three cases.

The first case concerned the analysis of the PNMC (i.e. the current Brazilian national climate policy) enacted in 2009; several governmental stakeholders are (supposed to have gotten) involved in the different PNMC tasks and activities (e.g.

intragovernmental coordination, intergovernmental affairs, and design and implementation of sectoral plans). The other two cases concerned the examination of sectoral GHG emission reduction plans related to the agriculture (ABC Plan) and transport (PSTM) sectors, which are both relevant in terms of the economy and climate.

In all three cases, the primary focus of the governance analysis was the intragovernmental and intergovernmental relationships that took place between the different ministries and federal agencies (intragovernmental) and the intergovernmental relationships between the different levels of government (the federal government, which represents the national level, and state and municipal governments, which represent the subnational level) during the lifetime of the GHG mitigation action under analysis. The lifetime could include different stages of a hypothetical policy cycle (e.g. agenda setting, formulation, implementation and monitoring).

To do so, this research employed a novel analytical framework called the CGAT. The CGAT was developed based on the literature on MLG and coordination of public policies. It consists of a two-step analytical process, in which the first stage maps the governance architecture and its key stakeholders and their roles in the GHG mitigation action in analysis. The second step runs the governance analysis by looking at the manifestation of four issues (which the analytical framework names governance gaps). The governance gaps are of four natures, as follows: i) gap 1 – politics, ii) gap 2 – institutions and processes, iii) gap 3 – resources and iv) gap 4 – information. The relevant data for the analysis was collected from the analysis of official documents (e.g. laws, decrees and meeting notes), a literature review and semi-structured interviews, which took place online and during two field trips to Brazil.

Chapter 4 – The Evolution of Environmental and Climate Governance Architecture in Brazil: Institutional and Federalism Aspects

4.1 Introduction

Brazil is a very diverse country with several economic and social inequalities within its five administrative regions (South, Southeast, Centre-West, Northeast and North). As a federative country with three levels of government (federal, state and municipal),[2] the diversities and inequalities found in the country influence the way public policies and public administration work in such a federalist environment, as highlighted by the several indicators depicted in Table 7.

When it comes to environmental and climate policies, an even more wicked policy scenario can be observed. In addition to the six biomes present in the country (the Amazon, the Atlantic Forest, the Caatinga, the Cerrado, the Pampas and the Pantanal), the industrial and economic development among the regions and the biomes is very diversified. This overall context matters for any kind of public policy analysis, especially for climate policies, which are expected to deal with such multifaceted political and policy contexts.

Therefore, this chapter presents a historical evolution of the environmental and climate policies in Brazil, discussing them in light of the struggles faced by Brazilian federalism and setting the scene for the analytical chapters that lie ahead. To do so, this chapter comprises eight subsections, as follows: after this introduction, I present the early stages of the environmental policy in Brazil. Then, I discuss the impacts of the 1988 Federal Constitution on domestic environmental policymaking, which is followed by a presentation of the birth of the debate on climate policy in the country. Next, I discuss the institutional consolidation of Brazilian climate governance, which is followed by the current political and institutional situation and the advent of the Paris Agreement. Finally, I move on to contextualise the role of the subnational

[2] The Brazilian political administrative structure also has a Federal District, which includes the state and municipal roles in its territorial jurisdiction.

governments and their main issues in climate policy, which is followed by the chapter's conclusion.

4.2 The institutionalisation of the environmental policy in Brazil – early stages

The first institutions and policies to address environmental issues in Brazil date back to the 1930s. That was the time when the federal government established the first National Forest Code (Brazil, 1934a) and the Water Code (Brazil, 1934b), which set basic regulations regarding the industrial and energetic usage of water resources. Moreover, the National Park of Itatiaia (Rio de Janeiro), the first Brazilian protected area, was established in that decade (Brazil, 1937). At that time, the institutional locus of the environmental policy was the Ministry of Agriculture (MAPA). The management of protected areas and the oversight of the Forest Code were transferred in 1967 to the Brazilian Institute of Forestry Development, a federal agency then linked to the MAPA (Brazil, 1967; Magalhães de Moura, 2016).

With environmental concerns rising during the 1970s thanks to the Club of Rome`s report 'Limits to Growth' (Meadows, Meadows, Randers, & Behrens, 1972) and owing to the developments of the United Nations Conference on the Human Environment (the Stockholm Declaration of 1972), the environmental agenda gained relevance and it received increased status and political attention from both developed and developing countries (McNeill, 2010). In Brazil, one of the principal consequences of this momentum was the establishment of the first exclusively focused environmental federal organisation, the Special Secretary of Environment (SEMA, in Portuguese), in 1973. The SEMA was placed under the control of the Interior Ministry, and it focused on the urban environmental agenda, mainly concerning industrial pollution. Following these institutional improvements, Brazil (1975a, 1975b) approved two legislations in 1975 which set up the regulatory framework to tackle industrial pollution (Magalhães de Moura, 2016).

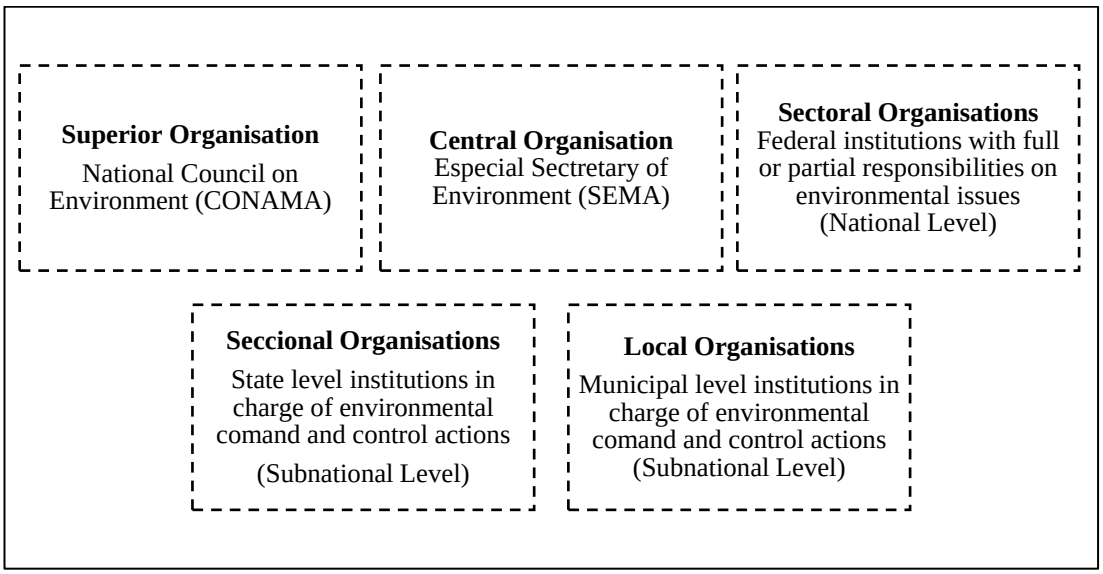
At this stage, the leadership of the environmental policy agenda was provided by the federal government; however, during the 1970s, there were also important institutional developments at the subnational level. For instance, the São Paulo State Environmental Company (São Paulo, 1973) and the Rio de Janeiro State Foundation on Environmental Engineering (Rio de Janeiro, 1975) were established during this time.

Furthermore, at the end of the 1970s, 7 federal states out of 23 already had environmental secretariats within their administrative structures (Scardua & Bursztyn, 2003). All of these national and subnational institutional developments were evidence of the flourishing environmental policy and governance that Brazil was experiencing at that time.

Following these improvements, Brazil (1981) established the Environment National Policy (PNMA, in Portuguese) in 1981, which is still a key regulation for the institutional setting of the country's environmental policy. The PNMA was an important driver of the decentralisation of the country's environmental governance since it created the Environment National System (SISNAMA, in Portuguese), which sets specific and shared competencies for the union (driven by the federal government), the states, the Federal District and the municipalities in regard to environmental management and protection. An overview of the original configuration of the SISNAMA in 1981 as well as the current structure (2020) is depicted below.

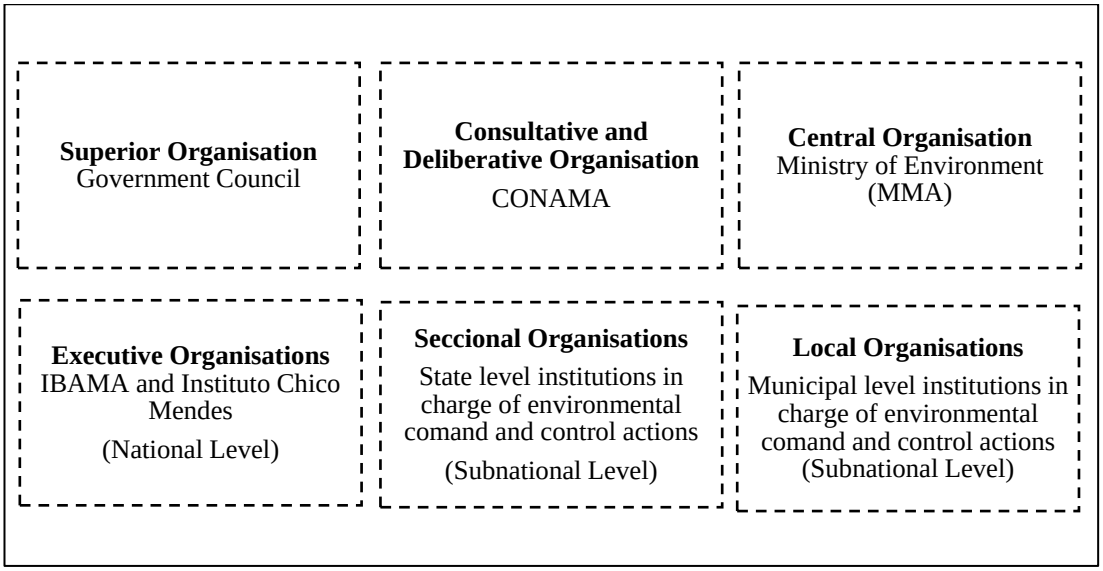
Figure 5 – The organisation of the Environment National System (SISNAMA) (1981 and 2020)

SISNAMA 1981



Source: Author's elaboration based on Brazil (1981).

SISNAMA 2020



Source: Author's elaboration based on Brazil (1981).

Despite its multilevel structure, the SINAMA has been criticised in regard to how it operates in practice. First, because the early discussions and decisions regarding its functioning and governance were centred at the federal level, few opportunities were given to states and municipalities to effectively contribute to its design despite its relevance for the proper functioning of the framework (Magalhães de Moura, 2016; Scardua & Bursztyn, 2003). Moreover, the SISNAMA does not participate in important environment-related policies, such as those related to biodiversity, waste management and climate change. This may cause potential institutional overlaps and issues in policy integration and coordination between the PNMA and all of the policies and programmes relevant to the Brazilian environmental agenda (Neves, 2016; OECD, 2021).

Furthermore, despite the key responsibilities states and municipalities hold in this area, another criticism is that the SISNAMA is unable to provide sufficient capacities (including financial and technical capacities) to the subnational actors to allow them to properly execute their competencies. All of these bottlenecks have led to the very low effectiveness of the system, and this still undermines the MLG approach that the Brazilian environmental policy is expected to pursue (Magalhães de Moura, 2016; OECD, 2021; Scardua & Bursztyn, 2003)

Finally, concerning this early governance-building process, the establishment of the Ministry of Urban Development and Environment in 1985 should also be highlighted.

This ministry replaced the SEMA and received the mandate to define and coordinate the governmental actions on environmental issues as well as to manage the regulatory aspects related to the environmental impact assessment and environmental impact report (Resolutions n. 1/1986 and n. 9/1987, respectively), which had lately been transferred to the National Council on Environment. All of these governance developments, especially in regard to the decentralisation of competencies to subnational governments, gained an important push in 1988, when the (then new) Brazilian Federal Constitution dedicated a specific chapter to the environmental agenda, as is presented in the next subsection.

4.3 The 1988 Federal Constitution and Brazilian environmental federalism challenges

In 1988, Brazil inaugurated the so-called New Republic (*Nova República*, in Portuguese) by establishing its new federal constitution (Brazil, 1988) in October of that year. During the National Constituent Assembly, which drafted the Constitution of the Federative Republic of Brazil (CF 88), environmental aspects were a subject of high attention, and as a result, the matter was given a specific chapter in the new Constitution. This attention given to the environment occurred due to different factors, such as i) the joint action of many constituent congressmen with close links to the environmental agenda, ii) a more favourable political atmosphere for power devolution to the subnational levels of government as well as an overall claim for the re-establishment of social rights and iii) an international landscape that increased worldwide momentum towards solving the environmental issue thanks to the Brundtland Report (*Our Common Future*), published in 1987 (Magalhães de Moura, 2016; Schmitt & Scardua, 2015).

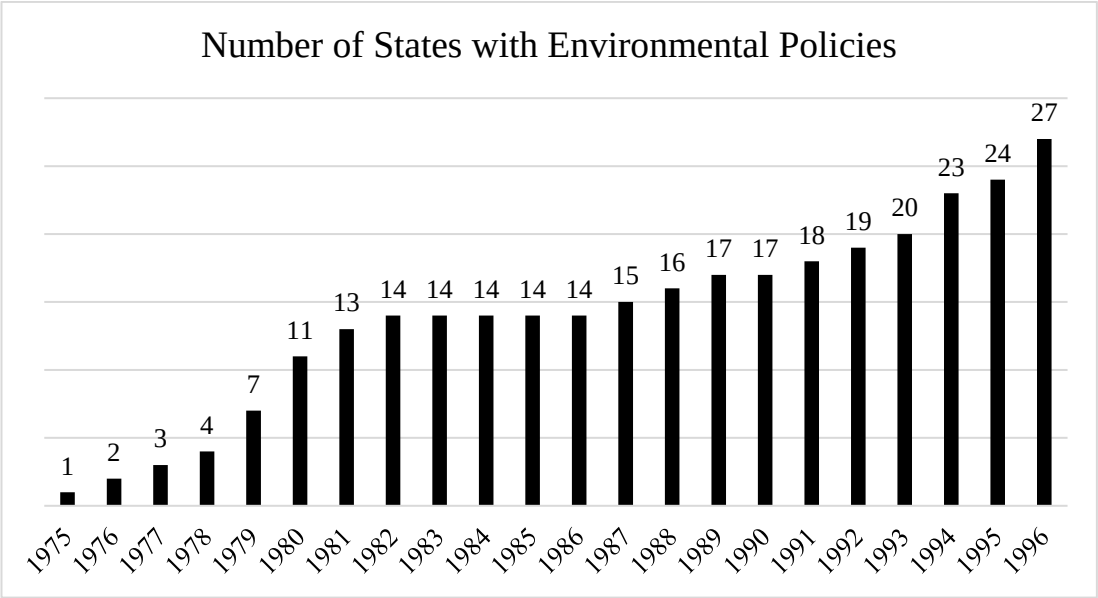
Such a combination of environmental activism, pressure for power decentralisation and international environmental awareness propelled the National Constituent Assembly to raise environmental protection to a more prominent position. Thus, by considering the (protection of the) environment a social constitutional right, the CF 88 not only dedicated a specific chapter to the environment but also addressed the subject in relevant parts of the constitution, for example, in the ‘Economic and Financial Order’ and ‘Fundamental Rights and Guarantees’ sections, as depicted in Appendices 1 and 2 of this dissertation.

The environmental management and policymaking framework set by the CF 88 was essentially cross-sectoral and multilevel, requiring the existence of effective federalism and a great level of collaboration among the different levels of government to achieve the expected results elaborated on in the constitutional text. By establishing a set of competencies for the three levels of government of the Brazilian federation, it created the backbone of the multilevel environmental governance in Brazil.

Overall, the CF 88 listed five types of executive and legislative competencies in regard to the environment, as follows: i) executive competencies of the union (article 21); ii) exclusive legislative competencies of the union (article 22); iii) shared executive competencies of the union, the states, the Federal District and the municipalities (article 23); iv) concurrent competencies of the union, states and Federal District (article 24) and v) executive and legislative competencies of the municipalities (article 25). After the promulgation of CF 88, these different competencies were regulated by Complementary Law n. 140 from 2011 (Brazil, 2011).

The CF 88 played a role in the consolidation of Brazilian environmental federalism, driving a series of institutional developments in the environmental policy field. For instance, the number of state environment secretariats noticeably increased after the constitution came into force, growing from 16 state secretariats in 1988 to 27 state secretariats (that is, secretariats for all states of the Brazilian federation) in 1996, as detailed in Figure 6. Moreover, by setting shared constitutional responsibilities, this decentralisation also aimed to fill the eventual gaps in terms of environmental protection that would arise from governmental inaction from one of the federation members (Mesquita, 2010).

Figure 6 – Evolution of environmental policies at the state level in Brazil.



Source: Scardua and Bursztyn (2003).

However, despite all these improvements to its environmental governance architecture, Brazil struggled to convert them into better environmental and climate performance as originally expected by the 1988 congressmen. This can be partially explained by the constraints of Brazilian federalism, which involve different aspects, such as lack of administrative capacities, political disputes, different cultures and social conditions, and income inequalities across the different regions of the country. Having an awareness of these facts is of critical relevance when trying to understand the challenges that lie ahead for Brazilian environmental and climate policies (Magalhães de Moura, 2016; Mesquita, 2010; Scardua & Bursztyn, 2003; Schmitt & Scardua, 2015).

One aspect relevant to understanding the struggles of the environmental federalism in the CF 88 is that despite the establishment of different competencies at the Brazilian subnational level of government, this was not followed by a provision of sufficient institutional and financial capacities for this level of government to properly fulfil the constitutional commandments it is supposed to (Scardua & Bursztyn, 2003). Even at the state level, where all Brazilian states have already had environmental secretariats since 1996, there are considerable gaps in terms of managerial and technical capacities. These bottlenecks are stronger at the municipal level, where the majority of the 5,570 Brazilian municipalities still struggle in terms of the availability of resources (e.g.

financial resources and human resources) required to properly comply with their role in the country´s federal system.

Another administrative bottleneck of this environmental federalism lies in the functioning of its governance. In such a complex and (technically and financially) unbalanced system integrated by the federal government, 27 federative states and more than 5,000 municipalities, an effective coordination scheme to avoid overlap and promote the integration and exchange of knowledge is of critical importance. However, despite the existence of the SISNAMA, a fragmented system embedded in competitive federalism is still observed in which cooperation among the different levels of government remains an unresolved issue. In addition, it should also be noted that this unbalanced governance is also propelled by a massive concentration of legislative power at the union level, which leaves little room for states and municipalities to also make environmental regulation (Neves, 2012, 2016; OECD, 2021; Scardua & Bursztyn, 2003).

The consolidation of Brazilian environmental federalism has also been undermined by several of the political and economic constraints faced by the country since 1988, such as the following: i) the fiscal and debt crisis faced by many federative states during the 1990s, which led to the increase of fiscal expenditure restrictions by the federal government; ii) the impeachment of two Brazilian presidents (Mr Collor de Mello in 1992 and Ms Roussef in 2015) and iii) a turbulent and unstable multi-political-party atmosphere, which might have led to a prevalence of political-oriented instead of technical-oriented decisions in regard to environmental management. This political and economic background might be considered as another reason behind the misalignments and issues seen in Brazilian environmental federalism.

Finally, an additional point that helps in understanding the struggles of Brazilian environmental federalism is related to the socioeconomic context, which involves environmental management. Issues including culture, socioeconomic profile, land tenure and sociology are key to understanding how the environment and the effects of the climate crisis are perceived at the regional and local levels in each part of Brazil. In other words, natural resource dependence and scarcity strongly vary across and within the 27 Brazilian federative states, and this also tends to influence the way the subnational government addresses the environment with its respective governmental actions and strategies.

In summary, Brazil is not a laggard in terms of the institutionalisation of environmental policy and management. On the contrary, the country is one of the few in the world that has a specific chapter of its national constitution exclusively dedicated to this subject. Moreover, the country has a good international reputation in regard to environmental legislation (OECD, 2015). However, Brazil still struggles in implementing most of this regulatory stock. On the one hand, the country still has unsolved issues in regard to the way its environmental federalism is framed, as I stressed earlier. On the other hand, there are also governance issues, which include problems with coordination, availability of resources and transparency, to name a few. These challenges come not only from the governance and coordination institutional bottlenecks expected in a country this size but also from historical economic roots, which wrongly set environmental conservation and economic development on opposite sides of the development debate. All of these different dualities become even more visible when it comes to climate change planning and governance, as I will highlight in the following sections.

4.4 Institutionalisation of the climate change debate in Brazil – from Rio 92 to Copenhagen 2009 and beyond

The first institutional climate-oriented arrangement within the Brazilian federal government dates back to 1989 when the CIM was established by Executive Decree n. 98,352 of 31 October 1989 (Brazil, 1989). This decree stated that climate change would require close monitoring in regard to its political, economic, environmental and technological implications. It was also set to ensure the coordination of Brazilian participation in international talks related to the topic.

Chaired by the Ministry of Foreign Affairs (MRE, in Portuguese) and integrated by federal ministries and agencies from different sectors (with the possibility of inviting members from other levels of government), the commission's main task was to advise the Brazilian president on the issue of climate change. Considering its attributions, this advisory function was essentially meant to inform Brazil's participation in international forums, such as the then recently launched IPCC, as well as in negotiations related to the establishment of the UNCCC (Mendes, 2014). It is worth highlighting the following two important features of this first arrangement, which defined this early phase of climate change institutionalisation and governance in

Brazil: i) the driven international-led debate on climate change in Brazil, headed by the MRE and ii) institutional recognition of the cross-sectoral aspects involved in the issue of climate change.

In 1990, the Inter-Ministerial Commission on Climate Change was abolished, and its main functions and competencies transferred to the newly created Inter-ministerial Commission on the Preparation for the United Nations Conference on Environment and Development (CIMA, in Portuguese). The CIMA was also chaired by the MRE, and its aim was to advise and coordinate the national government's preparation for the United Nations Conference on Environment and Development (i.e. Rio 92) to be held in June 1992. The CIMA had a broader scope than the previous commission. It addressed not only climate change matters but also a set of decisions and issues related to international affairs regarding environmental subjects. Moreover, this new commission brought further features in terms of non-state stakeholders' participation by assuring seats to representatives from NGOs and the National Confederations on Industry, Agriculture and Commerce (Brazil, 1990).

In 1992, the climate agenda received an institutional push with the adoption of the UNFCCC at the end of the Rio 92 (UNFCCC, n.d.). For Brazil, this was a key episode for its external and domestic positioning in regard to the climate agenda. On the one hand, as the conference's host, Brazil was the first nation to sign the convention. The country was recognised by the other nations as one of the main players in the negotiations that created the UNFCCC. On the other hand, the way things developed before and during Rio 92 culminated with the consolidation of two main leading institutions: i) the MRE and ii) the Secretary of Science and Technology, which later became the Ministry of Science and Technology (MCT, in Portuguese) (Mendes, 2014).

Following the main results of Rio 92 – namely, i) Agenda 21, ii) the Rio Declaration on Environment and Development, iii) the Statement of Forest Principles and iv) the openness for signatures of two legally binding instruments (the UNFCCC and the Convention on Biological Diversity) (UN, n.d.) – Brazil (1994) took further steps towards the domestic institutionalisation of sustainability, especially in respect to Agenda 21, by passing an executive decree that created the Inter-ministerial Commission on Sustainable Development (CIDES, in Portuguese), which replaced the CIMA. Like its predecessors, the CIDES also had presidential advisory status, but at

this time, the focus was related to 'the necessary strategies and national policies to achieve the sustainable development, according to the Agenda 21 (Brazil, 1994, p. 1).

The CIDES was chaired by the Ministry of the Secretary of Planning, Budgeting and Coordination of the Brazilian Presidency and integrated with all federal ministries. The following are two distinctive features of this commission which were not present in the previous inter-ministerial bodies: i) the establishment of Secretary of Planning as the institutional locus of coordination and ii) the inclusion of all ministries (at the ministerial level) in the collegiate. These two features could be considered important steps towards a more cross-sectoral approach, which the sustainable development agenda tended to require.

The climate agenda was a matter that received special treatment within the CIDES framework. This was because the executive decree that created the CIDES also established the Coordination of Climate Change under the guidance of the MCT aiming to 'coordinate the implementation of the commitments taken under the UNFCCC' (Brazil, 1994, p. 1).[3] The establishment of the MCT as the coordinator reinforced the previously mentioned strong leadership shown by this Ministry at that point time in regard to the Brazilian climate agenda, as Mendes (2014)[4] emphasised.

Following the mandate to coordinate the implementation of the commitments under the UNFCCC, the MCT created the Coordination Office for Global Change Research (which would later be renamed the General Coordination on Global Climate Change [CGMGC], which still plays important roles within the current climate governance model). Despite the broad meaning that the sentence 'coordinate the implementation of the commitments taken under the UNFCCC' (Brazil, 1994, p. 1) had, the CGMGC focused on the coordination of the preparation of the first National Communication (CN, in Portuguese; submitted in 2004). The CN required a multidisciplinary effort that involved more than 150 institutions and hundreds of specialists, and its preparatory works allowed the MCT (2004) to have greater engagement in terms of international climate negotiations and acquisition of know-how in climate policy.

[3] The CIDES had three permanent coordination within its institutional framework: i) Coordination on Foreign Affairs (chaired by the MRE); ii) Coordination on Climate Change (chaired by the MCT) and iii) Coordination of Biological Diversity (Chaired by the Ministry of Environment and of the Legal Amazon).

[4] An interesting overview about the champions of the climate agenda within the Federal Government over the history of the Brazilian climate policymaking is provided by Mendes (2014). The author analyses how the political leadership of the Brazilian delegation within the international climate talks (INC and the UNFCCC Conference of Parties) developed from the 1990, where the MCT and the MRE had a political internal prominence in regard to the agenda, and the leadership shifts from the MCT to the Ministry of Environment in the first decade of the 2000s.

In 1995, the government established the Chamber of Natural Resources Policies under the Council of Government.[5] Chaired by the Executive Office of the President of Brazil (Casa Civil, in Portuguese) and integrated with nine federal ministries (Casa Civil; Finance; Planning and Budgeting; Mining and Energy; Environment; Agriculture; Foreign Affairs; Science and Technology; and Industry, Trade and Tourism), the goal of this chamber was to 'formulate public policies and directives related to natural resources and to coordinate the implementation of such policies' (Brazil, 1995, p. 1). The establishment of this chamber created an overlap within the federal government in regard to natural resources policymaking since the Ministry of Environment (MMA) also had as one of its goals 'to plan, to coordinate, to supervise and to control activities … related to the preservation, conservation, and rational use of renewable natural resources' (Brazil, 1995, p. 1).

The following organisational change occurred in 1997 when the CIDES was abolished and its competencies were transferred to the recently created Commission of Sustainable Development and National Agenda 21, which was placed under the umbrella of the Chamber of Natural Resources Policies (Brazil, 1997). This signalled important changes in the evolution of Brazilian sustainability and climate policies. First, by placing a sustainable development collegiate under the umbrella of the Chamber of Natural Resource Policies, the government sent a political signal that the sustainable development agenda would be addressed (or would be part of) the natural resources and environmental agenda, which contrasted the CIDES perspective as well as the sustainable development view of the Brundtland Report. Moreover, this perception about the federal government's institutional view towards addressing the sustainability agenda tended to be confirmed by the fact that this new commission was chaired by the MMA, Hydric Resources and Legal Amazon.[6]

It is also worth mentioning that this movement can be interpreted as political downsizing of the sustainable development policy agenda since a shift from a ministerial body (at the ministerial level, where all federal ministries had a seat) to a new institutional configuration with representatives of the second tier of the

[5] The council of government, comprised of the ministers of state, should meet when convened by the president of the republic, with the purpose of assisting the president of the republic in formulating guidelines for governmental action (Brazil, 2019e).

[6] Provisional Measure n.370 from 1993 (Brazil, 1993) altered the powers of the MMA, establishing that the MMA has the purpose of planning, coordinating, supervising and controlling the activities related to the National Environmental Policy, the preservation, conservation and rational use of renewable natural resources, articulating and coordinating the actions of the integrated policy for the Legal Amazon, with a view to improving the quality of life of the Amazonian populations. (p. 1)

government – in which just five federal ministries had permanent seats, namely, the MMA, Ministry of Planning, MRE, MCT and the Strategic Affairs Secretariat of the Brazilian Presidency – was observed (Brazil, 1997).

Moreover, in regard to climate governance institutionalisation, the decree from 26 February 1997, which abolished the CIDES, also produced some uncertainties related to the institutional locus of climate policy at the federal level since it did not clearly mention the coordination on climate change issues, which had previously been set in 1994. Despite that, the internal political leadership agenda remained with the MCT, which at that time was equipped with the best technical and human capacities available. Furthermore, the evidence from that period also suggests that the MCT was acting together with the MRE in the international climate politics landscape. For instance, the MCT played a decisive part during the UNFCCC talks that ended with the adoption of the Kyoto Protocol (signed in 1997) and the creation of the Clean Development Mechanism (CDM) (MCT, 2004; Mendes, 2014).

When the Kyoto Protocol was adopted and due to the need for operationalisation of the CDM combined with 'the concern for greater institutionalization of the issue of climate change in Brazil, due to its strategic characteristic' (MCT, 2004, p. 60), the Brazilian federal government set the Inter-ministerial Commission on Global Climate Change (CIMGC, in Portuguese) through the executive decree of 9 July 1999. Reflecting the domestic leadership of climate politics and the 'scientific aspects of climate change' (MCT, 2004, p. 60), the chair of this committee was granted to the MCT, with the MMA serving as vice-chair of it and eight other federal ministries comprising the body[7] (Brazil, 1999).

To articulate the governmental activities related to the UNFCCC and its subsidiary instruments (including the Kyoto Protocol and the CDM), the CIMGC was set with the following competencies:

> I - issue opinions, when requested, about proposals for sectoral policies, legal instruments and regulations that contain a component relevant to the mitigation of global climate change and to the adaptation of the country to its effects.

[7] In July 1999, the CIMGC was formed by the following federal ministries: Foreign Affairs; Agriculture; Transport; Mining and Energy; Budgeting and Management; Environment; Science and Technology; Development, Industry and Trade; the Casa Civil; and the Extraordinary Ministry for Special Projects.

> II - provide support to the positions of the government in the negotiations under the auspices of the UNFCCC and subsidiary instruments to which Brazil is a party.
>
> III - define eligibility criteria additional to those considered by the Convention bodies responsible for the CDM, as called for in Article 12 of the Kyoto Protocol to the UNFCCC, according to national sustainable development strategies.
>
> IV - consider opinions about projects that result in reduction of emissions and that are considered eligible under the CDM, discussed in the above paragraph, and approve them, where appropriate; and
>
> V - coordinate activities with representative civil society organizations, in order to facilitate activities of governmental and private bodies aimed at complying with the obligations assumed by Brazil under the UNFCCC and the subsidiary instruments to which Brazil is a party. (Brazil, 1999, p. 1)

As the CIMGC competencies suggest, the focus of this collegiate was not to build domestic climate governance but was mainly oriented to help the country reach its international agreement on the subject and, more importantly, to better profit from the new-born CDM under the Kyoto Protocol (Mendes, 2014). Such pioneering of the CIMGC in developing an internal regulatory framework for CDM activities enabled the country to become one of the most successful nations in regard to the mechanism (MCT, 2010). For instance, until the end of 2014, Brazil was ranked third in the world in CDM project activities[8], which were responsible for a reduction of 370 million tons of carbon dioxide equivalent ($MtCO_2e$) and 97 million certified emission reductions. Since deforestation-tackling activities were not included in the mechanism, more than 75% of these CO_2e reductions were related to the energy industry and waste handling and disposal projects (MCTI, 2016).

It is also worth noting that the CIMGC became the first National Designated Authority (NDA) of the CDM under the UNFCCC. This innovation in the institutionalisation and organisation of the CDM projects domestically led Brazil to participate in several

[8] Until November 2014, China was ranked first (4.4 billion tons CO_2 - 57.5%), followed by India (1 billion tons CO_2 - 13.8%), in projected reductions. It should be noted that these two countries are heavily dependent on fossil fuel, which has encouraged more renewable energy projects in those nations than in Brazil, where the energy grid provides more than 45% of renewable energy.

international cooperation efforts with other developing countries with the aim of building the capacity for the CDM project's management (MCT, 2010). Moreover, the CIMGC activities in regard to the CDM projects were also relevant in serving as the first channel of experience for many Brazilian economic sectors regarding the issue of the carbon market as an effective instrument to reduce GHG emissions (Machado Filho & Mendes, 2013).

The last important event of the early stage of the institutionalisation of Brazilian climate governance was the establishment of the Brazilian Forum on Climate Change (FBMC, in Portuguese) in 2000 through two executive orders, dated 15 June and 28 August 2000.[9] The FBMC had as its main goal 'to inform and to mobilize the society about the discussion and decision-making about the problems arising from the climate change' (Brazil, 2000, p. 1). It was headed by the president of Brazil and chaired by a chosen representative from the civil society and was integrated with several federal ministries, heads of federal agencies, chairs of the Chamber of Deputies and the Senate, all state governors, all mayors of the Brazilian capitals and representatives from different sectors of civil society. The establishing decrees of the FBMC also stated that the forum should closely integrate with the CIMGC to properly implement their decisions (Brazil, 2000). The FBMC established a new landmark in Brazilian climate change by framing the climate change discussion within a multilevel environment of stakeholders, a feature that would be relevant to its activities in the coming decades.

4.5 The 2000s – consolidation of the climate agenda at the national level

While the 1990s can be considered the early phase of Brazilian climate change governance, the 2000s can be seen as the decade in which the climate agenda was introduced into Brazilian domestic policymaking in a more noticeable way. It should be noted that this was strongly influenced by global governance developments on the subject (e.g. the Bali Road Map, Copenhagen Accord and Paris Agreement). In the 2000s, Brazil saw the establishment of a series of bodies, governmental structures and

[9] This forum was reframed in 2017 with the aim of raising awareness and mobilising society and contributing to the discussions of the necessary actions to confront global climate change, in accordance with the National Policy on Climate Change and with the UNFCC and its agreements, including the Paris Agreement and the Nationally Determined Contributions, and in accordance with the legislation in force' (Brazil, 2017a, p. 1)

policy instruments related to the nation's addressing of climate change with which the country would govern its main climate-related initiatives, such as i) the 2009 PNMC (2009) and ii) the 2015 NDC.

The first half of the 2000s was productive in terms of the regulation and implementation of the UNFCCC commitments at the domestic level. For instance, four important achievements were reached during that period, as follows: 1) the Brazilian ratification of the Kyoto Protocol (2002); 2) the regulation of the Brazilian CDM projects by the CIMGC (2003); 3) the first Brazilian CDM project (Folha de São Paulo, 2004), that is, the first project globally approved under the Kyoto Protocol scheme (2004) and 4) the submission of the first CN (2004), which revealed the first Brazilian GHG emissions inventory (with data from 1990 to 1994). These were key aspects to leverage Brazil's institutional capabilities to deal with the climate policy arena, as the CN stressed (MCT, 2004).

Moreover, in the early 2000s, a change in the climate agenda's domestic leadership from the MCT to the MMA was also observed. This coincided with the Lula administration's inauguration of its first term in 2003. Mendes (2014) highlighted two pieces of evidence of that change, as follows: i) the leadership of the Brazilian delegation of the UNFCCC Conference of Parties of 2004 and 2005 (COP 10 and COP 11, respectively) by Ms Marina Silva, the then Minister of Environment and ii) the establishment of the National Secretary of Climate Change and Environmental Quality (SMCQ, in Portuguese)[10] within the administrative structure of the MMA on 26 April 2007 (Brazil, 2007a; Mendes, 2014).

The year 2007 was of particularly great relevance to the Brazilian climate agenda. For instance, during his speech at the United Nations General Assembly (UNGA), in September 2007, President Lula announced that Brazil would 'soon' (UN, 2007, p. 6) launch its national plan to combat climate change. Moreover, to fulfil Lula's UNGA announcement, the federal government passed Executive Decree n. 6,263 on 27 November, establishing the CIM and the GEx (Brazil, 2007b). This decree also provided guidance and directives for the preparation of the National Plan on Climate Change (Plano Clima, in Portuguese) (Brazil, 2007b). However, it also created one of

[10] The establishment of the SMCQ can also be understood as a hierarchical upgrade of the climate change agenda within the federal government since the secretariat level is the second level of importance within a federal ministry. General coordination (level of the unit which was working on climate change within the MCT) is the fourth tier.

the strongest pieces of evidence of the institutional overlap that would predominate in the domestic climate agenda from then on because it created an institutional situation in which two ministerial climate bodies – the CIM and the CIMGC (chaired by the MCT), which Executive Decree n. 6,263/2007 did not abolish – were supposed to deal with similar issues.

Chaired by the Casa Civil and integrated by 16 federal ministries,[11] the CIM was responsible for steering the preparation, implementation, monitoring and evaluation of the Plano Clima as well as for performing the periodical assessment of this plan. The committee was also in charge of approving propositions from the GEx to support international affairs in climate issues as well as other administrative tasks related to communication, social dissemination of the plan and mapping of financial resources for the implementation of the plan.

Within the CIM's framework, the GEx was created to serve as the main operational governance scheme since it was supposed to be serving as the main incumbent for the development, implementation and evaluation of the Plano Clima. The GEx was chaired by the MMA and integrated by eight other ministries plus the FBMC[12]. Among other competencies, it had two relevant tasks: i) drafting a preliminary proposal containing the general objectives, principles and directives of the PNMC and ii) drafting the preliminary proposal of the Plano Clima under the CIM's guidance (Brazil, 2007b). This plan was built in an environment of extensive public hearings and governmental discussions and launched in December 2008, during the UNFCCC COP 14 (in Poznan, Poland), while the law that enacted the PNMC was passed one year later, in December 2009 (MCT, 2010).[13]

The period between 2007 and 2009 was also marked by many other governance improvements at the national level. For instance, in regard to research and scientific networks related to climate science, two important bodies were established during this time, as follows: i) the Brazilian Network Research on Global Climate Change (Rede Clima, in Portuguese) (2007), which was given many research-related tasks, such as

[11] The original membership comprised the following institutions: the MAPA; MCT; Ministry of Defence; Ministry of Education; Ministry of Finance; Ministry of National Integration; Ministry of Health; MCid; MRE; Ministry of Mining and Energy; Ministry of Agrarian Development; Ministry of Development, Industry and Foreign Trade; MMA; Ministry of Planning, Budget and Management; MT; and Center of Strategic Affairs of the Presidency of the Republic. The FBMC also integrated the CIM as a guest participant.

[12] The original membership of the GEx comprised the following institutions: the MMA – chair; Casa Civil; MAPA; MCT; MRE; Ministry of Mining and Energy; Ministry of Agrarian Development; Ministry of Development, Industry and Foreign Trade; and FBMC.

[13] The PNMC was approved by law 12187/2009. I discuss it in more detail in the coming analytical sections.

the generation and dissemination of knowledge and technologies to enable Brazil to tackle the climate change challenges (MCT, 2007) and ii) the Brazilian Panel on Climate Change (PBMC, in Portuguese) (2009), a national scientific body based on the IPCC that had the objective of providing scientific and technical information related to climate change to decision-makers and society (MCT & MMA, 2009).

Regarding the financial mechanisms for financing climate action, two fundamental funds were launched in the last years of the 2000s, as follows: i) the Amazon Fund and ii) the National Fund on Climate Change (Fundo Clima, in Portuguese). Regarding the Amazon Fund, discussions of which were raised during COP 12 (2006) in Nairobi, it was meant to be financed by voluntary contributions to help developing countries in their mitigation actions related to deforestation and forest degradation. It was officially launched in 2008, operated by the Brazilian Development Bank (BNDES, in Portuguese) and pursuing a Steering Committee of the Amazon Fund (COFA, in Portuguese) chaired by the MMA[14] (Brazil, 2008b). In its turn, the Fundo Clima aimed to ensure the provision of resources to support projects and studies related to the mitigation of and adaptation to climate change (Brazil, 2009a). It had two funding schemes, as follows: a) grants, which were managed by the MMA, and b) loans, which are operated by the BNDES.

At the end of 2009, Brazil established the PNMC, through which the country established a voluntary commitment to reduce its GHG emissions by between 36.1% and 38.9% by 2020 compared to the estimated emissions for that year (Brazil, 2009b). To do so, the PNMC provided an economy-wide approach, including many different economic sectors. The PNMC also established the so-called 'institutional instruments', which are as follows: i) the CIM, ii) the CIMGC, iii) the FBMC, iv) the Rede Clima and v) the Steering Commission on Meteorology, Climatology and Hydrology Activities. The PNMC is one of the cases addressed by this research, and it will be further discussed in Section 5.2 of this dissertation.

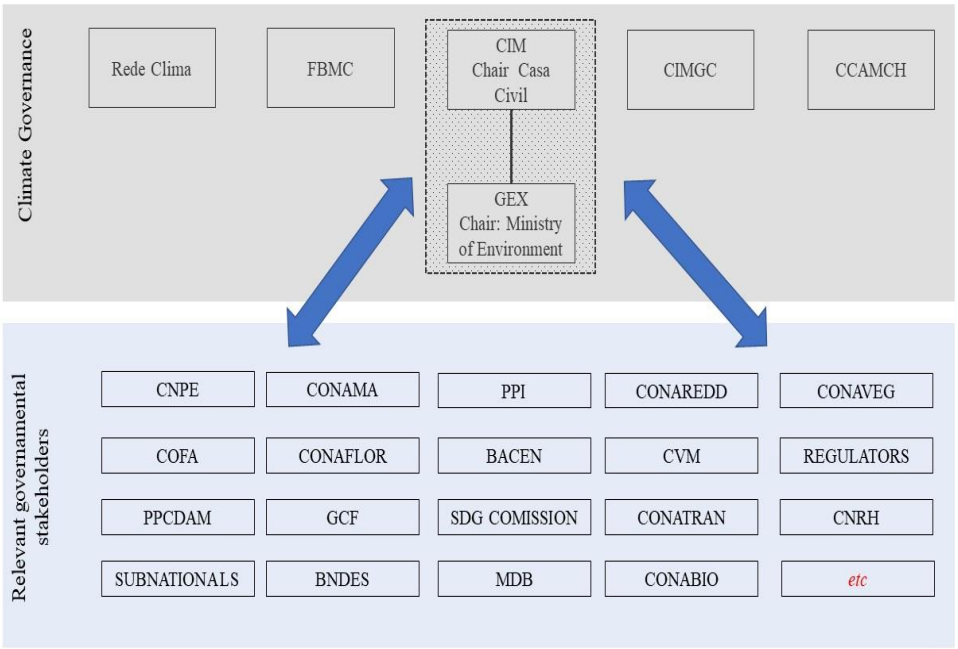
In addition to the institutional arrangements and planning instruments directly related to the PNMC, it is also worth highlighting a series of legislations produced at the national level which have strong convergence with the structuring of the broad climate

[14] The Amazon Fund can be considered the main financial instrument established in Brazil to fight against deforestation as well as to leverage forest conservation. An overview of the fund's main achievements is disclosed on the website http://www.fundoamazonia.gov.br/en/monitoramento-e-avaliacao/fundo-amazonia-em-numeros

mitigation and adaptation agenda in the country. This list includes the following legislations: i) the National Policy for Solid Waste (Brazil, 2010b), ii) the National Policy for Urban Mobility (Brazil, 2012a), iii) the law for the protection of native vegetation (Forest Code) (Brazil, 2012b), iv) the Biodiversity Law (Brazil, 2015b), v) the Metropolis Statute (2015a), vi) the National Biofuels Policy (RenovaBio) (Brazil, 2017c) and vii) the new legal framework for basic sanitation (Brazil, 2020b). Although not an exhaustive list, this regulatory stock tends to demonstrate how cross-cutting and multilevel the climate change adaptation and mitigation agenda is.

The existence of many other institutions and collegiates with clear links and great potential to provide co-benefits to the climate agenda – but that are not officially linked to climate or environmental governance – should be also noted, such as the following: i) the National Council on Energy Policy, chaired by the MME; ii) the National Commission for the Sustainable Development Goals, chaired by the Secretary of Government of the Brazilian Presidency; and iii) the Investment Partnership Programme (PPI, in Portuguese), chaired by the Ministry of Economy. The table below provides a non-exhaustive list of governmental bodies and public organisations which activities are related to the federal government climate action.

Figure 7 – The National Policy on Climate Change governance and relevant governmental stakeholders.



Source: Author's elaboration based on Brazil (2009b).

As can be observed, the figure above depicts many institutions, from governmental collegialities to financial institutions and other government-level organisations, whose actions tend to directly influence the country's GHG emissions and adaptive capacity. It also makes clear that climate policy management is not encapsulated only within climate governance chaired by the CIM. On the contrary, the figure indicates how relevant the CIM and its adjacent structures are in building bridges towards greater integration and coordination of this universe of relevant issues in Brazilian climate action. This becomes even more evident when the economy-wide nature of Brazil's NDC is considered.

4.6 The Paris Agreement, political turmoil and the current situation

In 2015, six years after the PNMC came into force, Brazil ratified the Paris Agreement and submitted its first NDC, which presented an emission reduction target of 37% below 2005 levels by 2025 and a subsequent indicative contribution of reducing its emissions by 43% below 2005 levels by 2030 (UNFCCC, 2016). It should be noted that these commitments differed in relation to the 2020 voluntary commitment (which is indicated in the PNMC and the Nationally Appropriate Mitigation Actions [NAMAs]). Brazil's NDC presents absolute reduction targets in relation to a defined year (2005), whereas the PNMC had a target for 2020 based on a projection for the same year.

With the ratification of the Paris Agreement, many experts consulted during the interview phase believed that it was expected that climate governance would undergo a process of improvement to provide the climate bodies greater power to coordinate and integrate the different sectoral policies necessary for the implementation of the NDCs. There was also the expectation of a quick update of the PNMC, not only to check the fulfilment of the targets set in 2009 but also to adjust the policy to the new regime established by the Paris Agreement. However, not only were most of these expectations frustrated but also many steps backwards in terms of the organisation of the already inefficient climate governance were noted, as observed by many authors (Gaetani, 2019; Hochstetler, 2021; Senado Federal, 2019).

In the years immediately following the Paris Agreement, few innovations in terms of governance and climate policy were observed. For instance, in the final weeks of

President Rousseff's administration, the National Adaptation Plan (PNA, in Portuguese) was launched (MMA, 2016a). During President Temer's administration (2016–2018), apart from the replacement of the SMCQ by the Secretary of Climate Change and Forests (SMCF) within the MMA and a few studies related to the implementation of the NDC having been completed, two actions were taken in regard to climate governance, as follows: i) the update of the FBMC's goals in order to enhance its participation in regard to the NDC implementation talks (Brazil, 2017a) and ii) the establishment of the National Emissions Register System (SIRENE, in Portuguese), managed by the Ministry of Science, Technology, Innovation and Communication (MCTIC, in Portuguese) with the goal of making available the results of the Brazilian GHG's inventories as well as other figures, such as the annual estimates of Brazil's GHG emissions (Brazil, 2017b).

It should also be highlighted that during Temer's administration, the Casa Civil made some efforts to improve climate governance by reforming the CIM and giving more centrality to climate policy within the national government. This was achieved via greater involvement of the political and economic areas of the government within the committee's activities and responsibilities; however, such attempts became mired in several political and bureaucratic divergences in regard to the division of labour and competencies that would take place in the reframed CIM. All of these divergences were associated with a perceived lack of political attention in regard to the need to reform the governance to make it more effective in addressing NDC challenges, which led to a failure of governmental talks to reframe the governance, as some people interviewed in this study stressed. Thus, the update of the CIM became a question to be addressed by the next president, who would be elected in November 2018 (Senado Federal, 2019).

On the inauguration of the new federal administration in January 2019, some measures related to the administrative reorganisation of the government had effects on the scope of climate governance. For example, the Secretariat of Climate Change and Forests of the MMA was abolished during that reorganisation which took place in the first days of the new administration. At that time, the new MMA structure did not indicate which body (secretariat or department) would be responsible for dealing with climate issues within the ministry (Brazil, 2019a). This could be seen as a retreat of the MMA in regard to the climate agenda, which had effects on most of the established national

climate governance (Gaetani, 2019). It was also verified the suppression of units related to the climate issue in other ministries, such as the MRE, where the Climate Change Division was abolished (Brazil, 2019b), and in the Ministry of Economy (a result of the merge of several ministries in the economic area), which had the General Coordination of Environment and Climate Change of the Secretary of Economic Policy (SPE) removed from its structure (Brazil, 2019c).

However, the permanence of relevant structures to the climate policy in other strategic ministries for climate governance was confirmed. This was the case, for instance, for the General Coordination of Climate, which transformed into the General Coordination of Climate Science and Sustainability, in the Ministry of Science, Technology and Innovations. This general coordination played a relevant role in the governance, especially in terms of providing information and transparency, since it was responsible for the elaboration of GHG inventories and the management of the SIRENE (Brazil, 2019f). In turn, it was noted that other ministries equally relevant to the climate agenda had been gradually giving more attention to the subject and the co-benefits that it tends to offer (e.g. market access, green bonds and improved sectoral reputation), either by updating programmes already included in the scope of the PNMC, such as the MAPA and its ABC Plan (MAPA, 2021a), or by developing new strategies that could seek synergies between sectoral actions and the climate finance market, as was the case with the Ministry of Infrastructure (MINFRA, 2019).

Moreover, to provide greater administrative organisation to the large number of collegiate bodies existing at the time, the government issued successive decrees abolishing government collegiate bodies in different types and sectors (Brazil, 2019d, 2020a, 2020d; Casa Civil da Presidência da República, 2019). Some of these collegiate bodies were directly related to the climate agenda, such as the COFA, abolished in April 2019. The extinction of the committee, which was responsible for determining the fund's guidelines and monitoring its activities, resulted in the operational paralysis of the instrument, with the last donation having been received on 17 December 2018 from the Norwegian government (Fundo Amazônia, n.d.). Moreover, one of the climate governance bodies, the CIMGC, was abolished in February 2020 (Brazil, 2020a). The CIMGC's resolutions have to be endorsed by the CIM to remain in force (Brazil, 2019g).

The changes mentioned above portray a particularly challenging period in the improvement of the country's climate policy, especially because they occurred concomitantly to the growth climate change scepticism in some sectors of the new administration regarding human participation in the climate changes currently happening globally. This conjunction of factors tended to block the debate on governance and implementation of the NDC during that period, which led to the rise of fierce criticism from several economic and social sectors at the domestic and international levels (CBEDS, 2020; Climate Transparency, 2021; Gaetani, 2019; Hochtetler, 2021). In this sense, not only the criticism but also the perception of reputational risks and economic opportunities involving climate policy seemed to motivate the government to (re)start a gradual movement of re-institutionalisation of the theme in the governmental structure by late 2020.

In this sense, the MMA underwent a new organisational restructuring, which brought the climate theme explicitly back into the competencies of the ministry through the creation of the Secretariat of Climate and International Relations, which replaced the Secretariat of International Relations. The new secretariat received a series of climate mandates which were not present in the old structure created in 2019 (Brazil, 2020c). A favourable movement towards the internalisation of the agenda in the government's economic policy was also perceived, with the Central Bank and BNDES (2021) presenting new initiatives in terms of regulation, credit and public discourse of the top leadership of these two institutions, all of which reflected key economic and business aspects of the climate agenda (e.g. green bonds, climate risk, and environmental, social and governance [ESG] aspects) (BCB, 2021).

Moreover, the CIM, which was a key structure of the national climate governance, was reformed in November 2019. It should be stressed that this recreation was surrounded by positive and negative structural and institutional aspects regarding the multilevel and multi-sectoral approach to climate governance. On the one hand, the new committee brought about positive innovations, especially regarding the fact that it raised the membership of the committee to the level of minister (eight ministers in total) under the coordination of the minister of the executive office (Casa Civil)[15]. It is also worth noting the relevance of clarifying the functions of the ministries of economy, foreign affairs and science and technology concerning the themes of the

[15] Minister is the highest hierarchical position within a Brazilian federal Ministry.

Green Climate Fund (GCF), international negotiations and GHG inventories, respectively. Finally, the CIM constitutive decree made explicit the role of this committee in the deliberation of strategies and the monitoring of actions related to the implementation of the NDC. All of these points were absent in the decree that regulated the CIM's past competencies and had already been permeating the discussions that the previous administration had conducted to restructure the committee (Brazil 2019g; Senado Federal, 2019).

However, the new CIM still contains the same design errors for the MLCG which were present in the old structure. The most critical aspect is the permanence of the MMA as the main actor, in practical terms, of the governance model. This is evidenced by the fact that the MMA was appointed as the executive secretariat, with strong agenda power within the governance. Also, note that the executive secretariat is politically empowered and even has veto powers over common work agendas that are clearly related to the institutional competencies of other ministries. Another flaw brought from the previous model is the generic character with which the text that created the committee deals with the need to strengthen climate federalism, which effectively involves subnational government actors in the scope of governance. One last aspect to be highlighted is the absence of coordination and integration mechanisms, especially MTMs, so that the different policies and programmes can be developed and implemented in a harmonic way and without overlap (Andrade, 2022; Brazil, 2019g; Senado Federal, 2019).

4.7 The subnational-level picture (climate policy at the state and municipal levels)

As previously pointed out in the discussion about Brazilian federalism, the subnational governments (the states, the Federal District and the municipalities) have a set of relevant constitutional competencies that can leverage the country's action in regard to climate policy. Theoretically, this could be seen as a good indicator of concerted climate action between the national and subnational entities, as advised by the latest IPCC report (SR15) as well as pointed out by the Paris Agreement, especially in regard to adaptation and capacity building (UNFCCC, 2015)

However, the Brazilian evolution of subnational climate change governance has not followed the same path in terms of the institutionalisation and capacity building

observed at the national level. This is not an unforeseen issue due to the different capacities, priorities, fiscal constraints and levels of awareness in regard to the climate issue, which are present in the different regions, states and cities of the country. In fact, as highlighted in Table 7, Brazil has enormous economic, social and public management capacity differences among its different regions, states and municipalities. For example, in economic terms, the state of São Paulo, the richest in the country, contains around 32% of the country's entire GDP. When the states of Rio de Janeiro and Minas Gerais are added, the wealth located in the southeast of Brazil exceeds 50% of the national total, a high concentration, even considering that 40% of the population lives in one of these three states. With a high Human Development Index (HDI), even higher than the world average of 0.71 (World Population Review, 2022), the situation in Southeast Brazil is quite distinct from that in the North and Northeast regions, where the poorest states in the country are located. It is in the North and Northeast regions of the country that the worst economic development indicators are located, with conditions well below the national average in terms of both GDP and HDI, as depicted in Table 7. For example, the state of Pará, the main GHG-emitting state in the country, has a per capita GDP equivalent to 40% of the per capita GDP of São Paulo and has an HDI of 0.646. The reasons that have led to these inequalities among the different Brazilian states have economic, political and historical roots that go beyond the objectives of this dissertation, but it is important to keep them in mind because they help explain part of the discrepancies experienced by the state governments when dealing with their environmental and climate policies.

The first aspect to be observed when comparing the realities of the different Brazilian states in dealing with the climate issue is the GHG emission profile of each of these states. As Table 7 depicts, there are distinct GHG emission profiles among the Brazilian states and regions. On the one hand, the Southeast, which houses most of the country's industries and population, has the energy sector (especially transport) as its main emission source, while in the South and Centre-West of the country, the emissions are basically driven by the agriculture sector, which is to be expected given that these two regions are quite representative of the country's agricultural GDP. These two regions of the country are important in terms of emission growth trends since they showed the highest growth rates of GGE emissions between 2009 and 2016, basically driven by the agricultural states of Mato Grosso and Mato Grosso do Sul.

In turn, the North-Eastern states mostly present the energy sector as the main emitter, but in this region, emissions from the livestock sector, which is within the agriculture sector, also tend to be relevant, as pointed out by a recent Ministry of Science, Technology and Innovation (MCTI) (2022) report. Finally, the North's emissions profile is directly associated with LULUCF and mainly related to rainforest deforestation. Although there has been a slight reduction in the participation of this region in the total Brazilian emissions from 22.3% in 2009 to 20.9% in 2016, the region continues to be relevant for any future GHG emission mitigation strategy because it is where most of the Amazon biome is located.

Table 7 – Brazilian states' climate and economic profiles[16].

Unit	GHG emissions 2016		GHG emissions growth 2009-2016		2016 GHG per capita (tons of CO2e/person)	Main source of GHG emmission in 2016 (according to the 4CN)	GDP		GDP growht rate (2009-2016)		2016 GDP per capita (R$/person)	Population (2010)	2016 Carbon Intensity (kg CO2e/R$ 1,000)	Municipal Human Development Index - IDHM	State Competitiveness Ranking (CLP)		
	CO2e (Gg CO2e)	% total	%	pa (%)			2016		%	pa (%)					General Ranking	Public sector efficiency	Environmental sustainability
							1,000 R$ (2010 prices)	% total									
Brazil	1,467,255	100.00%	19.07%	2.52%	7.69	Agriculture	3,438,248,938	100.00%	11.28%	1.54%	18,025.11	190,747,731	427	0.778			
Acre	24,460	1.67%	128.82%	12.55%	33.34	LULUCF	7,929,802	0.23%	7.80%	1.08%	10,810.04	733,559	3,085	0.663	26	22	24
Amapá	- 11,255	-0.77%	281.28%	21.07%	-16.81	Removal by LULUCF	8,544,281	0.25%	13.13%	1.78%	12,761.69	669,526	- 1,317	0.708	24	24	20
Amazonas	- 37,572	-2.56%	-48.67%	-9.09%	-10.78	Removal by LULUCF	48,155,139	1.40%	5.74%	0.80%	13,821.86	3,483,985	- 780	0.674	11	5	12
Pará	187,675	12.79%	-29.81%	-4.93%	24.76	LULUCF	79,189,108	2.30%	31.76%	4.02%	10,445.66	7,581,051	2,370	0.646	25	21	21
Rondônia	105,958	7.22%	190.80%	16.47%	67.82	LULUCF	22,447,577	0.65%	18.75%	2.48%	14,367.29	1,562,409	4,720	0.69	16	8	27
Roraima	- 2,728	-0.19%	-77.65%	-19.27%	-6.06	Removal by LULUCF	6,456,447	0.19%	14.44%	1.94%	14,332.40	450,479	- 422	0.707	27	27	25
Tocantins	41,019	2.80%	-17.16%	-2.65%	29.65	LULUCF	18,099,906	0.53%	34.47%	4.32%	13,083.21	1,383,445	2,266	0.699	19	25	15
Total North	307,557	20.96%	11.57%	1.58%	19.39	LULUCF	190,822,260	5.55%	20.35%	2.68%	12,028.29	15,864,454	1,612	n.a.			
Alagoas	8,169	0.56%	0.00%	0.00%	2.62	Energy	7,929,802	0.23%	7.80%	1.08%	2,541.20	3,120,494	1,030	0.631	13	16	18
Bahia	67,606	4.61%	-10.78%	-1.62%	4.82	Energy	144,848,506	4.21%	10.28%	1.41%	10,333.84	14,016,906	467	0.66	18	9	13
Ceará	24,256	1.65%	12.53%	1.70%	2.87	Energy	77,268,113	2.25%	20.84%	2.74%	9,141.58	8,452,381	314	0.682	12	19	11
Maranhão	91,225	6.22%	-18.84%	-2.94%	13.88	LULUCF	48,155,061	1.40%	20.17%	2.66%	7,324.20	6,574,789	1,894	0.639	23	20	26
Paraíba	10,500	0.72%	32.46%	4.10%	2.79	Energy	33,519,708	0.97%	13.53%	1.83%	8,899.37	3,766,528	313	0.658	14	23	17
Pernambuco	26,726	1.82%	53.05%	6.27%	3.04	Energy	91,367,412	2.66%	24.13%	3.14%	10,386.85	8,796,448	293	0.673	15	15	14
Piauí	22,008	1.50%	-3.64%	-0.53%	7.08	LULUCF	23,465,278	0.68%	28.83%	3.69%	7,544.40	3,110,292	938	0.646	20	26	22
Rio Grande do Norte	9,049	0.62%	-1.10%	-0.16%	2.86	Energy	33,706,749	0.98%	12.94%	1.75%	10,639.67	3,168,027	268	0.684	22	18	23
Sergipe	7,961	0.54%	-12.04%	-1.82%	3.85	Energy	22,046,054	0.64%	3.80%	0.53%	10,660.48	2,068,017	361	0.665	21	13	19
Total Northeast	267,499	18.23%	-5.92%	-0.87%	5.04	LULUCF	482,306,682	14.03%	16.18%	2.17%	9,087.46	53,073,882	555	n.a.			
Distrito Federal	7,273	0.50%	23.54%	3.07%	2.83	Energy	130,933,343	3.81%	13.16%	1.78%	50,943.65	2,570,160	56	0.824	3	17	3
Goiás	76,119	5.19%	13.13%	1.78%	12.68	Agriculture	102,838,292	2.99%	15.53%	2.08%	17,128.90	6,003,788	740		10	12	9
Mato Grosso	84,074	5.73%	77.37%	8.53%	27.70	Agriculture	70,997,135	2.06%	41.24%	5.06%	23,391.86	3,035,122	1,184	0.725	7	11	16
Mato Grosso do Sul	177,393	12.09%	75.92%	8.40%	72.43	LULUCF	52,442,751	1.53%	41.63%	5.10%	21,413.73	2,449,024	3,383	0.729	6	10	10
Total Central-Western	344,859	23.50%	55.75%	6.53%	24.53	Agriculture	357,211,521	10.39%	22.32%	2.92%	25,409.67	14,058,094	965	n.a.			
Paraná	58,545	3.99%	47.65%	5.72%	5.61	Agriculture	222,877,887	6.48%	20.18%	2.66%	21,339.21	10,444,526	263	0.7749	4	6	1
Rio Grande do Sul	76,023	5.18%	3.40%	0.48%	7.11	Agriculture	225,856,569	6.57%	18.94%	2.51%	21,120.07	10,693,929	337	0.746	9	4	6
Santa Catarina	30,232	2.06%	144.44%	13.62%	4.84	Energy	138,240,604	4.02%	14.57%	1.96%	22,124.03	6,248,436	219	0.774	2	2	4
Total South	164,799	11.23%	31.27%	3.96%	6.02	Agriculture	586,975,059	17.07%	18.34%	2.43%	21,432.70	27,386,891	281	n.a.			
Espírito Santo	32,894	2.24%	65.99%	7.51%	9.36	Energy	77,268,113	2.25%	27.43%	3.52%	21,982.69	3,514,952	426	0.74	5	1	7
Minas Gerais	108,309	7.38%	7.28%	1.01%	5.53	Agriculture	303,535,503	8.83%	11.83%	1.61%	15,488.62	19,597,330	357	0.731	8	7	5
São Paulo	149,019	10.16%	22.14%	2.90%	3.61	Energy	1,094,507,625	31.83%	7.46%	1.03%	26,525.67	41,262,199	136	0.783	1	3	2
Rio de Janeiro	92,318	6.29%	11.83%	1.61%	5.77	Energy	343,920,318	10.00%	-4.77%	-0.70%	21,508.56	15,989,929	268	0.761	17	14	8
Total Southeastern	382,541	26.07%	17.58%	2.34%	4.76	Energy	1,819,231,560	52.91%	6.28%	0.87%	22,637.28	80,364,410	210				

Source: Author's elaboration based on Brazil (2009b), Barbi (2014), Way Carbon (2016), Centro de Liderança Pública (2021), Ethos (2022) and MCTI (2022).

[16] The emissions of this table may present small variations concerning the Brazilian emission figures of other parts of this dissertation. This occurs because the estimates in this table are based on the GWP-SAR metric, the only one made available by MCTI for state emissions.

Another important aspect, which is sometimes forgotten in the climate governance debate, is related to the representativeness of each ton of carbon emitted for the economy of the jurisdiction under analysis. This aspect becomes even more relevant when the economic differences among the country's regions are considered. This point can be illustrated by the carbon intensity in the economy. On average, Brazil emits 427 kg of CO_2e for every R$1,000.00 added to the economy. This indicator becomes even worse when analysing the case of the North region of the country, which needs to emit 1,612 kg CO_2e – basically due to deforestation – to generate the same amount of wealth. Meanwhile, the Southeast and South need to emit much less CO_2e to add the same amount of wealth to their economies. This is an extremely relevant debate, as it sheds light on how ineffective LULUCF emissions (basically from deforestation in the Brazilian case) are in promoting economic and social well-being within the country.

These economic and social differences among Brazilian regions and states have also had repercussions on the quality and form of public management in the different states. On the one hand, the southern and Southeastern states tend to have better conditions and capabilities within their respective administrations, something that is reflected in better formulation, implementation, and quality of their public policies. In fact, when analysing the competitiveness ranking of the states prepared by CLP, depicted in Table 7, these differences become clear, with the South and Southeastern states being better positioned both in the efficiency ranking of their public sector and in the environmental sustainability ranking. Recognising these different capacities and realities is a key task when one intends to understand a model of MLG – these different governmental actors, with different administrative and economic realities, coexist.

However, even when facing obstacles of different sorts, the short history of Brazilian climate change subnational governance has also shown positive achievements that, in some cases, have exceeded some of the goals set at the national level, as in the case of the state of São Paulo, whose 2009 State Climate Policy adopted a mandatory economy-wide GHG emission reduction of 20% by 2020 compared to 2005 levels; this was an objective that went beyond the PNMC national GHG targets (Lucon & Goldemberg, 2010).

In terms of climate policy formulation at the state level, 18 out of 27 federative states already have climate bills, as depicted in the timeline presented in Figure 8. Although the first two states to have their climate bill passed were the Northern region states of

Amazonas and Tocantins, by looking at the institutionalisation of climate policies at the legal level, it is possible to see a better advancement of this matter in the states of the South, Southeastern and Centre-West regions of Brazil, which reflect, to some extent, the level of readiness and capacity of the state governments to deal with the issue as well as the challenges of the North and Northeastern region states in dealing with the matter.

It is also important to highlight that many of the state climate bills were passed during the national policy momentum towards climate change in 2009, which saw the implementation of the PNMC and the submission of the NAMAs at the COP in Copenhagen (see Figure 8). Some states were even ahead of the federal government in terms of climate policy institutionalisation, including the states of Amazonas, Tocantins, Goiás and São Paulo, which passed their respective climate bills before the national bill that approved the PNMC.

In regard to the formulation and development of such state climate bills, Barbi (2014) highlighted that many of the states employed their respective State Forum on Climate Change to kick off the talks in this regard and that most of the state's policies are cross-sectoral oriented, as the PNMC tends to be. However, few states have set GHG emission reduction targets or an objective policy track to develop their respective GHG inventories. Furthermore, it is important to highlight that many of these legislations were passed just before or after the institutional developments at the federal level promoted by the PNMC. However, it was observed that these initiatives were put forward on autonomous paths lacking integration with the national level, as pointed out by Barbi (2014) and by many of the stakeholders interviewed during this study.

However, in regard to the integration of subnational initiatives with the PNMC, one important attempt was the establishment of the Federative Articulation Unit for Climate (NAFC, in Portuguese) under the GEx. Aiming to enhance federal harmonisation in regard to climate policies, the NAFC was implemented in February 2013 with an initial work agenda focusing on the capacity building of the state governments on monitoring, reporting and verification (MRV) issues. It set the following two working groups: i) the Working Group on GHG Inventories and ii) the Working Group on Emissions Registry. However, after a promising beginning, in which several meetings and technical documents were undertaken, the NAF saw a

reduction in its activities, and after 2014, no more activity was seen in this initiative (Senado Federal, 2019).

With more than 5,000 municipalities, which have hugely different economic, social, cultural and environmental realities, climate action at the municipal level in Brazil is also an enormous challenge. This does not mean that local action is not going on – many city network initiatives, such as the Local Governments for Sustainability partnerships as well as the Environment Secretaries Forum of the Brazilian Capital Cities (a national adaptation of the world-famous C40), suggest a momentum in this issue (Dubeux, 2019). However, these local developments are facing a series of bottlenecks related to a lack of capacities and funding, and most lack coherence with the national law and even GHG emission reduction goals (Barbi, 2014; Senado, 2019). Moreover, in most cases, a lack of joint action/integration of different municipalities of the same metropolitan regions, which share common problems and challenges due to climate change, can be observed (Espíndola & Ribeiro, 2020).

In a nutshell, despite many efforts already having been made at the subnational levels, many of these efforts are facing various expected constraining issues that are present within Brazilian federalism, such as lack of capacities, resources and policy coherence. This is particularly critical nowadays, where bets are being taken that the subnational level will replace the vacuum left by the national government in the country's leadership to enhance climate action. However, this assumption should be viewed with reserve due to the different bottlenecks that were highlighted in this subsection. In this regard, despite some recent political signals (especially in terms of discourse), strengthening subnational climate governance is not an easy task to undertake.

For instance, one of the most prominent initiatives adopted in the last years is the coalition Governadores pelo Clima (Governors for Climate) initiative set in 2020. (Centro Brasil no Clima, 2020). However, many of the interviewees highlighted that this governmental involvement is a welcome change, although there is still a lack of information as to what extent this will be incorporated in the different GHG mitigation actions of the different states involved and how this discourse will be converted into the planning and budgetary aspects of the respective state public administrations.

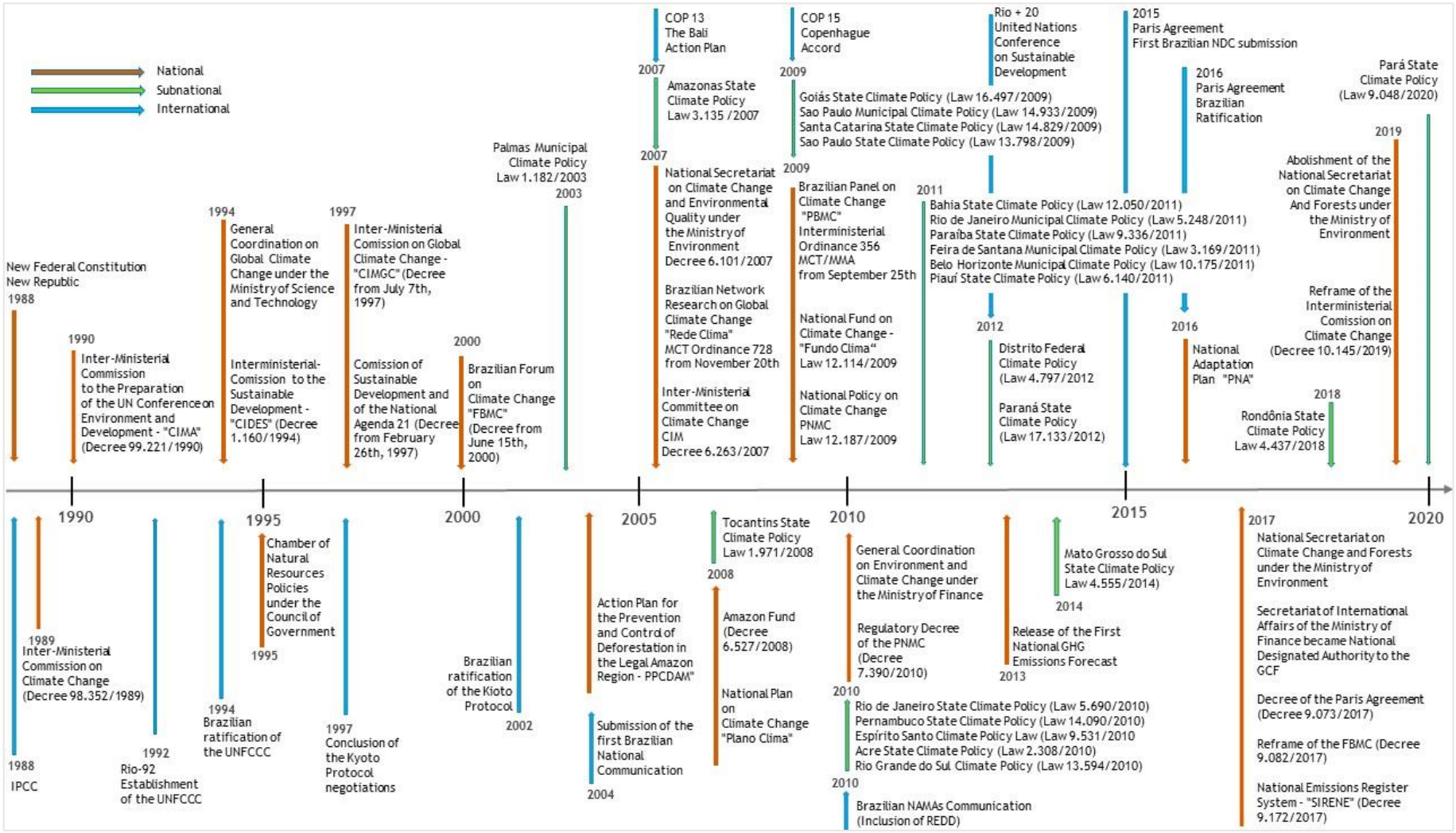
4.8 Conclusion

This chapter presented the institutional evolution of the architecture of Brazilian climate governance from a historical perspective. Moreover, I discussed the sequence of legislation and structural improvements made after the establishment of the current Brazilian constitutional regime (1988), which has had important impacts on Brazilian climate politics. Such events are threefold (international, national and subnational), and they are summarised in Figure 8.

This evolution of institutions and leadership of the agenda was initially top-down oriented, characterised by a movement from outside (foreign policy) to inside (domestic policy), in which the strong leadership from the MRE was noted. It is worth mentioning that this ministry has continued to be an important player in the Brazilian climate governance process, notwithstanding the subsequent ascension of the MCTI and MMA.

From the mid/late 1990s, the internalisation process of the climate agenda occurred through the leadership of the MCT, which, a decade later, would be substituted by the MMA with the creation of the CIM in 2006. This change in political leadership was followed by a bureaucratic crash and overlap, especially between the MMA and the MCTI. This was also a period of intense production in terms of regulations (e.g. PNMC and subnational climate laws), the formation of scientific groups (e.g. Rede Clima and PBMC) and the establishment of dedicated bureaucratic structures within the federal ministries dealing with different facets of climate policy. However, despite the climate agenda gaining more economic prominence first with the establishment of the PNMC's sectoral plans and then with the elaboration of an economy-wide NDC, climate governance was not modified to empower and provide a more active voice to government actors from the economic area and the centre of government. The MMA remained the main player on the agenda at the domestic level despite its institutional competencies being clearly insufficient for what an economy-wide, transversal climate policy tends to demand.

Figure 8 – Timeline of Brazilian climate change governance – key milestones.



Source: Author's elaboration.

A second obstacle that characterises the evolution of the architecture of climate governance in the country concerns the difficulties found in the consolidation of an MLG involving different national and subnational actors relevant to the promotion of GHG mitigation arrangements. More than 30 years after the first institutional arrangements, the country still faces difficulties in seeing MLG in practice despite the large number of climate laws at the subnational level. This bottleneck tends to be explained by the country's difficulty in building federalism in a broad sense.

With CF 88 as the main guiding principle, the different competencies relevant to the climate agenda are distributed among the different levels of government that make up the Brazilian federation. However, the full exercise of these competencies is hindered by the difficulties faced by the different actors in implementing them. Such difficulties not only include financial aspects and technical capacities but are also influenced by the different socioeconomic realities found throughout the Brazilian territory that tend to affect the way the different governments prioritise and view the climate issue. In a multilevel model, these differences should be dealt with by the national governance component, but it has been observed that the national government pays little attention to the topic, which ends up being reflected in the disintegrated and uncoordinated way in which the Brazilian climate policy has been carried out in practice until the present moment.

The conditions described above – especially regarding the historical aspects, the difficulties in the functioning of Brazilian federalism, the regional socioeconomic differences and the difficulty in consolidating the climate policy as a development policy, which needs to navigate beyond the competencies of the MMA – form what I call the exogenous conditions of climate governance in my analytical framework. This is essential information to be able to understand, analyse and discuss the context of the Brazilian climate policy and under which circumstances the different governance gaps tend to manifest themselves. Given this important background, in the next chapter, I will discuss the Brazilian climate policy through the cases already mentioned in the previous chapters of this thesis.

Chapter 5 – Brazilian Climate Multilevel Governance in Practice

5.1 Introduction

This chapter presents the empirical part of the research and constitutes the core of the present study, where the cases are presented, analysed based on the analytical framework presented in the chapter and discussed in the light of the theories of MLG and coordination of public policies (presented in Chapter 2) and the history of the development of Brazilian federalism and its difficulties and contradictions (presented in Chapter 4). The chapter is divided into five sections. Section 5.1 introduces the Chapter. In Section 5.2, I examine the PNMC and the extent to which Brazil's first specific national policy related to climate change was able to operate in a cross-sectoral and multilevel policy environment in which several intragovernmental and intergovernmental relationships were supposed to take place. Sections 5.3 and 5.4 are dedicated to the sectoral case studies, transport (5.3) and agriculture (5.4), respectively, where the PSTM and the ABC Plan are analysed and discussed. At the end, the chapter contains Section 5.5 which makes comparisons between the three cases (PNMC, PSTM, ABC Plan).

5.2 National case – the national policy on climate change

5.2.1 Introduction

Brazil adopted its PNMC in December 2009. It set a voluntary commitment to reduce the country's GHG emissions between 36.1% and 38.9% in 2020 based on a deviation of the forecasted emissions for the same year. Such a commitment was also part of the country's NAMAs, announced during the COP 15 under the UNFCCC (Copenhagen in 2009).

Based on a crude numerical analysis, Brazil is about to achieve this voluntary reduction goal. However, the difficulties of fostering a proper multilevel policy environment as well as the years of economic and political crises that succeeded the launch of the PNMC have introduced widespread doubts about the effectiveness of this policy in reducing the country's emissions and provoking transformative change towards a low carbon economy in the long run. For instance, the PNMC struggled with issues related

to the monitoring, integration, coordination and financing of its multisectoral actions. Such concerns have worsened in recent years due to the successive increase in the Brazilian Amazon deforestation rate as well as the structural changes observed in the federal climate governance.

In this first case study, I aim to investigate the problems faced by the PNMC by employing an MLG lens of analysis, as discussed in Chapter 2 of this dissertation. Moreover, I intend to understand how the different governmental institutions interacted among themselves while working during the lifetime of the PNMC. To do so, I employ my analytical framework (see Chapter 3) to identify and explain four governance gaps (i.e. politics, institutions and processes, resources and information) alongside critical moments in the lifetime of the PNMC. The findings suggest that these gaps have been occurring simultaneously but at different scales since 2009, with the politics and institutions and processes gaps being more pronounced. This chapter also reveals that overcoming such governance issues is of critical importance for Brazil to comply with its NDC under the Paris Agreement, in which the country pledged an unconditional commitment to reduce its GHG emissions by 37% below 2005 levels by 2025 and 43% below 2005 levels by 2030 (Brazil, 2015c).

5.2.2 Background

The 2009 PNMC was a milestone from which mitigation and adaptation to climate change started to be considered within the scope of Brazilian domestic policies in a more pronounced way. Until then, the governmental actions in regard to the climate agenda had mainly been related to international affairs; the country, under the leadership of its MRE, played decisive roles in most of the global concertation initiatives to tackle climate change (e.g. the organisation of the Rio 92 Conference; the development of the CDM; and the development of the Bali Road Map and the NAMAs.

Thus, it was with the first Brazilian national climate policy those Brazilian politicians and policymakers started to deal with the inherent challenges of a cross-sectoral and multilevel policy, as climate policies tend to be. In Brazil, these challenges were especially tricky since the country's GHG emissions profile was experiencing fundamental changes in terms of sectoral emissions. This was because the country's profile was historically and strongly linked with the emissions from LULUCF, in

which the CO_2 released from the deforestation of the Brazilian Amazon biome was the main variable.

However, due to the 2004 Action Plan for the PPCDAm, Brazil successfully reduced the Legal Amazon deforestation rates from 27,000 km^2 in 2004 to 7,464 km^2 in 2009. What makes this achievement even more remarkable is the fact that the country did so in a context of sustained economic growth not only for the entire national economy but also for the agricultural sector, as depicted in Table 8. The combination of positive results in both aspects (economic and environment) was a trigger for the launch of the PNMC since this was used by policymakers to convince the political level to include GHG reduction targets within the national policy of the same magnitude that the country was about to present in the COP of Copenhagen at the end of 2009 through its NAMAs.

Table 8 – Brazil: selected economic and climate figures.

Year	**GDP Brazil – annual rates (% p.a.)**	**GDP BR agriculture sector - annual rates (% p.a.)**	**Legal Amazon Deforestation rate (km^2 p.a.)**	**Emissions Brazil ($MtCO_2e$ GWP 1995)**	**Emissions LULUCF – Brazil ($MtCO_2e$ GWP 1995)**
2004	5.76	2.00	27,772.00	3,324.8	2,508.9
2005	3.20	1.12	19,014.00	2,353.5	1,522.3
2006	3.96	4.64	14,286.00	1,949.0	1,111.6
2007	6.07	3.25	11,651.00	1,662.5	818.9
2008	5.09	5.77	12,911.00	1,795.4	922.8
2009	–0.13	–3.73	7,464.00	1,175.9	317.3

Source: Author's elaboration based on IBGE (2020), INPE (n.d.) and MCTI (n.d.).

A second background aspect that helps to explain the approval of the PNMC in 2009 is the international climate talks at that time, wherein Brazil was trying to consolidate its soft power. The preceding negotiation of the Conference of Copenhagen was proving extremely complex to address in the short term, with developed countries

facing difficulties in managing their commitments. Meanwhile, Brazil, an emerging country with no legal obligation to cut its GHG emissions at the time, was in a comfortable situation since it had just accomplished the biggest emissions cut ever promoted by a single country. Thus, arriving in Copenhagen with a climate policy would not only be a demonstration of leadership but would also promote the country as a very attractive destination for those who wanted to invest and donate to climate action worldwide.

With this background, Brazil established the PNMC on 29 December 2009 through Law n. 12.187. This climate bill established a voluntary 2020 GHG reduction target between 36.1% and 38.9% based on the project emissions for the same year (same as the target set in the NAMAs). Moreover, it also presented directives and planning and governance instruments that formed the institutional framework of the first Brazilian climate policy at a national level, all of which are still valid today (Brazil, 2009).

5.2.3 Case description

The PNMC brought about a voluntary national commitment to cut Brazil's GHG emissions between 36.1% and 38.9% of the projected emissions by 2020. Both the projection of emissions for the year 2020 and the detailing of actions to achieve the established goal of reducing emissions were established by Decree n. 7.390 of 9 December 2010 (Brazil, 2010c).

In addition to the GHG mitigation target, the PNMC also established principles, directives, objectives and several instruments to be employed over its lifetime. In terms of the principles, it referred to precaution, prevention, citizenship participation, sustainable development and common but differentiated responsibilities principles. Moreover, the bill stated that the objectives of the PNMC should be in accordance with sustainable development to pursue economic growth, eradication of poverty and reduction of social inequalities by which the following should be observed (Brazil, 2009b):

- The compatibility of economic–social development with the protection of the climate system
- The reduction of anthropogenic emissions of GHGs in relation to their different sources

- The strengthening of anthropogenic removals by sinks of GHGs in the national territory
- The implementation of measures to promote adaptation to climate change by the three levels of government.
- The preservation, conservation and recovery of environmental resources, with particular attention paid to the large natural biomes, considered a national heritage
- Consolidation and expansion of legally protected areas and incentives for reforestation and recovery of the vegetation cover in degraded areas
- Stimulation of the development of the Brazilian Market for Emission Reduction (MBRE).

The law also referred to various policy instruments to be employed by the PNMC, which included the following: i) general instruments (article 5 of the climate bill) and ii) institutional instruments (article 6). A total of 17 general instruments were referred to in the law, in which the following should be stressed: i) the Plano Clima, ii) the Fundo Clima, iii) the Action Plans for Prevention and Control of Deforestation in the Biomes, iv) the CNs to the UNFCCC and v) the resolutions from the CIMGC (the body which was responsible for dealing with the approval of CDM projects). Moreover, article 11 mentioned the obligation of the government to develop different sectoral plans aiming at the consolidation of a low-carbon economy. These sectoral plans can be also understood to be in the category of general policy instruments. Regarding these plans, it is important to highlight that some of them were already in place before the establishment of the PNMC. These were governmental plans already being implemented owing to reasons other than the implementation of the PNMC specifically. These plans in this situation are included the PPCDAM and the PPCERRADO, managed by the MMA as well as the PDE, elaborated by the MME. The other plans were brought by PNMC brought “new” plans, which should be elaborated by the incumbent ministries until 15 December 2011. This deadline was lately postponed to 16 April 2012 due to delays in the elaboration of some plans. depicts the plans with their respective sectoral coverage and incumbent ministries.

Table 9 – The National Policy on Climate Change sectoral plans.

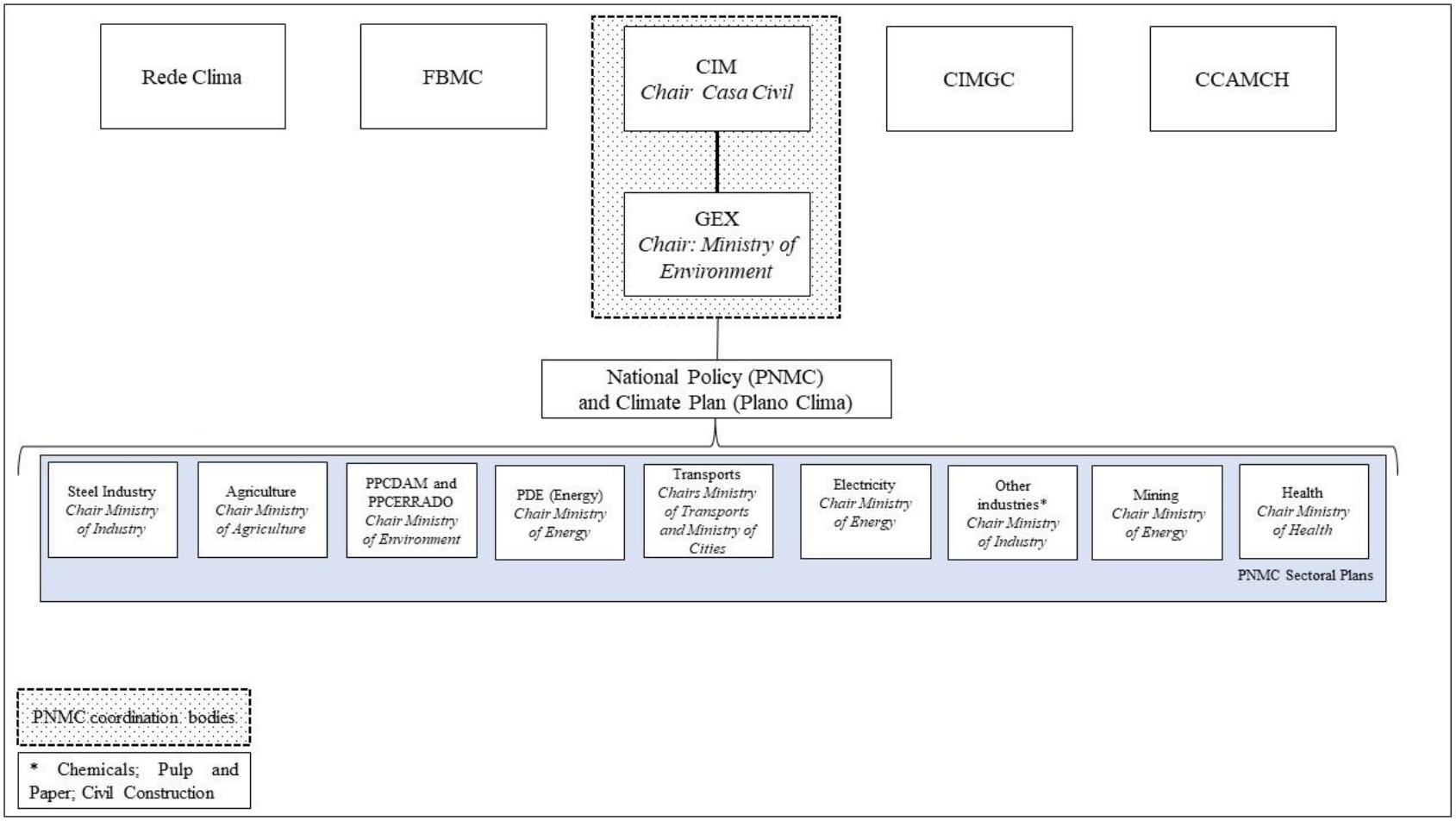
Sectoral Plan	**Sector**	**Incumbent Ministry**	**In place before the PNMC?**
Action Plan on Prevention and Control of Deforestation on the Amazon Biome (PPCDAm)	Amazon biome	MMA	yes
Action Plan on Prevention and Control of Deforestation on the Cerrado Biome (PPCERRADO)	Cerrado biome	MMA	yes
Decennial Plan on Energy (PDE)	Energy	MME	yes
Low Carbon Agriculture Plan (ABC Plan)	Agriculture	MAPA	no
Steel Industry Emission Reduction	Steel	MME	no
Sectoral Plan for Climate Change Mitigation for the Consolidation of a Low Carbon Emission Economy in the Manufacturing Industry (Plano Indústria)	Transformation industry; consumer durable goods; chemicals; pulp and paper; civil construction	MDIC	no
Sectoral Health Plan for Climate Change Adaptation and Mitigation	Health services	MS	no
Low Carbon Mining Plan (PBMC)	Mining industry	MME	no
Sectoral Plan for Transportation and Urban Mobility for Mitigation and Adaptation of Climate Change (PSTM)	Interstate transportation of goods and people; urban public transportation	MT; MCid	no

Source: Author's elaboration based on Brazil (2010c).

The institutional instruments mentioned in article 5 are the backbone of the national climate governance, and they are integrated by the following organisations: i) the CIM (chaired by the Casa Civil), ii) the CIMGC (chaired by the MCTIC), iii) the FBMC, iv) the Rede Clima and v) the Steering Commission on Meteorology, Climatology and Hydrology Activities (CCMCH). The CIM and GEx played a principal role in such governance since they oversaw the coordination and monitoring of the PNMC. At the time of the launch of the PNMC, all of these organisations were already in place. For instance, the CIM and the GEx elaborated the Plano Clima in 2018, which was supposed to serve as a planning piece for the implementation of the PNMC. Figure 9 summarises the governance of the PNMC as well as its main policy instruments.

In terms of objectives, it can be said that the PNMC has two overarching objectives. The first major objective has a short-term goal aspect, clearly stated in the law, which is the reduction of the country's GHG emissions by 2020. The second major objective is built from a systemic interpretation of the different commands contained in the law. It concerns a long-term and structural perspective that can be understood as the search for horizontal and vertical harmonisation of principles, directives and actions to achieve a low carbon pathway in the whole country. For instance, the possibility of using different sectoral plans to fulfil its voluntary commitment to reduce GHG emissions, the different mentions of the construction of a multilevel and integrated policy and the concern with the diversity of the socioeconomic context where the policy will be implemented show that the text of the PNMC presents considerations consistent with the construction of a durable climate policy in the long term. However, the effective implementation of this intersectoral and multilevel approach has proved to be more complex than the text of the climate policy law assumed, as I will address in the analytical part of this chapter.

Figure 9 – The governance of the National Policy on Climate Change.



Source: Author's elaboration based on Brazil (2007b, 2009b, 2010c).

With the establishment of the PNMC, the launch of many institutional improvements in the federal government administrative structure in regard to climate political challenges was observed. For instance, in 2010, the MRE upgraded its bureaucratic unit related to environment and climate change issues by creating the Secretary of Environment, Energy and Science and Technology, which had a specific division to deal with climate negotiations. In 2012, the MMA transferred the Directorate of Deforestation Tackling Polices from its vice-ministry branch to the SMCQ, aiming to integrate the actions to tackle deforestation into the climate policy framework. This association between climate and deforestation policies within the same MMA secretariat was kept during the 2017 administrative reform when the SMCQ was replaced by a new secretariat titled the SMCF (Senado Federal, 2019).

The institutional developments were also seen in other federal ministries, which, before 2009, were not strongly involved with the climate agenda. For instance, the Ministry of Finance (MF) established the General Coordination on Environment and Climate Change under the umbrella of the SPE in 2010, which has helped the federal government to leverage its actions in terms of the economic debate about climate change (Brazil, 2010a). More recently, in 2017, it was also defined that the Secretary of International Affairs of the MF would serve as the NDA of the GCF (Ministério da Economia, 2020).

Furthermore, sectoral ministries, such as the Ministries of Agriculture, Energy, Development, Industry and Trade, Cities, and the Strategic Affairs Secretary among others[17] also took part in the national climate agenda through different administrative approaches (e.g. ministerial units, sectoral technical bodies and sectoral policies), which demonstrates the cross-cutting appeal and coordination challenges that the climate agenda poses to the government. It should be noted that many of the administrative developments in the federal ministries happened only at the technical level of the ministries, with the political leadership of the agenda resting in the MMA.[18]

[17] Just to name a few of them: the Low Carbon Agriculture Platform – Plataforma ABC (MAPA), the Technical Commission of the Sectoral Plan of Emission Reductions in the Industry and the Low Carbon Industry Technical Chamber (MDIC), the Renovabio (MME), the Technical Group on Urban Mobility (MCid) and the Strategic Thinking on Climate Change Unit (strategic affairs secretary of the Brazilian presidency).

[18] In fact, the MMA increased technical and political dominance over the agenda from 2009 onwards. This can be confirmed by the fact that several bodies were created during the PNMC as well as by looking at the leadership of the former ministries of environment during the 2009 COP (NAMAs) and the 2015 COP (NDC). The last restructuring of the CIM (in 2019) confirmed such an impression since it increased the political and bureaucratic power of the MMA within the agenda.

5.2.3.1 The National Policy on Climate Change and the Brazilian Nationally Determined Contribution under the Paris Agreement

Six years after the PNMC was issued, the Paris Agreement was reached during the UNFCCC negotiations. It provided a new paradigm for climate policymaking since it represented a breakthrough in the international negotiations on climate change by recognising the importance of the engagement of all countries and government levels in the fight against global warming and by establishing instruments for nations to use to adopt an economic development strategy based on low GHG emissions.

One of the essential instruments for the implementation of the Paris Agreement is the successive NDCs, through which countries must present their actions to combat climate change and avoid an increase of more than 2℃ in the global average temperature compared to the pre-industrial level. As the Paris Agreement states, each party (country) must prepare, communicate and maintain successive NDCs that they intend to achieve over the years. Two important aspects of the NDCs are the following: i) they will be 'economy wide', that is, they should include actions and measures that consider the whole economy, and ii) they should be periodically reviewed (every five years).

So far, Brazil has presented two NDCs targeting 2025. According to the document presented by the Brazilian government to the UNFCCC secretariat, Brazil has committed to reducing its GHG emissions by 37% below 2005 levels by the year 2025. The document also presented a subsequent indicative contribution to reduce emissions by 43% below 2005 levels by the year 2030. The nature of the commitments undertaken in the Brazilian NDC is different from that of those presented by Law n. 12,187/2009 and the NAMAs since this new commitment targets an absolute reduction in relation to the historical emissions rather than a focus on bringing down emissions compared with a hypothetical scenario, which was the core of the PNMC target (Brazil, 2015).

From a broader perspective, the Brazilian government's official document on the NDC presented in 2015 spelled out the message that the Paris Agreement is a complex and cross-cutting agenda, imposing a political and technical coordination challenge that goes beyond the specific competencies of ministries and government agencies and that requires the active participation of the entire government, which includes its

environmental, economic, social, infrastructure and, especially, central government portfolios.

In 2020, the Brazilian government updated its NDC. This updated version also included the commitment to reducing emissions, in absolute terms, by the years 2025 and 2030 with the same percentages of 37% and 43% below 2005 checked levels, respectively. The main difference in regard to the first version of the document was that unlike the NDC submitted in 2015, which used data from the second national inventory of GHG emissions as a reference for the reduction of emissions, the updated NDC indicates that the baseline for the reduction of GHG emissions is the data available in the third national inventory of GHG emissions. In practice, this adjustment means that the reduction of GHG emissions aspired to by Brazil considering the updated NDC version is lower than what was initially proposed in 2015. Table 10 summarises the GHG reduction targets of the country under the PNMC and the two NDCs.

Table 10 – Brazil's greenhouse gas emission reduction targets (National Policy on Climate Change and Nationally Determined Contributions).

	2020 target	**2025 target**	**2030 target**
PNMC (2009)	Reduce between 36.1% and 38.9% of its projected GHG emissions by 2020.	-	-
NDC 2015	-	Reduce 37% of emissions in relation to the base year of 2005. CO_2e cap: 1.3 Gt CO_2e	Reduce 43% of emissions in relation to the base year of 2005. CO_2e cap:1.2 Gt CO_2e
NDC 2020	-	Reduce 37% of emissions in	Reduce 43% of emissions in relation

		relation to the base year of 2005. CO_2e cap: 1.76 Gt CO_2e	to the base year of 2005. CO_2e cap:1.6 Gt CO_2e

Source: Author's elaboration based on Brazil (2009b) and UNFCCC (2016, 2020).

From Table 10, and considering the 2020 version of the NDC, Brazil aims to reach, by 2025, a total emission level of 1.76 Gt CO_2e[19] instead of the 1.3 Gt CO_2e as originally intended by the NDC submitted in 2015. By way of illustration, this difference in emission volume between the two NDCs is practically equivalent to the total emissions of the country's energy sector in one year. Despite the theoretically correct argument that Brazil updated its emission level based on a new inventory that incorporates the best available science for the estimation of different sectoral emissions within its inventory, which is even guided by the UNFCCC itself, by updating its NDC and bringing its emissions to an absolute level higher than that initially proposed, Brazil is not observing one of the basic rules of the Paris Agreement, which is that countries need to present successive NDCs with increasing levels of ambition regarding their emissions cuts.

Regarding the elaboration of its NDCs, it can be said that Brazil used the climate governance structure at the national level (CIM, GEx and other collegiate bodies) in a very limited way. On the one hand, the elaboration of the NDC presented in 2015 was conducted by the MMA, which held ministerial consultations and other nongovernmental actors to finalise the text and elaborate the reduction targets. There are no records of CIM and GEx meetings being held to discuss the topic. On the other hand, the version of the NDC submitted in 2020 was considered and approved by the Council of Ministers of the CIM at a meeting on 8 December 2020 (Casa Civil da Presidência da República, 2020). The building process of this updated version of the NDC, for example, which involved consultations with ministries and the private sector, was not detailed at the meeting that approved it.

[19] $GtCO_2$ represents one billion tonnes of carbon dioxide.

5.2.4 Results

Considering the history of the PNMC, the application of my analytical framework enabled me to identify the manifestation of the four governance gaps. Some of these gaps were more pronounced, not having been properly addressed during most of the lifetime of the PNMC, such as the gap on politics (gap 1) and the gap on institutions and processes (gap 2). The process of elaboration of the NDCs was also considered in this analysis.

Gap 1 – Politics

The gap on politics was identified throughout practically the entire PNMC lifetime. This conclusion could be made based on the observation of three main aspects that generated this type of gap, as follows: i) occasional political attention, ii) lack of a clear political will throughout the PNMC and iii) reduced engagement from the upper tiers of the federal government. Overall, political will and engagement were limited to the MMA authorities, as the evidence indicated.

Regarding the political attention in regard to climate change in the PNMC, it was identified specifically in the early stages of the PNMC (e.g. the PNMC's design). This period ranged from the development of the climate bill by the executive branch in 2007 and 2008 until the parliamentary discussion and approval of the climate bill in 2009. Moreover, considering the earlier years of the implementation of the PNMC, which included the design of the regulatory decree of the PNMC (Executive Decree n. 7,390 from 2010) and the inter-ministerial talks related to the preparation of the sectoral plans (2010 to 2013), my findings also revealed a certain degree of engagement from the high-level staff of the federal ministries as well as some ministers themselves. Apart from the MMA, most of this political attention was gradually lost over the following years.

As mentioned by many interviewees, one of the triggers of such political awareness within the federal government was the willingness of the government to enhance the international soft power that Brazil had on the environmental agenda. One piece of documented evidence of this will is the speech from President Lula given during the UNGA, in which he declared that Brazil would 'soon launch its own climate plan'. It was also during this United Nations meeting that the Brazilian president made the pledge to host the Rio+20 Conference, held in 2012 in the city of Rio de Janeiro (UN,

2007, p.6). One consequence of that political willingness was the approval of Executive Decree n. 6.263 in 2007, which created the CIM and the GEx. The GEx was commissioned to the preparation of a preliminary proposal containing general objectives, principles and directrices of the PNMC which was supposed to be sent to the CIM by 11 January 2008.

My findings also revealed that two specific situations in the domestic political landscape also worked as triggers of the political interest in regard to the approval of a climate bill at the national level. The first aspect was that at the time of the 2007 executive decree, there were six climate bill proposals under deliberation in the Brazilian parliament that had already been submitted by lawmakers of the Deputy Chamber (the lower house of the Brazilian National Parliament).[20] The second aspect that tends to explain this sudden increase of political involvement in the climate agenda was the presidential election scheduled for 2010. As stressed by many of the interviewees, the topic was gaining importance in the discourse, and actions, of the likely main opposition contenders in the next presidential election, which would happen in 2010, and the government was trying to avoid falling behind in such political debates.

On the one hand, José Serra, governor of the state of São Paulo, was on the verge of passing a state climate law with absolute reduction targets. It should be noted that such an attempt was not commonly achieved, especially considering the economic relevance of the state of São Paulo to the Brazilian economy. On the other hand, Senator Marina Silva, a notorious environmentalist who had recently left her position as Lula's environment minister after clashes with Minister Dilma Roussef[21] was using the Senate's tribune to fiercely criticise Lula's environmental and climate actions. One respondent stressed,

> The reduction of deforestation and the consequent drop in [GHG] emissions were important factors in creating the technical and political conditions for Brazil to have its climate policy. Then in 2009, with the expectation that Marina Silva would become a candidate [for president of the republic in the 2010

[20] In November 2007, there were the following climate-related legislative proposals in the Lower House (Deputy Chamber): i) Project of Law n. 18/2007 (presented by Member of Parliament [MP] Sarney Filho); ii) Project of Law n. 261/2007 (presented by MP Mendes Thame); iii) Project of Law n. 479/2007 (presented by MP Fernando Gabeira); iv) Project of Law n. 759/2007 (presented by MP Ruy Pauletty); v) Project of Law n.1,378/2007 (presented by MP Rebecca Garcia); and vi) Project of Law n. 2,056 (presented by MP Edson Duarte).

[21] Lula's executive office chief and potential Labour's party contender for the 2010 presidential election.

> elections] and that Serra would also become a candidate, the federal government instances became mobilized to elaborate the national policy on climate change as fast as they could. (respondent NG7)

Thus, in June 2008, the PNMC law proposal was sent from the Executive branch to the Brazilian Parliament. On this occasion, the then Minister of Environment Carlos Minc highlighted the participatory way as the proposal was developed being

> a result of a process that involved ten GEX meetings and three CIM meetings. The participation of civil society happened through the meetings held by the FBMC, which included the participation of different sectors, notably academia, the private sector, the state forums on climate change, and the NGOs. (Brazil, 2008a, p. 1)

In terms of contents, there were noticeable differences between the proposal submitted by the government and the text that was approved by President Lula da Silva. In fact, the law proposal indicated the following two national objectives: i) the reduction of the anthropogenic emissions by sources and the enhancement of the removal of anthropogenic emissions by sinks of GHGs in the national territory and ii) the definition and implementation of measures to promote climate change adaptation in local communities, municipalities, states, regions and economic and social sectors, particularly in the ones vulnerable to the adverse effects of climate change (Câmara dos Deputados, 2008). The GHG emission reduction targets as well as the sectoral plans were not included in this initial version, having been included later during the legislative process.

The draft law of the PNMC initiated its legislative process in June 2008, identified as Law Proposal n. 3,535/2008. The debate about this proposal progressed at a slow until October 2009, when a requirement of urgency (Requirement n. 5,643/2009) was petitioned by Deputy Henrique Fontana (from the government's party [Labour's party]) and other members of the parliament. As many interviewees highlighted, such urgent processing was mainly motivated by the proximity of COP 15 (Copenhagen) as well as by the prospect of the approval of the São Paulo climate bill in the short term.

The final parliamentary pooling regarding the PBMC happened on 9 December at the Deputy Chamber, in time for President Lula da Silva to inform the approval of the Brazilian climate bill during his participation at the COP 15 in Copenhagen. As

mentioned earlier, the proposal was considerably amended in the National Congress, and many relevant features of the policy were added at this stage. For instance, this was the case for the GHG reduction targets added by an amendment requested by Senator Ideli Salvatti, the then situation leader, who was chairing one of the Senate committees in charge of formally assessing the climate bill proposal. Table 11 summarises the main amendments made by the National Congress in the final version of the law of the PNMC, which was officially adopted on 30 December 2009 with presidential sanction.

Table 11 – The National Policy on Climate Change law proposal: main amendments from the National Congress.

Subject of the amendment	**Member of Parliament**	**House**
Inclusion of a national voluntary commitment to reduce the Brazilian GHG emissions by 36.1%–38.9% below the projected emissions for 2020 (in article 12 of the law).	Senator Ideli Salvatti	Federal Senate
Inclusion of the Action Plans for Prevention and Control of Deforestation in the Biomes as one of the instruments of the PNMC (in article 6 of the law).	Senator Marina Silva	Federal Senate
Inclusion of the sectoral plans aiming the consolidation of an economy of low carbon consumption (in article 11 of the law).	Deputy Mendes Thame	Deputy Chamber
Establishment of the 'carbon credit' as a type of security to be negotiated in a future Brazilian Market for Emissions Reduction (in article 9 of the law).	Deputy Mendes Thame	Deputy Chamber

Source: Author's elaboration based on Senado Federal (2009) and Câmara dos Deputados (2009).

Nevertheless, with the PNMC entering its implementation phase from 2010 onwards, my analysis suggested that the political support that was present in a major part of the setting stage of the PNMC was being gradually reduced. The analysis found clear political engagement of the MMA, especially during the elaboration of the sectoral plans. However, apart from some exceptions, such as the partial political engagement of the MAPA, most of the other federal ministries sent their technical levels (third or fourth tier) to the intragovernmental talks which were setting the implementation of the PNMC. This conclusion was supported by many interviewees as well by the list of governmental representatives at the CIM and GEx meetings, in which the MMA usually participated with its top officials while the other ministries were represented by medium-tier civil servants of their respective ministerial structures. As different respondents stressed,

> The MMA's gain in prominence occurs in parallel to the Casa Civil's reduced participation in the coordination of the CIM and the PNMC. The MMA was occupying the space, the vacuum, left by the Casa Civil. If Casa Civil had used its power of convening to mobilize other ministries, which depends on the importance the government gives to the theme, there would be the participation of higher hierarchical levels in the meetings and deliberations of the CIM and GEx.(respondent NG7)

> The minister of finance himself participated in the NDC discussion because he was interested in the subject. After he left the Ministry, the internal discussion about climate change lost momentum and support. Of course, the staff of the ministry of finance remained involved, but in terms of the highest tiers [of the ministry of finance], I am not sure about that. (respondent P1)

> In the period that we had many ministers participating in the process, we made good progress [in the climate agenda]. This happened very clearly during the elaboration of the Climate Plan (2008). But then it weakened (the participation of ministries) and only the ministers of the environment remained more active [in the climate policy discussion]. So, it was difficult to coordinate and have a more integrated approach. There was one clear exception, which was the Ministry of Agriculture, which was well involved until the launching of the ABC plan. (respondent G5)

In a nutshell, the employment of the analytical framework, in this case, showed that the political gap prevailed in most of the lifetime of the PNMC, except for during the initial debates of the PNMC. As highlighted by some interviewees, a likely implication is that this gap may have contributed to the emergence of other governance issues, possibly influencing the emergence of the other gaps, especially the institutions and processes and the resource gaps. It might also be a potential explanation for the difficulties found in the federative (national–subnational) relationships on that matter. As highlighted by some respondents,

> Things [climate policies and plans] will be difficult to speed up unless you have the topic within the core of the national government and connect to the economic area. (respondent A6)

> The question of coordination needs to be punctuated with political time. In the Lula government [2003-2010], President Lula liked a strong Casa Civil, in charge of coordinating the whole government. At that time, that government had several ministries, so it was necessary to have a quality filter for things [policy proposals, governmental actions]. This filter was the Casa Civil. In President Dilma's model [2011-2015], she liked to speak directly with the ministers. In Dilma's model, the Casa Civil did not work like in Lula´s administration. The "filter" was the ministries directly. And from this posture, the coordination of the Casa Civil becomes secondary. And this affects everything below, including the climate governance model and the CIM functioning. (respondent G6)

> This bypass, of the president talking directly to the ministers, ended up undermining the work of the second-level technicians themselves. The internal communication, even within the ministries was not clear. The people who were in day-to-day politics were losing the order of things, and their references. For example, the next steps, the flow of decisions, etc. The contacts in the Casa Civil were lost. (respondent G5)

Gap 2 – Institutions and processes

The gap on institutions and processes was one of the most pronounced within the analysis. It stemmed from a series of problems verified in different elements of the PNMC, among which the following should be highlighted: (i) quality and monitoring

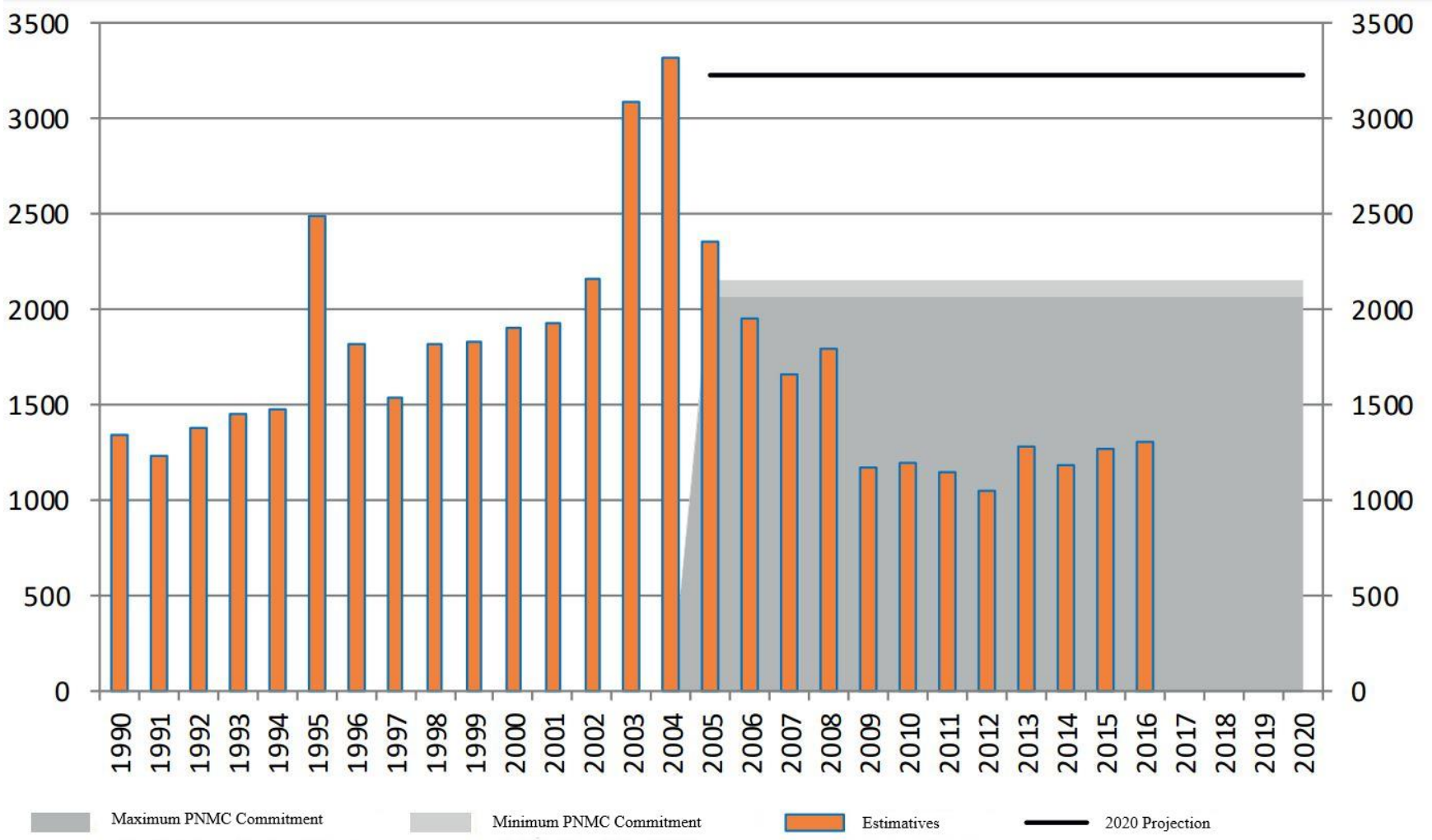
of GHG emission reduction targets; (ii) poor functioning of the central collegiate bodies of climate governance (the CIM and GEx) in the coordination and integration of the policy; (iii) poor employment of different coordination instruments, especially the ones related to MTM and NTM, referred in Table 1; (iv) difficulties in the allocation of institutional competencies and the intragovernmental relationships within the federal government; (v) difficulties verified concerning the full use of planning instruments, such as the Climate Plan and the Sectoral Plans and (vi) the absence of a climate federalism structure agenda between the national level and subnational governments (i.e. lack of intergovernmental relationships).

i. The PNMC GHG reduction targets

As mentioned in the case description, the initial draft law prepared by the executive branch and sent to the National Congress did not include any reduction target in the PNMC. The main reason for that was the fact that being a developing country and under the common but differentiated responsibilities principle, Brazil should not necessarily commit itself to a quantitative target in the global effort to tackle GHG emissions. However, due to the political debate in which the PNMC was inserted and considering the sound reduction of deforestation rates in the Legal Amazon, such a historical position changed, and the PNMC law came up with the target highlighted earlier.

According to the Fifth Edition of the Annual Estimates of Greenhouse Gas Emissions in Brazil (MCTIC, 2019), national GHG emissions had remained below the limit set for 2020 by the PNMC's target (e.g. in 2016, they were 1,305 million tons CO_2e), as shown in Figure 10.

Figure 10 – Brazilian greenhouse gas emissions and National Policy on Climate Change commitments (in million tons of CO_2e).



Source: MCTIC (2019, p. 9).

The achievement of this target could be largely explained by the nature of the commitment, which was defined as a deviation in relation to a very high future projection of the Brazilian GHG emissions and based on

i. the reproduction of past deforestation rates in the different biomes (e.g. in the case of the Amazon, the maintenance of the average rate from 1996 to 2005 of 19,500 km^2 was considered – much higher than the average observed since 2009 of around 6,400 km^2);
ii. a scenario of energy matrix expansion without mitigation measures (different, therefore, from the scenarios effectively considered in the Decennial Energy Plan (PDE) and
iii. a scenario of annual average GDP growth of 5% per year until 2020.

Furthermore, the assumptions used for the baseline foresaw hugely different scenarios from what the government already knew at the time (such as the high deforestation rates and the evolution of the energy matrix). For instance, the expected GDP growth rate was considered optimistic since there was no record in the recent history of the Brazilian economy in which the country grew 5% per year for 10 years in a row. Indeed, the average growth rate verified in the country from 2011 to 2019 was 0.6% p.a., and this naturally reduced the emissions verified at the time if compared with a 5% p.a. scenario (Andrade, 2019).

As pointed out in various assessments of the PNMC (Senado Federal, 2019) as well as in many of the interviews carried out during this research, the efforts that Brazil should take during the 2010s to meet the 2020 target were far from ambitious and, to some extent, unable to trigger a transformative change towards low carbon pathways in the different sectors. As many of the interviewees stressed, the Brazilian targets would be easily reachable by just keeping the Amazon Legal deforestation trend initiated in 2005, and minor efforts would be demanded from other sectors.

In addition, the relatively easily achievable target might have also provoked a feeling of non-urgency in regard to mitigation actions in other sectors as well as in the update and implementation of many sectoral plans. As one respondent who participated in many meetings of the GEX told me,

> Due to the nature of the GHG reductions target, I believe that many line ministries realized that they had no real need [for] implementation [or] monitoring of their

sectoral commitments since the overall target seemed to be easily achievable due to the low rates of deforestation and the economic crisis that Brazil was facing (respondent G19).

ii. The CIM, the GEx and the intragovernmental interplay

The CIM and the GEX were established in 2007 through Executive Decree n. 6.263 of 21 November 2007. The CIM was chaired by the Casa Civil and integrated by 16 ministries and the Strategic Affairs Office of the Presidency. The FBMC participated in the committee as an invited guest. One of the main competencies of this committee was 'to guide the elaboration, implementation, monitoring and evaluation of the National Plan on Climate Change' (Brazil, 2007b, p. 1).

In the years following their establishment, the CIM and the GEx played an active role in the climate agenda. For instance, they coordinated the federal government's efforts to prepare the first edition of the Plano Clima as well as the draft of the PNMC law proposal, both of which were finished in 2008, as mentioned earlier. With the approval of the PNMC, in 2009, the CIM gained key coordination planning roles within the climate policy, becoming the main collegiate body of the national climate governance, as already depicted in Figure 9.

Unlike the mobilisation observed for the elaboration of the Climate Plan, the findings revealed that these bodies were gradually losing their dynamism and reducing the frequency of their meetings, especially after the delivery of the sectoral plans in 2013. For instance, there was no evidence of CIM meetings between 2014 and 2019, while the GEx presented an irregular pattern in its meetings from 2014 to 2019, when it was abolished due to the climate governance reform that restructured the CIM (Brazil, 2019g).

The analysis revealed that these inter-ministerial collegiate bodies, which should have been strategically and permanently employed as a HTM instrument to strengthen the coordination and monitoring of the PNMC, were, in practice, underutilised during much of the history of the policy. This low dynamism of the main collegiate bodies of the PNMC was pointed out by most of the interviewees as one of the main explanations for the lack of monitoring and difficulty in coordinating the policy. Moreover, the CIM was not demanded to provide input during the discussions that the MMA coordinated

for the elaboration of the first Brazilian intended NDC, submitted to the COP of Paris in 2015.

In addition to the negative impacts on monitoring and strategic decision-making, the low effectiveness of the CIM and the GEx was stressed as one of the reasons explaining the PNMC's difficulties in implementing an effective MLG perspective, as the climate bill stated. With the establishment of the PNMC, a series of actions, collegiate bodies and working groups were created over the years, joining previous institutional arrangements, all of them relevant to the PNMC goals (e.g. the steering committee of the PPCDAm). For instance, by 2017, there were 34 collegiates with relevant functions (e.g. formulation, regulation, advisory, oversight, financing and implementation functions) related to the operationalisation of the PNMC (Unsterstell, 2017). Many of these institutions operated in a competitive mode rather than a cooperative one among themselves, and the lack of participation of the main climate governance body was an aggravating factor in the failure of harmonisation, integration and coordination of the different governmental actions.

Several factors tended to explain the weakening of the CIM, GEx and governance of the PNMC. First, an institutional design issue should be noted: the CIM was not a deliberative collegiate body but a consultative one. Thus, any guidelines issued by the group were not binding for the ministries. The group functioned in practice much more as a network enabler than as a decision-making sphere. Moreover, the Casa Civil was not endowed with enough human resource capacity to coordinate the body on a permanent basis. For instance, the group of civil servants who were handling the CIM's agenda within the Casa Civil was reduced and was not exclusive to climate issues, also needing to dedicate itself to other tasks that sometimes required more priority than the CIM's affairs.

Simultaneously, the MMA had acquired great bureaucratic and political visibility within the climate agenda through the creation of National Secretariats, the attraction of international cooperation resources and the acquisition, in practical terms, of command of the agenda, notwithstanding the fall of GHG emissions related to the sectors where the MMA would play principal roles, such as the deforestation policy. The MMA gained even greater powers in 2019 when, in the reformatting of the CIM, the MMA became the body responsible for the executive secretariat of the CIM, with strong power to influence and block the whole agenda, including topics that did not

concern the MMA's institutional competencies (such as carbon pricing and international negotiations), what suggests that the reshuffling of lines of control and competencies were misused in this case.

As some interviewees highlighted, all of these developments seemed to be taken the wrong way to enable a multilevel decision-making environment and led to a loss of the CIM's legitimacy in serving as the main space of decision-making and addressing ministerial divergences. In practice, this created a situation where the MMA was the de facto coordinator of the climate policy, leading to a situation where the PNMC was largely coordinated in a negative mode, without challenging previous sectoral equilibriums and trying to build low carbon patterns in different sectors. As one respondent stressed,

> It was a systemic problem [lack of coordination from the Casa Civil]. In my time there was a bloody fight between the MMA, the MCTI, and the MAPA. The personnel from Casa Civil tried to manage the problems, but the meetings of the CIM were, in my opinion, only pro forma, they did not solve the major problems we had (respondent A1).

iii. The National Plan on Climate Change and the Sectoral Plans

The Plano Clima was established in 2007 by the same executive decree that had created the CIM and the GEx (Executive Decree n. 6.263/2007) . According to this legislation, the Plano Clima should define mitigation and adaptation measures and actions to tackle climate change, what suggests that it was expected to work as a management instrument of the PNMC for planning and evaluation It had only one edition, released in 2008. When the PNMC came into force, the Plano Clima was defined as the main planning instrument of the policy, which was to include in its next editions all of the PNMC's sectoral plans. It was also to be regularly reviewed every four years just before the Pluriannual Plan (PPA) elaboration.[22]

Despite the obligation to periodically review the Plano Clima, the plan was never updated, an aspect which has been heavily criticised in many evaluations of the PNMC (Senado Federal, 2019). According to my findings, there was only one review attempt,

[22] The PPA is the main medium-term planning instrument of the federal government. It is a four-year-based plan. From the time the first edition of the Plano Clima was released (2008), Brazil developed three PPAs for 2012–2015, 2016–2016 and 2020-2023. Considering the timing of the PPA, the Climate Plan should have been revised at least three times since then (by 2011, by 2015 and by 2019).

carried out by the GEx right after the conclusion of the PNMC's sectoral plans, which did not happen before 2012. Thus, the review process was attempted between 2013 and 2014. According to the GEx meeting notes, the group worked on this task throughout 2013, during which several meetings and dialogues were held (which included the participation of the FBMC) as well as public consultations (presential and online). The draft of the new Plano Clima was finished in early 2014 and submitted to the CIM, where the plan was to be approved and published; however, this did not happen.

Since the meeting notes of the CIM were not made available and no official statement was given explaining the reasons why the new version of the plan was not approved, during my interviews, I asked the respondents for a possible explanation for that blockage. The findings revealed that the new version of the Plano Clima was fiercely criticised by some sectors of the federal government. The criticisms included points such as

i) an underestimation of the financial resources required to fund the sectoral plans
ii) technical issues in regard to the manner in which the GHG projections were being presented vis-à-vis other similar actions developed by other federal ministries
iii) a perceived lack of cross-sectoral perspective between the sectoral plans, which, in certain cases, was resulting in dissonant goals among the plans
iv) the absence of an execution calendar and of a matrix of responsibilities in regard to the actions to be taken to successfully implement the plan

It remains unclear whether these internal criticisms were the main explanation for why the CIM did not approve the draft. Other reasons might also have been behind this issue, such as the political and economic turmoil that Brazil was facing at that time, as some interviewees also stressed. It is more likely that all of these technical and political issues were behind the non-publication of the update. This non-publication of the Plano Clima, which was expected to serve as the main policy instrument of the PNMC, tended to reflect the struggles that the policy permanently faced in terms of planning, coordination and monitoring during most of its lifetime.

Regarding the sectoral plans, they were set to help the PNMC achieve the following two main goals: i) to reach the 2020 GHG reduction target goal (established in article 12 – Law n. 12,187/2009) and ii) to mainstream climate-related measures in different policies and governmental actions (article 11 – Law n. 12,187/2009). From the literature on public policy coordination, these sectoral plans can be understood as bottom-up management instruments from which an interactive strategic management was expected, as explained in Table 1. According to Executive Decree 7,390/2010, the measures to meet the GHG targets were supposed to come mainly from the following sectoral plans: i) the sectoral plans of prevention and control of deforestation (PPCDAm and PPCERRADO), ii) the PDE, iii) the sectoral plan for the consolidation of low carbon agriculture (the ABC Plan) and iv) the sectoral plan for emissions reduction in the steel industry. The other sectoral plans would play secondary roles to help Brazil achieve its 2020 target, having been thought to help consolidate a low-carbon economy in their respective areas (Brazil, 2009b, 2010c).

Greater prominence was often given to some plans over others to meet the PNMC targets. This reflected the degree of institutional maturity that each sector had at the time of the PNMC's creation to address the issue, as well as the relative importance of each of these sectors to mitigate the country's GHG emissions. For instance, the PPCDAm was already a sound programme to tackle deforestation at the time of the launch of the PNMC. The same applies to the PDE, one of the main pieces of Brazilian energetic planning at that time. However, the ABC Plan was a new plan that consolidated already known sustainable agriculture technologies under the umbrella of a PNMC sectoral plan.

In regard to the so-called 'new sectoral plans' (on electrical energy, transport, industry, chemical industry, pulp and paper, mining, civil construction and health services), Decree 7,390/2010 established that they must be elaborated by December 2011 (then postponed to April 2012) and contain at least the following items: i) GHG reduction targets for 2020, ii) actions to be taken, iii) a definition of an indicator for monitoring their effectiveness, iv) proposals for regulatory instruments and incentives and v) sectoral studies with estimated costs and impacts. They were to be regularly updated every two years.

In 2011, the sectoral ministries started the elaboration of these new sectoral plans under the coordination of GEx. The MMA provided technical support to the line ministries.

By the end of 2012, a total of four new sectoral plans had been prepared, the responsible parties and contents of which are presented in Table 12. It is important to highlight that for the steel industry, no sectoral plans had been developed thus far; there was only a five-page summary that highlighted the relationships between the sector, the consumption of coal and the use of planted forests (FP) to mitigate sectoral emissions.

As was found during the desk research and the interviews, the elaboration of these sectoral plans revealed several gaps in terms of the multilevel policy process in practical terms. For instance, as pointed out by several respondents, while some ministries were fully engaged with the process (e.g. by participating with top officials in the GEx coordinator meetings), other ministries seemed to have treated the issue as a secondary aspect. Moreover, some ministries showed a lack of preparedness (and will) in integrating climate concerns into their respective policy domains, and no evidence was found that the GEx and CIM had worked to properly address such constraints. As stressed by one respondent,

> When we look outside the MMA and MCTI, the ministerial capacities in climate change are almost null. We go to the [ministry of] Industry we see few people [discussing climate policy]. We look the [ministry of] cities and there is nobody taking care of the topic [climate]. We have the same situation in the [ministries of] planning and transports (respondent NG4).

Concerning the prevalence of this institutions and processes gap, the outcome of the development process of the sectoral plans was mixed. It developed some well-designed and useful plans, such as the ABC Plan, while other plans, such as the ones related to the transportation and steel industries, were not innovative, and their contributions to GHG mitigation were quite difficult to measure. Moreover, similar to the Plano Clima, the sectoral plans were not systematically monitored by the CIM/GEx or updated until 2020. These struggles perceived in the execution of the sectoral plans were also noted by the Environmental Commission of the Brazilian Federal Senate in 2019, in which the following was highlighted:

> The definition of sectoral plans as instruments of the PNMC seemed a natural choice given the need to implement sectoral goals. However, the way they were developed and implemented revealed a low level of coordination and adherence to the core

objectives of the PNMC. Furthermore, the sectoral plans were not monitored, as foreseen by the law, by employing tools that could assess the degree of implementation and the difficulties and limitations of the process.

The implementation of the plans has also suffered from governance problems, due to the absence of a general coordination, with power to convene, command and intervene to promote synergies among the various sectors that were involved in the policy, as well as to avoid the duplication of efforts and impose the necessary course corrections. It was something that the MMA did not have, due to the very nature of its attributions. The plans thus reflected, in a watertight manner, the priorities and capacities of the respective bodies responsible for them. (Senado Federal, 2019, p. 109)

iv. Climate federalism: the lack of national–subnational dialogues within the PNMC

At the subnational level, since the mid-2000s, Brazil has seen a proliferation of climate policies, especially at the state level. As highlighted in Table 12, there are currently 23 subnational climate policy laws in the country, with the vast majority having been produced in the early 2010s. This is a clear consequence of the institutionalisation of the PNMC and of the international debate on the subject (and what this could bring about in terms of reputation and new sources of funding).

Table 12 – Brazilian subnational climate policies enacted between 2003 and 2020.

Year	**State/Municipality**
2003	Palmas Municipal Climate Policy (Law 1.182/2003)
2007	Amazonas State Climate Policy (Law 3.135/2007)
2008	Tocantins State Climate Policy (Law 1.971/2008)
2009	Goiás State Climate Policy (Law 16.497/2009)
2009	São Paulo Municipal Climate Policy (Law 14.933/2009)
2009	Santa Catarina State Climate Policy (Law 14.829/2009)
2009	São Paulo State Climate Policy (Law 13.798/2009)
2010	Rio de Janeiro State Climate Policy (Law 5.690/2010)
2010	Pernambuco State Climate Policy (Law 14.090/2010)
2010	Espírito Santo Climate Policy Law (Law 9.531/2010)
2010	Acre State Climate Policy (Law 2.308/2010)

2010	Rio Grande do Sul Climate Policy (Law 13.594/2010)
2011	Bahia State Climate Policy (Law 12.050/2011)
2011	Rio de Janeiro Municipal Climate Policy (Law 5.248/2011)
2011	Paraíba State Climate Policy (Law 9.336/2011)
2011	Feira de Santana Municipal Climate Policy (Law 3.169/2011)
2011	Belo Horizonte Municipal Climate Policy (Law 10.175/2011)
2011	Piauí State Climate Policy (Law 6.140/2011)
2012	Distrito Federal Climate Policy (Law 4.797/2012)
2012	Paraná State Climate Policy (Law 17.133/2012)
2014	Mato Grosso do Sul State Climate Policy (Law 4.555/2014)
2018	Rondônia State Climate Policy (Law 4.437/2018)
2020	Pará State Climate Policy (Law 9.048/2020)

Source: Author's elaboration based on Barbi (2014), Way Carbon (2016) and Ethos (2022).

While there is a large number of climate laws, most of these policies have encountered implementation bottlenecks, and many of them are vague in terms of mitigation and adaptation targets. The difficulty of implementing subnational climate laws reflects the following two critical aspects of the Brazilian federalism context: i) the lack of institutional capacities verified in most subnational governments (discussed in Chapter 4) and ii) the difficulty of the PNMC to create bridges and make effective climate federalism viable in the country.

Even though the PNMC's bill concerns the integration and cooperation between the different levels of government in tackling climate change, the employment of my analytical framework revealed that the PNMC has struggled in complying with such legal commands. One of the senior federal government officials interviewed was very assertive in this regard, stating, 'If I would rank the different gaps we faced during the PNMC, I would say that the strongest gap was in our dialogue with the subnational level. I think we always had few dialogues, very few' (respondent G4). Acknowledging that most of these subnational laws were created due to the influential wave of the 2009 PNMC bill, the respondent commented, 'I must recognise that the federal government did not create enough space to run such dialogues' (respondent G4).

One of the few spaces created within the PNMC to promote such dialogue was the so-called Federative Articulation Unit for Climate (NAFC, in Portuguese). Aiming at the integration of various sectoral policies related to climate change and promoting the sharing of experiences between the governmental organisations (MMA, 2014), the

NAFC was launched in 2013 as a result of the CIM and GEx talks for the preparation of the sectoral plans when it was 'realized how important the subnational governments would be to many mitigation actions of the PNMC', as pointed out by another senior official from the federal government (respondent G20) engaged with this subject.

The NAFC was established under the umbrella of the GEx and co-chaired by the MMA and the Casa Civil. The inauguration meeting was attended by representatives from 17 different federative states and different ministries. This meeting set up the following two major working schedules for the NAFC: i) the working group on inventories (to be chaired by the MCTI and by the state of São Paulo) and ii) the working group on emission registry (to be chaired by the MF and the state of Rio de Janeiro). The common goal for both groups was to elaborate technical recommendations to promote federative harmonisation in regard to their core topics. This initiative can be theoretically seen both as a bottom-up management instrument and as a structural instrument for information exchange, which was network oriented (NTM).

Both NAFC working groups presented tangible and quick results. While the group on emission registry managed to raise and organise the main experiences of the subnational governments on emission registries to subsidise the debate the MF was carrying on in regard to the future establishment of a national registry system, the working group on inventories was successful in providing technical support to the elaboration of the GHG state inventories in closer coordination with the development of the GHG national inventories.

Many of the interviewees stressed that despite its short existence (2013–2014), the NAFC managed to produce important and sound results in terms of policy recommendations. One respondent stressed,

> If we wouldn't have [had] the NAFC, we [would] not have arrived so far with the SIRENE as we arrived. The same applies to the agenda of carbon pricing: we would not enter the World Bank Project for Market Readiness if we had not had the previous technical debate with the states. Today, we have a 'way to go' in many things thanks to the NAFC (respondent G20).

However, despite these remarkable achievements, the NAFC entered a period of sudden inactivity from 2014, almost at the same time that the CIM and the GEx saw their activities dramatically reduce, as mentioned earlier.

Gap 3 – Resources

The analysis showed that after the PNMC law came into force, there were improvements in the use of human and financial resources for the promotion of climate-related policies in Brazil, especially in the federal government. However, the analysis also revealed that subnational governments still face difficulties related to a lack of capacity and funding sources for the execution of their climate actions, with most of the (poor) capacities being strongly concentrated in the environment secretariats. There were few exceptions in the subnational picture, and they were mostly concentrated in subnational governments with good economic and bureaucratic capacities, such as those in the states of São Paulo and Paraná as well as the municipalities of São Paulo, Rio de Janeiro and Curitiba.[23]

Regarding capacity building at the federal level, the advent of the PNMC unleashed many ministerial partnerships and collaboration projects for capacity building, some of them supported by international organisations such as the World Bank and the German Corporation for International Cooperation GmbH. The PNMC was also keen to unlock and consolidate important networks, such as the Rede Clima, as well as create climate change units in different federal ministries. All of these institutional developments were a consequence of the different activities completed under the PNMC, such as i) the elaboration of GHG inventories and emission forecasts and ii) the development of sectoral plans.

If the PNMC was able to build capacities for climate change at the federal level, the same cannot be said with regard to the subnational level. Apart from exceptions related to the NAFC activities, which consolidated national and subnational organisations for a short period, evidence that the PNMC was a decisive policy to shorten the subnational gap in technical capacities for climate change was not found despite the national character that the PNMC should have had. Most of the subnational governments that already had reasonable climate policymaking capacities had those because they were able to develop them by themselves or engender technical cooperation with international partners.

Regarding the financial and economic resources used to foster GHG mitigation actions, mixed results were found. This was because there were institutional

[23] For an overview of the state capabilities in policymaking as well as in regard to the noticeable socioeconomic inequalities among the Brazilian states, please refer to Table 7.

improvements in the financial architecture to support climate policies, such as the Fundo Clima and the ABC Programme. However, these instruments were limited by constraints of different sorts, such as financial availability and operational design. For instance, the Climate Fund, created in 2009, had its main source of resources (derived from oil exploration) suppressed a few years after its creation, which limited the fund's ability to grow. In its turn, the ABC Programme, aimed at financing low-carbon agriculture activities, had operational problems for contracting the loans in addition to having a reduced financial allocation, as some interviewees pointed out.

Another important economic mechanism for the PNMC is the Amazon Fund, created in 2008 as part of the financing of the Reducing Emissions from Deforestation and Forest Degradation actions (Brazil, 2008b). The Amazon Fund is considered a successful case of financing actions to prevent, monitor, conserve and tackle deforestation (Senado Federal, 2019) and it can be classified as a results-oriented financial management instrument. By 2018, the fund had received R$3.4 billion (US$700 million) in donations from the governments of Norway (93.8% of the total) and Germany (5.7% of the total) and the state-owned oil company Petrobras (0.5%). The BNDES is responsible for managing the resources, and the COFA is responsible for defining the fund's guidelines and focus of action.

In addition to financial instruments, the findings also revealed that the PNMC struggled to settle the following two relevant instruments: the MBRE and the National Program for Reporting GHG Emissions. Despite the creation of two inter-ministerial working groups in the early 2010s to address both issues, bureaucratic disputes and sectoral interests against carbon pricing mechanisms in the Brazilian economy prevented the PNMC from moving forwards with both agendas (Melo & Silva, 2019; Senado Federal, 2019; Speranza et al., 2017). Moreover, the evidence found also revealed that the budgetary allocation for the PPA programme related to the PNMC remained low throughout the different cycles of the PPA and that there was still work to be done in terms of the identification and the extent of other PPA programmes, aside from the one exclusive to the PNMC. This could help in the achievement of the PNMC objectives (Tozatto et al., 2019).

Gap 4 – Information

The PNMC added important contributions to shortening the information gap in decision-making by developing GHG estimations. Such informational improvements came not only from the preparation of the UNFCCC's transparency instruments, such as the CNs and the Biennial Update Reports (BURs), but also from specific arrangements related to the PNMC, such as the GHG annual emission forecast and the SIRENE, both under the auspices of the MCTI, which was also in charge of the GHG Brazilian inventories. Moreover, there were other relevant initiatives, such as the online platform EducaClima coordinated by the MMA and aiming to provide information about climate change and raise civil society awareness about the topic.

Despite this, the findings revealed that all of this information was underused in support of the decision-making and policy evaluation, as many interviewees highlighted. Such underutilisation of the information obtained over the years had a close tie with the lack of monitoring, which was noted by many interviewees as one of the most important bottlenecks of the PNMC's implementation. The analysis revealed that this monitoring issue was explained by technical constraints related to the monitoring of different policy sectors and by the lack of political and bureaucratic willingness (especially from the line ministries) to create such a monitoring scheme.

Furthermore, the findings revealed the presence of turf wars between the MMA and MCTI in regard to the monitoring activities of the PNMC. For instance, during the PNMC cycle, the federal government outlined the so-called Modular System for Monitoring Action and GHG Emissions Reductions (SMMARE, in Portuguese). According to the country's third BUR submitted to the UNFCCC in 2019, 'the MMA designed the SMMARE, for which, in 2014, guidelines and methodological bases were established' (MRE & MCTI, 2019, p. 89). However, the system was never implemented despite having been mentioned several times in various official documents and on the MMA's website.

During my field trip, many interviewees related a complete ignorance about the system and its preceding discussions. However, one respondent with in-depth knowledge about the government talks in regard to this issue was very elucidative. He agreed that the government was not able to address some technical issues: 'It is challenging to measure [the] impact of the mitigation policies, even in developed countries. Today,

these things (methodologies) are much more well developed than 10, 11 years ago' (respondent G4). However, according to this respondent what was really a barrier to the SMMARE's implementation was the political dispute between the MMA and the MCTI in regard to which ministry should coordinate the efforts of the PNMC monitoring system within the federal government.

The development of the GHG annual emission forecast was also an object of a bureaucratic clash between the MMA and MCTI. The result of these struggles between the ministries was that the MCTI developed the estimation efforts practically in a top-down manner, with no participation of the MMA. So far, it has elaborated five editions of the estimations. All of these estimates are accessible to the public through the website of SIRENE, established in 2017.[24]

In a nutshell, the analysis of the PNMC showed that gaps 1 (politics) and 2 (institutions and processes) were the main issues faced by this policy throughout its lifetime. Although the development and implementation of the PNMC were able to partially address issues on resources and information, the analysis revealed that these two topics were also constrained due to some issues, such as the interruption of financial flows (manifestation of gap 3) and difficulties in the sharing of information among the governmental stakeholders (manifestation of gap 4). Table 13 summarises the main results of the analysis. In the following section, these results are discussed.

Table 13 – The National Policy on Climate Change gap analysis results.

Gap	**Results**
Gap 1 – Politics	▪ Political attention was infrequent. ▪ Absence of political will to fully implement the PNMC. ▪ Low level of engagement of the upper tiers of the federal government (apart from the authorities of the MMA).

[24] The SIRENE was established by Decree n. 9,172/2017 with the aim of making available the results from the Brazilian inventories of GHG not controlled by the Montreal Protocol and all other emission accounting initiatives, such as the estimations. It is managed by the MCTI (Brazil, 2017).

Gap 2 – Institutions and processes	▪ The GHG emissions scenario and targets based on fragile premises. ▪ The GHG targets lacked monitoring and updates. ▪ The CIM and GEx presented operationalisation difficulties (e.g. coordination of governmental actors; integration of sectoral plans; regularity of meetings). ▪ The CIM and GEx were little used for important decision-making processes (e.g. preparation of NDCs). ▪ Lack of monitoring and periodical updating of the Plano Clima and of the Sectoral Plans (excepted the ABC Plan, updated in 2021). ▪ Concentration of political and bureaucratic power on the agenda at the MMA. ▪ Lack of engagement of key federal government stakeholders in the PNMC agenda. ▪ Absence of permanent dialogue and cooperation between the different levels of government.
Gap 3 – Resources	▪ Climate policy capabilities unequally distributed within the federal government institutions. ▪ Lack of climate policy capabilities in most subnational governments. ▪ Climate finance struggled to unlock financial and budgetary flows over the PNMC's lifetime. ▪ Deployment of economic instruments (e.g. carbon pricing) to mitigate GHG emissions was very limited.
Gap 4 – Information	▪ Difficulties of developing PNMC monitoring mechanism. ▪ Turf wars limited information sharing among the governmental stakeholders. ▪ Reduced use of climate-relevant data for informing governmental decision-making.

Source: Author's elaboration.

5.2.5 Discussion

The challenges of climate governance in regard to the intragovernmental and intergovernmental relationships at the domestic level that climate policy demands are a research topic of growing interest. However, the focus of these investigations has been largely on cases of industrialised countries. Despite their relevance to the planet's future GHG emissions (Fuhr, 2021), the countries of the Global South have been the focus of few investigations of this kind, and Brazil is no exception to this rule. Aiming to reduce this knowledge gap for the Brazilian case, the results of my analytical framework in the analysis of the PNMC suggested that the governance gaps manifested in Brazilian climate policy can be largely explained by the theories of MLCG (Dubash, 2021; Gupta, 2007; Jordan et al., 2018) and of public policy coordination (Bouckaert et al., 2010; Gordon, 2015).

With more pronounced gaps at the policy level and in institutions and processes and considering that the PNMC was the first nationwide climate policy, the findings from these results are valuable both for further study of the topic and for future refinements that the country's climate policy will require to become the implementation springboard for successive NDCs and the transformations needed for Brazil to achieve net-zero emissions by the middle of this century.

The low level of political prioritisation that the PNMC received during most of its political cycle, as well as the low political will of many ministries with potentially relevant plans and competencies for the reduction of GHG emissions in the country, show that the manifestation of the PNMC's political gap is largely the result of issues related to agenda setting (Kingdom, 2011) and political attention (Jones & Baumgartner, 2005). The way political attention to the topic arose indicates that the period between 2007 and 2010 was a clear policy window for the PNMC, which was opened by the convergence of technical and bureaucratic factors (e.g. an abrupt reduction in emissions from deforestation and the mobilisation of governmental actors and policy entrepreneurs) and political aspects at the domestic (presidential elections in 2010) and the international (e.g. the level of global attention given to the topic and interest in strengthening the country's soft power) levels. All of these factors have been losing strength over the years, especially since 2012, and help explain the manifestation of the politics gap throughout much of the lifetime of the PNMC.

The existence of sectors opposed to the climate agenda (Schmitz, 2016), even if implicitly, is also an explanatory factor for the political difficulties experienced by the PNMC. This opposition not only arises from those sectors that benefit from the status quo of the existing public policy mix but is also the result of path dependencies (Worker, 2016), many of which are linked to the historical process of Brazilian economic development. This is the case of land use in the Brazilian Amazon, the extensive mode of Brazilian livestock farming and the road modal adopted by the country's transport matrix. In the end, the persistent occurrence of the politics gap in the scope of the PNMC, which most of the time has found political support only in the MMA, seems to have caused the occurrence of the other gaps, especially the institutions and processes gap and the resource gap.

In turn, the strong presence of the gap in institutions and processes in the cycle of the PNMC can be interpreted as a combination of factors that tend to occur within the scope of a multilevel climate policy. These factors, if not addressed in a timely manner, tend to undermine the whole process of policy implementation, as was the case with the PNMC. In this sense, the process of defining GHG emission reduction targets presented by the PNMC may have acted as a natural disabler for the entrance of new governmental actors to reduce emissions. This is because, as presented in the research results, the assumptions used to calculate the targets and the base scenario were very different from what was verified the year the PNMC was published. For instance, if the energy matrix conditions had already existed (e.g. a high rate of renewables, especially hydroelectric plants) and, especially, reduced deforestation rates were verified during the period from 2008 to 2010, then reaching the 2020 targets would have been a reasonably easy goal to achieve and would not have required the involvement of other actors/sectors.

Meanwhile, the difficulties verified in the functioning of the CIM and GEx climate bodies were the result of factors that the MLG literature could explain, such as the existence of unbalanced institutional capacities (Charbitt, 2011), distinct ministerial objectives (Hudson et al., 1999) and selective perception (Hustedt & Seyfried, 2016) among the ministries that are members of the CIM. These problems could have been solved, even partially, if the CIM had acted effectively in the coordination process of the PNMC, especially through the Casa Civil. The Casa Civil was expected to exercise its role as the centre of government and adopt a whole-of-government approach

(Brazil, 2016; Santiso et al., 2013), which is fundamental in a multilevel and multisectoral environment such as the PNMC. The systematic failure of the CIM to coordinate and promote the integration of different actors and policies within the federal government aggravated already existing problems related to the dispute for bureaucratic spaces (turf wars) (Hustedt & Seyfried, 2016), especially between the MMA and MCTI regarding the monitoring of the policy and the exchange of relevant information. It should also be noted that climate governance has had difficulties operationalising, or refining, different types of coordination instruments listed in Table 1, especially those related to MTMs and NTMs, and has mostly been limited to HTMs (Bouckaert et al., 2010). However even the employment of some HTM instruments, such as the climate collegiate bodies, was not able to enhance strategic management and effective lines of control and coordination in the PNMC The few instruments of an economic and network nature, such as the Climate Fund, the Amazon Fund and the NAF, although effective at the time they were in force, presented difficulties concerning sustainability in the long term for financial and political reasons.

At the end of the day, these unresolved obstacles led the PNMC to the operationalisation of governance that, in practical terms, operated in a negative coordination mode (Scharpf, 1994; Danken, 2017), where defensive and non-collaborative postures were adopted at the time of intragovernmental relations instead of collaborative postures that could have induced transformative and innovative initiatives within the policy. In turn, the absence of a holistic view (Dearborn & Herbert, 1958; Peters, 2018) regarding the necessary public policy interactions between the national and subnational governments in the climate policy (Charbit, 2011; Gupta, 2007; Jordan et al., 2018) showed that the institutions and processes gap of the PNMC had worsened due to the absence of structured dialogues between these different levels of government. This absence meant that the PNMC – in theory, a policy whose name already defined it as ‘national’ – operated in practice as a policy that was strongly limited to the federal government and whose interactions with subnational levels occurred in isolation and with top-down characteristics. For example, despite being considered a country goal, for which the effort of all governmental levels was expected, both the definition of the PNMC GHG reduction targets and the reduction targets contained in the NDC were basically defined by the national government. This mode of operation tends to be perceived much more with a centralised mode of

governance (MLG type II) instead of an MLG type I governance model, characteristic of federalist environments (Kuhlmann & Franzke, 2022; Hooghe & Marks, 2003), as is the case in Brazil. This difficulty in the relationship between the national and subnational governments within the scope of the PNMC could be explained by a series of factors (e.g., different policy capacities, distinct understandings in relation the threats posed by climate change) in relation to the confrontation of climate change as well as the relationship between governments run by political parties that oppose each other.

The results related to the gaps in resources (gap 3) and information (gap 4) also brought important inputs about the functioning of the governance of the PNMC. On the one hand, the advances identified in terms of the structuring of a climate finance architecture and the construction of formal and informal networks for the exchange of experiences at the intragovernmental level (e.g. for the elaboration of inventories) are positive lessons taken from the PNMC and are linked to legislative innovations (as in the case of the Climate Fund) and the importance of formal and informal networks within the cycle (e.g. the development of national, subnational and sectoral GHG inventories). An interesting aspect is that part of these advances can also be identified as the result of the performance of some bureaucratic groups that acted as true policy entrepreneurs (Mintrom, 2019) throughout much of the PNMC cycle despite the chaotic environment of coordination and integration that characterised it. This importance of policy entrepreneurs was, however, limited to a small group of civil servants, especially due to the capacity-building process, which was not addressed in a completely effective way by the PNMC. On the other hand, the presence of turf wars (Federal Senate, 2019) and perceptive selection as well as the absence of greater political attention regarding the implementation of the PNMC could be considered explanations for the noted absence of financial flows for climate policy funding as well as for the inadequate use of the information produced throughout the PNMC for decision-making. The annual estimate data of GHG emissions elaborated by the MCTI seemed to be a good example of this: despite their quality, the data were little used by decision-makers of other ministries in the analysis of the PNMC evolutionary performance.

There is no silver bullet to close or mitigate the gaps found in the PNMC. However, from observations of the PNMC over the years, especially during the years of its

discussion and elaboration (2007–2009) and those immediately after its launch (2010–2011), it is possible to infer that the presence of some critical aspects is important for this process, as follows: i) political will and ii) a whole-of-government approach. On the one hand, political will and political awareness, can be influenced by the following: i) new electoral cycles, with the election of members of parliament and heads of government that guarantee support for the theme; ii) action of nongovernmental governance stakeholders to raise the level of political attention for the theme, such as in the financial sector (e.g. the ESG wave) and the third sector (e.g. environmental movements and youth movements) and iii) diffusion of climate policy entrepreneurship. On the other hand, the effective adoption of a whole-of-government approach may help to equate several problems verified in the policy coordination, not only in the scope of the intragovernmental relations within the federal government but also in the construction of climate federalism that strengthens the dialogue between the different governmental levels.

5.2.6 Conclusion

This subsection discussed the policy problems faced by the PNMC from a governance by governments perspective. The findings suggested that the four governance gaps have been happening simultaneously but at different scales since 2009, with the politics and institutions and processes gaps being more pronounced than the other gaps. The PNMC was key to the improvements observed in terms of information and even in the development of funding structures to support GHG mitigation in the country. However, the gaps in politics and institutions and processes were also affecting the way resources were allocated and the information produced, shared and used by the different governance actors.

Based on the research findings, it is possible to conclude that Brazil struggled to implement a proper multilevel and cross-sectoral policy environment framework for the PNMC. Bottlenecks (gaps) of different types were preventing the policy from creating strong climate federalism in the country in addition to widespread climate-related action in relevant economic sectors for GHG mitigation. The difficulties encountered in the intragovernmental and intergovernmental relationships within this agenda are likely explanations for most of these struggles. Overcoming such governance issues is of critical importance for Brazil to comply with its economy-wide NDC under the Paris Agreement, in which the country has pledged an unconditional

commitment to reduce its GHG emissions by 37% below 2005 levels by 2025 and 43% below 2005 levels by 2030.

5.3 Sectoral case 1 – the transport sector

5.3.1. Introduction

The GHG emissions from the transportation sector are seen as one of the main challenges to achieving net-zero carbon emissions worldwide by the middle of the 21st century. Responsible for 28% of the globe's energy demand, the transportation sector accounts for 24% of the energy-related CO_2 emissions[25] (Climatewatch, n.d.). Due to the growth in population, income and access to transport services worldwide, these emissions could double by 2050 if proper mitigation actions[26] are not taken in the next years (IPCC, 2018a). Emissions from the road mode of transportation (passengers and freight) correspond to 75% of the sector's emissions, followed by aviation (11.6%) and shipping (10.6%) (Ritchie, 2020).

In Brazil, the figure for GHG emissions in the transportation sectors is worse than the world average. For instance, in 2018, the sector accounted for 32.7% of the country's energy demand, releasing 192.7 $MtCO_2e$. This represents 46% of the country's total energy-related CO_2 emissions. Moreover, despite the relevant participation of ethanol and biodiesel (renewables), it is estimated that 77% of the sectoral energy demand is provided by fossil fuels (EPE, 2019). Despite these facts about the Brazilian transportation sector, there is still a lack of understanding about how Brazil is governing its transportation policies towards more sustainable patterns, what the main struggles and explanations are in this regard.

In this subsection, I start the sectoral case studies by examining the transportation sector. More specifically, I will assess the PSTM, established under the 2009 PNMC auspices. To do so, this subsection has five parts. After the introduction, a background is presented about the interplay between transport and climate. To do so, the section first provides a historical perspective of the transportation sector and the main features

[25] In 2018, the total GHG emissions, including LULUCF emissions, were 48.9 billion tons of CO_2e. The transport sector emitted 8.2 billion tons of CO_2e that year (Climatewatch, n.d.).

[26] These actions could be taken, for instance, by adopting the avoid–shift–improve approach, in which 'avoid' refers to the reduction of the need for travel; 'shift' to the employment of more energy-efficient modes of transport; and 'improve' to the increase of public transport, vehicles and fuel efficiencies (GIZ, 2011).

related to the modal split, energy consumption, GHG emissions and sectoral governance. Then, it describes the PSTM, where it highlights its main features and design processes. This is followed by the presentation of the results of my analysis, which are based on the application of the analytical framework and followed by a discussion of these results before I conclude this subsection, in which implications from the findings are drawn.

5.3.2. Background

Initially, to understand the GHG emission dynamics within the transportation sector and why the decarbonisation of the sector is challenging, it is important to initially mention two aspects: i) the historical catching-up process of the Brazilian economy in which the road infrastructure and the automotive industry played decisive roles regarding the country's industrialisation process as well as the urbanisation and 'interiorisation' of the country[27] and ii) the current distribution of transportation modes for the displacement of passengers and freight, which is a direct consequence of the first aspect.

As essentially an agrarian economy in its early economic stage, Brazil has seen the railways assuming a very decisive role during this stage. This can be seen by the successive expansions of the railway networks from the 1850s until the 1950s when the networks achieved more than 36,000 km of extension. This figure started to change in 1920 with the diffusion of automobiles and the government's intention to populate the Brazilian territory to the north and west. Since then, the expansion of the railways has struggled to keep pace, and today, the country has a railway network (30,000 km) smaller than in the 1950s (36,388 km) when it reached its peak in terms of length (Andrade, 2010; CNT, 2019; DNIT, 2020).

From the 1950s on, the country deepened its strong relationship with roads and automobiles, consolidating in the country what is referred to as 'road mania'. In this decade, recently elected Brazilian President Juscelino Kubistchek launched an ambitious development plan for the Brazilian economy called Plano de Metas (Plan of Targets), in which massive public investment in road networks (mainly financed by

[27] A quotation from a prominent Brazilian politician, Washington Luís, who served as governor of São Paulo (1920–1924) and president of Brazil (1926–1930), summarises the intricate relation between roads, economic development and politics: 'To govern is to populate, but one cannot populate [a nation] without opening roads…To govern, then, is to make roads'. It is also attributed to Mr Luís, the request to all Ford Moto Company advertisements in Brazil include the slogan '*good roads shorten distances, unite people, and bring progress*' (Wolfe, 2010).

public debt) to unlock the logistic bottlenecks and the development of a programme of import substitutions were two important axes. The Plano de Metas managed to introduce a national industry of automobile components which, in its turn, paved the way for the installation of factories from foreign automobile components, such as Volkswagen, Chevrolet, Ford and Fiat. In addition to being a strong source of jobs and income, the installation of this industry allowed for an internal large-scale production of private vehicles, buses and trucks for the new and growing Brazilian road infrastructure for freight and passengers (Andrade, 2010).

In the decades that followed, the Plano the Metas kept the road-oriented approach in the investment planning for Brazilian transportation infrastructure. From a historical perspective, it is possible to say that if, on the one hand, the decision to build massive road infrastructure was a cheaper option when compared to other modes of transport, then, on the other hand, this decision of intensifying the road mode of transportation could be considered a strategic error by the country from a logistics perspective. With its vast territory, it should have followed a path of diversification of its matrix considering the long distances that goods and people tend to have to travel between different regions of the country. Table 14 illustrates the most adequate modal types, from an economic point of view, for the different distances to be covered in the cargo transportation sector.

Table 14 – Recommended travelling distance by mode of transport.

Mode	**Ideal travelling distance (km)**
Road	0–400
Railway	400–1,500
Waterway	1,500–3,000

Source: Author's elaboration based on TCU (2020).

5.3.2.1 Modal distribution in a nutshell

As a result of these historical decisions made in favour of the road mode of transportation, today, Brazil is one of the largest countries in the world that still heavily relies on this mode of transportation to move its population and goods from one point to another. In the case of freight, more than 60% of hauling was done by roads, while railways accounted for 21%. As Table 15 indicates, the road dependence in Brazil is

much higher than in other big countries, such as the US, Canada and even the EU, where trucks are also responsible for an impressive share of the carriage.

Table 15 – Modal split in Brazil: cross-country comparison (the United States of America, China, Russia and the European Union) in %.

Freight (in % of the total)							
	Brazil (1950)	Brazil (1960)	Brazil (2019)	US (2019)	China (2019)	Russia (2008)	European Union (2019)
Highways	38	60.5	61	43	35	4	50
Railways	29.2	18.7	21	27	14	43	11
Waterways	32.4	26.6	14	8	48	3	36
Pipelines	n.a.	n.a.	4	22	3	50	3
Passengers (in % of the total)							
	Brazil (1950)	Brazil (1960)	Brazil (2018)	USA (2007)	China (2007)	Russia (2008)	European Union (2008)
Highways	76.3	84.5	97.5	87.8	54.1	26.2	82.7
Railways	19.9	11.7	1.1	0.7	33.3	47.8	7.8
Waterways	0.18	0.05	0	0	0.3	0.2	0.6
Airways	3.6	3.6	2.5	11.5	12.3	25.8	8.8

Source: Author's elaboration based on Barat (1978), European Commission (2010), Andrade (2010), CNT (2019) and ILOS (2020).

In the transportation of passengers, road dependence is even more marked, with this mode carrying more than 97% of travellers. In comparison with the freight subsector, the transportation of people is particularly more serious in terms of GHG emissions since, in the last decades, growing demand for private vehicles (motorisation rate) has been observed (CNT, 2019) in daily commutes. Moreover, a decrease in passengers

transported by urban public transport systems in the Brazilian metropolitan regions was observed: from 5.5 billion passengers in 1995 to 3.5 billion passengers in 2018 (CNT, 2019).[28] Similarly, for the freight subsector, a cross-country comparison reveals that Brazil is much more dependent on highways than other large countries/regions.

In addition to the high frequency of use of the road mode, it should be also noted that the quality and operational conditions of the major part of this infrastructure are low, which leads to increased costs and loss of competitiveness for the whole economy. For instance, Brazil has a total of 1.7 million km of highways network on its national road plan (federal, state and local); however, only 12.4% of these roads are paved, while 79.9% are non-paved and 7.6% are still in the planning stage (DNIT, 2020). Moreover, regarding the railway network, only 7,000 km are in full operation, 13,500 km have a low traffic intensity and 8,500 km are underused or not used for commercial operations (EPL, 2018).

Table 16 – Stock of transportation infrastructure: international comparison.

	Brazil	**China**	**India**	**Russia**	**USA**	**Canada**
Area (million km^2)	8.5	9.6	3.0	17.0	9.1	9.0
Highways (paved) (in 1000 km)	219	1,576	1,569	776	4,375	416
Railways (in 1000 km)	29	86	64	87	225	47
Pipelines (in 1000 km)	19	87	35	260	2,225	100
Waterways (in 1000 km)	14	110	15	102	41	0.6

Source: Author's elaboration based on ILOS (2014).

As depicted in Table 16, when these numbers are compared to those of the other largest countries in the world, the Brazilian lack of transportation infrastructure becomes even more evident, and it also brings forth important insights in regard to the way transportation policies and investments may be developed in the next decades. One aspect is that the length of Brazilian paved highways is still very low, which can lead us to infer that this sector might get massive investments in the years ahead. The amount of these investments will be directly related to investment in other modes

[28] This perceivable shift from public to private means of transportation is not a situation exclusive to Brazil and can be observed in many other developing countries, especially in Latin America, where years of economic crises have led to the precariousness of public transport systems and an increased demand for private vehicles (Vasconcellos, 2001).

(especially railways and waterways). All of these developments will largely impact the quantity of GHG emissions coming from the Brazilian transportation sector in the future. The more adept Brazil is at strengthening the multimodality of its transport system, the lower the impact of these future investments on sectoral emissions will tend to be, especially because of the interplay correlation between modes of transportation and energy consumption.

5.3.2.2 Energy consumption

One of the main consequences of this concentration on the road mode of transportation lies in the Brazilian energy consumption profile, in which the transportation sector is one of the main consumers. For instance, in 2019, the sectoral energy demand was estimated to be 84.8 million tons of oil equivalent (toe) (33.5% of the total final energy consumption). The second main consumer was the industrial sector, which consumed 78.6 million tons in the same year. However, these two energy-intensive sectors are presenting different trends in regard to their use of energy. For instance, since 2009, the year of the approval of the PNMC, the industrial final energy consumption has grown by 3.3% while the transportation sector consumption has increased by 34.7%, which was driven by road transportation (37.0% – highways) and, to a lesser extent, by civil aviation (16.5% – airways), as depicted in Table 17.

Table 17 – Final energy consumption by sector (10^3 toe).

Identification	**1990**	**2005**	**2009**	**2016**	**2019**	**Variation from 2009** to 2019**
Final consumption	127,542	195,491	220,646	254,805	259,885	17.8%
Final non-energy consumption	9,953	13,222	14,921	14,771	14,253	–4.5%
Final energy consumption	117,590	182,269	205,725	240,034	245,632	19.4%

Transportation – total	32,964	52,720	62,969	81,987	84,810	34.7%
Highways	29,276	48,073	57,614	76,325	78,946	37.0%
Railroads	633	926	1,122	1,120	1,219	8.6%
Airways	1,967	2,596	2,874	3,347	3,348	16.5%
Waterways	1,089	1,124	1,359	1,194	1,297	–4.6%
Industrial – total	43,527	72,806	76,188	83,233	78,699	3.3%
Others*	41,098	56,744	66,568	74,814	82,123	23.4%

*Others: energy sector; residential; commercial; public; agriculture and livestock; unidentified consumption.

**2009: the year of the establishment of the PNMC.

Source: Author's elaboration based on EPE (2019).

There are structural and economic reasons that explain these different patterns in these two sectors. From the 1970s, a growing diversification of energy sources in the industry was observed, with a gradual increase in renewables, especially electricity (from the Brazilian hydropower plants) and sugar cane bagasse, in the sectoral profile until these two sources became sectoral dominant. Meanwhile, the transportation sector has intensified the use of fossil fuel (e.g. gasoline and diesel), and despite the widespread adoption of ethanol from sugar cane (especially for private vehicles), the now-renewables are still the main source of energy for the different transportation systems in Brazil (Andrade, 2010; EPE, 2019). Moreover, it should also be noted that the process of deindustrialisation faced by the Brazilian economy in recent decades together with the low economic growth average rates of the 2010s might be behind the slowing down of industrial energy consumption since 2009. However, such a combination of economic factors also tends to impact the transportation sector, especially in regard to freight transport.

5.3.2.3 Greenhouse gas emissions

In 2016, the Brazilian energy sector accounted for 422,498 Gg CO_2e, which represented 32.4% of the total Brazilian emissions for that year. Moreover, CO_2 gas

accounted for 95% of the Brazilian energy emissions, with the burning of fossil fuels representing 94.8% of these CO_2 emissions. The emissions of the transportation sector are included in this sector. As Table 18 indicates, the road mode is the main emitter in the transportation sector. In 2016, this mode accounted for 91% of the total sector emissions. Civil aviation is the second main emitter, with 6% of the total emissions in 2016.

Table 18 – Brazilian transportation sector emissions (in Gg CO_2).

	1990	**2005**	**2009**	**2016**	**Δ 1990–2016**	**Δ 2009–2016**
Energy (total)	169,985	291,019	316,368	399,798	135.20%	26.37%
Transport-ation (total)	79,338	135,991	150,448	200,311	152.48%	33.14%
Highways	70,094	123,773	134,811	183,118	**161.25%**	**35.83%**
Railways	1,592	2,836	2,956	2,752	72.86%	–6.90%
Airways	4,232	6,316	8,330	12,074	**185.30%**	**44.95%**
Waterways	3,420	3,476	4,351	2,367	–30.79%	– 45.60%
Freight*	48,159	75,675	82,858	103,782	115.50%	25.25%
Passengers *	37,052	66,198	72,685	101,714	**174.52%**	**39.94%**

*Retrieved from SEEG data.

Source: Author's elaboration based on MCTIC (2019) and SEEG Brasil (n.d.).

The evolution of the CO_2 emissions of the transportation sector over the past years has revealed important trends. First, it can be observed that since 1990, the total emissions of the transportation sector have grown more rapidly than the emissions of the energy sector. Such a trend continued even after the launch of the PNMC. The main drivers of this expansion were road transportation and civil aviation. In terms of distribution of the emissions by type of transport (freight and passenger), the emissions are divided

equally between the two types. However, the emissions related to passengers are growing more rapidly, and it is expected that they will surpass the freight emissions in the coming years. The main explanations for this are the increasing motorisation rate and the growing use of private vehicles in Brazil, as mentioned earlier.

5.3.2.4 Governance and planning of the Brazilian transportation sector

The institutional arrangements of transportation are mainly based on the distribution of competencies established by the 1988 Federal Constitution (Brazil, 1988). Mirroring what is observed in the environmental sector (discussed in Chapter 4), the federalism of the Brazilian transportation sector also presents a concentration of competencies within the union (national level). For instance, the union has the power to establish the principles and directives for the national transportation system as well as directives for urban transportation.

The union also has exclusive powers to legislate on maritime and aeronautical issues, directives of national transportation policy, transit and transport. In their turn, the municipalities oversee organising and performing (directly or via partnerships) the services of public transportation. The states (regional governments) have so-called 'residual competencies', which means that they can act on issues that are not explicitly forbidden by the constitution. In the case of the transportation sector, such residual competencies tend to be seen in the regulation and provision of services for the metropolitan regions (which exceed the political boundaries of one single municipality).[29] For instance, several state constitutions, such as those of Rio de Janeiro and São Paulo, foresaw such governmental action (Brazil, 1988; Rio de Janeiro, 1989; São Paulo, 1989).

The transport policy arena is populated by several governmental stakeholders at both the national and subnational levels (see the bottom section of Figure 11). At the national level, and as part of the National Secretariats of the Ministries of Infrastructure and Regional Development, there are several agencies and state-owned companies that play important roles in the regulation of different modes of transport (e.g. the Terrestrial Transports National Agency [ANTT], the Civil Aviation National Agency [ANAC] and the Waterway Transport National Agency [ANTAQ]) in planning and sectoral investments (e.g. National Department of Transport Infrastructure [DNIT],

[29] Examples of that type of service provided by the states: i) the service of ferryboats at the Guanabara Bay (CCR Barcas – Rio de Janeiro) and ii) the subway service in São Paulo (metro).

Planning and Logistic Company S.A. [EPL], INFRAERO, DOCK Companies, Brazilian Urban Trains Company [CBTU], TRENSURB and VALEC) as well as in transport legislation (National Traffic Council [CONATRAN]). In their turn, most states and municipalities have in their administrative structure transport-oriented organisations. For instance, at the state level, the following can be observed: i) the State Secretariats of Transport, ii) the Department of Roads (DER) and iii) the Department of Transit (DETRAN). Some states also have specific regulatory agencies for the sector, such as in the state of São Paulo (ARTESP) and the state of Rio de Janeiro (AGETRANSP). Moreover, the municipalities, especially the richest and biggest ones, also present Secretariats of Urban Mobilities and Transport as well as dedicated agencies such as Traffic Engineering Companies (CET) or similar. This constellation of actors is also populated by financial and private players, such as funding institutions (e.g. BNDES) and concessionaires.

This complex system of interconnected stakeholders requires proper governance to foster integration and coordination of the different actions and policies. However, despite several institutional improvements in the last decades, especially with the establishment of several regulatory agencies and the privatisation of many transportation services, Brazil still faces issues in the governance of its transportation policies. Parts of these are exogenous aspects, such as the struggles of Brazilian federalism (e.g. unbalanced technical, administrative and financial capacities over the different levels of the federation), while others are related to the modus operandi of the transportation planning and policy in Brazil (e.g. lack of financing, lack of planning development, unbalanced distribution of power between different societal actors in the decision-making, presence of corruption and exchange of favours between politicians and contractors, and some trace of path dependency, especially in the road mode).

When this intricate network of actors and planning enters the climate policy arena, the sector's dysfunctionalities and lack of preparedness to deal with a multilevel and multisectoral perspective tend to become more evident, not only because of the sector's planning difficulties but also because this involves new themes and approaches for the sector's formulation (e.g. electric cars, climate financing, monitoring of GHG emissions and active transport). In the following section, I start the discussion of these challenges in the promotion of GHG mitigation action in the transportation sector by presenting the case to be analysed.

5.3.3 Case description: The Sectoral Plan for Transportation and Urban Mobility for mitigation and adaptation of climate change

The PSTM was one of the sectoral plans foreseen by the PNMC. The legal mandate that established the PNMC set such sectoral plans with the aim to 'consolidate a low carbon economy with the intention to gradually reach GHG emission reductions considering the sectoral specificities' (Brazil, 2009b, p. 1). Moreover, according to Brazil (2010c), it should have as its minimum content the following five components: i) the sectoral emission reduction goals of 2020, including intermediate targets with a maximum interval of three years; ii) actions to be implemented; iii) definitions of indicators to be monitored; iv) proposals of regulatory instruments and incentives to implement the sectoral plan and v) sectoral studies with estimated costs and impacts.

The PSTM was supposed to be released by 15 December 2011; however, an amendment in Decree n. 7,390 pushed the date forwards to 16 April 2012. Even so, the final version of the plan was not released before June 2013. The plan was co-elaborated by two different federal ministries (the Ministry of Transportation [MT] and Ministry of Cities [MCid]), which, despite being at the same level of government, had different structures, capacities and levels of priority in relation to the issue. Moreover, the way in which the ministries interact with the subnational levels tends to differ, with the MCid having a closer relationship with the municipal level, given the implementation of the National Policy on Urban Mobility (PNMU, in Portuguese) launched in 2012.

The preparation of the PSTM involved intragovernmental talks, including public hearings, and a final draft submission to the national climate governance bodies (CIM and GEx), which were responsible for approving the plan. The CIM and the GEx also had a legal mandate to develop the overall coordination and monitoring of the sectoral plans included in the Plano Clima.[30] An illustration of the multiple dimensions of governance where the PSTM was embedded is provided in Figure 11.

The PSTM and all other sectoral plans were conceived as instruments of coordination and integration between the PNMC and other sectors and public policies relevant to the climate policy objectives, especially regarding GHG mitigation. On one side, there

[30] As previously discussed, despite the regulatory decree of the PNMC stating the need for an update of the Plano Clima, including the sectoral plans, it never actually culminated with a published updated edition of the Plano Clima. Thus, in practice, the PSTM and the other sectoral plans were never officially included within the Plano Clima.

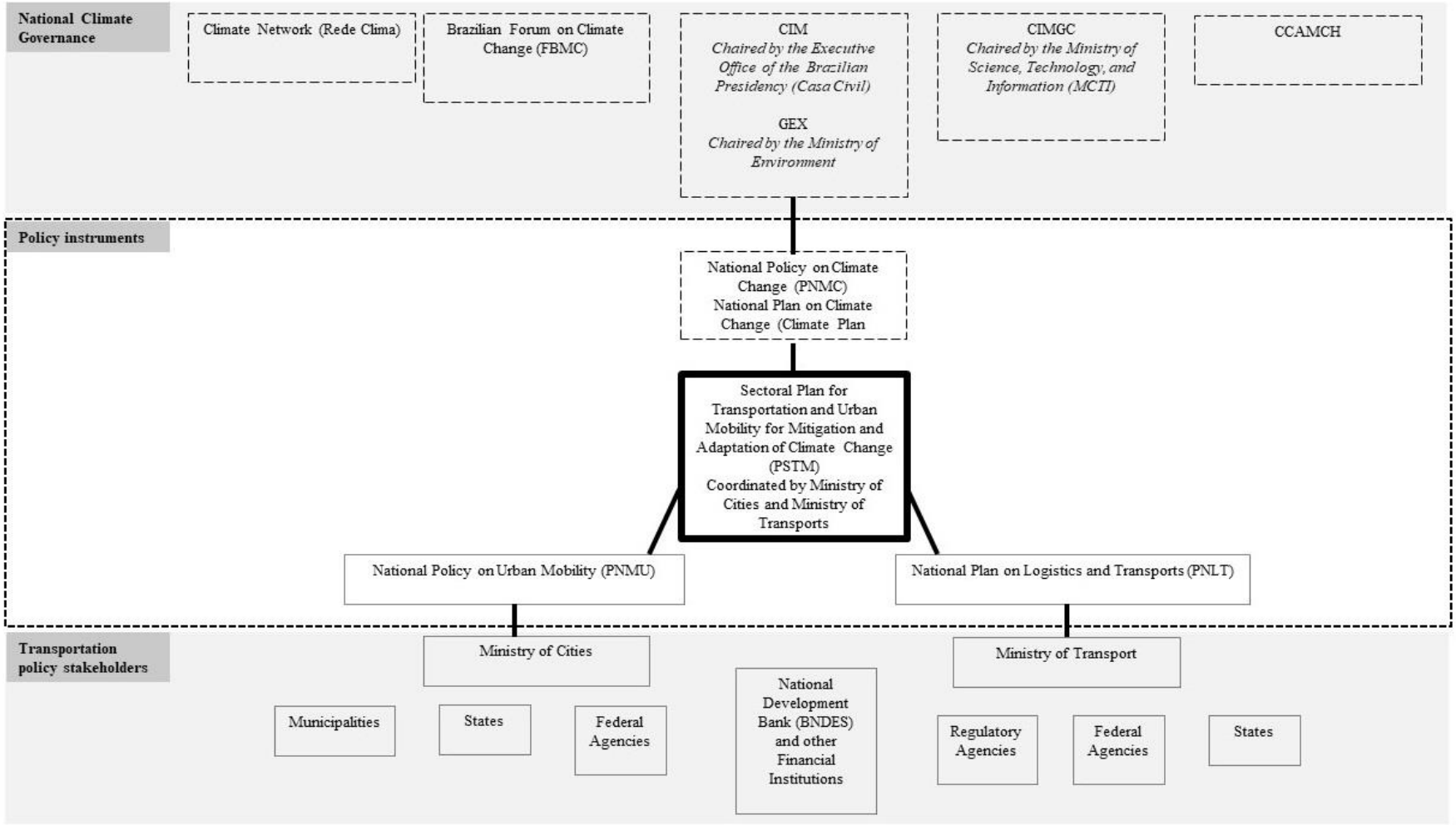
were governmental actors directly related to climate governance, such as the CIM and GEx and their respective chairs (Casa Civil and MMA). On the other side, there were governmental players in charge of the sectoral policies relevant to GHG mitigation and responsible for developing the different sectoral plans under the auspices of the PNMC.

As can be observed in Figure 11, the PSTM was expected to work as a bridge between the PNMC and its governance and planning process and the transport policy. In Brazil, the transportation sector has two main governmental stakeholders at the federal level, each of them working in a different segment of transport. At the time of the elaboration of the PSTM, the MT was the main governmental actor in relation to freight transportation, while the MCid was the key stakeholder in regard to the transportation of passengers, especially concerning urban mobility.

Each of these transport segments (freight and passengers) had distinct relevant actors for the planning and implementation of transport policies, a fact that consequently tended to affect the PSTM, not only in its elaboration phase but also throughout its lifetime. For example, in the case of the urban mobility area, at the time of the PSTM's elaboration, the PNMU had recently been launched, bringing a series of opportunities for the PSTM to build different links between climate action and urban mobility. In this segment, subnational actors are extremely important, particularly because the execution of the main actions in terms of urban mobility and passenger transport in large urban centres falls on the municipalities.

Meanwhile, in the policymaking and investment related to the freight sector, there was greater participation and concentration of powers in the hands of the national level (notably via the then MT). At the time of the PSTM elaboration, the great planning and directive piece for the country's cargo transport fell on the National Plan on Logistics and Transports (PNLT, in Portuguese), an instrument under which the PSTM was to act to promote greater convergence and coherence via a GHG mitigation perspective in the transport sector. On this side of transportation planning, the different regulatory agencies (ANTT, ANTAQ and ANAC) were also important players to enable actions and regulatory instruments aimed at reducing CO_2 emissions.

Figure 11 – Interplay between the governance of the National Policy on Climate Change and the Sectoral Plan for Transportation and Urban Mobility for Mitigation and Adaptation of Climate Change and the governance of the transportation sector.



Source: Author's elaboration based on Brazil (2009b, 2010c) and Ministério dos Transportes and Ministério das Cidades (2013).

The PSTM assumed as its main goal

> to contribute to the GHG sectoral mitigation, through initiatives that leverage the freight transportation infrastructure and the higher usage of more efficient modes of energy and, in the urban mobility sector, the increase of efficient systems for the public transportation of passengers, contributing to the reaching of the voluntary commitments of Brazil. (Ministério dos Transportes & Ministério das Cidades, 2013, p. 22)

It should be noted that this aim ('to contribute to the GHG sectoral mitigation') differs from what the PNMC law was expecting from its sectoral plans ('to consolidate a low carbon economy'). This can be perceived as a potential source of problems in regard to the future deliverables of the PSTM. Moreover, the PSTM did not comply with other PNMC commandments. For instance, it did not present any sectoral GHG reduction goal for 2020, as determined by Decree n. 7,390 from 9 December 2010. Instead, it only summarised already-planned transportation investments that, if fully implemented, would reduce the sectoral GHG emissions.

In the freight sector, the emissions reduction forecast was based on the 'adoption of the measures intended by the National Plan of Logistics and Transports – PNLT'[31] (Ministério dos Transportes & Ministério das Cidades, 2013, p. 20). Considering the adoption of all intended interventions of that plan, the emissions related to the transportation of goods would reach 98 $MtCO_2e$ by 2020. This represented 3 $MtCO_2e$ less than the business-as-usual scenario and was 42% more than the emissions verified in 2010.

For the transportation of passengers, the PSTM estimated a total emission of 131.7 $MtCO_2e$ by 2020, an increase of 52% compared to 2010 but 4 $MtCO_2e$ lower than the business-as-usual figure of 2020. Taking the same approach adopted for freight transportation, the PSTM only indicated already-planned interventions in urban mobility to figure out its forecast. The main interventions considered were as follows: i) the improvement of urban mobility related to the FIFA 2014 World Cup and the matrix of responsibilities signed by the union, states, municipalities and Federal

[31] The PNLT was an attempt of the Brazilian national government to resume its long-term tradition of transport planning that suffered strong constraints during the 1980s and 1990s. The first edition of the PNLT was launched in 2007 and the second version in 2009. Nevertheless, the plan was not successful in reaching its major goal, and it was practically discontinued after its third edition in 2011, when Brazil started to note the main signals of an economic crisis and fiscal constraints, which were still faced by the country when this dissertation was written.

District; ii) the Acceleration Growth Program for urban mobility in large cities and the atmospheric railway of Porto Alegre (Aeromóvel); iii) the investments of the BNDES in urban mobility projects and iv) the investments of the state and municipal governments of São Paulo and Rio de Janeiro to be implemented until 2020 and whose funding resources were not included in the previously expected interventions.

Finally, in regard to the presentation of proposals of regulatory instruments and incentives to enhance a low carbon pathway, the plan limited itself to providing recommendations to move towards the decarbonisation of the transport sector, such as i) enhancing policy coherence and integration; ii) the need for GHG inventories and related methodological improvements in that regard; iii) modal transfer; iv) improvement of the environmental licensing process, including the implementation of the Strategic Environmental Evaluation; v) use of the CDM; vi) the need for energy efficiency and renewable energy and vii) traffic demand management. However, the PSTM did not point out how to achieve many of these initiatives or address the bottlenecks that were preventing Brazil from adopting many of these recommendations at that time.

5.3.4 Results

The employment of the analytical framework in the PSTM helped identify the occurrence of several gaps, especially those related to politics (gap 1), institutions and processes (gap 2) and resources (gap 3). The results of the analysis also revealed that, despite keeping a very low quantity of staff to deal with the issue in the federal government, the PSTM helped the sector to reduce the informational gap (gap 4), notably by inducing sectoral GHG inventories and technical publications (e.g. GHG inventories for road, railways and civil aviation, urban mobility guidelines and development of technical coefficients).

Gap 1 – Politics

The gap in politics was perceived to be very strong during the lifetime of the PSTM. This result was mainly related to the absence of political attention and political will during the different stages of the PSTM, as the analysis showed. This finding was supported by different pieces of evidence. For instance, there was significantly reduced engagement of the top-level authorities of the MT and the MCid during the PSTM preparation and following stages. Overall, these two ministries participated in the CIM

and GEx meetings with lower-ranked representatives (e.g. third- or fourth-tier representatives of the ministry hierarchy), and they had much more reactive than proactive behaviour during these meetings. As argued by one interviewee,

> I always perceived the mobility secretary of the ministry of cities as very disempowered. It had the technical eye, but it wasn't the one who decided. I think there was a promising moment during the 2013 protests, which generated a great demand for urban mobility, but that was all. It was a secretariat that was always very vulnerable to party-political interests. To me, it always seemed like a secretariat that was in the second tier from the decision-making point of view. The decision was taken in the Casa Civil, in the [ministry of] Planning, while the MCid was more in charge of execution. I think because of the lack of political power, which in turn generated little investment in intelligence for decision-making. (respondent NG5)

The findings also revealed that political attention given to climate-friendly transportation policies and plans (e.g., modal shift, active means of transportation, public transportation improvements), was much more related to specific conjectural aspects than to actions pushed by the PSTM. For instance, the improvement of urban mobility systems in many Brazilian cities was done mostly because of the big sporting events that Brazil hosted during the 2010s, such as the 2014 FIFA World Cup and the 2016 Rio Olympics, and not because of the PSTM or the PNMC. Furthermore, the analysis revealed a more recent growing interest (and personal engagement) of the political tier of the Brazilian Ministry of Infrastructure (MINFRA) in developing infrastructure projects more aligned with sustainable principles in an attempt to make these projects more attractive for the growing climate (green) financing and not because of the PSTM's actions. As one interviewee detailed,

Today we have an agenda focused on transferring our [infrastructure] public assets to the private sector. This strategy is being applied to all modes of transport, railways, airports, roads, and ports. This is where the importance of sustainability and the climate perspective come into play within the investments we want to promote in the country's transport infrastructure. During the roadshows we recently held, we identified that the investment funds are very careful about where to allocate their resources, especially because of the long term of the investments, which are 30, 60 years… So they are

looking for projects and assets that have a green label. We need to ensure that our agenda of transferring assets to the private sector does not get stuck in attracting investors because of the lack of sustainability of our projects. So we went after partnerships, such as the one with the Climate Bond Initiative [CBI] so that we can certify that our projects have this sustainability aspect very clearly defined for all investors. (respondent G14)Moreover, since the Brazilian emissions until the mid-2000s were strongly related to deforestation of the Amazon rainforest, the findings also noted that the level of political attention in regard to climate change outside the MMA was still low. According to many interviewees, the cut in GHG emissions tended to be perceived by politicians and part of the bureaucracy as an environmental policy matter, in which the main political attention in regard to the topic concerned the emissions from LULUCF. Such a perception still tended to dominate the Brazilian climate debate, with potential (negative) implications for hard-to-mitigate sectors, such as transportation, as many respondents stressed.

Gap 2 – Institutions and processes

Several issues particularly accentuated the gap in institutions and processes in the PSTM. In this regard, the first issue found during the analysis was that the PSTM did not present any GHG emission reduction targets, as it was obliged to do by climate law. It merely listed actions already planned in other government policies and programmes, such as the PNLT and PNMU. As one of the interviewees highlighted, 'the PSTM was much more an inventory of already-decided governmental action than a plan. It did not add [anything] new in terms of actions to reduce GHG emissions' (respondent NG7).

It was also found that the preparation of the PSTM lacked coordination and integration between the two ministries responsible for the development of the first edition of the plan, the MT and MCid. The MCid formally established a working group to prepare the urban mobility chapter of the plan, while the MT did not observe the same level of organisation. Another aspect observed in the performance of the two ministries while preparing the PSTM was that while the MCid perceived a potential co-benefit of the climate policy for the responsibilities that the ministry had within the national urban mobility policy, as one respondent stressed 'One vision that we brought was the vision of co-benefits, which did not exist before. For example, making a quality public

transport system generates a direct benefit for GHG mitigation, in addition to improving air quality, health, etc.' (respondent G11).

On the other hand, the MT bureaucracy faced difficulties in drafting the freight transport chapter, especially in proposing more sensitive and transformative measures for the sector. This probably had to do with the transformative potential and breaking of the status quo that a deep transformation of the transportation sector could cause. For instance, one interviewee who was actively engaged in the PSTM from the MT side said that 'the Ministers like to do their infrastructure works … As long as these new actions (such as the PSTM or any other attempt to decarbonize the sector) do not interfere [with] that, it is fine'(respondent G15).

The analysis also showed that instead of informing and influencing new policies and programmes in the area of urban mobility and freight, for instance, through the PNMU and the PNLT, the PSTM did not bring any innovation in terms of indicators or regulation proposals to advance the decarbonisation of the transportation sector. Instead, it limited itself to repeating old information and already-planned investments depicted in the then-current policy scenario of the urban mobility and transportation sectors.

Moreover, it was also found that the governance bodies did not act to correct this perceivable lack of information, ambition and event compliance of the PSTM concerning climate legislation. In other words, these governance bodies struggled in setting effective coordination instruments such as lines of control and enhancing systems of information exchange among the governmental stakeholders directly involved with the PSTM.

One of the interviewees was very assertive in regard to this low level of attention that CIM–GEx paid to the PSTM: 'After the release of PSTM, we were no longer asked about the plan (and its implementation) in the GEx meetings' (respondent G13). Yet in regard to the quality of the PSTM, it should be noted that after its launch, in 2013, the plan was never updated to correct such failures or monitored, disregarding the need for a periodic review every two years, which was foreseen in the PNMC. This episode also revealed how ineffective the climate governance bodies were in enhancing integration and coordination through the different sectoral policies of the PNMC. As stressed by one interviewee,

> At the time the GEx was functioning the coordination helped us to set up the PSTM. That was until 2014. Now after that, things have gone off the agenda. To get a plan like this off the ground, you need support. You can't make an ambitious plan like this and let a ministry work on it alone. It needs to be a policy [the PNMC and its sectorial plans] where the whole government works all the time. (respondent G11)

Moreover, it was also found that the PSTM and its incumbent ministries struggled to navigate the plan in the fragmented governance faced by Brazilian transportation policies. The difficulties in the coordination and integration of different policy instruments and governmental stakeholders (e.g. national and subnational agencies) were also noted in many other transport policies with potential benefits for the sustainability of the Brazilian transport system.

For instance, the PNMU, which was regarded as an urban mobility policy that paid attention to sustainability issues, had struggled since its establishment to get fully implemented in the country. Brazil still had capital cities without Urban Mobility Plans, and only in two capitals was strong evidence found that the local authorities were trying to incorporate climate mitigation action within the mobility policies (São Paulo and Belo Horizonte). This revealed that coordination mechanisms to enable transformative actions towards low carbon transformation were being poorly employed to foster GHG mitigation. This lack of coordination mechanisms is especially noted for the MTM instruments (e.g. results-oriented financial management systems). To illustrate this, no strong evidence was found that the federal funds available for the improvement of cities' mobility systems were adopting climate criteria to inform their fund allocation processes.

Gaps 3 and 4 – Resources and information

Regarding the gap in resources, the analysis showed that the PSTM was unable to tackle existing issues related to financing. However, the findings suggested that the PSTM was partially successful in helping the federal government reduce its technical capacity gaps in regard to the readiness for policy formulation on low-carbon transportation. This was essentially perceived mainly in the urban mobility sector, in which many capacitation initiatives and much technical cooperation took place to leverage the understanding of the technical staff of the MCid and some subnational

urban mobility secretariats in regard to climate policy and its interlinkages and co-benefits for urban mobility policies. As one respondent highlighted,

> I believe that PSTM was a milestone in bringing the discussion of sustainability of transport and urban mobility into the ministries [of cities]. It brought us knowledge. The construction of the plan was a learning process. It was not a great plan, but it was an impulse to put this agenda within the ministry. It generated information for decision-making. There was nothing before. (respondent G11)

Regarding financial resources, the decades of economic crisis restrained the country's capacity to invest in transportation projects. State-led investments, which were the main drivers of investments in the sector between the 1950s and 1970s, were abruptly interrupted. For instance, the MINFRA saw a decrease from R$22 billion (EUR 3.6 billion) in 2010 to R$5.3 billion (EUR 800 million) in 2020. This made the country underperform in terms of transport investment compared to other emerging countries, such as Russia, India, China and South Africa group. While Brazil invested 1.8% of its GDP on transport infrastructure, the average rate of this group was 4% (G1, 2019).

> In this scenario of scarce resources for new investments in infrastructure, it might be expected that the PSTM would be designed to address these problems, even if only partially. However, the plan was ineffective in enabling transport infrastructure actions and projects to benefit from climate policy funding opportunities, such as the CDM and other opportunities arising from the growing climate finance market. The main explanation that many interviewees had was that there was a lack of preparation of teams from the MT and MCid and at the subnational level to adapt their projects to the requirements of the CDM[32] and other such opportunities related to climate finance. As one respondent argued, 'We did the plan [PSTM] the way it was possible to do... we didn't have financial resources nor the strong technical capacity to do the PSTM. We were experts in urban mobility, not climate change' (respondent G11).

[32] The lack of CDM transportation projects is a matter of concern, especially when considering that other Latin American countries are making use of the mechanism, such as Colombia, which registered the bus rapid transit system of the Colombian city of Bogotá, the *Transmilenio*, for the mechanism (UNFCCC, 2018).

Also, in the management of financial resources, no attempt was noted to better inform important federal funds that financed the transport sector, such as the Guarantee Fund for Length of Service (FGTS), so that they could establish climate criteria related to both mitigation and adaptation in the allocation of their resources.

Moreover, it is important to note that the difficulties of linking transport projects with climate financing are not unique to the PSTM. The findings suggested that these issues in the designs of the of the programmes and projects of the sector were structural. For instance, during the interviews, it was highlighted by some interviewees that the same lacunae were perceived in other relevant actions, such as in the following: i) the PPI, at the national level (Valor Econômico, 2017) and ii) the discussion of the new concession of the ferry service in the state of Rio de Janeiro (subnational level). As stressed by one respondent while sharing his view about ministerial capabilities,

> We see that within the [transport] sector there are different levels of institutional capacity to discuss the issue [relationship between climate and transport]. For example, within the sector's regulatory agencies, ANAC, ANTAQ, and ANTT, you can see the difference regarding the climate agenda: while some are already more advanced in discussing climate and green bond issues, others are still lagging. But this ends up being good because those who are behind [in discussions of the interplay between climate and transport] tend to want to catch up faster with the more advanced institutions. (respondent G14)

Aware that this should be solved because investors worldwide were demanding more sustainability in transport-related projects (and conditioning their participation on that principle), the MINFRA[33] recently signed a memorandum of understanding with the Climate Bond Initiative intending to improve the sustainability components of its transportation concession projects and gain access to the green bond market (MINFRA, 2019).

Regarding the gap in information, the analysis indicated that information available for decision-making was slightly improved after the launch of the PSTM. As some interviewees highlighted, the discussion of the PSTM was an important push to

[33] The MINFRA was established in 2019. It replaced the MT in the governance and planning of the Brazilian transportation sector. See more about the cooperation between the MINFRA and the Climate Bond Initiative here: https://www.gov.br/infraestrutura/pt-br/minfra-e-cbi-definem-proximas-etapas-do-processo-de-certificacao-ambiental-de-ferrovias.

produce information. Many initiatives during the 2010s were found, most of them in cooperation with non-state actors, which reduced the shortage of knowledge of the nexus climate transport, especially in the fine-tuning of GHG emission projections and emission factors related to transport activities, such as the following: i) the GHG emission calculator, developed by the BNDES (2020); ii) the GHG emission simulator developed by the state-owned EPL (2020) and iii) the GHG inventories for a) motorised road vehicles (MMA, 2011), b) freight transported by railways (ANTT, 2012) and c) civil aviation (ANAC, 2020). Despite being powerful tools to inform decision-making, the analysis showed that part of these initiatives and results were being poorly employed by policymakers at the national and subnational levels when creating transportation policies. Table 19 summarises the main results of the analysis. In the following section, these results are discussed.

Table 19 – The Sectoral Plan for Transportation and Urban Mobility for mitigation and adaptation of climate change gap analysis results.

Gap	**Results**
Gap 1 – Politics	▪ Lack of political willingness to enhance low carbon transportation. ▪ Lack of engagement of the upper tiers of the MT and of the MCid during the PSTM's preparation and implementation. ▪ Path dependency in regard to the road mode of transportation likely to undermine the political willingness for low carbon transformation in the sector.
Gap 2 – Institutions and processes	▪ Fragmented governance without deployment of coordination and integration mechanisms. ▪ Absence of GHG emission reduction targets. ▪ Lack of integration with already-in-place governmental actions (e.g. the PNMU and PNLT).
Gap 3 – Resources	▪ The development of climate policy capabilities within the MT and the MCid remained limited. ▪ The MCid managed to establish partnerships with subnational entities for capacity building for low-carbon urban mobility.

	▪ Climate-related funding opportunities were missed (e.g. CDM projects). ▪ Investor climate and ESG considerations appeared to be increasing the level of political attention.
Gap 4 – Information	▪ Greenhouse gas sectoral inventories improvements were made (e.g. in roads, railways, civil aviation and cities). ▪ There is a lack of climate-relevant data for policy decision-making in the sector. ▪ The little information available (derived from sectoral GHG inventories) was poorly deployed to inform planning and decision-making.

5.3.5 Discussion

The employment of the analytical framework in the assessment of the PSTM proved useful to examine the interplay between climate and transportation policies in Brazil and the main challenges of the country in this regard. The evidence showed that the PSTM faced extreme difficulties in becoming a link between climate and transport policies, something that could be explained by the presence of large gaps in politics (gap 1), institutions and processes (gap 2) and resources (gap 3). The sum of these gaps led to the conclusion that the PSTM failed to achieve its objectives and help the decarbonisation of the transport sector.

By placing the analysis of the present case in a perspective of the theoretical framework used by this research (MLG and public policy coordination), it is possible to realise that the problems faced by the PSTM throughout its cycle, with the consequent manifestation of the gaps already mentioned, were due to a conjunction of sectoral factors (within the transport sector itself) and systemic aspects of climate policy and the way they interacted with the different economic sectors relevant to GHG mitigation.

Regarding the internal factors of the transport sector, the lack of political will for structural changes in the transport sector is directly linked to the way the transport sector developed in the country in the second half of the last century, where the strong

dependence on the road sector brought about political, economic and public policy formulation implications, tending to impose a strong path dependency within the sector, where any structural change, especially regarding better distribution of the different transport modes, tended to face difficulties (Schmitz, 2016; Worker, 2016).

An important stimulus for increased policy attention is the potential co-benefits of a climate-friendly sectoral policy (Naess et al., 2015; Schmitz, 2016). Although the benefits of greater multimodality in the transport matrix are many, especially in terms of gains in the competitiveness of the country's economy (e.g. in the reduction of transport costs) and for the well-being of people (travel agility, reduction of traffic jams, etc.), this perspective was not duly adopted in the PSTM.

Regarding the topic of co-benefits, the discussion on the electrification of vehicles in the country, despite still being incipient, does not seem to experience the same level of resistance faced by multimodality. This may be related to the fact that the electrification of vehicles has a reduced potential to change the current distribution of modes both for cargo and passengers. This aspect is important for the discussion of public transport systems in Brazilian metropolises. However, the resistance this debate may face could come from another policy field, the energy sector, in which other climate-friendly fuel types, such as sugar cane ethanol and biodiesel represent an expressive share of the energy consumed in the transport sector.

Still, within the transport sector, the absence of the planning capacity (Charbit, 2011) within the transport sector is something to be noted, not only within subnational governments but also in the federal government, especially the MT in the period covered by the analysis. In an environment where the culture of planning and policy innovation was still barely perceptible, it was naturally expected that this would influence the way the MT prioritised the PSTM and its relevance to sector planning. This aspect tended to be further aggravated by the lack of resources for new investments, which has been characterising the Brazilian transport sector for some decades. With huge infrastructure and financial bottlenecks, the transport sector has struggled for a long time to make its existing infrastructure stock minimally usable.

In terms of systemic aspects, the gaps in the PSTM can also be understood to be a result of the coordination and integration failures verified in the scope of the national climate governance, notably the CIM and GEx, as already presented in the previous

section of this chapter. This is because during the elaboration of the PSTM, and especially after the launching of the plan, the CIM and the GEx did not act effectively to ensure that the plan was implemented and updated. As already discussed, a clear problem of selective perception (Hustedt & Seyfried, 2016) of the very people responsible for climate governance towards the PSTM was noted here, a fact that probably translated to the lack of holistic vision (Behn, 1998; Clarke & Stuart, 1997) and low level of attention that these actors of climate governance had in relation to sectoral plans that were not part of the more relevant plans to achieve GHG reduction targets for 2020 (e.g. the PPCDAm, PPCERRADO, PDE and ABC Plan). The low effectiveness of climate governance in reducing the capacity differences between the various federal ministries on climate issues, as well as the low use of economic coordination mechanisms with the transport and mobility sector (such as carbon pricing and the use of funds), could also be included with these systemic aspects that caused the gaps in the PSTM. Also with respect to the use of coordination instruments, the development and employment of management and structural instruments was very limited. An exception to this was perhaps the attempt to create systems that would make possible the exchange of information, especially in the area of urban mobility.

The reduction of the informational gap throughout the development of different GHG inventories and guidelines for sustainability in transport projects was an achievement fostered by the PSTM that should be stressed. It suggests that the PSTM may have unleashed some formal and informal networks at the national level to reduce, at least partially, the gap in information verified in the transportation sector regarding sustainability principles. As the MLG literature stresses, the quality of information for climate policy decision-making is of critical importance, not only to inform policymakers but also to monitor and provide transparency regarding decarbonisation initiatives (Averchenkova & Bassi, 2016).

The multiple gaps found throughout the lifetime of the PSTM suggest that the transport sector in Brazil is still struggling to find ways to improve sustainability and climate concerns in its projects. This understanding gains even more relevance when considering the critical picture of Brazil's transportation infrastructure, which needs not only more railways and waterways but also available financial resources for the construction of a series of planned highways. In the urban sector, the absence of a more

integrated discussion between the development of transport systems and the development of cities is also something to be pointed out.

The PSTM study showed that the Brazilian transport sector has huge governance challenges concerning decarbonisation. It is essential that future versions of the PSTM, or similar plans, address the gaps discussed here so that they can have better impacts than the PSTM. Political attention and will are key factors in this process and perhaps could be increased in a scenario where the co-benefits of climate policy are better highlighted. In this sense, the search for climatically responsible investments, as well as the growing trend of the green finance market, could become important attractions for politicians and bureaucrats to increase their levels of attention to the decarbonisation of the Brazilian transport sector, especially when considering the scarcity of public resources for new investments.

However, future climate governance arrangements also need to innovate in the use of coordination mechanisms and should not be limited only to the elaboration of plans which are relevant but require unavailable means of implementation. In this sense, the development of MTM coordination instruments – such as the allocation of resources from government funds based on the climate performance of transport investments, the use of pricing of carbon emissions from the sector and a capacity development strategy that includes not only the federal agencies involved with the transport sector but also subnational bodies – may help in bridging the gaps discussed here.

5.3.6 Conclusion

The complexity of the cross-sectoral and multilevel governmental relations of climate policies demands political willingness, tailored institutions, a well-defined policy process and the availability of technical and financial resources to deal with the coordination and integration issues that tend to arise throughout the lifetime of climate policies, especially when they aim to promote decarbonisation in hard-to-abate sectors, such as the transportation sector. In Brazil, these requirements tend to be even more relevant because the sectors present traces of a strong path dependency on the road mode due to the close ties that this mode of transportation has with the development and industrialisation of the Brazilian economy.

The employment of my novel analytical framework in the analysis of the PSTM indicated that Brazil faces gaps in politics, institutions and processes, resources and

information in regard to the decarbonisation of its transportation sector. This subsection identified that the gaps in enhancing integration between climate and transportation policies as well as fostering transportation projects that are more climate-oriented in Brazil are mainly related to a lack of political will, poorly designed policy mechanisms, a lack of coordination and a lack of availability of financial resources. The strong path dependence on the road mode associated with the lack of awareness with respect to the relevance of the transportation sector to GHG mitigation is a potential explanation for these gaps. Moreover, the analysis revealed that climate financing associated with the increasing consciousness about ESG principles in the financial market could foster climate-oriented transportation projects and help the country achieve better sustainability indicators in its transportation sector. Further investigation about the role of climate financing in promoting transformative change in Brazilian transportation is required.

5.4 Sectoral case 2 – the agriculture sector

5.4.1 Introduction

Playing a major global role in food and grain production, the Brazilian agriculture sector is one of the main topics of the national debate on climate change. In 2016, the agriculture sector was responsible for emitting 487 Gg CO_2e, a figure that placed the sector as the principal emitter of GHG in Brazil (MCTI, n.d., 2021). The climate relevance of Brazilian agriculture is expected to increase in the coming years due to the even more prominent position that Brazil is expected to take in the international market of agriculture commodities in the future (FAO, 2021; MAPA, 2021a, 2021b). In addition, agriculture activities also pose important challenges in terms of environmental conservation, such as the demand for land and water resources. Moreover, the sector plays relevant roles in the country's political and economic life, which encompasses issues such as its relevance to the Brazilian trade balance and its wide political support within the National Congress (Garcia & Vieira Filho, 2014; Silva, 2019).

In this subsection, I run my second sectoral case study by examining the interplay between the agriculture sector and climate policies. To do so, the ABC Plan established under the 2009 PNMC will be assessed. The ABC Plan is a plan that intends to scale up the adoption of low-carbon agricultural techniques to a larger portion of agriculture

in Brazil and make the sector more adaptable in terms of climate change. This plan, therefore, does not directly address LULUCF emissions from the conversion of forests[34] into agricultural areas. However, this relationship tends to be affected by the way agriculture is practised in the country: it is expected that the greater the dissemination of low-carbon agricultural techniques is, the lower the pressure for the conversion of forests (deforestation) into agricultural lands tends to be.

This subsection comprises six parts. After this introductory part, I provide a background, which includes an overview of the recent Brazilian agriculture development process as well as the multiple links between agriculture production, GHG emissions and the interplay between agriculture and the environment. The case is described in Section 5.4.3. This is followed by the results of the analysis (see Section 5.4.4) and the discussion (see Section 5.4.5) before I conclude the study in Section 5.4.6, which draws some implications from the findings.

5.4.2 Background

The Brazilian agriculture sector has considerably changed in the last 40 years. From Brazil's status as a food importer that faced a supply crisis in the 1960s to one of the main global food producers today, the economic relevance of agriculture to the country's economy is clear. For instance, this sector represents 26.6% of the country's GDP, with crop-related and cattle-related activities representing 18.5% and 8.1% of the Brazilian GDP, respectively. Moreover, the sector accumulated a positive trade balance of US$87 billion in 2020[35] (Barros et al., 2020; CEPEA, n.d.; MAPA, n.d.).

This agriculture development was the result of various government actions over the past decade, notably from the 1970s, such as the following: i) public investments, ii) the development of rural credit and insurance mechanisms, iii) research and agricultural extension, iv) the opening of the Brazilian economy for the foreign trade and v) the expansion of the agricultural frontier towards the north of Brazil. Altogether, these actions contributed to the successive increases in production and productivity in the sector[36] (EMBRAPA, 2018a; Vieira Filho & Garcia, 2020

[34] The PNMC sectoral plans which explicitly address deforestation are the PPCDAm and the PPCERRADO.
[35] For successive years, the agriculture sector has been guaranteeing a positive Brazilian trade balance; meanwhile, all other sectors together experienced negative figures for 2019 and 2020 (US$35 billion and US$36 billion, respectively).
[36] Currently, Brazil is the world's biggest producer of soybean, sugar cane, beef, chicken, oranges and papaya and the main exporter of soybean and beef to name a few. During the 1950s, only 2% of Brazilian rural properties were mechanised (Embrapa, 2018a).

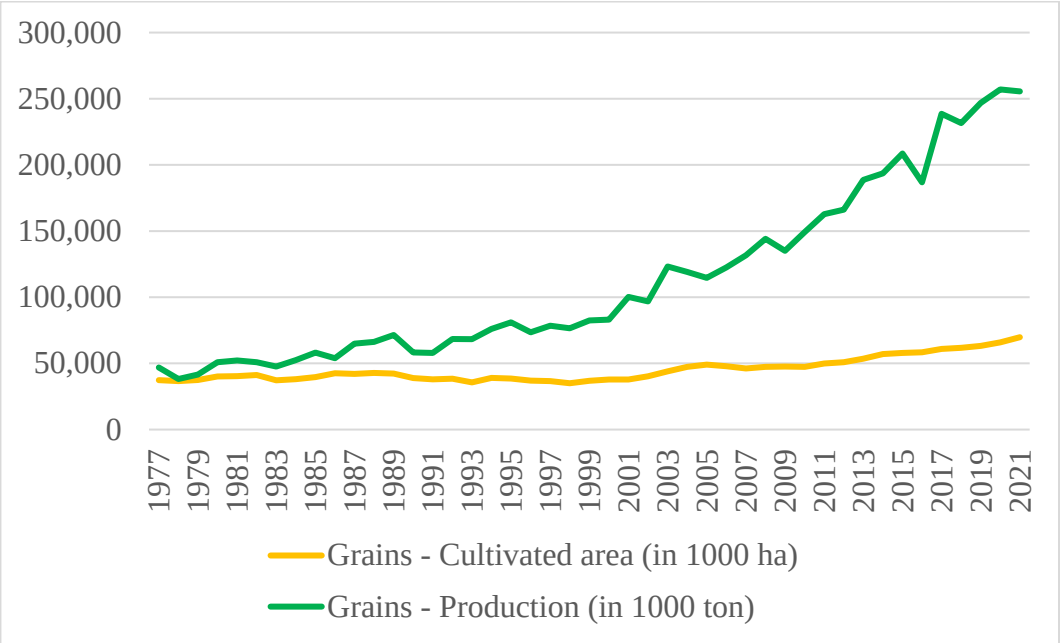
The production and productivity figures of Brazilian agriculture show the noticeable intensity of the agricultural development in the country. For instance, the production of grains increased by 400% from 1977 to 2017, while the cultivated land grew 63% within the same period, suggesting that the land use in this sector became more efficient, as depicted in Figures 12 and 13, which show that the most noticeable gains in productivity per hectare were seen in rice and corn cultivation.

Regarding livestock-based activities, a rapid increase in terms of production was observed, especially in beef and chicken, which grew 1,200% and 300%, respectively, from 1978 to 2016, as illustrated in Figure 14. This expansion was less related to gains in productivity, being more associated with the expansion of pastures towards the North and the Centre-West regions of Brazil (Dias-Filho, 2014; Ferreira Júnior, Santos, Mesquita, & Parente, 2020).

This geographic expansion into regions that were until then more environmentally preserved is noted above all in the production of cattle. As indicated in Table 20, currently the Centre-West region holds the largest number of cattle heads in the country (74,251,340 heads in 2019), which represents a 224% growth concerning the figure for the same region for the year 1974. Another very relevant fact in the geographical dynamics of cattle production is the impressive increase in cattle heads in the North region, which went from 2,211,000 heads in 1974 to 49,609,974 in 2019, an increase of 2,144% in the period and which made this region the second most relevant in terms of cattle heads in the entire country. Together, the Centre-West and North regions currently hold 57% of the total cattle in the country, a noticeable contrast when compared to the representativeness that the two regions together held in 1974 (27% of the total), at which time the Brazilian southeast held the largest herd in the country. From Table 20, it is also important to highlight the relevance of the main producing state, Mato Grosso, which alone holds 14% of the national production, a value greater than the total of the South region of the country.

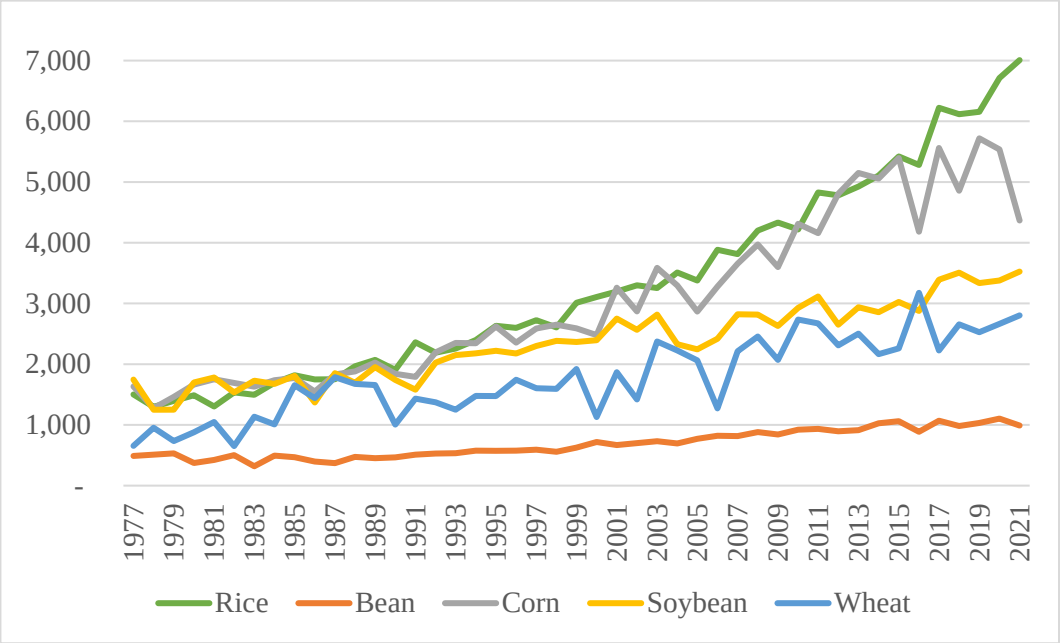
This expansion towards pristine regions of the country had environmental impacts, as has been widely discussed in the literature (Parente, Mesquita, Miziara, Baumann, & Ferreira, 2019; Rivero, Almeida, Ávila, & Oliveira, 2009), and today, it is one of the central aspects of the sustainability discussion observed in the agriculture sector and in the GHG emissions from LULUCF, as I will later discuss in this chapter.

Figure 12 – Brazilian evolution of grain production and cultivated land.



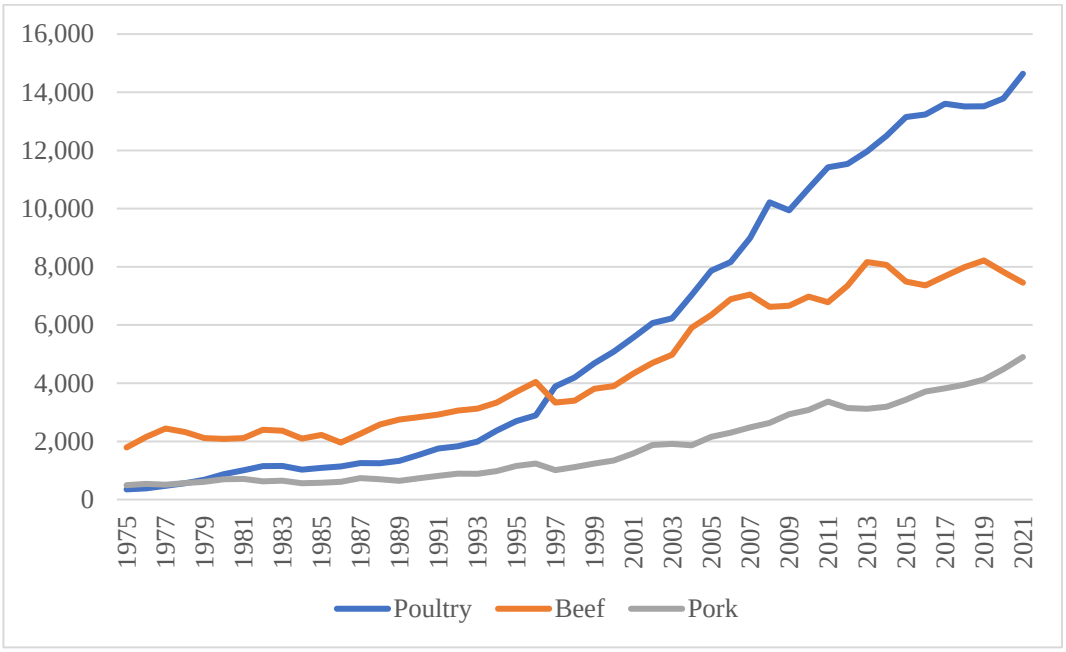
Source: CONAB (n.d.).

Figure 13 – Brazilian productivity (in kg/ha) for different types of grains.



Source: CONAB (n.d.).

Figure 14 – Brazilian evolution of livestock production – carcass weight (in 1,000 tons).



Source: CONAB (n.d.)

Table 20 – Brazilian herd of cattle: evolution by region (in head of cattle).

Region	**1974**	**1990**	**2000**	**2005**	**2010**	**2019**	**Change from 1974 to 2019 (%)**
North (N)	2,211,000	13,316,950	24,517,612	41,489,002	42,100,695	49,609,974	2,144
Northeast (NE)	16,244,000	26,190,283	22,566,644	26,969,286	28,762,119	28,593,389	76
Centre-West (CW)	22,892,000	45,945,934	59,641,301	71,984,504	72,559,996	74,251,340	224
Southeast (SE)	30,386,000	36,323,168	36,851,997	38,943,898	38,251,950	37,046,635	22
South (S)	20,763,000	25,325,979	26,297,870	27,770,006	27,866,349	25,392,462	22
Total (BR)	92,495,000	147,102,314	169,875,524	207,156,696	209,541,109	214,893,800	132
Main producing state	Minas Gerais (SE)	Minas Gerais (SE)	Mato Grosso do Sul (CW)	Mato Grosso (CW)	Mato Grosso (CW)	Mato Grosso (CW)	-
Total main producing state	17,077,000	20,471,539	22,205,408	26,651,500	28,757,438	31,973,856	-

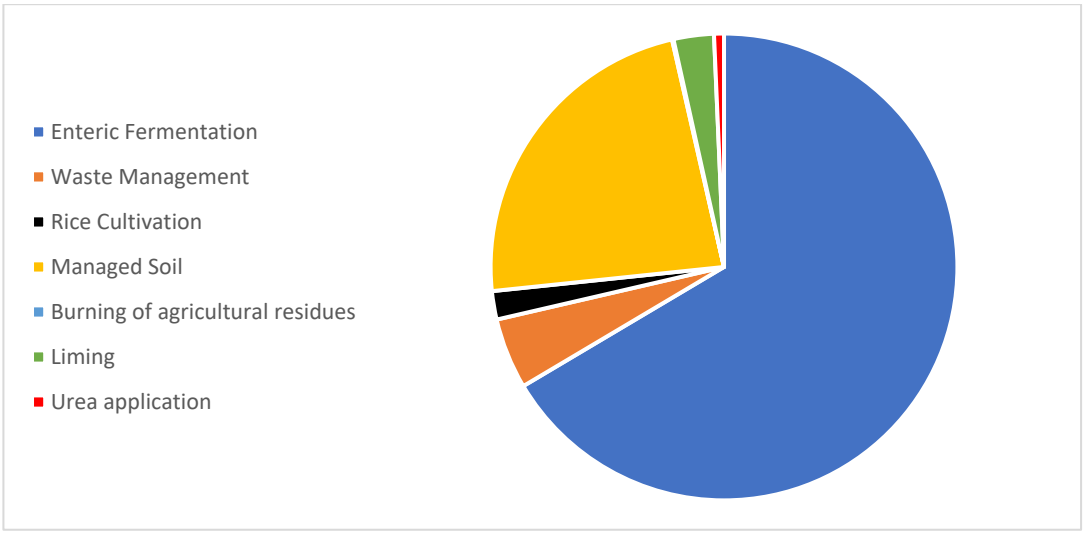
Source: IBGE (2021)

In a nutshell, Brazil is among the top producers of several agricultural items, such as oranges, papaya, rice, tobacco, cocoa, manioc, coffee, cotton, sugar cane, corn, chicken, beef and soybeans. In terms of economic relevance, soybeans and beef accounted for 42% of the gross value of Brazilian agriculture production. In fact, soybean production reached 124 million tons in 2020 (37% of the world's production), making Brazil the biggest producer of this commodity. In its turn, Brazilian beef production ranked in the second global position with a total of 10 million tons in 2020 (Aragão & Contini, 2020; MAPA, 2021b; United States Department of Agriculture, 2022).

5.4.2.1 Agriculture, greenhouse gas emissions and the environment

In 2016, the agriculture sector was responsible for emitting 567 Gg CO_2e. This made it the main GHG emitting sector for that year, followed by the energy and the LULUCF sectors at 27.0% and 25.0%, respectively. The emissions of the agriculture sector can be divided into the following seven subsectors: i) enteric fermentation, ii) manure management, iii) rice cultivation, iv) managed soils, v) field burning of agricultural residues, vi) liming and vii) urea application (MCTI, 2020). In 2016, enteric fermentation and managed soils were reported as the main sources of GHG emissions in Brazilian agriculture, as depicted in Figure 15.

Figure 15 – Brazilian agriculture subsector greenhouse gas emissions – 2016 – in Gg CO_2e (metrics: Global Warming Potential – IPCC Fifth Assessment Report [GWP AR5]).



Source: MCTI (n.d.).

The total amount emitted by the agricultural sector and the profile of these emissions are important indicators of the relevance of the sector to the country's climate policy and governance. On the one hand, this being the main emitting sector in the country – alternating with the energy sector since the sharp drop in LULUCF emissions – shows the political and economic importance of the sector regarding the mitigation of GHG in Brazil. On the other hand, the division of emissions within the sector tends to indicate potential pathways that could be followed for mitigation proposals for Brazilian agriculture emissions.

Regarding the enteric fermentation subsector, this is largely related to the methane (CH_4)[37] emitted by the national herds, specifically beef cattle, which accounted for 84.3% (317,816 Gg CO_2e), and dairy cattle, which accounted for 12.9% (48,628 Gg CO_2e) of that subsector in 2016 (MCTI, 2020). This noticeable figure of beef cattle emissions in this subsector is related to the size of the herds of cattle in Brazil, estimated to be 215 million animals, of which 80% go to beef production (MCTI, 2020), where Brazil is among the biggest producers and exporters, as I stated earlier in this chapter.

Although a growing trend in enteric fermentation can be observed in the four GHG inventories that Brazil has presented so far, it is important to highlight that the CH_4 emissions per animal head decreased 8.2% from 1990 to 2016, which was related to technological gains concerning the digestibility rate of the foraged plants that are consumed by the national herd, as stressed by the MCTIC (2020).

In its turn, the managed soil subsector was responsible for 130,846 Gg CO_2e of the 2016 agriculture emissions. This subsector comprises nitrous oxide (N_2O) emissions (direct and indirect), and these are mainly related to the application of fertilisers and the deposition of crop harvest and animal manure directly into the soil. In recent years, Brazil has managed to expand the adoption of biological nitrogen fixation (FBN, in Portuguese) to replace nitrogen fertilisers, which has mitigated N_2O emissions in the country. For instance, it is estimated that the FBN was adopted in 10 million hectares of cultivated land between 2010 and 2016, which may have led to the mitigation of 10,000 Gg CO_2e (Manzatto et al., 2020).

[37] The CH_4 emissions are from agriculture, land use, waste, industrial processes and refining of oil and natural gas. In 2016, the agriculture sector accounted for 76.1% of the total CH_4 released by the country (MCTI, 2020).

Finally, it is also important to highlight the relationship between agricultural activity and GHG emissions related to land use accounted for by the LULUCF sector. As depicted in Table 21, LULUCF emissions comprise seven subsectors: i) forest land, ii) cropland, iii) grassland, iv) wetland, v) settlement, vi) other lands and vii) harvested wood products. In 2016, the LULUCF accounted for 403,141 Gg CO_2e and ranked as the third main emitter. In previous years, the situation was quite different for this sector. For instance, in 2004, the sector accounted for 73.0% (2,627,797 Gg CO_2e) of the country's emissions thanks to the high rates of deforestation that the country was facing. However, with the evident drop in deforestation as of the mid-2000s, the situation was reversed, although the fires and the continuous increase in deforestation rates in the Amazon biome have raised new concerns on the subject.

Within the LULUCF sector, the most representative GHG emissions came from the grassland subsector, in which the conversion of land to grassland accounted for 645,124 Gg CO_2e. The relevance of the grassland subsector has a strong relation to the geographic dynamics of the cattle production in the country, which in the past decades expanded to regions covered initially by forests, notably the North region, as previously discussed and already highlighted by Table 20.

As depicted in Table 21, the second most important source of emissions was the conversion of land to cropland, which reached 133,494 Gg CO_2e in 2016. On the GHG removal side of the LULUCF sector, forest land was responsible for the removal of 347,742 Gg CO_2e. Overall, two features should be highlighted, as follows: i) the drop in the sector's emissions by the mid-2000s thanks to the PPCDAm deforestation programme in particular and ii) the relevance of the emissions related to land conversion to grassland over time in the overall sector picture.

Table 21 – Brazilian land use, land-use change and forestry subsector greenhouse gas emissions – 2016 – in Gg CO_2e (GWP AR5).

Forest Land	–347,423
Cropland	133,494
Grassland	645,124
Wetlands	8,659
Settlements	5,090
Other Land	8,968

Harvested Wood Products	–50,772
Total Land Use, Land-Use Change and Forestry – LULUCF	**403,141**

Source: MCTI (2020).

The relationship between the LULUCF emissions and agricultural activities is of critical importance. This is because there is still strong evidence that the main source of GHG emissions in this sector, that is, the conversion of lands (which are often native forests) to grassland, is being driven by cattle activities, which are usually employed in the occupation of land cleared by loggers, notably in the Amazon biome. This dynamic, which is an important step in the so-called deforestation cycle, has already been vastly explored in the literature (Parente et al., 2019; Rivero et al., 2009; Silva, 2016), and in the noticeable growth to the numbers of head of cattle in the Amazon region between 1970 and 2019.

With the significant drop in Amazon rainforest deforestation since the middle of the 2000s, the emissions related to grassland also experienced a noticeable drop, and a lower amount of native vegetation was converted into pasture for cattle activities. Despite this, the production of cattle in the country suffered minor impacts, which can be inferred from the evolution of Brazilian herds of cattle since then; this also indicates the possibility of Brazil maintaining its global leadership in many agriculture commodities while simultaneously employing environmental conservation and deforestation policies (Koch, Ermgassen, Wehkamp, Oliveira Filho, & Schwerhoff, 2019; Mazatto et al., 2020; Soterroni et al., 2018).

Deforestation in Brazil, especially in the Amazon and the Cerrado biomes, involves a multitude of aspects, such as land tenure, lack of law enforcement, regional inequalities and other socioeconomic variables that go far beyond the agriculture practices and policies in the regions. Nevertheless, one important debate that Brazil is facing nowadays is about how sustainable agriculture practices can help environmental conservation in the country along with productivity and reputational gains in the sector, especially when agricultural intensification is considered (Silva, 2016; Soterroni et al., 2018).

For instance, the recovery of degraded lands (RPD)[38] is one of the main challenges of that debate (Dias-Filho, 2014; MMA, 2016b; Silva, 2016). According to the Brazilian Company on Agriculture Research (EMBRAPA, n.d.), Brazil has 200 million hectares of grasslands (native and tame pastures), of which 130 million present some degree of degradation and 50 million hectares are producing at half of their capacity. Recovering that amount of land would be of critical relevance to Brazilian GHG mitigation action since it is estimated that the degraded land emits 4.7 tons of CO_2e per hectare per year while a recovery area is expected to absorb 3.8 tons of CO_2e per hectare per year (MMA, 2016b).

Moreover, the full restoration of productive capacity to that degraded land would also have further environmental and economic relevance. Given the growth scenario for Brazilian agriculture in the next decades, finding ways to achieve the recovery of the area will be of critical relevance to reduce the pressure for new agricultural lands and avoid the clearance of further native vegetation in the country (MAPA, 2021a).

Moreover, there are important issues to be addressed in terms of increasing the productivity of agriculture activities that will also have positive gains for climate and environmental policies, such as the following: i) increase the pasture utilisation in cattle ranching, which remained low in the last two agriculture censuses (around 1.10 head/ha); ii) increase productivity in large rural properties (with more than 1,000 ha) and iii) spread technical assistance and rural extension (ATER, in Portuguese) to leverage the production capacity and manage the skills of farmers and their properties. All of these issues tend to have worse figures in the Amazon region context (Barros et al., 2020).

Aiming to build a bridge between agriculture and climate action, the ABC Plan is thought to serve as one of the main triggers to enhance and mainstream sustainability into agriculture practices as they adapt to and try to mitigate climate change. Moreover, if it succeeds, the ABC Plan would also add to efforts in environmental conservation and the tackling of deforestation, as pointed out above. The next subsection details the main aspects of that PNMC sectoral plan.

[38] A pasture can be considered degraded within a relatively wide range of conditions, and this is closely related to its productivity over the years of use. According to Dias-Filho (2014), a pasture can be defined as degraded when it has 'a sharp decrease in agricultural productivity (sharp decrease in carrying capacity) that would be expected for that area and may or may not have lost the ability to maintain productivity from a biological point of view (accumulate biomass)'.

5.4.3 Case description – The sectoral plan for mitigation and adaptation to climate change for the consolidation of a low-carbon economy in agriculture

As one of the PNMC's sectoral plans, the ABC Plan was launched in 2012 as part of the country's strategy to reach its voluntary 2020 GHG emission reduction target as well as to foster a low-carbon economy in the long run. The main objective of the ABC Plan was to promote GHG emission reduction in agriculture by improving efficiency in the use of natural resources and by increasing the resiliency of productivity systems and rural communities, thus enabling climate adaptation in Brazilian agriculture. The plan also set a list of specific objectives to be achieved, as follows:

> - To contribute to the achievement of GHG emission reduction commitments voluntarily assumed by Brazil.
>
> - To guarantee the continuous and sustained improvement of management practices in the various sectors of the Brazilian agriculture that may reduce GHG emissions and, additionally, increase the atmospheric fixation of CO_2 in the vegetation and soil of the Brazilian agricultural sectors.
>
> - To encourage the adoption of Sustainable Production Systems that ensure the reduction of GHG emissions and simultaneously raise the income of producers, especially with the expansion of the following technologies: recovery of degraded lands; crop–livestock–forest integration (ILPF) and agroforestry systems (SAF); no-till farming system (SPD); biological nitrogen fixation (FBN); and planted forests.
>
> - To encourage the use of animal waste treatment to generate biogas and organic compost.
>
> - To encourage studies and the application of techniques for adapting plants, productive systems, and rural communities to new scenarios of atmospheric warming, especially those of greater vulnerability.
>
> - Promote efforts to reduce forest deforestation resulting from the advances in cattle raising and other factors. (MAPA, 2012, p. 38)

To achieve all these objectives, it established a set of nationwide targets related to the expansion of six different agriculture technological process techniques by 2020, as

follows: i) RPD, ii) ILPF systems (agroforestry systems), iii) no-till farming system (SPD), iv) FBN, v) FP and vi) animal waste treatment (TDA). It is important to note that all these techniques were already being employed by the time of the launch of the ABC Plan. In addition to these techniques, the plan also referred to the issue of climate adaptation in Brazilian agriculture. Table 22 presents the targets and the respective GHG mitigation potential of each of the six ABC technologies.

Table 22 – The Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture: technological processes, commitments and greenhouse gas mitigation potential

Technological process	**Commitment (increased use in millions of hectares)**	**GHG mitigation potential (in million Mg CO_2e**
Recovery of degraded lands (RPD)*	15	83 to 104
Integrated crop–livestock–forest systems (ILPF)*	4	18 to 22
No-tillage system (SPD)*	8	16 to 20
Biological nitrogen fixation (FBN)*	5.5	10
Planted forests (FP)*	3.0	na
Animal waste treatment (TDA)*	4**	6.9
Total		133.9 to 162.9

*All acronyms in Portuguese.

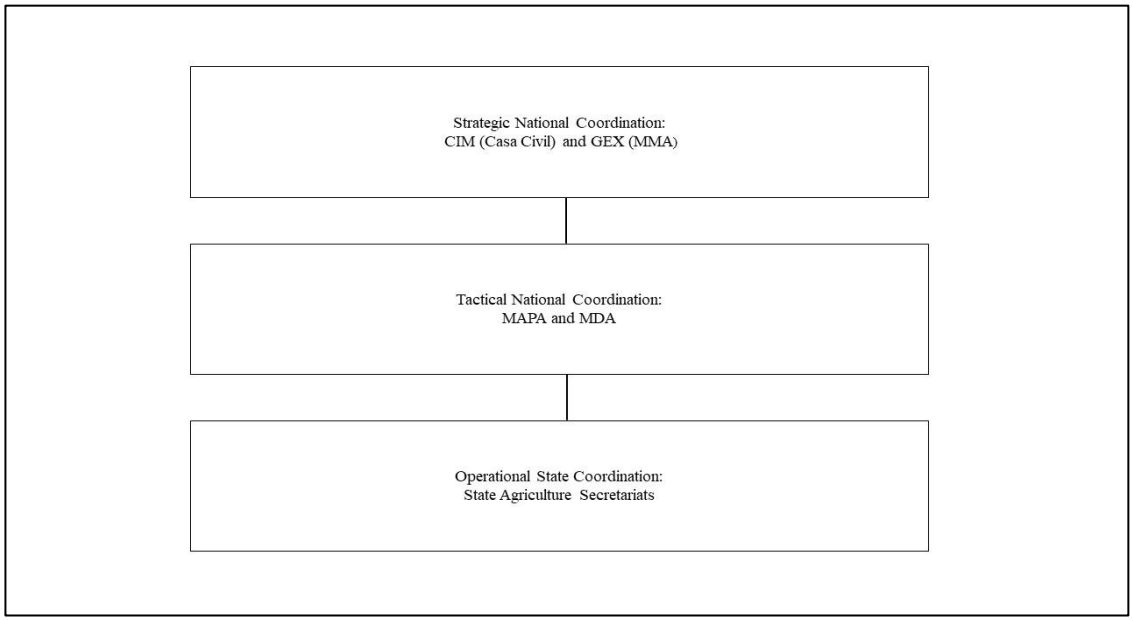
**Unit: millions of m^3.

Source: MAPA, 2012.

The plan was prepared during 2010–2012 by a working group coordinated by the Casa Civil and integrated with the following federal organisations: the MAPA, the Brazilian Company on Agriculture Research (EMBRAPA), the MF, the MCT and the MMA. Later, the FBMC included representatives from non-state organisations (e.g. the National Confederation on Agriculture and the World Wildlife Fund) to participate in the talks. During more than 30 meetings, different viewpoints were discussed and considered in the final version of the text, launched in 2012. The plan set 2020 as the deadline to reach the plan's commitments, the same year by which the NAMAs goals were supposed to be achieved (MAPA, 2012).

The governance model of the plan had three tiers: i) strategic national, to be managed by the CIM and the GEx (climate governance bodies); ii) tactical national, to be managed by the National Executive Commission of the ABC Plan (CENABC, in Portuguese), coordinated by the MAPA and MDA, in which representatives from the MF, MMA, Casa Civil and the FBMC had sat and iii) operational state, to be managed by state steering groups, chaired by representatives of the agriculture state secretariats and integrated by members of the state and federal governments plus members of public banks and civil society. The ABC Plan's governance model is presented in Figure 16.

Figure 16 – Governance of the Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture.



Source: Author's elaboration based on MAPA (2012).

According to the ABC Plan, each state was supposed to develop a state plan based on its specific realities in which should be presented actions to be taken, strategic regions and the goal to be reached by 2020, all of which should be in line with the national plan. To do so, a diagnostic containing: i) the land tenure and logistic situation, ii) state agriculture activities, iii) ATER, iv) identification of goal and programme activities and v) the state proposal was supposed to be prepared by each of the 27 Brazilian states.

The ABC Plan also encompasses activities involving the training of technicians and rural producers, technology transfer, research, development and innovation, credit lines, and land and environmental regularisation. Among these activities are included the distribution of campaign material, workshops and seminars, and the realisation of events in the so-called Technological Reference Units and the Demonstration and Tests Units. Research and educational institutions are mentioned as part of the national effort to enhance technology transfer and to ensure their incorporation into production systems.

Regarding the monitoring structure of the ABC Plan, the CENABC was established in October 2015 through MAPA Ordinance nº 230 (MAPA, 2015). According to the ministerial ordinance, the CENABC is a permanent body of a technical–consultative nature, with the objective of promoting the articulation between public and private agencies and entities to implement, follow up, monitor, evaluate and review both the ABC Plan (one of the sectoral plans of the PNMC) and the ABC state plans (MAPA, 2015).

Moreover, the MRV of the mitigation actions related to the actions listed in the ABC Plan would be based on the following definitions: i) explanation of the scenario of reference (baseline) to allow for comparison with the plan's commitments, ii) establishment of calculation methodologies, iii) establishment of the responsible agency for the development and publication of methodologies and iv) creation of a multi-institutional system of climate change and agriculture to be accountable for the MRV system and for carrying out periodic progress evaluation about the ABC Plan's commitments (MAPA, 2012).

Regarding the need for funding to reach the ABC Plan targets, the government estimated a total amount of R$197 billion[39] to be expended between 2011 and 2020. These resources would come from the public budget and agriculture credit. Of this total, the government estimated that R$157 billion would be rural credit resources to finance the attainment of the plan's physical targets. The resources would have several financing sources (such as the BNDES and banks' resources), and the federal government's equalisation expenses were estimated at R$33 billion. It was also estimated that R$6.7 billion would be spent to support the specific measures of several initiatives of the plan (e.g. training, technical assistance, media campaigns and monitoring systems) (MAPA, 2012).

The specific expenditures with the adoption of different low-carbon agriculture technologies included in the plan were also estimated. For the RPD, which had the most potential in terms GHG emission reduction, an expenditure of R$44 billion was estimated. With similar GHG mitigation potentials during the lifetime of the ABC Plan, the expenditures of ILPF and SPD were estimated to be R$76 billion and R$50 billion, respectively. The expenditure to reach the commitments in regard to FP and TDA was R$7 billion and R$9 billion, respectively. In regard to the expenditure on the adaptation of Brazilian agriculture, spending of R$63 billion on actions related to the development of information systems, mapping of vulnerabilities and identification of priority areas as well as the research and development of new economic instruments was expected (MAPA, 2012).

The main credit line of the ABC Plan was the programme for GHG emission reduction in agriculture (known as the ABC Programme), established by a resolution of the National Monetary Council in 2010 (Resolution n. 3896). It was oriented to finance large and medium-scale agriculture ('agricultura empresarial' in Portuguese), while the family farming–based agriculture ('agricultura familiar' in Portuguese) would have its ABC Plan activities funded by the Family Farming National Programme (PRONAF, in Portuguese) credit lines, PRONAF Eco and PRONAF Florestas.

In terms of the ABC Plan's results from 2010 to 2020, there has not been an official government assessment. Nevertheless, the EMBRAPA recently put forth efforts to consolidate an initial estimate of these results. Regarding this effort, the company

[39] This amount was estimated in 2012. In 2020 values (December), it represented R$321 billion (approximately EUR 50 billion).

presented data from different sources (platforms and academic literature), including its estimations for some technologies, as Table 23 depicts.

However, some results presented in this table should be read with reservations. For example, if on one hand it is indicated that from 2010 to 2020 there was an increase in agricultural areas employing some type of ABC technology (between 33,12 and 40.86 million hectares), on the other hand, this increase in the usage of ABC technologies cannot be taken as an exclusive result of the specific actions and funding granted within the ABC plan and ABC programme respectively. As one interviewee mentioned, although the ABC plan is aimed at all types of producers in the country (small, medium and large properties), it is observed that large producers represent a small amount of the contracts signed under the ABC Programme (around 10% of the total stock of contracts, according to this interviewee). The interviewee noted that although these large producers do not access ABC credit lines, they are already employing sustainable agriculture techniques on their properties. Thus, it is possible to say that the general figures of the adoption of ABC techniques presented in Table 23 are also capturing this aspect.

Despite the caveat above, the estimated results of the ABC plan provide important information about its performance. The first refers to the total GHG emissions mitigated in the period (between 106.25 and 169.93 million Mg CO_2e), which is in line with the mitigation foreseen by the plan (133.9 to 162.9). Regarding the adoption of the technologies, ILPF, SPD and FBN were adopted in figures well above what was aimed by the plan. However, the financing for the expansion of most of these technologies most likely came from sources other than the ABC Programme. For example, according to Table 23, only 380,000 hectares of ILPF were financed with resources from the program. In SPD, which increased by 12.72 million hectares in the period, only 2.13 million hectares were financed by ABC credit lines.

Table 23 – The Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture: estimated results.

		RPD*	**ILPF***	**SPD***	**FBN***	**FP***	**TDA****	**Total*****
Commitments	Increase in area adopting ABC technology (millions of ha)	15	4	8	5.5	3.0	4	35,5
	GHG mitigation potential (in million Mg CO_2e)	83 to 104	18 to 22	16 to 20	10	n/a	6.9	133.9 to 162.9
Estimative	Total area adopting the ABC technology	26.14	12.61	32.86	33.98	7.84	n/a	91.04 to 113.66
	Increase in area adopting ABC technology during the ABC Plan period (millions of ha)	3.3; 10.45	5.83	12.72	10.64	0.63	1.71	33.12 to 40.86
	% Related to the commitment	22%. 70%	146%	159%	193%	21%	39%	93% to 115%
	Funded by the ABC Programme (millions of ha)	3.3	0.38	2.13	0	0,63	114	
	GHG mitigation (in million Mg CO_2e)	12.54; 57.52	22.1; 36.40	23.28	19.74; 18.03	0.54; 25.3	2.67	106.25 to 169.93

*All acronyms in Portuguese.

**Unit: millions of m^3.

***Except TDA.

Sources: MAPA (2012), Manzatto et al. (2020) and Silva and Vieira Filho (2020).

As table 23 suggests, RPD, FP and TDA struggled to reach the same performance as the other techniques. The low figure for increasing RPD technologies is particularly critical to achieving low-carbon agriculture in Brazil. First, the relevance of RPD for GHG emissions from agriculture is noted above all in the mitigation potential it offers (83 to 104 million Mg CO_2e). Second, when it is considered the scenario of agricultural production expansion for the coming years and the pressure that such expansion may cause in terms of demand for new production areas, especially in North and Centre-West regions, the RPD would reduce the need for new agriculture lands, and the consequent conversion of forests in croplands (Barros et al., 2020; MAPA, 2021b).

There is a wide variation in the estimates measuring the increase in adoption of RPD in the country over the period (3.3 to 10.45 million hectares). This is probably related to the difficulty in monitoring the adoption of this technology as well as the diversity of rural properties (small, medium and large) that have degraded pastures, a problem that tends to be greater in small and medium farms due to lack of technical assistance, according to one interviewee.

5.4.4 Results

The ABC Plan has been praised as one of the most successful sectoral plans of the PNMC, not only because of some of the results that it has achieved but also due to the bottom-up way it was developed, as many interviewees stressed. Despite this, the employment of my analytical framework, in this case, revealed that the plan presented gaps in politics, institutions and processes, and resources that might have hindered its success in helping Brazil mainstream low-carbon agriculture techniques.

Gap 1 – Politics

In terms of the gap in politics, the analysis showed that political will regarding the plan was present, especially during the design stage of the plan. The technicians developed a draft proposal to integrate different sustainability actions in agriculture – which were already being taken in the Brazilian agriculture sector – under a single umbrella with the aim of making a bridge between agriculture and climate policies. This was welcomed by the political leaders of the MAPA and the Casa Civil at that time. According to the interviewees, the main reason behind the political will for the ABC Plan was the possibility that such a plan would offer reputational gains for Brazil in the international community and productivity gains for Brazilian agriculture that

would come with the adoption of the mitigation and adaptation techniques that the ABC Plan would offer to the country's climate action. As highlighted by different respondents,

> There is no way in a country the size of Brazil with an agricultural base that you can have a discussion on climate change and not address this issue [agriculture]. Agriculture is one of the main drivers of deforestation and, consequently, emissions [in LULUCF]. Our biggest challenge was to show that the climate agenda for agriculture was as profitable or more profitable than traditional agriculture. I will never convince the traditional farmer to change his practices because of something that will happen fifty years from now on. So we wanted to show that low-carbon agriculture also provided a price differential in the international market and that it was economically viable. (respondent G1)

> We have already started to hear signals within the Ministry [MAPA] saying that all Brazilian agriculture will be linked to the ABC [plan]. I think that the international market and the non-tariff barriers will force us to do that. If you generate deforestation [in your agriculture] you are "out". If [your agriculture] emits [GHG] too much, you are out [of the market]. If [you] cattle emit a lot, you are out. This is for the whole world, not only for Brazil. Those who are defending this are not the big [commercial] groups. Yes, they have something to do with it, but who is redefining all this is mainly the consumer. He is demanding sustainability and clean food [without pesticides]. (respondent A1)

Another indicator of political support for the ABC Plan was the creation of a specific credit line for supporting investments in ABC technologies, known as the ABC Programme, which was regulated in 2010 by the Brazilian Central Bank (BCB, 2010) well before the launch of the ABC Plan (in 2012). As stressed by some interviewees, the participation of the Central Bank during the early stages of the ABC Plan was a very clear signal that the plan received a high level of political attention within the government, which perhaps was equivalent only to the attention given to the PNMC's sectoral plans related to combating deforestation (PPCERRADO and PPCDAm).

However, the low amount of rural credit channelled to the ABC Programme also suggested that the political will for a broad transformation of Brazilian agriculture

towards low carbon fell short of what was needed. Widely explored in the literature, the low volume of public agricultural credit resources, something around 2% of the total credit, for the ABC Programme was one of the limiting factors for the execution of the plan and the achievement of even higher numbers than those verified (Barros et al., 2020; Lima, Harfuch, & Palauro, 2020; Senado Federal, 2019). As mentioned several times during the interviews, increasing the credit for the ABC Programme would require political deliberation in this direction, which did not happen during the cycle of the ABC Plan.

Gap 2 – Institutions and processes

With respect to the gap in institutions and policy processes, the analysis revealed that the ABC Plan was well-designed thanks to the institutions that were involved and the way the policy design was framed. The plan had a well-defined design in terms of the presentation of targets and the definition of a governance structure. According to many respondents, such features were a result of a comprehensive construction process that involved the engagement of different governmental and nongovernmental stakeholders. Moreover, the leadership of the Casa Civil, in the process of drawing up the plan, was also viewed positively, especially given the degree of importance and urgency that this active participation by the center of government conferred on the development of the plan. As stressed by different respondents,

> The ABC plan became a kind of blueprint for the creation of other PNMC sectorial plans. The way we formatted the discussion, was something difficult, but very solid because it was not top-down. We had several actors involved, such as universities, NGOs, the government, etc. Then it [the ABC plan] was submitted to the GEx. We also hired consultants to evaluate the GHG emissions metrics. Some criticism came up saying that it took a long time to prepare the plan. Yes, it took a long time, but the plan is solid. In other words, it will not be an easy thing, for example, to extinguish from one hour to another in case of a change in government. The ABC Plan is working until today, unlike other sectorial plans [of the PNMC]. This is because we came out with a solution to the emission problems of agriculture. From the most conservative to the most radical sectors, everyone agreed. (respondent A1)

> Agriculture was not among the goals that Brazil intended to present in Copenhagen [COP]. But when we took the issue to a meeting at the Casa Civil [preparatory meeting to the COP of Copenhagen] the Casa Civil authorities became interested in the subject. They saw that we had scientific knowledge, numbers, and technical data and that the technologies [of low carbon emissions in agriculture] could avoid GHG emissions in the country. And then it was decided to take the numbers of agriculture to Copenhagen. The role of Casa Civil in the preparation of the ABC plan was fundamental, they were actively involved. (respondent A9)

The policy process by which the plan was developed was helpful in legitimising the ABC Plan as an important step towards building sustainability in the agriculture sector even though it lacked scale. It adopted procedural instruments concerning consultation and review by different state and non-state stakeholders which were useful to build legitimation. However, institutional and processual issues over the cycle of the ABC Plan were noticed. These were related to difficulties in the governance, coordination and monitoring of the interplay between the national and the subnational governments, with the latter being a critical aspect to help the plan reach Brazilian farmers and rural producers effectively.

Moreover, one of the main problems throughout the execution of the first phase of the ABC Plan (2010–2020) was the lack of coordination between the different bodies involved in the implementation and monitoring of the planned activities. As previously shown in Figure 24, the ABC Plan's governance structure had three levels (strategic national, tactical national and operational state). Most of these levels had difficulties operating, as highlighted by several interviewees. For instance, the CIM and GEx (climate governance bodies), which were in charge of the strategic national ABC Plan, did not have regular functioning, which led to negative effects on the coordination of all sectoral plans, including the ABC Plan. As two respondents detailed,

> Articulation at the national level is weak. Governance was better at the beginning when the CC participated more actively. Then the concentration [of the leadership] in the MMA hurt. They even started concentrating resources and setting agendas. (respondent G3)

> The ABC plan was supposed to be managed jointly by MAPA and MDA (social agenda and family agriculture), but this did not effectively happen. The MDA practically did not work on the ABC [Plan]: The ministry was extinguished and then transformed into a secretariat. It is now within the structure of the MAPA. All of these issues with MDA hinder this more integrated and systemic view of the subject, especially concerning the interplay between organic and family farming. (respondent G22)

> The fragmented national governance [of the PNMC] hinders the ABC plan: there is a lack of space for dialogue and the MAPA is isolated in the discussion. The MAPA would only go to the meetings [of the CIM and GEX] to present the plan's status. There were no deeper discussions about the difficulties [to implement ABC technologies in Brazil], which in some cases generates problems of complex correction in the future, as in the case of the carbon metric for livestock. (respondent G22)

At the national tactical level, which should have been managed by the MAPA and the MDA, the findings revealed that there was a gradual reduction in the MDA's involvement in the plan, which pushed the MAPA to lead the plan in isolation. Furthermore, during the 2010s, the MDA lost political strength, which had negative impacts on important themes coordinated by this ministry that were relevant to the ABC Plan, such as the ATER, organic agriculture and family farming activities. With the extinction of the MDA,[40] in 2016, these topics lost relevance within the ABC Plan, as many of the interviewees highlighted.

At the national tactical level, problems were observed with the plan's monitoring. For example, the CENABC, responsible for 'promoting the articulation of public and private agencies and entities to implement, follow up, monitor, evaluate and review' (MAPA, 2015, p. 1) the ABC Plan and its state plans, was only installed in 2015. After this installation, only a few meetings took place before the extinction of the CENABC in 2019.[41] These delays and lack of regularity in the functioning of the commission were one of the reasons for the lack of the plan's periodic reviews, which should have

[40] Following its extinction in 2016, the institutional competencies of the MDA were allocated to the newly created Special Secretariat for Family Agriculture and Agrarian Development (SEAD), which was linked to the Casa Civil. In 2019, a new change occurred, and the SEAD was transformed into the Secretariat of Family Agriculture and Cooperativism and became linked to the MAPA.

[41] The CENABC was recreated in 2020 through Decree n. 10,431 of 20 July 2020.

occurred every two years according to the PNMC, as well as for the lack of annual releases of the implementation reports of the plans (MAPA, 2015).

The lack of effective governance of the ABC Plan also had a negative impact on the coordination of the plan. As many interviewees highlighted, the plan lacked coordination, especially between the national and subnational levels, where the ABC Plan faced various productivity issues. This was because Brazil is a country of contrasts, which also tends to be reflected in the agriculture sector, in which different technological and production levels and even perceptions regarding the construction of sustainable agriculture[42] tend to coexist. In practice, the coordination of the ABC Plan was carried out by a small technical team within the MAPA, with clear limitations in terms of staff and access to the political level of both ministries and state agricultural secretariats. Ultimately, despite the predicted governance of the ABC Plan (see figure 16), this scheme has not functioned effectively as a structural coordination arrangement that has enabled collective decision-making.

At the state level, the governance of the plan also presented difficulties. All of the states and the Federal District created state management groups, the third tier of the ABC Plan's governance (see Figure 2), and according to Lima et al. (2020), 2,785 Brazilian municipalities had adopted ABC practices by January 2019, which indicates the importance of the state link in the governance and coordination of the plan, especially when considering the different economic and productive realities of these municipalities. Despite the creation of state groups, many interviewees highlighted that these states presented very distinct performances, primarily due to political and technical constraints experienced by each state. The lack of a monitoring system for the ABC Plan and the way it was implemented in the states were additional bottlenecks of the plan's governance, as many of the interviewees highlighted.

Gaps 3 and 4 – Resources and information

Despite having a specific team dedicated to the ABC Plan within the MAPA, the analysis revealed that the ABC Plan had gaps in terms of the human resources involved with the plan. On the one hand, the MAPA team was evaluated as small by several actors interviewed. In the states, a shortage of people directly involved in the plan was

[42] Thinking about the dissemination of sustainable practices in a sector that is diverse in terms of scale, level of information and productive reality demands strong commitment and involvement of local and regional governments.

also noted. Another aspect to be highlighted was the several changes made to the state teams in charge of the state plans, which happened several times, especially because of the political changes that state governments tended to observe more frequently than the federal government, as many interviewees pointed out. On the other hand, at the national level, although reduced, it was noted that the team involved had relative stability in maintaining its components, which was important when considering the medium- and long-term nature under which the plan was conceived. As one respondent informed,

> The ABC [plan] is a national plan that is based on the implementation of the states (ABC state committees). So, the excessive change of representatives of the state structures (more subject to political interference) hindered the execution of the plan at the state level. (respondent G22)

I also found a gap in relation to the financial resources for financing the plan's activities. At the time of its launch, it was estimated that to comply with the ABC Plan's actions, resources of around R$197 billion would be needed during the 2010s (MAPA, 2012), which were to be financed by agricultural credit and budget resources. However, the ABC Programme, the government's main credit instrument to finance investments related to the ABC technology, provided only R$19 billion over this period. In addition to this being a low value concerning what was expected, the value of the ABC Programme was also low when compared to the total Brazilian official agricultural credit. For example, agricultural credit for the 2021/2022 crop year was R$251.2 billion,[43] with costing credit accounting for R$177.8 billion and investment credit, wherein the ABC Programme was included, accounting for R$73.4 billion (Lima et al., 2020; MAPA, 2021c).

In addition to presenting a reduced amount when compared to the total agricultural credit made available for investments, evidence from the literature, as well as the interviews, showed that the ABC Programme was presented with difficulties related to its contracting procedures, which included the conditionalities for the loans, bureaucratic obstacles and divergences among the public banks that were operating

[43] The agricultural credit policy was an important instrument used by the country to make it one of the largest agricultural producers in the world. However, despite its relevance for the investment and funding of Brazilian agriculture, it is estimated that all official agricultural credit in the country (known as the National Rural Credit System) accounts for only 28% of the sector's credit volume. The remaining 72% comes from other sources, such as traders, private banks and producers (Santana & Nascimento, 2012).

the scheme (the BNDES and Banco do Brasil); another issue was the lack of knowledge of the product of both bank agencies and many producers. As highlighted by some interviewees, this set of aspects hampered the implementation of the ABC Programme in its entirety even though the ABC Programme presented slightly more attractive conditions in terms of the interest rate, grace period and authorised volume of funding than other credit lines that had financeable items like the ABC Programme. As one respondent detailed,

> There are criticisms about the low volume of financial resources allocated to the ABC Programme. But it is not enough just to put, from one day to the other, more than R$ 6 billion in the programme, because the sector will not be able to take this volume all at once. This also depends on the capacity of farmers and banks. The ABC Programme is different from traditional agricultural credit. The traditional one finances specific items (e.g. tractors, seeds, and inputs in general). On the other hand, the ABC Programme requires a sustainable productive project for the property. In other words, it is not just items, but the whole system that needs to be financed. So, besides the producer needing a greater capacity to assemble his agricultural project. On the other hand, banks also need to improve their capacities, since they will need to analyse projects, and not only the loan request for a specific production input. (respondent G3)

As the analysis showed, the ABC Programme brought some innovation to Brazilian agricultural credit since it did not focus on bankable items, as is the rule in agricultural credit, but on the production system, which should be aligned with sustainable agricultural practices (Lima et al., 2020). In that sense, it can be seen as a successful case of the employment of a result-oriented financial management coordination instrument. As many interviewees stressed, this approach was necessary for the agricultural credit policy to disseminate ABC techniques in a large share of Brazilian agriculture and make ABC techniques mainstream in the country. However, for this to occur on a large scale, in addition to increased targeting of investment credits for ABC, it was necessary to fill the technical and operational gaps, which required greater capacity building of the financial agents involved, better communication with farmers concerning the ABC Plan and a reduction in the complexity of the loan contracting process. These are all issues that were not fully addressed by the ABC Plan. Furthermore, many interviewees also indicated the need to readjust the whole Brazilian

agricultural credit system to incorporate sustainability and GHG mitigation variables in the process of granting official credit, a move that seemed to be essential for the country, especially when considering the commitments assumed in the Brazilian NDC regarding the absolute reduction of GHG emissions and decarbonisation of the country's economy by the mid-century (UNFCCC, 2020).

Regarding the informational aspects and evidence available for decision-making to build a low-carbon economy, the findings revealed that Brazilian agriculture seems to be one of the best-structured sectors in this regard. In terms of scientific development, the sector is endowed with excellent research centres on climate change, such as the EMBRAPA, which, in the last decade, has reinforced its research staff in studies related to climate change and its impacts on the country's agriculture. These aspects suggest that most of the conditions to enable a structural coordination instrument of information exchange within the sector are existent.

In addition to participating in the construction of the ABC Plan and shining a light on the scientific debate on adaptation and mitigation within the agriculture sector, the EMBRAPA has also been making important contributions to the construction of solutions for the sustainability of agriculture in the country, among which can be mentioned the development of agricultural climate risk zoning in the 1990s and, more recently, the carbon neutral meat strategy (Carne Carbono Neutro, in Portuguese). The institution has also lent some of its researchers to the MMA and MAPA for the execution of executive functions.

Moreover, I observed the presence of institutions and alliances not linked to the government that have been contributing in a prominent way to the creation of low-carbon agriculture, such as via activities related to scientific development, monitoring and advocacy for the promotion of ABC. These institutions include the Center for Agribusiness Studies of the Getúlio Vargas Foundation,[44] the Center for Advanced Studies in Applied Economics of the University of São Paulo,[45] the ILPF Network,[46] and the Climate, Forests and Agriculture Coalition,[47] which brings together sectoral institutions, companies, the third sector and academia with the aim of promoting a low-

[44] https://gvagro.fgv.br/en/node/143
[45] https://www.cepea.esalq.usp.br/br
[46] https://www.redeilpf.org.br/#
[47] http://www.coalizaobr.com.br/home/index.php/en/sobre-a-coalizao-2/who-we-are

carbon economic development model. These institutions have been contributing in a relevant way to improving the quality of information and transparency in decision-making processes on low-carbon agriculture in the country.

Despite the well-developed scientific progress and organisation of the sustainability debate within the agricultural sector, it was noted that the ABC Plan was presented with difficulties in organising and making available the information needed for decision-making and monitoring. For example, monitoring systems that should have been initiated at the launch of the ABC Plan were not implemented until at least the mid-2010s. This was the situation with the following two important systems: i) the governance system of the ABC Plan, whose system development was only initiated in 2016 and ii) the Multi-institutional Platform for Monitoring of Greenhouse Gas Reductions in Agriculture and Livestock, which was launched by the government in March 2018 (Brazil, 2021; Embrapa, 2018b). The lack of budget availability along with the technical and governance difficulties of the ABC Plan were pointed out by the interviewees as possible explanations for this delay in the implementation of the monitoring and transparency systems.

One of the main consequences of the absence of these monitoring systems was the difficulty the ABC Plan managers experienced in monitoring and following up in which agricultural areas the technologies foreseen in the ABC Plan were deployed. Evidence of this difficulty is the large number of sources that the government employed to map the evolution of the various ABC technologies, as can be observed in the sources that gave rise to Table 23. As one respondent stressed, ‘the data is scattered on various platforms (e.g. *ILPF Platform, specific literature*). This hampers monitoring [of the ABC plan]’ (respondent G21. Another aspect highlighted by some interviewees was that the MAPA measures the areas where ABC technologies are being applied based on data from the Rural Credit and Proagro Operations System, managed by the Central Bank. However, the use of this data tends to limit the results of the analysis, since the ministry only has access to the operations that are financed by the ABC Programme, not covering other agricultural credit lines that also contribute to the dissemination of ABC technologies in the field (Senado Federal, 2019).

Regarding the information gap, one of the aspects widely explored during the field research and in the existing literature refers to the communication aspect of the ABC

Plan for society and producers. The plan presented difficulties with its communication strategy with producers (Lima et al., 2020; Senado Federal, 2019). This was mainly because Brazil has an agriculture sector with diverse actors who do not have the same level of understanding regarding the sustainability discussion and to what extent ABC practices can help them in productivity gains. As many interviewees highlighted, the plan had failed in creating a differentiated communication strategy for each group. One interviewee (respondent P4) said, 'This language does not have to be about CO_2, carbon, etc. ... but about production, productivity, and crop security'. It is interesting to note that this gap in the ABC Plan was acknowledged even by actors directly linked to the plan's management, which is an important indication that this will be one of the points to be improved in the coming version of the plan (2021–2030).[48]Yet in regards the communicational aspect, one respondent stressed,

> Bottleneck [of the ABC plan]: The farmer's knowledge of the [ABC] technologies. The technologies don't reach the farmer. If they do, they come at a very high cost. We need to create ways to show how these [low carbon agriculture techniques] work. Brazilian agriculture is extremely conservative. It was already difficult to convince the farmer to use "Safra-Safrinha" (the first and the second crop during the same year). Imagine showing them that if they do cattle breeding and farming together. That he will plant soybean over brachiaria. The farmer would rather plant his soybean and explore the farm for four months and leave [the farmland] the rest of the year with bare soil and emitting [GHG] than do a rotational system. We are trying to show him [the farmer] how the farm's useful time works. You can make a farm work well all the time [with ILPF] but it's hard to show that. (respondent A1)

> One of our concerns is cattle breeding. Most of the cattle farmers, in the beef cattle business, see the property only as asset maintenance. He leaves one or two employees who look after the 2000 head of cattle... He doesn't have planting machines, he's not worried about agriculture. So when you come and tell him to plant (do crop-livestock integration), he reacts with restrictions. It's a cultural issue that we need to equate. (respondent G3)

[48] The MAPA recently launched a public consultation, where it intends to collect subsidies for the elaboration of a new phase of the ABC Plan, called the ABC+ Plan, which will come into force between 2021 and 2030 and will seek to align the implementation of ABC technologies with the commitments assumed by the Brazilian NDC.

Table 24 summarises the main results of the employment of my analytical framework in the case of the ABC Plan. The ABC Plan had relative success, especially if compared with the other sectoral plans under the PNMC framework. Nevertheless, the manifestation of some gaps, especially those related to politics and institutions and processes, was observed. These findings are discussed in the following subsection.

Table 24 – The Sectoral Plan for Mitigation and Adaptation to Climate Change for the Consolidation of a Low-Carbon Economy in Agriculture gap analysis results.

Gap	**Results**
Gap 1 – Politics	▪ Growing political attention in regard to the need for more sustainable agriculture. ▪ The growing political awareness was not enough to unleash deep structural transformations in the sector (e.g. to increase the amount of rural credit for the ABC Programme as needed). ▪ Involvement of the governmental upper tier of the MAPA was occasional after the launch of the plan. ▪ Lack of participation of the MDA political authorities.
Gap 2 – Institutions and processes	▪ The coordination body (CENABC), set in 2015, presented low effectiveness in monitoring and integrating the action of the ABC plan. ▪ Reduced bureaucratic staff to manage the ABC Plan. ▪ Lack of participation of the MDA bureaucracy during the ABC Plan's lifetime. ▪ Lack of monitoring. ▪ Biennial updates were skipped. ▪ The EMBRAPA was a key scientific institution to support the plan activities.
Gap 3 – Resources	▪ The ABC Programme struggled to scale up rural public credit to low carbon activities. ▪ Lack of technical staff to carry on day-to-day managerial routines related to the plan.

	▪ Distribution of resources related to international cooperation was a matter of dispute between the MAPA and the MMA.
Gap 4 – Information	▪ Lack of data for monitoring the different ABC techniques. ▪ Lack of communication strategy to better inform producers and the bank employees responsible for selling the ABC Programme credit lines.

5.4.5 Discussion

The Brazilian agricultural sector is a key element both for the country's economy and for any climate change mitigation and adaptation strategy that the country wishes to implement. On the one hand, Brazilian agriculture is responsible for around 25% of the country's GDP and is relevant in terms of employment and income generation, the generation of positive trade flows and the global geopolitics of food production. On the other hand, the direct GHG emissions caused by the sector, as well as the indirect emissions caused by land use change, especially in the northern and central regions of the country, and the need for the country to adapt its crops to the climate change already underway indicate the indispensability of the agricultural sector for the domestic and foreign aspects of Brazilian climate policy. The results of my analytical framework in the analysis of the ABC Plan suggested that the plan was partially successful in addressing some bottlenecks in the consolidation of low-carbon agriculture in Brazil. However, issues in politics, institutions and processes, and resources are still observed and are preventing Brazil from mainstreaming low-carbon techniques in its agriculture sector.

In its early stages of development, the ABC Plan relied on support from the political level of government, and this was reflected in the decision to include an agriculture sector plan within the PNMC and in the way this initiative was approached both internally and externally. Moreover, the regulation of a specific credit line to finance the investments foreseen by the ABC (i.e. the ABC Programme) by the Central Bank was a sign that the subject had gained economic, and therefore political, relevance within the government. Moreover, in the external sphere, the government saw the ABC Plan as an attempt to guarantee the decoupling of some agricultural practices from illegal deforestation and to improve the reputation of Brazilian agribusiness in

sustainability, thus reducing the risk of the country facing non-tariff barriers to Brazilian agricultural products and the loss of market share.

Despite the initial support, the ABC Plan did not maintain the necessary political support throughout its cycle. In addition to the fact that the ABC Programme received far fewer resources from the MAPA than what the government itself had indicated as necessary at the launch of the plan, the size of the federal government team dedicated to managing the plan remained small throughout its implementation. These bottlenecks could have been addressed or at least mitigated if there had been greater political will to direct financial and personnel resources to the plan's activities.

This episode of gradual reduction of political support and priority for a policy over time is not something new, having already been explored in both the climate governance literature and the general policy literature regarding the way political leadership tends to establish priorities in day-to-day government (Jones & Baumgartner, 2005; Jordan et al., 2018), and my study confirmed this aspect. In the case of Brazilian agriculture, it was observed that political attention tended to occur more out of concern for preserving the reputation of Brazilian agribusiness than for the economic and climate protection issues offered by ABC technologies, as already widely discussed in the literature (Barros et al., 2019; Saviani, 2022; Sousa, 2021).

In recent years, it has been observed that economic aspects other than the trade ones are pushing up the level of political attention in relation to low-carbon agriculture, especially by potentially attracting financial resources from green investments in Brazilian agriculture in the current economic state of the country, where fiscal restrictions are indicating the need for different sectors to build strategies to attract national and foreign private capital. With increasing attention being paid to environmental and climate considerations within the portfolios of investors and asset managers, this political attention in regard to the sustainability of agriculture will likely gain momentum in the coming years.

Regarding institutions and processes, one of the main criticisms within the climate governance literature is related to the level of preparedness of institutions and the way different governmental policies and programmes for a country's climate action are integrated and coordinated. When applying the analytical framework to the ABC Plan, I identified that the institutions involved (e.g. the EMBRAPA and the MAPA in

addition to nongovernmental partners) presented an adequate level of institutional development to carry out the process of building the plan. The result was a well-designed plan with coherent planned actions, targets and a proposed governance model. However, during the implementation and monitoring of the plan, several difficulties in the coordination and functioning of the different levels of governance of the ABC Plan were identified, which can be explained by several factors.

In addition to the difficulties in the functioning of climate governance (national strategic level), an issue somewhat exogenous to the ABC Plan, there were also coordination problems arising from the MAPA's difficulty in coordinating an agenda that, given the diversity of the Brazilian agricultural sector, could be seen as multilevel in itself. The supposed involvement of the states did not occur as expected, whether for political reasons or due to lack of institutional capacity, resulting in the development of state plans at different paces and leading to changes that were barely perceptible in those states with the greatest deficits in capacity, such as the states in the North and Northeast regions. These aspects indicated that even in a sector institutionally well organised and with robust technical knowledge on the climate issue, the coordination and governance aspects tended to be critical, especially when considering the need to create a greater scale for the planned actions, as will likely be the case of the next cycle of the ABC Plan aimed at achieving the commitments under the Brazilian NDC (successive absolute GHG emission reductions for 2025 and 2030 and the achievement of a net-zero carbon situation by the year 2060).

The difficulties in coordination and governance had a decisive impact on the plan's deficiency in terms of monitoring. Similar to other studies and evaluations (Lima et al., 2020; Senado Federal, 2019), the application of my analytical framework allowed me to identify that a lack of effective monitoring brought about a series of issues throughout the plan, ranging from the lack of periodical plan updates to the final evaluation of the effective impact of the ABC Plan on the increase of agricultural areas that started using low-carbon technologies in the country. The difficulties in monitoring and evaluation have become a more complicated factor at the current moment, when the government is discussing a new cycle of the plan, called the ABC+ Plan. New targets are being set for the period between 2021 and 2030 without there being a clear assessment of whether the strategies and actions previously employed

were effective in changing the trend scenario of the adoption of low-carbon agriculture practices even before the ABC Plan came into effect.

In terms of resources, the small volume of rural credit that was channelled to the ABC Programme is by far the most important aspect to be addressed in the near future. In fact, the programme presented reduced amounts, something like 2% of all rural credit in the period, which can be partially explained by the lack of greater political prioritisation in relation to this credit programme. However, the problems of the scale of the ABC Programme go beyond political will. They also include operational and contractual problems for the realisation of the loans, largely explained by the character of the programme. Furthermore, the need to develop a better narrative for the plan, especially for the public that takes the loans, has been highlighted as something to be improved.

In addition to public resources, an interesting fact perceived in recent years is the growing mobilisation and concern of political leadership in improving the regulation to make private resources viable through the green finance market, and in the discussion of the creation of the 'green bureau' by the Central Bank,[49] an important indication. Even though these discussions are in the initial stages within the government, this movement suggests that there is a resumption of political interest in relation to sustainability in agriculture, not only due to the reputational issue but also due to the attraction of private capital resulting from the green finance market.

The deficit in the size of the technical teams involved in the ABC Plan was an expected finding in my research. However, one of the most highlighted aspects, and one which I had not anticipated, was the importance that many actors gave to the need for stability of the state staff involved in the ABC Plan. State administrations tend to be more volatile to changes in political configurations, many of which occur over short intervals, and this influenced the composition of the teams and leadership involved, which suffer high turnover and bring difficulties in terms of the continuity of the plan.

One last aspect concerns the informational gap within the ABC Plan. Despite the existence of a good amount of data, much of which was obtained throughout the ABC Plan's lifetime, it was noted that there was a lot of difficulty in integrating these data,

[49] See at https://revistagloborural.globo.com/Noticias/Opiniao/Vozes-do-Agro/noticia/2021/07/banco-central-cria-bureau-verde-e-sinaliza-o-futuro-do-credito-rural.html

which is critical, especially when considering the need for the sector to develop an MRV system so that it is possible to accurately measure the impacts of the ABC Plan and sustainability in Brazilian agriculture in the coming years. This will be fundamental not only for the verification of the country's commitments under the Paris Agreement but also to attract greater flows of financial resources that have environmental and climate conditionalities.

5.4.6 Conclusion

In this subsection, I discussed the relationship between the agricultural sector and the Brazilian climate policy. This dynamic is complex and is perhaps one of Brazil's greatest challenges in the implementation of its climate policy. Brazilian agriculture is an important vector of Brazilian economic growth and has strong political support in the Brazilian parliament. If, on the one hand, the sector is seen as a success story given its rapid development and successive records of productivity and production, then, on the other hand, it also suffers intense and critical national and international scrutiny due to the relationship between agricultural production and environmental conservation, a noticeable example of which is the advancement of the agricultural frontier towards the North region of the country (Amazon biome).

Despite its success, especially in comparison with other sectoral plans, the ABC Plan is not free from the manifestation of the various governance gaps that are being discussed in this dissertation. The main governance difficulties encountered in the ABC Plan are related to gaps in politics, institutions and processes, and resources. The level of political attention given to low-carbon agriculture cannot be considered low, especially because of the reputational and productivity gains that climate action offers to the Brazilian agribusiness. However, from the findings, it can be concluded that this level of political attention is still low and occurs irregularly throughout the cycle of the plan, a fact that tends to influence the occurrence of the other gaps, especially the low allocation of financial resources for the ABC Programme, which is the main source of funding for the ABC Plan, and also the failures in coordination and monitoring.

Finally, it is important to highlight the gap related to information (gap 4), something that was very peculiar in this case study. If, on the one hand, low-carbon agriculture has been benefiting considerably from the tropical agriculture science and low-carbon

agricultural techniques developed by the EMBRAPA that improve the productivity and sustainability of crops, then, on the other hand, the ABC Plan and, more specifically, the ABC Programme have as one of their bottlenecks the informational aspect regarding the way the plan and the programme are presented to the interested public. Issues such as the level of preparation of the commercial bank agents at the street level and the non-use of language appropriate to the context of different types of farmers, who are potential borrowers of this type of credit, was a point often brought up during the interviews.

At this time, when Brazil has just launched the second stage of the ABC Plan, which covers the period between 2021 and 2030, the findings presented in this subsection provide important information for decision-makers and others involved in the promotion of low-carbon agriculture in Brazil, mainly due to the need to increase the scale of adoption of low-carbon practices in agriculture in order to meet the goals presented in the Brazilian NDC, increase the use of financing opportunities offered by the sustainable finance market and engender greater resilience and adaptability of the agriculture in the country to the climate change already underway.

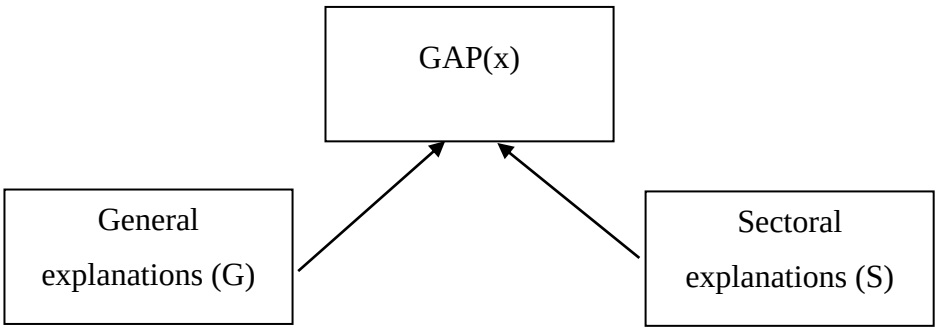
5.5 Cross-case comparisons

5.5.1 Introduction

In the three cases analysed, the predominance of gaps 1 (politics) and 2 (institutions and processes) throughout the cases evaluated was observed, while gaps 3 (resources) and 4 (information) presented differentiated manifestations and intensities. From the comparative analysis, it was possible to conclude that some explanatory factors for the gaps tended to be repeated in all cases, especially for gaps 1, 2 and 3, which seemed to infer that there are common bottlenecks among the different governmental GHG mitigation policies and plans analysed.

Moreover, sectoral specificities that also helped explain the occurrence of the gaps were noted, which indicated that in addition to the common aspects and difficulties of climate policy, there are also sector-specific (policy or plan) factors. Thus, it was possible to conclude that the manifestation of the gaps could be modelled as a function of general (G) and sectoral (S) variables, that is, GAPx = f (G, S), where x is the type of gap analysed, as illustrated in Figure 17.

Figure 17 – Climate governance gap: general function.



Source: Author's elaboration.

5.5.2 A comparative view of the governance gaps

When the results of the case studies were put into a compared perspective, it was possible to see that the use of the analytical framework made it possible to identify some common characteristics among the three cases. It was also possible to identify that there were specific characteristics of each case that helped to explain the gaps and why they occurred in different ways in the cases analysed.

Gap 1: Politics

The evidence indicated that this gap was present in all three cases, mainly due to a lack of political will and attention to climate change. This gap was more strongly perceived in the PSTM case, while in the PNMC and the ABC Plan, it was perceived to a lesser extent. In general, the political attention given to the theme tended to arise due to punctual and temporary aspects, such as, for example, the visibility that the theme of climate change tended to gain on the eve of a COP of the UNFCCC, where pressures from the media and organised civil society seemed to work as a springboard for the governments and their top leadership to use the event as an opportunity to launch plans and policies and reinforce old commitments related to GHG mitigation in their respective domestic spheres, both at the national and subnational levels.[50]

The analysis of the three cases allowed me to observe that the political will and the level of political attention in relation to the theme were not continuous over time, keeping the theme, most of the time, within the limits of the technical and bureaucratic

[50] Thus, it is possible to say that political attention given to the issue of climate change is not something that is constantly on the agenda for most politicians, as tend to be, for example, the control of inflation and the level of employment in the economy.

sphere of government. It is also important to note that given the irregular character of the level of political attention given to the theme, which tended to be transformative and challenge balances already previously consolidated in the economy, it ended up being an additional ingredient for the manifestation of other gaps, such as the resource gap (e.g. allocation of personnel and financial resources) and gap 2 (institutions and processes) in regard to the low effectiveness of the climate collegiate bodies.

In the case of the PNMC and of the ABC Plan, the occurrence of the political gap could be defined as 'stop and go', with alternating moments of greater and lesser intensity, according to conjectural aspects linked mainly to internal and external pressures, such as those from the civil society and environmentalist groups, as well as the increase of media coverage and international events. Therefore, it was not possible to affirm, in a generalised way, that political will would also be a result of the perception of the co-benefits that the climate agenda could offer to the country (e.g. adaptation, resilience and economic efficiency gains). This occurs in a specific manner, as in the case of the agricultural sector, where part of the co-benefits, such as the reputational effects for the sector, seemed to be clearer. At the end of the day, this dynamic did not make feasible the necessary and permanent political support for the promotion of GHG mitigation actions studied in this work.

In terms of the specific factors related to each case, it is possible to say that the manifestation of gap 1 also had specific features in each case analysed. For instance, in the case of the PNMC, despite its multisectoral and multilevel profile originally foreseen in the law and in the policy design itself, it was noted that the political attention given to the theme was limited, most of the time, to the MMA and its first level (secretariats). The same political attention (and priority) given to the topic was not observed in other ministries, including the Casa Civil, which coordinated the highest instance of climate governance. For the majority of the governmental actors involved in the agenda, the theme was restricted to the technical–bureaucratic level of the ministries.

The explanations for this greater political attention the MMA and its staff gave to the issue can be found in the historical profile of Brazilian emissions associated with land use, where the MMA has institutional competence to act. The MMA was, and still is, the first authority consulted by the president of the republic on the subject. The

minister of the environment is usually the leader of the Brazilian delegations in the COPs of the UNFCCC, which is also the main entry channel for potential possibilities of international cooperation on the subject as well as a focal point for the demands of nongovernmental actors on the subject. Meanwhile, the Casa Civil, on which climate governance has depended to foster the greater performance of the other ministries and their political levels, has not played such a role, except at the beginning of the policy discussions between 2008 and 2010.

However, as already highlighted, from the moment the profile of Brazilian emissions began to suffer significant modifications, especially due to the success in combating deforestation in the 2000s, the political leadership of the minister of the environment on the climate issue became somewhat insufficient to unlock all of the processes necessary for the implementation of the different sectoral policies required for full implementation of the PNMC. This because the institutional competencies and political leadership to maintain the general decrease of Brazilian emissions started lie under the auspices of other governmental actors rather than the MMA, such as the Ministries of Agriculture, Energy, Transportation and Industry, in addition to the Ministries of Economics, Finance and Planning in the matter of economic and market instruments and financing. Combining this aspect with the low political attention the theme received from the Center of Government, which had the mission of coordinating the CIM and the whole climate governance (Casa Civil), the findings suggested that the mitigation of the political gap, or its closing, was extremely dependent on how the political leadership of each sector saw the subject, which differed from sector to sector. In this sense, the two sectoral cases analysed were contrasting, showing the difficulty of building political support in a country with a diversified source of GHG emissions.

In the sectoral comparison of the agriculture and transport sectors, the political gap was present in both cases analysed, but it was stronger in the transport sector, where very little evidence was found in regard to the participation of the political tier of the ministries (cities and transport) during the design stage of the plan (and after that). An issue that partially explains this reduced level of participation at the political level in the PSTM discussion was that the plan was not supposed to cause constraints to the ministers' political agendas and priorities, as highlighted by some of the interviewees. Moreover, the strong path dependency that the sector has in regard to road

transportation and all issues that this may cause (e.g. lobbies and corrupted relations between constructors and politicians) should also be stressed.

However, the (albeit partial) involvement of the political level of the MAPA during the early stages of the ABC Plan, in which the ministry was the main coordinator, was noted. The president of the republic also gave special attention to that plan since the Casa Civil was in charge of leading the preparation talks for it. In the establishment of the ABC Plan as a PNMC sectoral plan, direct involvement of the government's highest level, which counted on the direct support of the minister of agriculture, was noted. This involvement, however, was not enough to neutralise the manifestation of the gap throughout the ABC Plan's lifetime, but it seemed to have been an important factor for the ABC Plan to be able to go through all of the stages of its first cycle (2010–2020) without issue or abolishment, as was observed in the PSTM case. The MDA, which was supposed to take care of the rural farming/organic agriculture affairs within the ABC Plan, had very limited participation over the whole period of this GHG mitigation action.

One of the explanations for this difference in the magnitude of gap 1 in the two sectoral cases seemed to related to the perceived co-benefits of climate policy may offers to the different sectors, which at the level of the agricultural sector seemed to be clearer to the authorities. Moreover, the transport sector had a factor that complicated the closing of the gap, namely the strong path dependency around road modalities that exists in the sector and that brought several political parties and economic constraints together to achieve a more incisive move towards decarbonisation of the sector by the responsible authorities, both at the national and subnational levels.

Gap 2 – Institutions and processes

Regarding the gap in institutions and processes, the comparison between the cases also allows me to observe very similar patterns, especially in four aspects: i) functioning and effectiveness of the collegiate governance bodies of the policy/plan, ii) lack of planning and monitoring instruments, iii) poor GHG reduction targets and iv) lack of federative dialogues (national–subnational articulation). Based on the findings, it can be concluded that the presence of this gap seems to be directly associated with the level of maturity/institutional development of the sector analysed. For instance, in the case of agriculture, where conditions prior to the establishment of the ABC Plan, such

as the existence of an already consolidated research body (EMBRAPA) and the already use of low-carbon technologies for the sector, tend to be feasible explanations for gap 2 in the agricultural case being considered less intense than in the other cases. In a nutshell, while comparing the two sectoral cases, it is possible to conclude that the level of preparedness to build a bridge between climate and sectoral policies was higher in the agriculture than in the transportation sector.

Regarding the functioning of the collegiates, (CIM, Gex and CENABC) the evidence found for the three cases suggests that they functioned irregularly and, at the end of the day, failed to deliver what was expected of them in terms of governance, especially regarding coordination, integration and monitoring. Both in the case of the CIM and GEx (general governance of the PNMC) and the CENABC, coordinated by the MAPA and the MDA, it had low effectiveness. This led to situations where decisions that should be taken in a collegiate environment were taken, at the end of the day, by the Ministries that held de facto leadership, namely the MMA, in the case of the PNMC, and the MAPA, in the case of the ABC Plan.

On the other hand, the PSTM did not form a collegiate body to execute its governance, even though the MCid has established a working group to elaborate on the urban mobility part of the plan, which was the responsibility of this specific ministry. This lack of collegiate bodies was one important failure of the PSTM, especially since the plan had two implementation ministries and several potential links with the subnational government. In the absence of collegiate bodies, the integration of all these stakeholders became even worse, also because CIM and GEx were not working properly to foster that type of integration and coordination among the climate governance players.

The low effectiveness of the collegiate bodies is also a possible cause for another bottleneck observed, and common to all three cases, which is the lack of monitoring and updating of the plans and actions initially presented. For example, the Climate Plan, the main instrument for planning and monitoring the PNMC, was never updated after the launch of its first version, and one of the main bottlenecks was the CIM's lack of deliberation on the updating proposal that had been prepared by the GEx. Like the Climate Plan, the PSTM was not updated either, and it was not found evidence that this has been attempted, although some subsectoral initiatives have occurred, such as

the negotiations about the ICAO's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA), which were led by the Secretariat of Civil Aviation in the second half of the 2010s. It is important to note that the civil aviation sector was not included in the PSTM, despite the growing relevance of emissions from Brazilian commercial aviation to the total transport sector. On the other hand, there was also no update of the ABC Plan until 2021, although in this case, an effort by the MAPA and Embrapa teams to measure the results of the initial targets set out in the Plan was noticed.

The establishment of GHG reduction targets is also an aspect to be highlighted. Besides one of the plans (PSTM) not having presented targets, despite the legal provision to do so, in the PNMC and the ABC Plan, it was evaluated that the targets presented inconsistencies, especially from the point of view of the premises under which they originated, as in the case of PNMC, and from the point of view of the sectoral emissions reduction ambition (ABC case). The practical result of this low quality of the targets can be seen in Table 25, which shows an increase in GHG emissions both nationally and for the two sectors analysed, between 2009 (establishment of the climate law) and 2016 (the last year presented by the official inventory), despite the period having been characterised by a low economic growth rate (1.38% p.a.), well below the growth rate expected for the period that the government used, to a large extent, to prepare its projections (5% p.a.). The figures of the transport sectors are particularly relevant because it shows a noticeable increase of GHG emissions (4.20% pa), which is almost two times higher than the annual rate of economic growth (1.54%) that this sector had in the period from 2009 to 2016 despite the low economic growth that this sector.

On the other hand, the agricultural sector figures suggest a more favorable relationship in terms of sustainability than the transport sector and Brazil itself. As highlighted in Table 25, despite having presented an annual economic growth (2.53% pa) higher than the Brazilian average and then the transport sector (1.38% and 1.54%, respectively), the growth of the agriculture sector emissions per year (1.24%) grew relatively less than the figures of Brazil (2.37%) and of the transport sector (4.20%). These numbers for the agricultural sector possibly reflect the adoption of sustainable and GHG mitigation practices within the sector, although it is necessary to point out that the scale of these practices still falls short of what was initially planned by the ABC plan.

Table 25 – Cross-case comparison: greenhouse gas emissions and gross domestic product growth (Brazil, agriculture and transportation).

	Case		
	Brazil (Total)	**Agriculture**	**Transport**
GHG emissions – CO_2e (Gg)			
2009	1,337,935	520,305	154,194
2016	1,576,545	567,043	205,625
GHG growth 2009–2016			
%	17.83%	8.98%	33.35%
pa (%)	2.37%	1.24%	4.20%
GDP (million R$, 2010 prices)			
2009	3,613,792.54	149,893.70	127,404.35
2016	3,977,162.04	178,586.45	141,404.35
GDP growth 2009–2016			
%	10.06%	19.14%	11.32%
pa (%)	1.38%	2.53%	1.54%

pa = per annum.

Source: IBGE (2020) and MCTI (2020).

Another aspect to be highlighted from the comparative analysis of the three cases was related to possible initiatives of federative articulation (national–subnational) for the implementation of the respective policy plans. As the evidence found suggested, this articulation was very low throughout most of the cases, a fact that contributed to the manifestation and intensity of gap 2. Although in all three cases there was an initial provision, both in the PNMC law and in the text of the plans, the evidence showed that the articulation between the different government levels was very low for effective implementation of actions from a multilevel perspective. In the PNMC, for example, there was only one isolated and short-term initiative (NAFC in 2013–2014), which, despite promising results, was not sustained over time.

From a sectoral point of view, the ABC Plan presented different patterns of progression at the state level within its state governance related to differences in terms of institutional capacities and issues of a political partisan nature, as the interviewees highlighted. In turn, the PSTM proved to be even more limited in its ability to builda bridge between the different levels of government in an economic sector whose decision-making is highly fragmented among levels, especially with regard to urban mobility, where the main competencies and policy stakeholders are at the city level, but the main source of finance comes from the national level, such as from the FGTS.

Gaps 3 and 4 – Resources and information

Regarding gap 3 (resources), it was possible to observe that both the PNMC and the ABC Plan had contributed, even if in a limited way in terms of scale and impact, to closing the gap in terms of both financing and technical capacities. For instance, both the Fundo Clima and the ABC Programme (credit line oriented towards the implementation of the ABC Plan) could be seen as important aspects in reducing the financing gap that existed before the establishment of the Brazilian climate policy in the promotion of low carbon and mitigation practices.

However, these financing sources fell short of what was necessary for the full funding of relevant and necessary actions for the full implementation of the two cases. There was also no evidence of improvement of these funding channels throughout the years, especially regarding the PNMC. For example, the Climate Fund had its main source of revenue withdrawn as of 2012 (resources from oil exploration), that is, only three years after its creation. In addition, the PNMC was also presented with difficulties in mainstreaming the climate perspective in the various lines of public funding, whether via public banks, such as the BNDES and Banco do Brasil, or through investments made directly with public budget resources. In its turn, the ABC Programme presented a not very expressive share (2%) of the total public rural credit system, something that has still not been equated despite the criticism and several evaluations on the subject made over the years.

However, the PSTM did not present in its structure a specific financing line, as observed in the ABC Plan. The absence of this line is not, in itself, a negative indicator; however, it was not noted that those responsible for the plan’s strategic actions included guidelines or criteria related to GHG mitigation in transport in existing credit

options, such as resources from the FGTS, which is currently the main source of public money for financing investments in urban mobility in the country. Moreover, attempts to enable transport infrastructure projects in important mechanisms for climate finance, such as the CDM, were not found even though transport projects were also eligible under this mechanism.

Regarding gap 3, it is important to highlight that there have been improvements, albeit limited, in terms of the capacities and training of the institutions and teams involved with the climate agenda within the national government since the year of implementation of the PNMC and its sectoral plans. For instance, a climate unit was created in the MF to deal with climate issues; despite having a reduced team, this unit made important contributions to the implementation of the policy, especially in conducting studies for the implementation of economic instruments to promote mitigation in different sectors, such as the World Bank's Project for Market Readiness project. This nucleus, however, had limited capacity to influence decisions at the political level of the MF, and recently (2019), it was dismantled by the new federal administration.

However, the formation of teams dedicated to the theme was not the pattern observed in most of the ministries involved with the PNMC, such as the MT (PSTM) or the Casa Civil (coordinator of the CIM). Nevertheless, an improvement in terms of team capacity building in the MAPA (ABC Plan) and MCid (PSTM – urban mobility) was noted. In general, based on the analysis of the cases, it was possible to assume that there were improvements, albeit limited, over the cycles analysed and that these could be taken as explanations for the shortening of this gap throughout the cycles assessed.

Regarding the gap in information, related to the production and use of information for decision-making, the evidence found allowed me to conclude that this gap was reduced the most throughout the three cycles studied. There were considerable improvements from 2009 onwards in terms of production of national inventories, future estimates of emissions and the production of sectoral inventories for segments of the transport sector (road, rail and civil aviation), as well as the development of better metrics for the agricultural sector, which counted on an important contribution of the EMBRAPA. Thus, it was valid to adopt the general conclusion that both the PNMC and its sectorial plans experienced a positive impact in the production of data.

However, despite this data improvement, a general weakness observed was the reduced use of this information to subsidise decision-making in the scope of climate policy and beyond (e.g. in general governmental planning). For instance, recurrent use of this information in government planning instruments (e.g. PPA and national strategies) or in other relevant government strategies (e.g. planning and implementation of built infrastructures) was not observed. In other words, Brazil has evolved in the production of information for decision-making in climate policy but has had difficulties using it in a systemic and strategic way, which has ended up hindering the total closure of gap 4 over the years. Table 25 summarises the gaps found in the PNMC, PSTM and ABC Plan.

Table 26 – Cross-case comparison – main results.

Gap	**Case 1 – PNMC**	**Case 2 – PSTM**	**Case 3 – ABC Plan**
Gap 1 – Politics	▪ Political attention was occasional. ▪ Absence of political will to fully implement the PNMC. ▪ Low level of engagement of the upper tiers of the federal government (apart from the authorities of the MMA).	▪ Lack of political will to enhance low carbon transportation. ▪ Lack of engagement of the upper tiers of the MT and of the MCid during the PSTM preparation and implementation. Path dependency in regard to the road mode of transportation likely to undermine the political willingness for low carbon transformation in the sector.	▪ Growing political attention in regard to the need for more sustainable agriculture. ▪ The growing political awareness was not enough to unleash deep structural transformations in the sector (e.g. to increase the amount of rural credit for the ABC Programme as needed). ▪ Involvement of the governmental upper tier of the MAPA was occasional after the launch of the plan. ▪ Lack of participation of the MDA political authorities.

Gap 2 – Institutions and processes	▪ The GHG emissions scenario and targets were based on fragile premises. ▪ The GHG targets lacked monitoring and updates. ▪ The CIM and GEx presented with operationalisation difficulties (e.g. in the coordination of governmental actors, integration of sectoral plans and regularity of meetings). ▪ The CIM and GEx were hardly used for important decision-making processes (e.g. preparation of NDCs). ▪ Lack of monitoring and periodical updating of the Plano Clima and the sectoral plans (excepted the ABC Plan, updated in 2021).	▪ Fragmented governance without deployment of coordination and integration mechanisms. ▪ Absence of GHG emission reduction targets. ▪ Lack of integration with already-in-place governmental actions (e.g. PNMU, PNLT).	▪ The coordination body (CENABC), set in 2015, presented low effectiveness in the monitoring and integration of the actions of the ABC Plan. ▪ Reduced bureaucratic staff to manage the ABC Plan. ▪ Lack of participation of the MDA bureaucracy during the ABC Plan's lifetime. ▪ Lack of monitoring. ▪ Biennial updates were skipped. ▪ The EMBRAPA was a key scientific institution to support the plan activities.

	▪ Concentration of political and bureaucratic power on the agenda at the MMA. ▪ Lack of engagement of key federal government stakeholders in the PNMC agenda. ▪ Absence of permanent dialogue and cooperation between the different levels of government.		
Gap 3 – Resources	▪ Climate policy capabilities were unequally distributed within the federal government institutions. ▪ Lack of climate policy capabilities in most subnational governments. ▪ Climate finance struggled to unlock financial and budgetary flows over the PNMC's lifetime. ▪ Deployment of economic instruments (e.g. carbon pricing)	▪ The development of climate policy capabilities within the MT and the MCid remained limited. ▪ The MCid managed to establish partnerships with subnational entities in capacity building for low-carbon urban mobility.	▪ The ABC Programme struggled to scale up rural public credit to low carbon activities. ▪ Lack of technical staff to carry on day-to-day managerial routines related to the plan. ▪ Distribution of resources related to international cooperation was a matter of dispute between the MAPA and the MMA.

	to mitigate GHG emissions was very limited.	▪ Climate-related funding opportunities were missed (e.g. CDM projects). ▪ Investor climate and ESG considerations appear to be increasing the level of political attention.	
Gap 4 - Information	▪ Difficulties in developing PNMC monitoring mechanism. ▪ Turf wars limited information sharing among the governmental stakeholders. Reduced use of climate-relevant data for informing governmental decision-making.	▪ GHG sectoral inventories improvements were made (e.g. road, railways, civil aviation, cities). ▪ There was a lack of climate-data or policy decision-making in the sector. ▪ The little information available (derived from sectoral GHG inventories) was poorly deployed to inform planning and decision-making.	▪ Lack of data for monitoring the different ABC techniques. ▪ Lack of communication strategy to better inform producers and the bank employees responsible for selling the ABC Programme credit lines.

5.5.3 Conclusion

In summary, the comparative analysis of the three cases studied in this work allowed me to conclude that gaps 1 and 2 were the most intense and common in all cases and could be seen, for the selected cases, as the main bottlenecks in promoting GHG mitigation since the establishment of the climate policy in 2009. Moreover, the compared perspective also permitted me to conclude that there have been important advances in the production of data and, to a lesser extent, in the allocation of technical and financial resources for the actions studied, even though it is necessary to highlight the limitations of these resources in terms of scale, volume (financial) and distribution (capacities of ministries in terms of climate change policy).

Another important aspect to highlight is that when comparing the intensity and manifestation of the gaps in the different cases considering the trend of GHG emissions observed throughout the years, it was possible to observe a direct correlation between the manifestation of the gaps and emissions observed for the three units of analysis. Comparatively, the agricultural sector was the one that presented the lowest annual emission growth rate between 2009 and 2016 and was also the sector that presented the lowest intensity for the four gaps studied. However, the transport sector, where all gaps manifested with the greatest intensity, was the sector that presented the highest GHG emission rate for 2009–2016 among the selected cases. Although it is necessary to recognise that other factors also help explain the different trajectories of these GHG emissions, such as the economic growth of the sector, this relationship between the perceived intensity of the gaps and the annual growth in the emissions tends to demonstrate that the analytical framework proved adequate to capture governance differences between the cases that, at the end of the day, materialised in the patterns of GHG emissions in the cases analysed.

Finally, the comparative study of the three cases suggested that to close the various governance gaps, climate governance must take a developed and integrated approach, not only to foster coordination and experience sharing among the governmental stakeholders but also to align common procedures for the elaboration of sectoral GHG reduction targets, to build climate policy capacities among the different governmental actors and to deploy coordination mechanisms instead of relying only on collegiate bodies and working groups. For instance, economic instruments could play an

important role in this subject. Regarding the political gap, which might have helped worsen or fill the other gaps, a combination of factors, such as pressure from society, donors, insurers (e.g. ESG and green financing) and the legal system (e.g. climate litigation), as well as a greater perception of the co-benefits that climate policy could generate for sectoral policies (e.g. building resilience, increasing productivity and attracting investment), could be useful to increase political attention towards the issue and help keep it permanently at the top of the country's political priorities.

Chapter 6 – Conclusion

6.1 Introduction

Enacted in 2009, the PNMC was a milestone in the institutionalisation of climate action in Brazil. With targets that internalised the NAMAs, the PNMC law also brought a series of principles and guidelines that intended to lay the foundations of a cross-sectoral and multilevel climate policy in the country. Moreover, at the international level, the PNMC was celebrated, as it was one of the first commitments made by an emerging country to cut GHG emissions and reinforced the leadership of Brazil in the global efforts to tackle climate change.

However, after more than a decade since its establishment, the PNMC has experienced several obstacles related to its governance, coordination and planning that have posed threats to the effectiveness of GHG mitigation actions in the country. These obstacles become even more challenging when considering the country's commitments related to the implementation of the economy-wide Brazilian NDC, which, in addition to providing absolute emission reductions for the coming years, also concerns the country's aspiration to achieve climate neutrality (net-zero emissions) by the middle of the current century.

It is important to review the history of Brazilian emissions to understand the challenges that this research aimed to investigate. On the one hand, the programme to combat Amazon deforestation launched by the Brazilian federal government in 2005, the PPCDAm, presented rapid and relevant results, curbing the annual deforestation rate of the Legal Amazon from 27,400 km^2 in 2004 to 4,500 km^2 in 2010. This enabled the country to achieve, individually, one of the largest cuts in global GHG emissions in history. Fundamentally based on command-and-control policies, creation of protected areas and land title regularisation, the initial results of the PPCDAm were also celebrated because they occurred at the same time as a period of high economic growth. This growth occurred in the agricultural sector, which has traditionally demanded new lands for planting, has made Brazil a global player in world food production and is one of the main drivers of the national GDP. This suggested that addressing deforestation while maintaining growth rates in the production of agricultural products was achievable.

The reduction of emissions from deforestation contributed significantly to creating the political conditions for the Brazilian government to enact its national climate policy in the late 2000s. However, as discussed throughout this dissertation, the governance and planning of a climate policy go beyond tackling deforestation and require a move towards a cross-sectoral and multilevel approach, which involves the participation of different policy constituencies and stakeholders, many of whom have conflicting interests. A combination of top-down and bottom-up policy approaches within this policy arena is critical to building more effective climate policies.

By providing for the use of different sectoral plans to meet its voluntary commitment to reduce GHG emissions, the PNMC offered initial traces of an economy-wide perspective, which, six years later, would become the core of the Brazilian NDC presented under the Paris Agreement in 2015. The willingness to have a cross-sectoral and multilevel approach, integrating various sectors and levels of government (federal, state and municipality), as well as the concern with the diversity of the country´s socioeconomic context, is expressed in the law. However, the implementation of this intersectoral and multilevel approach experienced difficulties of many sorts, such as an absence of a political will, policy design failures, a lack of coordination and integration of cross-sectoral action, and a lack of resources and data. The explanation for these bottlenecks includes a combination of endogenous and exogenous aspects of the PNMC, of which failures in the intragovernmental and intergovernmental relationships likely explain most of these issues.

As highlighted by a few works dedicated to investigating the Brazilian climate change governance subject (Andrade, 2019; Senado Federal, 2019; Speranza et al., 2017; Unterstell, 2017; Viola & Franchini, 2013) and as stated by many research respondents, the PNMC presented different design flaws and implementation difficulties related to monitoring, periodic review, funding, political prioritisation of the climate issue by government authorities and the building of a participatory and effective federative environment between the national and subnational governments in dealing with the topic. At the core of these difficulties lie the issues encountered by the PNMC and its sectoral plans in regard to the intragovernmental and intergovernmental relationships. In other words, the struggles of the governance by governments within the PNMC likely serve as a key explanation for the difficulties faced by the country’s climate policy.

Despite the obstacles faced in the implementation of the sectoral plans and the PNMC itself, it is assumed that the GHG reduction target established by the policy was reached in 2020. According to the Fifth Edition of the Annual Estimates of Greenhouse Gas Emissions in Brazil (MCTIC, 2019), national GHG emissions have remained below the limit set for 2020 (in 2016, they comprised 1,305 million net tons of CO_2e), as shown in Figure 10.The nature of the commitment, defined as the deviation in relation to a very high future projection of GHG emissions, was based on the following: i) the reproduction of past deforestation rates in the different biomes of Brazil (in the case of the Amazon, the maintenance of the average rate from 1996 to 2005 of 19,500 km^2 was considered, much higher than the average observed since 2009 of around 6,400 km^2) ii) a scenario of energy matrix expansion without mitigation measures (different, therefore, from the scenarios effectively considered in the PDE) and iii) in the case of emissions from industrial processes, agriculture and cattle raising, and waste treatment, the projection of GHG emissions that would occur in a scenario of annual average GDP growth of 5% per year until 2020 – a much higher growth than it was actually checked from 2010 to 2020.

However, the virtual fulfilment of the PNMC's voluntary target does not guarantee that the country's past and future GHG emissions trajectories are in line with the NDC targets or the aim to reach net-zero emissions by 2050 and the consolidation of a low-carbon emission economy in the country. For instance, except for LULUCF emissions, the other sectors reported in the Brazilian government's fourth CN to the UNFCCC showed an increase in their emissions from the launch of the PNMC until 2016, the last year of the most recent GHG inventory. Moreover, the pace of the deforestation rate reduction, observed in the second half of the 2000s, lost vigour and presented an upsurge, causing the LULUCF sector to also present an upward trend in recent years.

Furthermore, concerning the trend of Brazilian emissions observed in recent years and the impact of this on the distribution and relevance of different sectors in the country's emissions profile, the Brazilian government's official estimates for GHG emissions for the next three decades suggest that in a business-as-usual scenario, Brazil will continue to increase its GHG emissions, as shown in Figure 2. Furthermore, the comparison of this trend considering the absolute emission reduction commitments assumed in the Brazilian NDC for the years 2025 and 2030, as well as the indication of reaching carbon neutrality (net-zero emissions) by mid-century, indicates that Brazil

will not fulfil its commitments under the Paris Agreement, which has already been stressed in different assessments (Climate Action Tracker, 2021; Climate Transparency, 2021).

Within this challenging context, the way Brazilian governmental stakeholders participate and get organised in the PNMC is the most critical aspect of the climate governance debate in the country, not only due to these stakeholders' rulemaking and rule-enforcing features but also because they can enable or undermine the participation of the non-state actors within this process, as well as undermine even the overall achievements of the climate policy. In this regard, the discussion of climate governance by governments in the Brazilian context encounters the following two main issues: first, the intragovernmental relationships among the various governmental actors that comprise the Brazilian federal government, and second, the intergovernmental relationships between the federal government and the state and municipal governments.

Despite the importance of understanding how intragovernmental (within the federal government) and intergovernmental (between the federal government and the state and municipal governments) relationships work within Brazilian climate governance, there is a lack of in-depth studies about these interplays and what they entail for the operation and results of the country's climate policy. However, the few analyses that have touched on Brazilian climate governance suggest that the interactions that occur within the government are problematic and tend to be part of the explanation for problems related to integration, coordination, effectiveness and transparency that occurred in the PNMC's lifetime. There is also little evidence on the extent to which sectoral specificities, within this climate governance by governments context, may explain why certain sectoral mitigation plans under the PNMC have been more successful than others (Senado Federal, 2019; Speranza, Romeiro, & Biderman, 2017; Unterstell, 2017).

In this sense, this dissertation aimed to investigate Brazilian climate change governance by adopting the climate governance by governments lens mentioned above. By employing the literature on MLG and coordination of public policies as the theoretical background, this study had a twofold objective. First, it sought to understand how the different governmental interplays happened within the PNMC and

its sectoral plans on agriculture (e.g. the ABC Plan) and transport and urban mobility (e.g. the PSTM).

Being primarily focused on the intragovernmental relationships among the federal government stakeholders (e.g. federal ministries and governmental agencies), this research also paid attention to the intergovernmental relationships between the federal government (national level) and the state and municipal governments (subnational level). Second, it sought to identify and explain how and why the governance gaps arose in each case examined (mitigation action) and find out whether failure in the intragovernmental and intergovernmental relationships examined (climate governance by governments) could be one of the reasons for the manifestation of these gaps. Considering this background, this research posed the following questions:

> Q1. How are climate policy arrangements organised and coordinated among governmental actors to mitigate GHG emissions in Brazil? What might be the reasons behind how such arrangements are established?
>
> Q2. What are the predominant governance gaps of the different GHG mitigation actions examined? Why do these governance gaps occur?

Here, Q1 explored how the Brazilian climate governance was constructed and how it works. By explaining the historical, institutional and political conditioning factors as well as the actors involved (leaders, followers, possible veto players, etc.), this question concerned the way the various governmental stakeholders were positioned and how relevant intragovernmental and intergovernmental relationships were taking place within the functioning of the PNMC and its sectoral plans.

Then, Q2 intended to identify the occurrence of climate governance gaps for each of the cases examined, which, according to the analytical framework of this research, could be revealed in four aspects (i.e. politics, institutions and processes, resources and information). Through this question, the factors that explained these gaps and how they differed between the cases and whether failures in climate governance by governments could be one of the explanations for the gaps were also examined.

Furthermore, with the aim of understanding the main theoretical and empirical aspects of MLCG and public policy coordination, the research promoted an extensive literature review of these two themes (see Chapter 2). Finally, the study aimed to add new theoretical and empirical knowledge to the little-studied Brazilian climate governance,

which is entering its most challenging phase given the worsening of the climate crisis and the international commitments made by the country. By bringing forth evidence of the main challenges of climate governance in the policies and economic sectors critical to the country's climate action (see Chapters 4 and 5), the study hopes to offer a clear and highly valuable empirical view for researchers and policymakers engaged in the topic in Brazil and worldwide.

6.2 Summary of main findings

My study initially focused on the review of the theories on MLG, with a focus on the MLCG aspects, and theories on coordination of public policies. At this stage, I sought to understand the state-of-the-art research on the subject and identify the main obstacles that climate policy tends to face in the scope of its governance, planning and coordination. This complexity was initially explained as being a result of a policy arena populated by stakeholders of different levels (global, continental, national, regional, city and village) and different economic sectors. Considering the approach adopted in this research (climate governance by governments) as well as the profile of the Brazilian GHG emissions, this arena of governmental players are composed by three different levels of government (national, represented by the federal government, and subnational, represented by the state and municipal governments) as well as by different policy sectors (e.g. agriculture, energy, industry and transport).

From the literature review, I was able to conclude that the domestic model of MLCG has certain defined characteristics, as follows: (i) the coexistence of top-down and bottom-up approaches, both with an influence on policy planning and implementation (Gupta, 2007); (ii) a diversity of actors and sectors that, given the transformative nature of the policy, do not necessarily act in a cooperative manner (Schmitz; 2016; Worker, 2016); iii) the diffusion of relevant public policy competencies towards GHG mitigation among the different levels of government (Charbitt, 2011; Jordan et al., 2018) and iv) the fact that climate protection is a potential co-benefit for the different sectoral policies that make up the domestic policy mix of a country and that it can be an important factor for the construction of new alliances around the theme.

Based on the characteristics described above, and considering that my study was mainly focused on the examination of climate governance by governments – concerning the intragovernmental relationships within the same level of government

(the federal government) and the intergovernmental relationships among the different levels of government (federal, state and municipal) that make up the Brazilian political administrative setting – for this study, climate governance was defined as follows: the formal and informal orchestrated exercises of power and policies that happen in the governmental sphere with the aim of formulating and implementing mitigation and adaptation policies in a country-specific context.

Having defined the concept of climate governance to be applied in the research, I looked for references in the literature about the main bottlenecks that climate governance faces when promoting policy arrangements to reduce GHG emissions in carbon-intensive economic sectors. The literature indicated several aspects equally relevant to the quality of political governance that could be categorised into the following four major analytical groups: i) politics, ii) institutions and processes, iii) resources and iv) information.

In the politics aspect, issues related to political will and receptiveness of the agenda by the country's political leadership, as well as the predominance of interest groups opposed to the agenda and the existence of so-called political denialism, tended to affect the functioning of governance and the results of climate policy (Gordon, 2015; Kingdon, 2011; Schmitz, 2016), while in the institutions and processes aspect, the distribution of competencies among the different ministries and levels of government throughout a climate policy's lifetime, the difficulties of coordination and integration in this diverse environment (where different perceptions coexist regarding the best way to tackle the problem), bureaucratic space disputes, and unbalanced technical and bureaucratic capacities among the actors were also aspects that influenced the proper functioning of climate governance (Behn, 2014; Bouckaert et al., 2010; Charbitt, 2011; Gupta, 2007; Hustedt & Seyfried, 2016; Jänick, 2017; Jordan et al., 2018).

Equally important aspects, which received their own separate analysis, also referred to the availability of resources, whether financial, technical or human, as determining whether the different ministries and levels of government could act effectively within the scope of governance (Averchenkova & Bassi, 2016; Brunner et al., 2012), as well as the availability of information and data for decision-making, which also includes the ways in which information is generated and shared among stakeholders and how

governance decisions are registered and made transparent (Evans & Duwe, 2021; Gordon; 2015; Worker & Palmer, 2021).

Due to the different horizontal and vertical dynamics present in the relationships between the ministries and between the levels of government, while enacting climate policy, respectively, in the literature review, I also addressed the main aspects of public policy coordination for cross-sectoral and MLG environments, especially in regard to possible coordination failures. These could be categorised into three groups (i.e. political reasons, organisational reasons, and technical and legal reasons) (Jennings & Krane, 1994). I also found that with respect to the level of ambition, a coordination model could be presented in two ways (positive or negative) that are differentiated by the level of ambition and the way in which they are achieved (Danken, 2017; Scharpf, 1994).

In addition, I also identified the main mechanisms (HTM, MTM and NTM) and instruments (managerial and structural) employed in public policy coordination, which tend to be deployed in combination with a multilevel policy, as well as the possible problems that each of these mechanisms may face (Bouckaert et al., 2010). Finally, when mapping the different concepts of coordination presented in the literature, it was possible to conclude that most of them aimed for convergence in the sense that one of the central objectives of coordination was the alignment 'of different organizations towards common task, to enhance coherence and to reduce redundancy, duplication and contradiction', as highlighted by Danken (2017, p. 11), which is a determinant aspect for the effectiveness of climate policy governance and planning.

By combining the theories on MLCG and public policy coordination, I was able to develop an analytical framework, which I named the CGAT. It was structured in two stages. In the first stage, I mapped the architecture of governance and public policy, as well as the general context in which the policy or programme evaluated was inserted. This included, for example, the architecture of governance and actors, the existence of formal and informal rules and institutions, the distribution of power and the emissions profile of the case being evaluated. This step aimed to describe the exogenous contexts (which tend to apply to all cases studied, discussed in Chapter 4) and the context endogenous to each case (discussed in Chapter 5).

In the second step, the qualitative gap assessment of the four gaps was carried out. The gap assessment model was initially developed by Charbitt (2011) with the aim of mapping the challenges of coordination and capacity in decentralised policymaking contexts. Due to my research objectives, which included not only the relationship between the different levels of government but also the intragovernmental interplay within the federal government, I developed a model that aimed to identify and discuss the occurrence of the following four types of gaps within Brazilian climate governance: the gap in politics (gap 1), the gap in institutions and processes (gap 2), the gap in resources (gap 3) and the gap in information (gap 4). To better understand the occurrence of these different gaps as well as the intensity with which they manifested in each case studied, I established a list of aspects to be observed in the analysis, as shown below.

Table 27 – Climate governance gaps: description and rationale.

Gap	**Aim**	**Issues to be observed in the gap assessment**
Gap 1 – Politics	To assess the strength of political support for the GHG mitigation action.	Presence of political leadership.
		Engagement of high-level ministerial staff.
		Political attention to GHG mitigation in analysis vis-à-vis the other governmental and ministerial priorities. (e.g. budget allocation and political discourses).
Gap 2 – Institutions and processes	To assess how institutions and policy processes are shaped and work in the GHG mitigation action.	GHG emission reduction targets.
		Governmental arrangements for coordination and monitoring.
		Distribution of institutional competencies throughout different governmental stakeholders.
		Engagement of different levels of government.
Gap 3 – Resources	To assess what the main constraints in terms of finance, budget and technical capabilities are in	Availability and allocation of financial resources to implement the GHG mitigation action.

	GHG mitigation action.	
		Availability and allocation of technical and human resources to implement the GHG mitigation action.
		Engagement of public financial institutions in the support of the GHG mitigation action.
Gap 4 - Information	To assess the availability and the usage of data and relevant information for decision-making and management of the GHG mitigation action.	Existence of data and information (GHG inventories, sectoral studies) to inform decision-making and monitoring.
		Sharing of information and data between the relevant governmental stakeholders for the GHG mitigation action.
		Documentation and registry of information and relevant decisions in regard to the GHG mitigation action assessed.

Source: Author's elaboration.

By aspects understood as exogenous to climate governance (see Chapter 4), I am referring to issues inherent to the Brazilian political administrative system that tend to affect the way Brazilian public policies are designed, implemented and monitored, which, at the end of the day, have a direct influence on their results. This gains even more relevance in a multisectoral and multilevel context, such as that of climate policy. In this way, issues that are not yet addressed in a definitive way in the scope of Brazilian federalism, such as the difference in technical, administrative and financial capacities among the different levels of government that make up the federation, are important aspects to explain the difficulties and generation of gaps (and the failure to close them) in the climate policy.

In this sense, it is important to highlight that the CF 88 establishes a series of responsibilities and competencies (exclusive and shared) for the three levels of the Brazilian federation (see Appendices I and II) that are relevant to the climate policy and the GHG mitigation actions by the different sectors of the economy. However, many of these competencies are not fully exercised, especially at the subnational levels, due to the lack of necessary administrative and financial capacities, as discussed in Chapter 4. This situation, coupled with the political and economic power of the federal government, seems to be an external push for the country's climate policy to adopt a top-down mode of operation, where the national government sets the rules and drives the agenda at the domestic level.

As discussed in Chapter 4, in addition to having a strong top-down profile, another aspect that has characterised the process of institutional consolidation of the Brazilian climate policy, and that still has a decisive role in the direction of climate governance in the country, is the foreign affairs related to climate change, in which the country, especially between the 1990s and 2000s, played a leading role. This made the MRE ('Itamaraty') play a central role in this initial consolidation process.

As the debate on the climate agenda at the domestic level advanced, and considering the maintenance of the influence that the foreign policy component still exerts in the conduction of the country's climate policy, a displacement of the political and institutional leadership of the agenda from the MCT to the MMA was observed; this change was institutionally consolidated in 2007 with the creation of the Secretariat of Climate Change and Environmental Quality in the scope of the MMA. At the time,

this change was in line with the profile of Brazilian emissions, where LULUCF emissions resulting from deforestation, especially in the Amazon biome, represented more than 70% of the country's total emissions. It was an agenda wherein the MMA, as the ministry responsible for the PNMA, had the institutional competencies to lead the issue and, therefore, make great contributions in the attempt to reduce the country's emissions and coordinate short-term efforts on the subject.

However, one of the effects of the Brazilian government's successful plan to combat deforestation, coordinated between 2005 and 2013 by the Casa Civil and from 2013 by the MMA, was the marked change in the profile of GHG emissions in the country in terms of the representativeness of the sectors. As of 2009/2010, that is, the period when the PNMC was launched and regulated, the profile of Brazilian emissions became more distributed among the following three major sectors: energy, agriculture and land use.

However, this new profile of emissions, where economic sectors gained greater importance in the matrix of these emissions, was not followed by a rearrangement of the leadership and coordination established for climate policy. Thus, as highlighted in Chapter 4, the PNMC law and its regulating decree of 2010 maintained the governance arrangement established in 2007, with the CIM and GEx, coordinated respectively by the Casa Civil and MMA, being the main parts of the gears of climate governance in the country. These collegiate bodies had the mission to coordinate different sectoral plans, whose elaboration oversaw different sectoral ministries with relevant economic importance and political power (such as the MAPA, the MME, the MT and the MDIC among others) which had distinct visions regarding the prioritisation of mitigation actions in the scope of their respective policies and programmes.

As the evidence found in my research indicated, this governance model presented several difficulties in enabling the full implementation of the PNMC (e.g. coordination and integration difficulties, a lack of political attention from central levels of government and a lack of monitoring) (see Chapter 5). It is not clear what their role was in the achievement of the PNMC targets for 2020. If the achievement of this goal were officially confirmed, it would have been strongly influenced by the country's low economic growth in the 2010s and the set of premises that were assumed for the realisation of the Brazilian commitment.

Another aspect to be highlighted is that the governance scheme centred around the CIM[51] was not used in discussions prior to the elaboration of the first Brazilian NDC, submitted in 2015 under the Paris Agreement. In fact, as the findings revealed, the CIM did not meet between the years 2014 and 2019. In turn, the GEx also showed low regularity of meetings. As identified, the discussions for the drafting of the first NDC were led by the MMA, which conducted a series of consultations with the national government, society and market actors during the process of preparing the document. However, no official records of these consultations were found on Brazilian government websites.

With the reform of the CIM, at the end of 2019, the collegiate met again in 2020, having deliberated on the submission of the new NDC submitted to the UNFCCC at the end of 2020. However, this new CIM, which now had the Council of Ministers as its highest body, received criticism regarding the review process of the Brazilian NDC due to the lack of clarity regarding the form of the NDC review process. Many interviewees highlighted that there was little dialogue with society, the market and other sectors outside of the federal government, including the subnational governments. The new Brazilian NDC was severely criticised by experts and environmentalists for presenting a new target, in absolute values of tons of CO_2, below what was initially informed in the 2015 NDC. It is also worth noting that in the reformatting of the CIM, the GEx was extinguished, and most of its functions were incorporated by the new executive secretariat of the CIM, which, like the GEx, was coordinated by the MMA. This rearrangement meant that, in practice, the MMA continued to coordinate the agenda despite the changes in the profile of Brazilian emissions throughout the 2010s, as already highlighted.

However, the functioning of this governance model also did not indicate that it was able to strengthen MLG and cooperation among the three levels of government in the country. On the contrary, the subnational climate legislation initiatives observed over the last years presented a low degree of integration with the national initiative; for the most part, they presented few practical results in terms of mitigation and adaptation so far, and to a certain extent, they were disconnected from what was happening at a national level, as several interviewees highlighted in their interventions.

[51] For the governance of the PNMC, see figure 9 of this dissertation.

6.3 Answering the research questions

Q1: How are climate policy arrangements organised and coordinated among governmental actors to mitigate GHG emissions in Brazil? What might be the reasons behind how such arrangements are established?

Governmental arrangements for the promotion of GHG mitigation in Brazil are mainly organised under the PNMC established by Law n. 12,187 of December 2009 (Brazil, 2009b). This law establishes the governance of the national climate policy; the policy's principles, guidelines and targets; and the actors involved in the governance and implementation of the policy. Although it is considered a law of national scope (that is, it should not be limited to federal government actors), this analysis allowed me to conclude that the PNMC is a climate policy that is fundamentally sustained by the actions of government actors of the federal executive branch (central government), thus assuming features closer to those of a federal policy than of a national one.

Thus, despite foreseeing the articulation with other government levels at a principal level, the most pronounced aspect of the PNMC law was the provision of a multisectoral approach that, from an actor's perspective, was confined to the different ministries that make up the administrative structure of the Brazilian federal government (central government). Thus, the first conclusion of my analysis was that the PNMC, the main general mitigation arrangement in the country, presented a more multisectoral than a multilevel perspective for its governance and implementation even though the institutional and federative competencies for the promotion of mitigation in some sectors, such as urban mobility and transportation, have been strongly decentralised to the subnational governments (states and municipalities), resembling a type II governance model, as conceptualised by Hooghe and Marks (2003).

In turn, the coordination and implementation of the PNMC were planned to occur fundamentally through collegiate bodies CIM (coordinated by the Casa Civil) and GEx (whose coordination, until its extinction in 2019, was done by the MMA). Despite this multisectoral coordination arrangement, and the participation of the centre of government (Casa Civil), the evidence suggested that it functioned precariously, with little practical effect on the effective coordination of the different ministerial actors involved. In practice, this coordination was (and still is) carried out by the MMA, which had its institutional structure strengthened in this area as of 2007/2008 with the

creation of the SMCQ. In turn, the Casa Civil had little active participation in most of the cycle of the PNMC, except for during the discussion period of the PNMC's law project, which also included the elaboration of the Climate Plan (prior to 2009), and in the years immediately after the law was issued. For the reasons described in the previous section, this low level of effective involvement of the centre of government, along with the strong role of the MMA in the agenda, brought about consequences in the coordination mode of the PNMC, which adopted a negative type of coordination model, with reduced attention given to sectorial transformations. This had repercussions on the perception of integration of the different actions necessary to the success of the PNMC.

The implementation of the PNMC and the tracking, monitoring, integration and harmonisation of the policy were planned to happen in an integrated and coordinated way through the Climate Plan (broad and multisectoral character) and the sectoral plans that were supposed to comprise it. However, the lack of effective coordination by the climate collegiates CIM and GEx associated with the different levels of attention, both political and technical, that each one of the agents (ministries) involved in the PNMC gave to the climate agenda made the sectoral plans assume quite different trajectories in terms of quality and results, ranging from successful initiatives that were framed with the sectoral plans (such as the PPCDAm and PPCERRADO) to initiatives derived from the PNMC (such as the ABC Plan and PSTM), as I addressed earlier in this work. These differences identified in the sectoral plans could be attributed to the differing perceptions that each actor (ministry) had regarding the climate agenda and its benefits for their respective sectoral agendas, as well as contextual issues in the sector itself (exogenous), which were presented here in order to address the second research question.

Question 2: What are the predominant governance gaps of the different GHG mitigation actions examined? Why do these governance gaps occur?

The predominant gaps in the promotion of GHG mitigation arrangements were of a political nature (gap 1) and concerned institutions and processes (gap 2). On a smaller scale, there were gaps related to resources (gap 3) and information (gap 4). However, for these last two gaps (3 and 4), the case analysis allowed me to find evidence of some improvements that, although limited, made it possible to conclude that there have been

important advances in data production (e.g. inventories and technical studies) and, to a lesser extent, in the allocation of technical resources (dedicated teams) and financial resources (funds and budgets) for the actions studied, even though it is necessary to point out the limitation of these resources in terms of scale, volume (financial) and distribution (capacities of the ministries in the area).

The gaps occurred due to common or general factors in all mitigation arrangements studied, especially gaps 1, 2 and 3 (politics, institutions and processes, and resources, respectively) as well as specific factors, which were directly related to the sector under study (agriculture and transport). In this sense, the occurrence of the gaps could not be explained by a singular issue but by a set of factors (general and specific) that combined to generate the gaps in greater or lesser magnitudes.

Regarding gap 1 (politics), the evidence indicated that it was present in all three cases and was mainly due to the different levels of political will and attention found regarding the climate agenda in the cases studied. It was noted that most of the time, the political attention given to the theme tended to arise due to punctual and temporary aspects, such as the visibility that the theme of climate change tended to gain on the eve of a COP of the UNFCCC, where pressures from the media and organised civil society seemed to work as a springboard for governments and their top leadership to use the event as an opportunity to launch plans and policies and reinforce old commitments related to GHG mitigation in their respective domestic spheres, both at the national and subnational levels. It was possible to affirm that the lack of greater political will towards climate action was due to aspects that stemmed from the lack of perception at the political level regarding the co-benefits that the climate agenda offers from the macro level (e.g. potential economic, social and environmental gains for the economy as a whole) to the sectoral level. I also identified that the presence of path dependencies tended to affect the gain of political traction on the issue, something that has been noted in the Brazilian transport sector in particular, which has had a historical formation process strongly associated with road modalities since the 1950s.

In turn, the second gap also considered prominent, was the gap in institutions and processes (gap 2), which was related to the following four fundamental aspects of the quality of climate governance that tend to explain its challenges: i) functioning and effectiveness of the collegiate bodies of the governance of the policy/plan, ii) planning

and monitoring instruments, iii) GHG reduction targets and iv) federal dialogues (national–subnational articulation). Based on the findings, I could conclude that the elimination or reduction of this gap seemed to be directly associated with the level of maturity/institutional development of the sector analysed. Conditions prior to the establishment of the ABC Plan (such as the existence of an already consolidated research agency, the EMBRAPA and the use of low carbon technologies for the sector) tended to explain gap 2 in the agricultural case, in which the gap was considered less intense than in the other cases.

Moreover, the lack of regular and effective functioning of the collegiate bodies was a common trend in the cases studied, and, at the end of the day, they failed to deliver what was expected of them in terms of governance, especially with regard to coordination, integration and monitoring. The cases of the CIM and GEx (overall governance of the PNMC) and the CENABC, coordinated by the MAPA and the MDA, were limited to the agricultural sector. This led to situations where decisions that should be taken in a collegiate environment were taken, at the end of the day, by the ministries that held the de facto leadership, that is, the MMA in the case of the PNMC and the MAPA in the case of the ABC Plan. In turn, the PSTM did not form a collegiate to execute its governance even though the MCid had established a working group to elaborate the urban mobility part of the plan.

From the analysis, it was possible to conclude that one of the possible causes of this low effectiveness of the collegiate bodies stemmed from their organisational format. Despite involving many ministries, in the case of the CIM and GEx, it could be seen that the collegiates did not become spaces for the resolution of conflicts in the construction and implementation of a policy that tended to expose distinct, and even conflicting, visions among themes where more than one ministry was involved (e.g. land use, energy consumption and carbon pricing). Thus, it was noted that these spaces became mere arrangements for ministerial meetings at a technical–bureaucratic level, which were usually more informative and indicative than deliberative, leading to a situation where the negative coordination mode was predominant, and that offered little in terms of the structural modifications that a climate policy tends to demand. Added to this was the absence of coordination instruments available to these collegiate bodies (e.g. inter-ministerial resolutions that were binding for the entire federal public

administration), which also tended to indicate flaws in the design of the bodies responsible for climate governance in the country.

The low effectiveness of the collegiate bodies could also be pointed out as being one of the possible causes for another bottleneck observed that was common to all three cases, that is, the lack of monitoring and updating of the plans and actions initially presented. For example, the Climate Plan, the main instrument for planning and monitoring the PNMC, was never updated after the launch of its first version, and one of the main bottlenecks was the lack of deliberation by the CIM on the updating proposal that had been prepared by the GEx.

In turn, the establishment of GHG reduction targets is also an aspect to be highlighted from the analysis of gap 2 because, in addition to one of the plans (PSTM) not having presented targets despite having the legal provision to do so, in the other two cases analysed, it was also found that the targets presented inconsistencies, especially from the point of view of the premises under which they originated (as in the case of the PNMC) and from the point of view of the sectorial emissions reduction ambition (the ABC Plan's case).

Finally, regarding 2, another aspect highlighted was related to possible federal articulation initiatives (national–subnational) for the implementation of the respective policy plans. As the evidence found suggested, this articulation was very low throughout most of the cases' lifetimes, a fact that contributed to the manifestation and intensity of gap 2. Although in all three cases there was an initial provision, both in the PNMC law and in the text of the plans, the evidence showed that the articulation between the different levels of government was very low for effective implementation of actions from a multilevel perspective. This low level of articulation between the three levels could be attributed to the inadequate distribution of the capacities for dealing with the climate issue among the different levels of government that make up the political–administrative organisation in Brazil. It is also necessary to mention the difficulties faced in Brazilian federalism of political, institutional, and financial natures that tend to influence any public policy that demands a strong articulation between different levels of government, as I already highlighted in Chapter 4.

6.4 Theoretical considerations

Despite the singularities of the cases and contexts studied, the findings of this research indicated that the problems and challenges of Brazilian climate governance are consistent with the findings already discussed within the theory and literature on MLCG in other countries. According to my literature review, contained in Section 2.2, climate change is a cross-cutting issue whose context is not limited to the involvement and actions of only one level of government/sector; it involves different levels of political and bureaucratic power. The Brazilian case reflects well this perspective, especially considering the accentuated fall in deforestation emissions verified in the mid-2000s, the recent economy-wide mitigation commitments for 2025 and 2030 and the intention to reach net-zero emissions by 2050, all of which were assumed by the country within the scope of the Paris Agreement.

Moreover, mitigation actions can be encouraged or blocked by the different actors involved as well as by the context in which they are embedded (Bernstein & Hoffmann, 2018; Gupta, 2007; Naess et al., 2015; Schmitz, 2016). As the Brazilian case demonstrates, these blockages are not always explicit and may stem from situations in which there are strong path dependencies, as is the case with the transport sector of Brazil and its strong orientation towards the road modal. As for agricultural practices, extensive cattle raising is another example to be considered regarding the advancement of GHG mitigation practices in the country. Moreover, this study also managed to capture the importance of some political and bureaucratic actors that, at the end of the day, have managed to push the different mitigation actions studied here.

Regarding agenda setting, the literature has already extensively discussed the way governance and policy planning occurs in practice (top-down vs bottom-up) (Gordon, 2015; Gupta, 2007; Jordan et al., 2018; Schreus, 2017), whether in federalist or unitarist regimes, is essential to explaining the conformation of climate policy, its outcomes and the way different government actors perceive it. With a (still) strong component in soil and land use change, especially in the fight against deforestation, the Brazilian climate policy tends to mirror this aspect. If, on the one hand, the actions related to LULUCF (where the actions and attentions of the national governance actor historically stand out) tend to be an issue still relevant to the balance of Brazilian emissions, then, on the other hand, mitigation actions in economic sectors (energy

consumers), where institutional competencies tend to be more distributed to subnational actors, have presented challenges, many of which are related to the low involvement of subnational entities in the national policy. This has had repercussions on different fronts, leading to governance gaps, such as a lack of political will and allocation of financial and technical resources for relevant GHG mitigation actions, integration failures, and indecision as to how mitigation commitments should be met considering the socioeconomic situations present in the different Brazilian states.

Moreover, the environmental bias of a climate policy is another aspect already highlighted in a theory (Gupta, 2007) and verified for the Brazilian case that also offers important challenges regarding climate governance since the actors responsible for the different mitigation actions foreseen in the PNMC and its sectoral plans go beyond the sphere of action of the environment ministry in the country. As stated in the international literature, analysis of the Brazilian context tends to indicate the importance of a better division of labour among the different ministerial and governmental actors involved with mitigation actions, which requires the development of institutional capacities and a clear allocation of responsibilities in order to avoid overlaps and gaps in terms of competencies.

However, one aspect to be observed is that even if one considers the development/levelling of the capacities of the different actors involved in climate policy, the rearrangement of competencies as well as the need to execute shared works and the reform/updating of public policies in order to align them to a climate perspective tend to be fertile ground for the occurrence of oppositions to the proposed changes and for disputes regarding the maintenance of already defined bureaucratic spaces and lack of willingness to cooperate among the parties (Charbitt, 2011; Hustedt & Seyfried, 2016). These are striking features of Brazilian climate policy, which involves key actors of the PNMC (the MMA and MCTI) in addition to the ministries responsible for the coordination of sectoral plans. Based on this study, it is clear that a coordination movement from the centre of government is something that, when in effective operation, tends to mitigate these problems. In addition, the formation of formal and informal arrangements within the bureaucracy that are favourable or oriented towards climate action are also factors that can mitigate the problem.

The harmonisation between the domestic and international levels of governance and the consequent coherence of the actions adopted by a country in these two arenas is another central aspect of the theory of MLCG in which the Brazilian case confirms the findings of the literature in addition to providing relevant contributions. At the current stage of the global effort to tackle the climate crisis, when the Paris Agreement starts its implementation period, the success of this global effort will largely depend on how countries have addressed their NDCs domestically (Jordan et al., 2018).

The Brazilian case is especially important in this context. On the one hand, the country has had a historical leadership in international climate negotiations, involving not only the issue of LULUCF emissions but also the process of the formation of the entire international climate governance (including the conduction of Rio 92, which originated the UNFCCC, the discussions that originated the Kyoto Protocol and, more recently, the negotiations that originated the Paris Agreement). On the other hand, the difficulties of climate governance at the domestic level in Brazil, especially in mainstreaming the climate perspective in sectors and public policies beyond those traditionally linked to the environmental competences of national and subnational governments, indicate the challenges of multisectoral and multilevel integration; not addressing these could jeopardise the country's commitments abroad. This need for the buy-in of the different sectors that make up the mix of climate policy at the domestic level is not limited to Brazil but extends to most other countries; the need to integrate the backyard (domestic policy) and the front yard (foreign policy) of a country's climate policy tends to be a central aspect for its success.

This link between the international and domestic perspectives of a climate policy necessarily goes through the national government. If this actor is the one that represents the country in international negotiations on the issue and assumes the commitments that, in theory, will influence the formulation of the domestic public policy, national governments are the main players within the political–administrative organisation of the country that are expected to promote an integrated and coherent climate policy that can create a dialogue on the different regional realities within the territory. Moreover, they are responsible for some essential bureaucratic tasks in the scope of governance and climate policy planning, such as acting as guarantors of international loans taken by subnational entities.

Brazil's case tends to reflect the difficulty that national governments have in making the link between these two perspectives, especially when considering the difficulties countries have had in taking climate policy to the 'tip', that is, involving subnational actors. If, on the one hand, the subnational actors are essential actors within the governance of Brazil, especially due to the different conditions of mitigation of and vulnerability to climate change that each region, state and municipality has, then, on the other hand, there is a list of constitutional and institutional attributions that are eminently up to the country's central government. Thus, even though recent years have seen a movement towards the organisation of the subnational entities for climate action in the country (even just to make a political counterpoint to the management of President Bolsonaro in relation to the subject, especially in the first years of his administration), the fact is that good functioning of Brazilian climate governance goes beyond the aspirational component and deals with actions that effectively promote the necessary changes for a low carbon economy in the country. It demands the effective participation of all governmental levels in the scope of this governance, an aspect that has proven to be complex and difficult to solve since the beginning of the PNMC.

Another theoretically relevant aspect discussed in my research concerns the coordination of a multilevel climate policy, which is a critical aspect for the promotion of policy integration and coherence. The coordination of the climate policy tends to face challenges on the following three main fronts: political, organisational and technical–legal (Jennings & Krane, 1994). The difficulties faced by Brazil tend to reinforce all the above aspects related to political difficulties (explained by the high political gap found in the cases) and the aspects related to organisational factors, where the precarious functioning of the climate collegiate bodies, the occurrence of bureaucratic disputes and the difficulty of giving greater organicity to the climate policy (involving different ministries and levels of government) are important indications of this aspect that has made the coordination of the policy difficult in the country.

Furthermore, the difficulties in building effective climate federalism in the scope of the PNMC tend to translate into the political and technical–legal bottlenecks faced by the policies and their sectoral plans. On the one hand, party political issues, which often place national and subnational executives in antagonistic camps, end up spilling over into public policies, including climate policies, which undermines coordination

and cooperation initiatives among these actors. However, the distribution of institutional competencies among the different government levels, an essential aspect of federalism, may – in the absence of good coordination among the levels – become a complicating factor for the construction of public policies that are oriented towards GHG mitigation and consistent with the country's global commitments. The case of governmental actions related to urban mobility in the country seems to reflect this understanding. For instance, in the same period in which the enactment of a national urban mobility policy that presented principles aligned with sustainability was observed, a high increase in the motorisation rate in Brazilian cities and governmental actions that ended up stimulating the adoption of private transport to the detriment of public transport were also observed. These were caused by actions/omissions from different levels (e.g. temporary reduction of the tax on industrial production for automobiles – federal government; and the vertiginous increase in the use of transportation by apps – municipal governments).

As discussed in Chapter 2, the construction of a well-coordinated policy brings positive impacts to the governance environment of this policy and allows the government actors involved to use the different mechanisms and coordination instruments available to be implemented by them. The Brazilian case is relevant to this debate, especially because (in the scope of the PNMC) the existence of different types of mechanisms, each presenting successes and failures, was noted in this work.

The HTM instruments were the first to employed in the scope of climate policy, where the creation of the CIM/GEx and the establishment of the Climate Plan as the main part of the PNMC planning are examples of structural and policy management instrument creation, respectively. In turn, the use of a market approach was also perceived in the execution of the PNMC, where the Amazon Fund, with its results-based financing process, is a good example. The ABC Programme and the Climate Fund, parts of which were developed under the climate policy, are also examples of this type of coordination mechanism even though they have suffered financial restrictions (in terms of funding capacity and sources) due to the nature of their design (as addressed in Section 5.3). Finally, network-related mechanisms have also played a role in the governance of the PNMC, where the establishment of the Climate Network (especially for the construction of UNFFC transparency documents, such as national inventories) is an example. Informal networks of civil servants have also played a role

in some of the PNMC's decision-making moments, such as the so-called Petit Committee of the CIM, which was composed of the Casa Civil, MF, MMA, MCTI and MRE. If, on the one hand, this committee may have provided agility in some bureaucratic decisions, then, on the other hand, one should also consider its restricted character within an arena that is naturally broad. This demands the involvement of other ministerial actors to contemplate different points of view and provide greater legitimacy to the policy, including within the bureaucracy.

Thus, based on the findings from the use of my analytical framework in the different cases, the establishment of coordination instruments in the scope of a climate policy tends to be a necessary, but not sufficient, condition for the success of coordination and, consequently, of governance. Beyond the creation, combination and employment of different management and structural instruments throughout the history of the GHG mitigation actions assessed, the evidence indicates that the sources required (e.g. power, information and authority) for coordination instruments to be effective need to be present and guaranteed throughout the cycle; otherwise, the instruments may not be effective or may lose their effectiveness over time, as the problems encountered in the Brazilian climate policy case study suggest.

6.5 Methodological considerations

This exploratory work joins the existing qualitative research aimed at studying climate governance arrangements at the domestic level for the promotion of GHG mitigation policies, plans and programmes, a field of study still limited to the Global North. However, with the growing relevance of emissions from the Global South (Fuhr, 2021), in addition to the importance of joint action of developed and developing countries in addressing the climate crisis, and in light of the provisions of the Paris Agreement, developing new methodological approaches and adapting existing ones for the analysis of climate governance schemes in developing countries has become a relevant scientific contribution to the community that is dedicated to investigating the topic.

My approach to analysing climate governance by studying and verifying the gaps in four relevant categories (politics, institutions and processes, resources and information) within the framework of a climate policy`s cycle has contributed to this academic line. Since this was a case study, a central aspect of this approach was the

choice of relevant units of analysis of the context to be studied. For the definition of relevance, it is important to consider the participation of the analysed sector in terms of its contribution to the total GHG emissions for the chosen country. In this sense, it is valid to consider not only the historical emissions of the sector to be studied but also the expectations regarding the future performance of these emissions. The emissions profile of a country is not static and may undergo significant changes in its composition, which may, at the end of the day, lead to the need for adjustments to the existing governance models.

In addition to the relevance of this study in terms of emissions, another aspect that should help in defining the choice of the case/sector refers to the abundance/scarcity of works in relation to it. In this sense, the researcher must be attentive and seek to build contributions in those cases where, in addition to being relevant, the literature and governance studies are scarce for the country under analysis. In the case of Brazil, a country that has suffered a change in terms of the participation of the different sectors in the profile of its GHG emissions in a short period, these considerations led me to choose the agriculture and transport sectors as the study cases.

Regarding the design of this research, one aspect that I considered important for the gap analysis was to cover the entire policy lifetime. Considering that gaps can evolve (increase or decrease) over time after the implementation of a policy or programme, which was evident in some cases of this research, the consideration of the whole cycle tends to make the results of the analysis more robust. For example, one concrete aspect I noted was that many governments react to external pressures (from environmentalists, media or other countries) to adopt initiatives favourable to GHG mitigation. This pressure tends to open windows of opportunity, which bureaucrats acting as policy entrepreneurs (Cohen & Aviram, 2021; Mintrom, 2019) can take advantage of to propose solutions, as was the case of the agricultural sector in this study. Once the mobilisation phase is over (which tends to occur in the policy/programme design), there may be a demobilisation or reduction of attention given to the subject, especially in the political segment, throughout the other phases of the cycle.

Moreover, the national policy was selected for study because it is the main political regulatory framework in the attempt to build a national climate action. The

combination of the national case with the sectoral cases was another important methodological aspect to be considered in the study, especially since it allowed me to evaluate how the relations and interactions of different types of public policies/sectoral actions tend to work. Their integration and harmonisation tend to be essential aspects of a transversal policy such as the climate policy in the Brazilian case; this tends to be observed in most of the main global emitters of GHG.

In relation to the collection of data and evidence, in addition to a review of the existing literature (which, for the Brazilian case, is still lacking), the analysis of official documents (such as legislation and speeches from authorities) and the notes from committee meetings should also be considered by the researcher. It is worth noting, however, that the researcher may face difficulties in collecting information from climate bodies in some cases since not all of them have the practice of making their meetings transparent through minutes or keeping them on the websites of the responsible bodies, as noted in my research for the CIM.

The collection of primary data from interviews with relevant actors in the context of climate/sectoral policies (e.g. civil servants, politicians, experts and environmentalists) is one of the main strategies for conducting exploratory research, such as the research I conducted. For the selection of interviewees, in addition to the knowledge that the researcher will need regarding the context to be investigated, one should also employ random selection techniques, such as snowballing.

In turn, the definition of the type of interview is relevant to this process. Since this research adopted an exploratory approach, I understood that the best strategy was to opt for semi-structured interviews, which would enable me to extract from the interviewees as much qualitative information and as many experiences and perceptions as possible for the case under analysis. For certain interviews, in addition to paying attention to the protection of the interviewee's identity, it is important to put them at ease during the interview. With recorded interviews, some interviewees may choose to conduct part of their interview off the record. This tends to happen mainly with interviewees connected to the government and is an aspect that the researcher should be aware of to extract as much relevant information from their source as possible. However, this does not limit the use of other approaches for data collection, such as

surveys and closed questionnaires, especially in studies that complement exploratory studies previously conducted.

6.6 Implications for policymakers

The study has provided useful lessons for those directly involved in Brazilian climate policy at the federal, state and municipal levels in addition to serving as an important source for policymakers from other countries, considering the particularities that each country has regarding the subject. It offers a broad analysis based on four major perspectives (politics, institutions and processes, resources and information) that occupy the daily routines of most of the bureaucracies involved with the theme in Brazil.

Via the discussion and explanations presented in this study for the different bottlenecks and problems arising from these four aspects, policymakers can obtain important information and insights into the challenges common to the cases studied, as well as the peculiarities of each one. In addition to registering the difficulties encountered in the past, this text may offer insight for future improvements of the climate governance model in the country, which has become indispensable not only for facing the challenges that the implementation of the NDCs will impose on the country but also for giving a new status to climate policy, whose core structure clearly resides in the discussion of economic development, especially when considering the structural economic transformations that will be necessary for the goal of decarbonisation of the national economy by the middle of this century.

Moreover, the study sheds light on exogenous aspects of climate policymaking related to the political–administrative organisation of the country that tends to influence how the different arrangements formed for GHG mitigation develop in the real world. This is the case of Brazilian federalism, where the different economic realities of Brazilian regions and states are reflected in their capacities and willingness to deal with the climate issue. Focusing on this structural factor tends to be central to building a model of MLCG that also promotes a just transition.

An understanding of the successes and failures of GHG mitigation arrangements also cannot do without an understanding of the way governments are formed in the country, where the prevailing logic is the presidentialism of a coalition (Presidencialismo de Coalisão) which, most of the time, take countries to forming governments with several

political parties (often antagonistic when addressing the climate issue) to consolidate their majorities in parliament. Thus, a lesson that can be drawn from this work is that the exogenous aspects also make up the rules of the game, which demand from policymakers innovation, high articulation power, systemic vision and resilience in the management of the climate policy in the country.

The perspective of seeking to understand how the MLCG is consolidated is another aspect of this work that could be useful to policymakers and decision-makers in future improvements of climate governance at the national level. This is particularly relevant when considering the recent changes in the country's emission profile, with relative growth of the agricultural and energy sectors, by which the transport sector will undoubtedly require a greater capacity for articulation and integration among the actions of the different levels of government. Given the nature of climate policy, this is an important message not only for Brazilian decision-makers but also for other countries that face problems in the governance of their respective climate policies.

Another relevant aspect related to the multilevel perspective refers to the importance of climate policy being recognised by political authorities and decision-makers as an economic development policy whose ramifications go beyond the environmental sector. In fact, thinking about climate policy is thinking about a new form of economic development. A first consequence of the adoption of this perspective tends to be the reorganisation of the management of climate policy where, in addition to the implementation of inter-ministerial collegiate bodies, the leadership of the policy is exercised politically and technically within the scope of the actors responsible for the coordination of the government (centre of government – Casa Civil) and the economic policy (Ministry of Economy). If effective in practice, this change could provide greater capacity for coordination, integration and enforcement, as well as for addressing certain expected gaps (e.g. those in financial and technical resources). It could also lead to greater political prioritisation of the agenda at the highest levels of government, with probable impacts on parliament as well. In addition, this institutional locus change of climate policy may contribute to greater harmonisation between the domestic and international agendas in the scope of climate governance, which is relevant given the indispensability of the two perspectives (domestic and international) for the success of the arrangements of mitigation and global confrontation of the climate crisis. Finally, this new approach is also a way to try to break the certain elitism

that still permeates the treatment of the climate issue in Brazil at the governmental level, which is still, as the evidence suggests, a theme of a few ministries and a reason for the occurrence of turf wars.

Finally, it is important to highlight that the results of this study come at an appropriate time for its use by decision-makers and other government practitioners since the handling of the climate issue and the performance of climate policy management itself have been the subject of intense internal and external debate. In addition to the implementation of the NDCs and the paving of the way for net-zero emissions by the middle of this century, the results of the country's climate policy management (including the fight against illegal deforestation) are starting to be scrutinised in terms of several strategic issues for the country, such as access to the Organisation for Economic Co-operation and Development and the EU–Mercosur trade agreement, as well as in terms of the attraction of investments (national and international) given the growing demand of investors for ESG investments and the movement of MDBs to align their portfolios with the Paris Agreement. Moreover, as in other countries, such as the US and Germany, the climate debate tends to gain strong relevance in upcoming elections, including the presidential elections in Brazil that will take place at the end of 2022.

6.7 Limitations of the study

This study advanced a subject little explored in the literature, which is the search for a better understanding of how Brazilian climate governance has been working from the perspective of how different governmental institutions interact (the climate governance by government lens), under which basis the coordination of different policies and relevant programmes for mitigation occurs. This study also dedicated itself to investigating the relations between the different levels of government in dealing with the climate issue. By adopting an exploratory approach, this research covered part of this gap. The closing of this gap is, however, partial, especially when considering the relations between climate policy and the relevant sectoral policies since this research was limited to the agricultural and transport sectors. In this sense, it is important to consider that the extrapolation of the research results to other economic sectors should be done with reservation, even though some conditions

(exogenous and from the PNMC itself) tend to affect all relevant sectors of the Brazilian economy regarding GHG mitigation.

The comparison between the intensity of the gaps in the three cases studied and the respective average growth rates of emissions related to the aggregates that the evaluated policies covered (i.e. national, agriculture and transportation) suggested the possible existence of a relationship between the intensity of the gaps and the growth rate of the emissions. As this was an exploratory study, I did not intend to establish this kind of causality but rather to open the way for future works to investigate this possible correlation through research designs that could possibly use new approaches, such as a combination of qualitative and quantitative methods.

Finally, concerning suggestions for possible studies on the theme in order to further scrutinise Brazilian climate governance, I envision three possible paths, as follows: i) the application of the approach adopted in this research to other sectoral plans that integrate the PNMC and the PNA as well as in the relationship between governmental and nongovernmental actors (the latter of which an important part in the provision of legitimisation, transparency and improvement of governmental actions to be adopted), ii) advancement in the field of mixed method research aiming at the development of a robust model to evaluate climate governance that integrates exogenous and endogenous factors for policies and plans relevant to GHG mitigation and iii) advancement in the research on the elements of climate governance that need to be present for the country to decarbonise its economy throughout the present century. This last item is very relevant, transcends the four analytical groups addressed within this research and seems to demand an in-depth discussion of the structural and behavioural issues that govern the Brazilian economy and society, which involve, for example, the adoption of sustainable consumption patterns and an environmental and climate education strategy for future generations.

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Appendices

Appendix I – The environment in the Brazilian 1988 Federal Constitution (main passages)

Title II. Fundamental Rights and Guarantees - Chapter I: Individual and collective rights and duties
Art 5 Everyone is equal before the law, with no distinction whatsoever, guaranteeing to Brazilians and foreigners residing in the Country the inviolability of the rights to life, liberty, equality, security and property, on the following terms:
…
LXXIII - any citizen has standing to bring a popular action to annul an act injurious to the public patrimony or to the patrimony of an entity in which the State participates, to administrative morality, to the environment and to historic and cultural patrimony; except in a case of proven bad faith, the plaintiff is exempt from court costs and from the burden of paying the prevailing party's attorneys' fees and costs;
Title VII: Economic and Financial Order - Chapter I: General Principles of Economic Activity
Art 170 The economic order, founded on the appreciation of the value of human labour and free enterprise, is intended to assure everyone a dignified existence, according to the dictates of social justice, observing the following principles:
…
VI. environmental protection, including through differentiated treatment in accordance with the environmental impact of the products and services and the processes by which they are elaborated and rendered;
Art 174 As the normative and regulatory agent of economic activity, the State, as provided by law, shall perform the functions of supervision, incentive-promotion and planning, the latter being binding for the public sector and advisory for the private sector.

...
§3°. The State shall favor organization of cooperatives for prospecting and placer-mining activity, taking into account protection of the environment and the socio-economic promotion of the prospectors and miners.
Title VII: Economic and Financial Order - Chapter III: Agricultural Land Policy and Agrarian Reform
Art 186 The social function is met when rural property simultaneously complies with the following requirements, in accordance with the criteria and standards prescribed by law:
I. rational and adequate use;
II. adequate use of available natural resources and preservation of the environment;
III. observance of provisions regulating labor relations;
IV. exploitation that favors the well-being of owners and workers.
Title VIII: The Social Order - Chapter VI: The Environment
Art. 225 Everyone has the right to an ecologically balanced environment, which is a public good for the people's use and is essential for a healthy life. The Government and the community have a duty to defend and to preserve the environment for present and future generations.
§1°. To assure the effectiveness of this right, it is the responsibility of the Government to:
I. preserve and restore essential ecological processes and provide for ecological management of species and ecosystems;
II. preserve the diversity and integrity of the Country's genetic patrimony and to supervise entities dedicated to research and manipulation of genetic material;
III. define, in all units of the Federation, territorial spaces and their components that are to be specially protected, with any change or suppression permitted only through law, prohibiting any use that compromises the integrity of the characteristics that justify their protection;

IV. require, as provided by law, a prior environmental impact study, which shall be made public, for installation of works or activities that may cause significant degradation of the environment;
V. control production, commercialization and employment of techniques, methods and substances that carry a risk to life, the quality of life and the environment;
VI. promote environmental education at all levels of teaching and public awareness of the need to preserve the environment;
VII. protect the fauna and the flora, prohibiting, as provided by law, all practices that jeopardize their ecological functions, cause extinction of species or subject animals to cruelty.
§2°. Those who exploit mineral resources are obligated to restore any environmental degradation, in accordance with technical solutions required by the proper governmental agencies, as provided by law.
§3°. Conduct and activities considered harmful to the environment shall subject the violators, be they individuals or legal entities, to criminal and administrative sanctions, irrespective of the obligation to repair the damages caused.
§4°. The Brazilian Amazonian Forest, the Atlantic Forest, the Serra do Mar, the Pantanal of Mato Grosso, and the Coastal Zone are part of the national patrimony, and they shall be utilized, as provided by law, under conditions assuring preservation of the environment, including use of natural resources.
§5°. Lands necessary to protect natural ecosystems, which are vacant or which have reverted to the States through discriminatory actions, are inalienable.
§6°. Power plants with nuclear reactors shall be located as defined in federal law and may not be installed otherwise.
§7°. For purposes of the provision in the final part of subparagraph VII of § 1º of this article, sporting practices that utilize animals shall not be considered cruel as long as they are cultural manifestations, in conformity with §1° of art. 215 of this Federal Constitution, registered as a good of immaterial nature that is part of Brazilian cultural patrimony, which should be regulated by a specific law that assures the well-being of the involved animals.

Source: Constitute (n.d.)

Appendix II – Federative constitutional competences in regard to the environment (selected fragments)

Art 21 The Union shall have the power to
I. maintain relations with foreign States and participate in international organizations;
IX. prepare and execute national and regional plans for ordering the territory and for economic and social development;
XII. operate, either directly or through authorization, concession or permit:
b. services and installations of electric energy and utilization of hydroelectric power, in cooperation with the States in which the potential hydroelectric sites are located;
c. air and aerospace navigation and airport infrastructure;
d. railway and waterway transportation services among Brazilian ports and national frontiers, or that cross State or Territorial boundaries;
e. passenger services for interstate and international highway transportation;
f. sea, river and lake ports;
XV. organize and maintain official national statistical, geographical, geological and mapping services;
XVIII. plan and promote permanent defenses against public disasters, especially droughts and floods;
XIX. establish a national system for management of water resources and define criteria for granting rights for their use;
XX. establish directives for urban development, including housing, basic sanitation and urban transportation;
XXIII. operate nuclear services and installations of any nature and exercise governmental monopolies over research, mining, enrichment, reprocessing,

industrialization, and commerce in nuclear ores and their by-products, in accordance with the following principles and conditions:
XXV. establish the areas and conditions for conduct of prospecting and placer mining in the form of associations.
Art 22 The Union has exclusive power to legislate with respect to:
I. civil, commercial, penal, procedural, electoral, agrarian, maritime, aeronautical, space and labor law;
IV. waters, energy, informatics, telecommunications and radio broadcasting;
IX. directives of national transportation policy;
XI. transit and transportation;
XII.mineral deposits, mines, mineral resources and metallurgy;
XIV. indigenous populations;
XVIII. national systems of statistics, mapping and geology;
XXVI. nuclear activities of any nature;
Art 23 The Union, States, Federal District and Counties, shall have joint powers to:
III. protect documents, works, and other assets of historic, artistic, and cultural value, monuments, remarkable natural landscapes and archeological sites;
VI. protect the environment and combat pollution in any of its forms;
VII. preserve the forests, fauna and flora;
VIII. promote agricultural and livestock production and organize the food supply;
IX. promote programs for construction of housing and improvement of conditions of living and basic sanitation;
XI. register, monitor and supervise concessions of rights to research and exploit water and mineral resources within their territories;
Sole Paragraph. Complementary laws shall establish rules for cooperation among the Union, States, Federal District and Counties, aimed at balanced development and well-being on a nation-wide basis.

Art 24 The Union, States and Federal District shall have concurrent power to legislate on:
V. production and consumption;
VI. forests, hunting, fishing, fauna, preservation of nature, defense of the soil and natural resources, protection of the environment and pollution control;
VII. protection of the historic, cultural, artistic, touristic, and scenic patrimony;
VIII. liability for damages to the environment, consumers, property and rights of artistic, aesthetic, historic, tourist, and scenic value;
Art 30 The Municipalities have the power to:
I. legislate on subjects of local interest;
II. supplement federal and state legislation where applicable;
V. organize and perform essential public services of local interest, including collective transportation, either directly or by concession or permit;
VIII. promote, where applicable, adequate territorial ordering through planning and control of use, subdivision and occupation of urban land;

Source: Constitute (n.d.)