

Knowledge for change, or more of the same?

The roles of policy knowledge systems in the Nationally Determined Contributions of South Africa, Ghana, and Kenya

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Declaration

I, Michael Joseph Boulle (Student number: BLLMIC009), declare that the above thesis is my own unaided work, both in concept and execution, and that apart from the normal guidance from my supervisor, I have received no assistance.

I have used the American Psychology Association (APA) 7th edition referencing style to reference the work of other authors.

Neither the substance nor any part of the above thesis has been in the past, or is being, or is to be submitted for a degree at the University of Cape Town, or any other university.

Signed by candidate

28 August 2023

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“An endeavour achieved without delay, wrong turnings, occasional blank walls and a vein of self-doubt running through all, leading eventually to some degree of heartbreak, is a thing of the moment, a bagatelle, and often neither use nor ornament. It will be scanned for a moment and put aside. What is worthwhile carries the struggle of the maker written within it, but wrought into the shape of an earned understanding.”

--David Whyte, Consolations – The solace nourishment and underlying meaning of everyday words

Abstract

The Paris Agreement represents a major shift to a more bottom-up global response to climate change, with the Parties of the Agreement, agreeing to formulate their Nationally Determined Contributions (NDCs) to the global effort, and update these plans every five years. What knowledge is necessary to formulate and quantify climate action to reduce emissions, to adapt and attract financial support? There is an established body of literature that demonstrates that the NDCs are woefully inadequate to get the world on a 1.5°C trajectory. A few studies have assessed the drivers of these inadequate outcomes, in terms of the formulation processes and the knowledge systems that shaped the iNDCs and their Updates, and even fewer the evolution between these milestones. As a result, these processes are still poorly understood, particularly in African countries. This thesis analyses how policy knowledge systems evolved over time and shaped the NDC processes, their knowledge system outcomes, and implementation prospects in South Africa, Ghana, and Kenya. It does so by utilising a comparative, qualitative case study research design, drawing on literature and document review, direct observation, semi-structured interviews, and regional workshops as its data collection methods. Data analysis techniques employed include content analysis, qualitative coding, and discourse analysis. The intention of this methodology is to reveal “how” and “why” these processes unfolded as they did in these countries, leading to their outcomes. The research found that the processes set the terms for participation. Policy actors responded through their access to the processes, their knowledge and capacities, to shape the processes and their outcomes.

The policy knowledge systems and NDC processes built credibility, legitimacy, and relevance, which were important for building support and consensus, and showed that the state of knowledge influenced the location of consensus and contestation. Not all knowledge held equal currency; those holding technical knowledge and an ability to organise and represent their interests in the terms of the processes, were well represented by the processes while others were marginalised. Although the NDCs were successful in elevating the conversation about climate change, questions remain about how inclusive the processes were, and whether they can support implementation. Lastly, this research demonstrated the ways in which the Updates progressed from the iNDCs. Work remains for future NDC processes and policy knowledge systems to deliver the step change required this decade, to keep the global temperature goal of 1.5°C within reach.

List of Acronyms

AFOLU – Agriculture, Forestry and Other Land Use

ALIN – Arid Lands Information Network

ANC – African National Congress

ARUA CD – African Research Universities Alliance, Centre of Excellence in Climate and Development

BAU – Business as Usual

BCG – Boston Consulting Group

BUR – Biennial Update Report

BUSA – Business Unity South Africa

CAIA – Chemical & Allied Industries’ Association

CAT – Climate Action Tracker

CBIT – Capacity Building Initiative for Transparency

CCD – Climate Change Directorate

CCS - Carbon Capture and Storage

CDKN – Climate Development and Knowledge Network

CEO – Chief Executive Officer

CER - Centre for Environmental Rights

CO₂e – Carbon Dioxide Equivalent

COP – Conference of the Parties

CONTRALESA - Congress of Traditional Leaders of South Africa

COSATU – Congress of South African Trade Unions

CPUT - Cape Peninsula University of Technology

CSIR – Centre for Scientific and Industrial Research

CSO – Civil Society Organisation

DANIDA – Danish International Development Agency

DDG – Deputy Director General

DEA – Department of Environment Affairs

DEROs – desired emissions reductions outcomes

DEFF - Department of Environment, Forestry and Fisheries

DFFE – Department of Forestry, Fisheries and the Environment

DFID – Department for International Development

DMRE – Department of Mineral Resources and Energy

DNA – discourse network analysis

ECN – Energy Research Centre of the Netherlands
EPA – Environmental Protection Agency
ERC – Energy Research Centre
ESRG – Energy Systems Research Group
G4 – Ghana Goes for Green Growth
GEF – Global Environment Facility
GHG – Greenhouse Gas
GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
Gt – Gigatonnes
GTS – Green Transport Strategy
ICRAF – World Agroforestry
ICTU – Information necessary to facilitate Clarity, Transparency, and Understanding
IDLO – International Development Law Organisation
IEP – Integrated Energy Plan
IGCCC – Inter-Governmental Committee on Climate Change
IISD – International Institute for Sustainable Development
iNDC – intended Nationally Determined Contribution
IPAP – Industrial Policy Action Plan
IPCC – Intergovernmental Panel on Climate Change
IPG – International Partners Group
IPPU – Industrial Processes and Product Use
IRP – Integrated Resource Plan
JET-P – Just Energy Transition Partnership
JICA – Japan International Cooperation Agency
KNUST – Kwame Nkrumah University of Science and Technology
LECRD – Low Emissions and Climate Resilient Development
LEDs – Low Emissions Development Strategy
LT LEDs – Long term Low Emissions Development Strategy
LTAS – Long Term Adaptation Scenarios
LTMS – Long Term Mitigation Scenarios
LTS – Land, Trees and Sustainability
LULUCF – Land Use, Land Use Change and Forestry
MAPS – Mitigation Action Plans and Scenarios
MEMR – Ministry of Environment and Mineral Resources

MENR – Ministry of Environment and Natural Resources
MEST – Ministry of Environment, Science and Technology
MESTI – Ministry of Environment, Science, Technology and Innovation
MoEF – Ministry of Environment and Forestry
MPA – Mitigation Potential Analysis
MRV – Monitoring, Reporting and Verification
MSSD – Most Similar Systems Design
Mt – Megatonnes
MTPs – Medium Term Plans
NALEDI – National Labour and Economic Development Institute
NAMAs – National Appropriate Mitigation Actions
NAP – National Adaptation Plan
NBI – National Business Initiative
NCCAP – National Climate Change Action Plan
NCCAS – National Climate Change Adaptation Strategy
NCCC – National Climate Change Committee (in South Africa)
NCCC – National Climate Change Council (in Kenya)
NCCMP – National Climate Change Master Plan
NCCP – National Climate Change Policy
NCCRGP – National Climate Change Response Green Paper
NCCRP – National Climate Change Response Policy
NCCRS – National Climate Change Response Strategy
NDC – Nationally Determined Contribution
NDP – National Development Plan
NDPC – National Development Planning Commission
NEDLAC – National Economic Development and Labour Council
NEES – National Energy Efficiency Strategy
NGP – New Growth Path
NIR – National Inventory Report
NPC – National Planning Commission
ODA – Official Development Assistance
PCC – Presidential Climate Commission
PPCB – Paris Committee on Capacity building
PPD – Peak Plateau and Decline

PTC – Technology Action Plan

SAFCEI – Southern African Faith Communities Environmental Institute

SALGA – South African Local Government Association

SANEDI – South African National Energy Development Institute

SATIMGE – South Africa TIMES (SATIM) and Computable General Equilibrium (eSAGE)

SDCEA – South Durban Community Environmental Alliance

SDGs – Sustainable Development Goals

SLCP – Short-Lived Climate Pollutants

SNC – Second National Communication

STS – Science and Technology Studies

UCT – University of Cape Town

UNDP – United Nations Development Programme

UNEP – United Nations Environment Programme

UNFCCC – United Nations Framework Convention on Climate Change

USAID – United States Agency for International Development

VEJA – Vaal Environment Justice Alliance

WOGA – Whole of Ghana Approach

WRI – World Resources Institute

WWF – World Wide Fund for Nature

YPC – Youth Policy Committee

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CHAPTER 1: Introduction

Climate change is an existential threat to humanity, and yet the response to date has been woefully inadequate to address the magnitude and scale of the problem. This thesis seeks to make its contribution by studying an under-researched area of the literature, namely assessing the role of knowledge, actors and policy processes in implementing the Paris Agreement in three African countries. Through its original contribution, the research aims to respond to the societal problem of climate change, and the theoretical problem of how to drive change in policy processes through the participation of knowledge and actors. In so doing, the thesis endeavours to play its part in contributing to scaling up and accelerating the response to the climate crisis in this decade and beyond.

This introductory chapter of the thesis, describes the characteristics of climate change as a policy problem and provides an overview of the global policy response and knowledge infrastructure that has been assembled to address this problem. The chapter then outlines the research focus by introducing the research question, objectives and problem statement, which is followed by the rationale for the research. The chapter concludes by discussing scope and limitations, as well as an overview of the rest of the thesis.

1.1 Characterising climate change as a policy problem and the role of knowledge

Climate change is already having devastating impacts around the world, and the need to respond at scale and speed is more pressing than ever (IPCC, 2018, 2021). Knowledge has a key role to play in understanding the problem and its impacts, and in informing the policy response to the climate crisis. At the core of the policy problem of climate change is that greenhouse gas (GHG) emissions are locally produced but accumulate in the atmosphere globally, and lead to climate impacts that are felt locally; often in the places that were least responsible for the emissions. Therefore, a global solution is needed, with everyone needing to act to adapt to the impacts of climate change and mitigate its causes. Although everyone benefits from action and suffers from inaction, the benefits and costs are born unequally. Climate change therefore represents a classic tragedy of the commons problem, with individuals or individual countries not incentivised to restrain their use of the commons (Levin et al., 2012; Mintrom & Luetjens, 2017). A response to climate change needs to determine how to apportion action and the cost of acting, and how historical responsibility, capability, and current emissions should be weighted. These features make climate change a complex policy problem (Daviter, 2019; Levin et al., 2012).

Knowledge is critical for navigating this complexity and uncertainty, and for establishing ways to respond that will maximise benefits and minimise negative impacts. It follows that knowledge is imperative for understanding the climate problem, the drivers of emissions, and climate impacts. Knowledge is also needed for identifying emissions reductions options, developing and adopting solutions, and for financing technological and economic transitions that deliver on the development aspirations of countries (Daviter, 2019).

However, at no point in time will there be the necessary information to resolve the complexity and uncertainty associated with the climate problem; indeed, complexity does not allow for resolution (Daviter, 2019; Tyler, 2019). This points to the need to establish governance systems, policy processes, and knowledge systems that are capable of engaging with complex problems. Capabilities include developing solutions, building consensus, and acting with the information available at a given point in time, while maintaining flexibility to adapt as new information becomes available and broader contextual dynamics shift (Termeer et al., 2015; Wyborn, 2015). New knowledge and new ways of working with knowledge are needed for driving change.

1.2 Assembling a global policy response and knowledge infrastructure for the climate crisis – The evolution of the UNFCCC and IPCC

Given the features of the policy problem, a policy response and knowledge system for climate change requires the requisite characteristics. These include an enabling international policy architecture with binding rules, national policy frameworks that prioritise near-term action that is compatible with long-term goals, vertical and horizontal policy integration, and inclusive policy formulation and implementation processes. Sound monitoring and reporting is also needed to track progress (Levin et al., 2012). All these features require robust and well-supported knowledge that makes a compelling case for action. This demonstrates the important interplay between policy processes and knowledge. I define a policy knowledge system as a system of interconnected actor groups that, based on their roles and capacities, together with the knowledge they hold and the access they are permitted to the policy process, attempt to influence the interactions between knowledge and policy and their outcomes in ways that align with and represent their interests (Cornell et al., 2013; Muñoz-Erickson, 2014; Never, 2012a; Pohl, 2008; Rafey, 2013).

Over the last three decades, the global response to climate change has evolved and become more sophisticated with two of the most notable milestones: the formation of the Intergovernmental Panel

on Climate Change (IPCC) and adoption of the United Nations Framework Convention on Climate Change (UNFCCC). The IPCC, which represents the community of scientists and governments working on climate change globally, has released regular assessment reports on the state of knowledge on climate change through its three working groups: Working Group I – The Physical Science Basis; Working Group II – Impacts, Adaptation and Vulnerability; and Working Group III – Mitigation of Climate Change. The UNFCCC has established the international policy architecture for governing the international policy response to the climate crisis (UNFCCC, 2020). Some of the most important milestones for climate policy and knowledge over the last 30 years are illustrated in Figure 1: below.

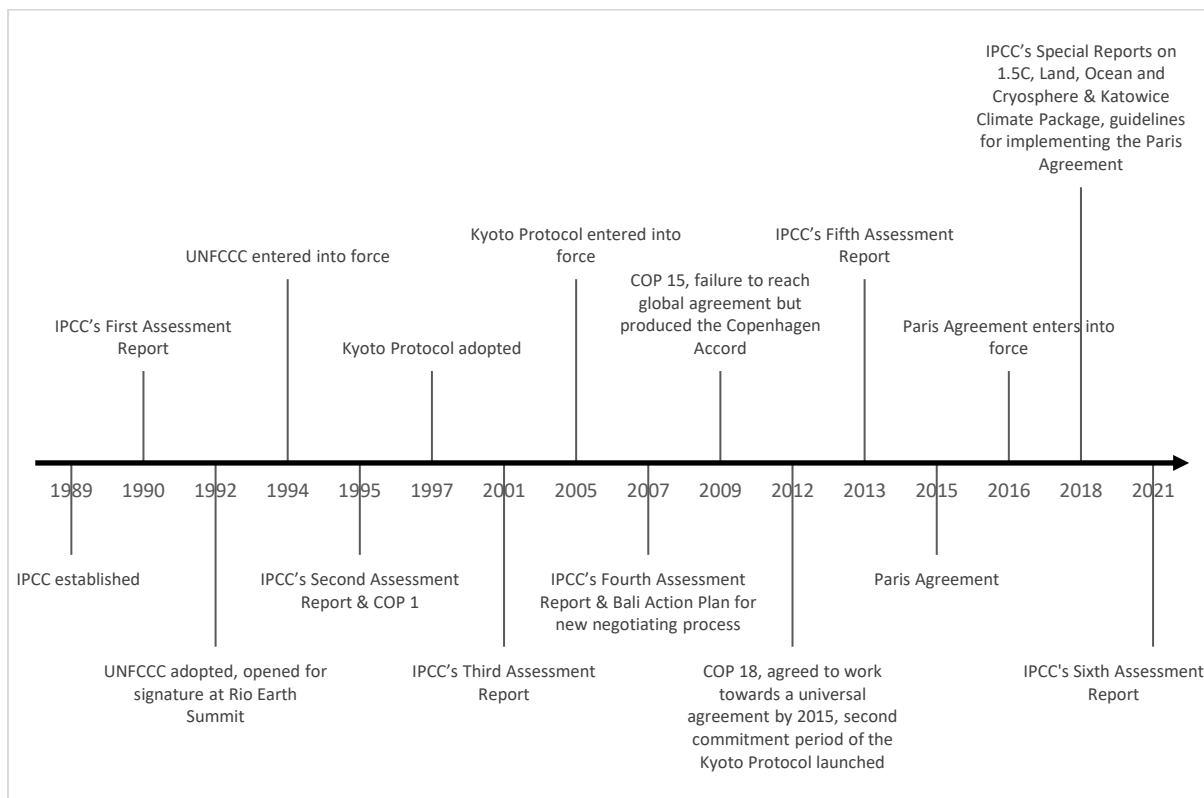


Figure 1: A timeline of the evolution of the UNFCCC and IPCC. (Source: Author's creation based on UNFCCC (2020))

The IPCC has played a leading role in bringing together scientists and policymakers to establish the knowledge base for framing the problem of climate change, its drivers, likely impacts, and the options available to prevent warming of the climate system (IPCC, 2018). Under the UNFCCC, the Kyoto Protocol came into force in 2005, and established legally binding top-down emissions reduction targets for industrialised nations to respond to climate change. The Protocol consisted of two commitment periods concluding in 2020. The Paris Agreement, which was agreed on at the 21st Conference of the Parties (COP 21) to the UNFCCC in 2015 to govern action from 2021, marked a shift in the global response from allocated targets to nationally determined contributions (NDCs) (Iacobuta et al., 2018; Kuyper & Schroeder, 2018). The Agreement was based on the participation of all Parties

to the Convention rather than focusing solely on industrialised nations, and included mitigation, adaptation, and finance as opposed to the mitigation-centric approach of the predecessor, the Kyoto Protocol (Kuyper & Schroeder, 2018).

1.2.1 Country contributions to a global agreement

Parties were invited to prepare national climate action plans, so-called intended nationally determined contributions (iNDCs), at COP 19 in Warsaw. This was in preparation for the successor agreement to the Kyoto Protocol, which was agreed upon in December 2015 at COP 21 in Paris. The iNDCs became binding Nationally Determined Contributions (NDCs) after the ratification of the Paris Agreement in 2016 (UNEP, 2018). The NDCs sought to contribute to achieving the objective of the UNFCCC laid out in Article 2, to stabilise the concentration of GHGs to prevent dangerous levels of warming of the climate system (UNFCCC, 2015; United Nations, 1992). All Parties were expected to submit either new or updated NDCs in 2020 and every five years thereafter, as stipulated in Article 4.9, decision 1/CP.21 of the Agreement (UNFCCC, 2015). Given the impact of the COVID-19 pandemic, the deadline for submissions of NDC Updates was pushed out to 2021, with COP 26 postponed from November 2020 to November 2021. For clarity, this thesis refers to the 2015 NDCs as iNDCs, even though they have since been ratified to become NDCs. NDC Updates or Updates are used to refer to the NDCs submitted in 2020 and 2021. NDCs are then used to refer to the NDCs generally, covering both the iNDCs and the Updates.

The first global stocktake that will be conducted in 2023 and every five years thereafter (Article 14.2) will assess the collective progress in achieving the purpose and long-term goals of the Paris Agreement (Article 14.1). Progress on adaptation, mitigation, means of implementation, and support will be assessed in a facilitative manner (African Development Bank, 2018; UNFCCC, 2015). A timeline illustrating the requirements of the Paris Agreement, with a focus on the NDC cycles, is provided in Figure 2 below.

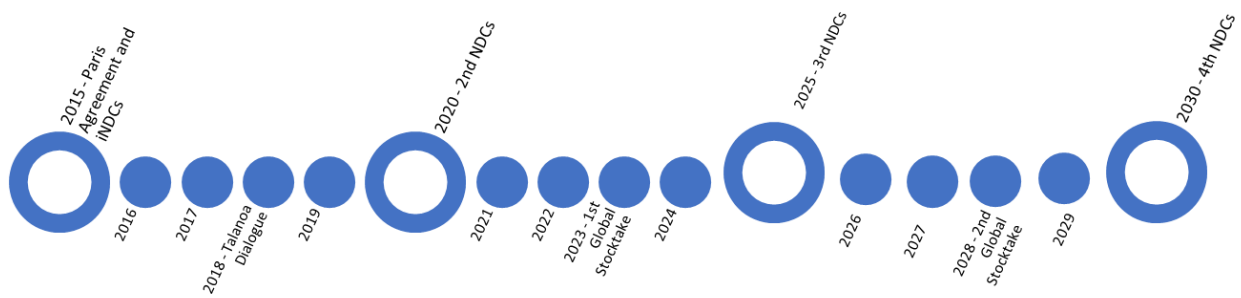


Figure 2: Timeline of milestones under the Paris Agreement. (Adapted from African Development Bank (2018))

The guidance on how to prepare the iNDCs was vague (De Pinto et al., 2018; Pauw & Klein, 2020), and as a result, the iNDCs submitted in 2015 varied greatly (Dash & Gim, 2019; De Pinto et al., 2018; Pauw & Klein, 2020). In the years that followed Paris, more guidance for the formulation of NDCs was given, with the agreement to provide the information necessary to facilitate the clarity, transparency, and understanding (ICTU) of the iNDC submissions (decision 1/CP.21, paragraph 27) (UNFCCC, 2015), the requirement to communicate NDCs every five years, common timeframes, and the detailed guidelines provided by the Katowice Climate Package (Pauw & Klein, 2020).

1.2.2 The 2020s – A critical decade for climate action

Despite the progress in policy and knowledge, the response to the climate crisis since the formation of the UNFCCC has been woefully inadequate, as the magnitude of the problem has only increased (IPCC, 2018, 2021; UNEP, 2021). The international community is therefore at an inflection point in its response to the climate crisis. Either it can stay its course and head towards dangerous levels of warming of the climate system, or it can radically respond at scale and speed to avert disaster and enact just transitions to inclusive and prosperous low-carbon societies and economies. Both these are options for this decade; in other words, this is an urgent problem, and this is a defining decade.

2020 marked the start of this critical decade for climate action, by the end of which global emissions need to have declined by more than half to avoid global temperatures rising by more than 1.5°C (IPCC, 2018; Pauw & Klein, 2020). Six years on from the iNDCs, with the NDC Updates submitted in time for COP 26 in 2021, the IPCC's Sixth Assessment Report (AR6) has demonstrated that human-induced climate change is unequivocal; that the impacts of climate change are not a concern for the future but are here, and many are irreversible. A failure to avoid overshooting 1.5°C will lead to major climate

impacts, such as increased intensity and frequency of extreme weather events, sea level rise, ocean acidification, and ice sheet collapse; all of which will severely compromise the ability to live well on planet earth, particularly for those most vulnerable (IPCC, 2021).

A substantial body of work has analysed the NDCs in terms of: levels of ambition and the aggregate effect of the NDCs on emissions (UNEP, 2018; UNFCCC Secretariat, 2015, 2021); the intersection with Agenda 2030, SDGs, and national development (Antwi-agyei et al., 2018; Atteridge et al., 2019; Janetschek et al., 2019; Mantlana et al., 2021); adaptation and resilience (Brandt et al., 2018; Chemura et al., 2020); mitigation (Van Zyl et al., 2018; Vázquez-Rowe et al., 2019); support, including finance, technology, and capacity building (Antwi-agyei et al., 2018; Khan et al., 2018, 2019; Mbiru, 2019; Selvakkumaran & Silveira, 2019; Sokona, 2021); fairness and equity (Cunliffe et al., 2019; Pauw et al., 2019; Winkler, 2020; Zimm & Nakicenovic, 2019); the role of non-state actors, including cities (Bäckstrand et al., 2017; Hale, 2016; Hsu et al., 2019); transparency and policy coherence and implementability of NDCs (Pauw et al., 2019; Pauw & Klein, 2020; Weikmans et al., 2019; Winkler et al., 2017); the sectoral implications of NDCs (Altieri et al., 2016; Antwi-agyei et al., 2018; Antwi-Agyei et al., 2017; Caetano et al., 2017; Dal Maso et al., 2020; Selvakkumaran & Silveira, 2019); and the need to manage the science-policy interface for the NDCs to enhance progress (Ourbak & Tubiana, 2017; Zougmore et al., 2019). Although these are valuable contributions to enhancing understanding of the NDCs, the focus has been predominantly on the outputs of NDC processes rather than the drivers of these outputs, specifically the processes. The formulation processes have remained under-researched, despite them being responsible for the outcomes assessed (Laudari et al., 2021; Röser et al., 2020). This is a concerning gap in the literature, given the expectation that learnings from one round of NDCs will inform the formulation of the subsequent rounds of NDCs, to deliver on the principle of progression outlined in Article 4.3 of the Paris Agreement: “Each Party’s successive nationally determined contribution will represent a progression beyond the Party’s then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances” (UNFCCC, 2015, p. 22). The research of this thesis focuses on the NDC formulation processes and the role of knowledge and actors therein, as a way to assess how and why the NDCs unfolded as they did, resulting in their outcomes.

1.2.3 An emerging body of literature on the NDC processes

In the lead up to COP 26, literature on the formulation processes of the iNDCs emerged, for example in the Gambia, Argentina (Dash & Gim, 2019), Nepal (Laudari et al., 2021), and Colombia (De Pinto et

al., 2018). Still, there is a limited body of literature that analyses the formulation processes of the iNDCs (Laudari et al., 2021; Röser et al., 2020). Röser et al. (2020) respond to the gap in the literature that they observed, by assessing the formulation processes of the iNDCs of a wide selection of countries. Their findings form part of the Climate Policy Special Issue, *Making climate action more effective: Lessons learned from the first Nationally Determined Contributions* (Pauw & Klein, 2020). The contribution of this special issue is a valuable one, as it draws attention to the importance of analysing the iNDC processes to inform future NDC processes. Röser et al. (2020) identified the role of iNDC processes in raising political awareness, promoting institutional innovation and coordination, and the challenges iNDCs faced. Challenges included time pressures, superficial stakeholder engagement processes, inadequate resources and capacity, insufficient political support, challenges with the quality and availability of data and technical analysis, and lack of guidance from the international process about the content and form of iNDCs (Atteridge et al., 2019; Dodwell et al., 2015; Kurdziel et al., 2016; Röser et al., 2020). Furthermore, inadequate transparency of the processes, data, and methodologies employed led to questions over the credibility, feasibility, and ambition of the outcomes of the iNDC processes (De Pinto et al., 2018; Mbeva et al., 2015; Pauw & Klein, 2020).

There is need for a better understanding of stakeholder involvement in NDC processes to improve future processes, and to prevent process-related challenges from hindering implementation further down the line (Laudari et al., 2021; Röser et al., 2020). Even more so than anywhere else, there is a dearth of such analyses about these processes in African countries. Mbeva et al. (2015) make an important contribution by assessing 43 African countries' iNDCs. The analysis primarily focuses on the content of the iNDCs to identify prominent themes and trends, as opposed to policy process analysis.

1.2.4 Empirical context: Inadequate NDCs? More of the same with the Updates?

It is well accepted by now that the initial round of contributions to the Paris Agreement was not enough. The 2018 United Nations Environment Programme (UNEP) Emissions Gap Report showed how the 2015 conditional iNDCs will, by 2030, result in a 12 gigatonnes (Gt) carbon dioxide equivalent (CO₂e) gap between a 2°C trajectory and 29 Gt between a 1.5°C trajectory (UNEP, 2018). This is why the principle of progression was built into the Agreement. With each new commitment every five years, countries can enhance their contributions; and therefore with every cycle, get the world closer to a 1.5°C trajectory and the long-term goals of the Agreement (UNFCCC, 2015).

The NDC Updates failed, however, to deliver on the extent of progression in mitigation ambition needed. In the lead up to COP 26, the UNFCCC released a Synthesis Report to assess the contribution

of the updated NDCs, and similarly, the 2021 UNEP Emissions Gap Report assessed the gap between emissions associated with the NDC Updates and a Paris compatible trajectory (UNEP, 2018, 2021; UNFCCC Secretariat, 2015, 2021). Both assessments showed that while some progress was visible, six years after the Paris Agreement, the world was still a long way from being 2°C compatible, and even less so for 1.5°C (IPCC, 2021; UNEP, 2021). The 2021 Emissions Gap Report showed that the cumulative impact of the updated NDCs will lead to a 7.5% reduction in emissions by 2030, whereas a 30% reduction by 2030 would be required for a 66% chance of avoiding more than 2°C of warming, and 55% reduction for 1.5°C (UNEP, 2021). The findings of the IPCC's Special Report on 1.5°C, the IPCC's AR6, the UNFCCC's Synthesis Report, and UNEP's Emissions Gap Report have highlighted the drastic action required in the next decade to avoid overshooting 1.5°C (IPCC, 2018, 2021; UNEP, 2021).

This body of literature has continued to expand with even more recent assessments such as the 2022 UNEP Emissions Gap Report (UNEP, 2022), UNFCCC Synthesis Report 2022 (UNFCCC, 2022), State of NDCs 2022 report (Fransen et al., 2022), and State of Climate Action 2022 report (Boehm et al., 2022), which all reiterate the concerning trends that the world is well off track for 1.5°C. Due to the inadequate progress, the COP 26 Presidency called for countries to revisit their 2021 NDC Updates and return a year later to COP 27 with enhanced targets. But very few countries did so. While more ambition is clearly needed, continuing to ask for enhanced ambition without adequate attention paid to the country-level NDC formulation processes that determine ambition levels runs the risk of focusing on outcomes, but ignoring their drivers. This raises questions about the efficacy of the NDCs and the approaches to formulating them, which warrant critical reflection. Now more than ever, there is a pressing need to scale up research to analyse the formulation of NDCs.

1.2.5 Conceptual perspective: The interplay between knowledge, actors, and policy – An influential relationship for the NDCs

Given the assessments outlined above, motivating for 'enhanced ambition' and implementation is urgent and imperative. Enhancing ambition and implementation applies to both adaptation and mitigation and needs to include diverse policy actors. Action comes in different forms, depending on the policy actor. This can include government formulating and implementing robust public policy, the research community providing credible and relevant knowledge, business providing resources and expertise for implementation, and civil society building support for and creating pressure for change. A key concern for the global community should be to ask why the mitigation ambition pledged in the NDC Updates once again fell so far short of a 2°C or 1.5°C compatible trajectory (UNFCCC Secretariat, 2021). Mitigation ambition refers to the extent of emissions reduction. At the Talanoa Dialogue held

in 2018, three questions were asked to assess the collective progress of global action on climate change based on the NDCs: Where are we? Where do we want to go? How do we get there (UNFCCC, 2018)? These three questions should be taken seriously, given the critical juncture that the world is at. With the inadequacy of the targets put forward by the iNDCs and NDC Updates, and to respond to these three questions, it is appropriate to focus analysis on unpacking the processes that led to these targets and a broader set of outcomes that underpinned the NDCs. The Talanoa Dialogue was the precursor to the Global Stocktake (GST) and shares its aims. The first Global Stocktake is to be completed in 2023, and will occur every five years after that. As outlined in Article 14 of the Paris Agreement, the aim of the GST is to take stock of the global progress towards achieving the long term goals of the Paris Agreement. The results of the GST are intended to inform the enhancement of the next rounds of NDCs and find ways to close the gap between current action and these long term goals (UNFCCC, 2015).

It is well recognised that the preparation processes for the NDCs in 2015 suffered from a lack of time, resources, and capacity, and inadequate guidance from the international climate policy architecture for the formulation of the NDCs (Atteridge et al., 2019; Dodwell et al., 2015; Kurdziel et al., 2016; Röser et al., 2020). Were these then contributing factors to the emissions gap observable in 2018? Perhaps more concerning are the similar trends in the 2021 emissions gap report (UNEP, 2021), which suggests that the lessons from the 2015 NDCs were not taken seriously by the processes to update the NDCs six years later.

Despite recognition of the inadequacy of the preparation processes of the 2015 NDCs, literature on these processes is surprisingly limited, particularly for African countries. While there is much discussion about the role of knowledge in the NDCs, there is again limited literature that assesses how the relationships between knowledge, actors, and the NDCs operate, and the influence of these interactions.

This thesis seeks to make a contribution to addressing this underdeveloped part of the literature by conducting an in-depth policy process analysis of the iNDC and NDC Update processes in South Africa, Ghana, and Kenya, specifically unpacking the role of policy knowledge systems in these processes. Building on the definition introduced by this thesis and to represent how knowledge operates in a policy knowledge system, the status of the knowledge base is characterised, as well as its credibility, salience, and legitimacy (Cash et al., 2003; Cash & Bello, 2020; Haas, 2004). The aim of this conceptual framework is to reveal how policy knowledge systems influence NDC processes, their outcomes and

implementation prospects, and how these insights could inform the development and implementation of future NDCs. The conceptual framework of this research will be elaborated on in Chapter 3.

1.3 Focus of the research

1.3.1 Research Questions

Primary research question

1. How have policy knowledge systems evolved over time and shaped the Nationally Determined Contributions (NDC), their processes, outcomes, and implementation prospects in South Africa, Ghana, and Kenya?

Secondary research questions

1. How has the policy access, roles and capacities, knowledge, and interests of policy actors shaped their participation in the NDC processes?
2. How have the processes to develop and use knowledge for the NDCs determined the credibility, legitimacy, and relevance of the NDCs and their knowledge?
3. How have NDC processes and their policy knowledge systems built consensus and uncovered contestation?
4. Whose interests are represented and marginalised by the NDC processes and final NDCs?
5. What insights does a policy knowledge systems perspective of the formulation of the NDCs reveal about their implementation prospects?

1.3.2 Objectives

1. To characterise policy knowledge systems, their features, and the roles they have played in the iNDC and NDC Update processes, and identify how these roles have changed.
2. To assess how policy actors participated in and shaped the NDC processes and their knowledge system outcomes.
3. To investigate the boundary work performed by policy knowledge systems for the NDCs and their influence on the support for, and opposition to, the NDCs.
4. To identify which features of policy knowledge systems need to be addressed to enhance future NDC processes and their implementation prospects.

1.3.3 Problem statement

The climate crisis is a global problem that requires action at scale and speed this decade, to avert the catastrophic impacts of dangerous levels of warming of the climate system. But the existing policy response has not driven the scale and speed of action required. Disproportionate attention and research have been placed on the inadequate outcomes of the global policy response, and not enough on the drivers of these inadequate outcomes. This research aims to respond to this gap in the literature by assessing the formulation processes of country policy responses, with a focus on the interaction between actors, knowledge and policy, to reveal how and why these interactions have shaped these processes and how they resulted in the outcomes that they have. In so doing, the research aims to provide insights that could enhance future policy formulation processes, and contribute to more ambitious outcomes, commensurate with the scale of the challenge at hand and urgency required.

1.4 Rationale for the research based on its social and scientific relevance

This research responds to arguably the most pressing problem facing humanity: the need to establish an adequate and transformative national and international policy response to the climate crisis. The research identifies intervention points for long-term knowledge work to lay the basis for social change, policy change, and action, particularly in African countries. African countries are of particular concern because they have received limited attention in the literature. Furthermore, while most African countries are currently low emitters with pressing development challenges, they are also home to young and fast-growing populations and economies. This means that many of these countries are at a crossroads; either they follow the carbon-intensive development pathways of industrialised nations to meet their development aspirations, or they embark on alternative, lower-carbon development pathways. Although NDCs can contribute to the transitions to such alternative pathways, they will need to make a compelling case for these transitions, supported by robust knowledge.

What is the relevance of this research to policy?

This research conducts reflective work on country-specific climate policy processes, namely the iNDCs and NDC Updates in South Africa, Ghana, and Kenya. It aims to provide insights on the workings of these processes, where progress is being made, and where challenges are being experienced. The value of these insights for policymakers and those working at the knowledge-policy interface is in using them to inform the design and operation of future NDC processes. Specifically, how to create and use knowledge, how to involve policy actors, and how to build consensus and address contestation. This

includes approaching knowledge and capacity building as a sustained, long-term endeavour to get countries closer to the types of trajectories needed.

What is the relevance of this research to the NDC process literature?

This research has identified an understudied area of the empirical context: the formulation processes of the NDCs. It presents findings based on three country experiences about the drivers of these processes and explains how and why they unfolded as they did, as well as the implications. This research identifies the need for future research, particularly in African countries, to build on and extend this initial contribution, to inform the formulation and implementation of future NDCs.

What is the relevance of this research to theory?

This research has turned to the rich theoretical literature on knowledge systems and policy processes, and their influence in enabling and resisting change in policy processes. The research has drawn on and extended this conceptual body of literature by developing a unique conceptual framework and applying it to the empirical context of the NDCs, to understand the roles of policy knowledge systems in shaping these processes, their knowledge system outcomes, and implementation prospects. It therefore applies and expands this body of knowledge to a relatively new policy field; laying the basis for more in-depth research to apply this conceptual framework to past and future NDC processes in these three countries and beyond.

1.5 Scope

This research has two primary dimensions: (1) assessing change between the iNDC and NDC Updates in South Africa, Ghana, and Kenya; and (2) comparing across these three countries, the NDC processes, the role of knowledge systems therein, and the knowledge system outcomes. A policy knowledge systems conceptual framework provides a lens through which to assess the NDC processes; a lens that reveals the role of knowledge and actors and their interaction and how this shapes the NDC processes, their knowledge system outcomes, and implementation prospects. This conceptual framework determines the boundaries of analysis: what is included and what is not included. The focus on knowledge includes types of knowledge and their qualities that make up the knowledge base. The focus on actors includes their roles and capacities, their knowledge, interests, and policy access; all of which shape contestation and consensus that emerge throughout the process. These features provide the anchor points for unpacking and assessing the NDC processes in these three countries.

The other dimension of the scope is the country selection. The research selected three countries, situated in Southern, West, and East Africa. While these three countries cannot claim to be representative of the regions, they may be able to provide insights for countries in their regions to consider. Furthermore, they offer useful opportunities for comparative research, acknowledging that the emissions profiles, economic structures, and policy processes of each of the three countries differ significantly. Further detail about the rationale for the country selection is discussed in Chapter 4, the methodology chapter of this thesis.

1.6 Thesis overview

This thesis consists of eight chapters. This first chapter has introduced the research problem and the research gap. It has provided an initial overview of the literature about the global response to the climate crisis, with a focus on NDCs and the role of knowledge. The next chapter will elaborate on the state of the research literature on the implementation of the Paris Agreement, specifically the NDC formulation processes and the role of knowledge and actors. Chapter 3 reviews the theoretical literature on the roles of knowledge in policy processes, generally, to establish the conceptual framework that guides the data collection and analysis. The methodology for this thesis explains how the conceptual framework is operationalised, presents the research design, data collection and analysis in Chapter 4. The results and discussion of the thesis is structured in three chapters focusing on two time periods and a comparative analysis of the outcomes between the three countries respectively. Chapter 5 analyses the origin and evolution of the knowledge systems in the iNDC processes in South Africa, Ghana, and Kenya, implications for their knowledge outcomes leading up to the Paris Agreement. The chapter covers the period 2010 to 2015. Chapter 6 analyses the Update processes in these three countries, the roles of knowledge and participation of actors, and how these features have evolved since the iNDCs, thereby covering the period 2016 to 2021. Chapter 7 assesses the knowledge system outcomes of the Updates processes from a policy knowledge systems perspective, and compares these outcomes across the countries, and to those of the iNDC processes. Chapters 5, 6 and 7 discuss how the findings revealed by this conceptual framework relate to the literature presented in Chapters 2 and 3, thereby demonstrating how the findings extend these bodies of literature. Finally, Chapter 8 synthesises, discusses the findings and concludes. The discussion shows how the thesis has answered the research questions through the conceptual framework and empirical work. In so doing, it reflects on the original contribution to understanding the NDC processes and knowledge systems in African countries.

CHAPTER 2: Reviewing the empirical literature on NDCs

The literature review is divided into two components and presented in Chapters 2 and 3. Chapter 2 presents the state of the empirical literature on the NDC formulation processes. This body of literature covers the roles of NDC formulation processes, the information and knowledge used in NDC formulation processes, capacity building through the NDCs and Paris Agreement, including types of capacities and critiques, the ways in which stakeholders have participated in NDC processes, and the politics of knowledge that is a feature of the NDCs and climate policy more generally. Chapter 3 presents the theoretical literature on the role of knowledge systems in policy processes, out of which it develops a conceptual framework to apply to the NDCs. Together, these two chapters demonstrate what is already known about the research problem by the literature, to illustrate how the contribution of this research builds on and extends these bodies of knowledge.

2.1 NDC formulation processes – An overlooked feature of the NDCs

Despite now being a well-established body of literature on the NDCs, there is still a limited understanding of the formulation processes of the iNDCs and NDC Updates, particularly at the country level (Laudari et al., 2021; Röser et al., 2020). As Laudari et al. (2021, p. 2) point out: “An extensive body of literature has assessed the various aspects of NDCs[...]. However, very few studies have assessed success and failure of NDC considering the process adopted for NDC formulation and the subsequent arrangements made for implementing targets of NDC. As the process followed for developing and formulating public policy largely influences its implementation trajectories...”. Even fewer studies have compared the formulation processes for the iNDCs and Updates.

In the lead up to COP 26, a growing body of literature began to recognise the value of assessing process for understanding the iNDCs. Pauw et al. (2018) suggest that an endeavour to understand process must go beyond the headline numbers and unpack the formulation processes to mine how the NDC formulation processes unfolded, why they unfolded as they did (Dash & Gim, 2019; De Pinto et al., 2018; Laudari et al., 2021; Röser et al., 2020), their drivers (Dash & Gim, 2019; Zheng et al., 2021), as well as the challenges encountered (Day et al., 2015; Dodwell et al., 2015; Kurdziel et al., 2016; Mbeva et al., 2015). But the dearth of documentation from the iNDC formulation processes has hindered analysts seeking to understand the underlying dynamics that shaped the processes and their outcomes (Laudari et al., 2021).

The intention with unpacking the role of knowledge systems in NDC processes is to identify what has changed and what has not changed between the iNDCs and Updates, and what has been learnt and failed to be learnt in the last six years. Reflecting on these challenges can help take stock and uncover insights to inform future NDC formulation and implementation processes (Dash & Gim, 2019; Kurdziel et al., 2016; Zheng et al., 2021). Such insights are important for implementation because process-related challenges have been shown to hinder implementation (Laudari et al., 2021; Röser et al., 2020).

Majority of the academic and grey literature that has been written on the NDC processes focussed on the 2015 iNDCs and identified key issues for looking ahead to the NDC Updates in 2020. At the time of writing, there was limited literature on the Updates. The research for this thesis seeks to make a unique contribution to this under-researched part of the literature, by conducting an in-depth policy analysis of the iNDCs and Updates in South Africa, Ghana, and Kenya, to unpack the evolution of the NDC processes, their outcomes, and implementation prospects, from a policy knowledge systems perspective. This review of literature focuses on the roles and relevance of NDCs in developing countries, summarised in Table 1.

Table 1: Overview of geographical scope covered by the different sources cited in the literature review

Citation	Scope
(Laudari et al., 2021)	Nepal
(Dash & Gim, 2019)	Argentina, Gambia
(De Pinto et al., 2018)	Colombia
(Upadhyaya et al., 2021)	India and South Africa
(Brandt et al., 2018)	Kenya
(Atteridge et al., 2019)	Small Island Developing States: Belize, Belize, Fiji, Jamaica, Kiribati, Marshall Islands, Seychelles, St Lucia
(Marquard, 2020)	South Africa
(Boulle et al., 2015; Kane & Boulle, 2018; Raubenheimer & the MAPS team, 2015; Rennkamp & Boulle, 2017)	Brazil, Chile, Colombia, Peru, South Africa
(Day et al., 2015; Dodwell et al., 2015; Fransen et al., 2019; Höhne et al., 2014; Hsu et al., 2019; Kurdziel et al., 2016; Levin et al., 2015; NDC Partnership, 2022; Pauw et al., 2019, 2018; Pauw & Klein, 2020; Röser et al., 2020; Sokona, 2021; Zheng et al., 2021)	Aggregate assessments of numerous NDCs
(Khan et al., 2018, 2019; Nautiyal & Klinsky, 2022; SBI, 2020, 2021; UNFCCC, 2022; UNFCCC Secretariat, 2015, 2016, 2021; Winkler et al., 2017)	UNFCCC landscape analyses

2.1.1 The roles played by NDC formulation processes

The growing body of research on the iNDCs has been critical for uncovering the roles played by these processes. Based on the findings of four surveys conducted in 2015, 2017, and 2018, which covered the iNDCs of 137 countries, mainly developing countries, Röser et al. (2020) identified agenda setting, policy coordination, and institutional innovation as some of the key roles played by iNDC processes. Two surveys of 44 developing countries conducted before and after the iNDC processes (Kurdziel et al., 2016), as well as iNDC Regional Technical Dialogues in Latin America and the Caribbean, Africa, the Asia-Pacific region, and Eastern Europe that were run by the UNDP and UNFCCC (Levin et al., 2015), found that knowledge creation, and technical and institutional capacity building were key functions performed by iNDC processes. Strengthening policy integration and communicating political commitment, resource needs, as well as the co-benefits of pursuing climate action, were also identified as important (Levin et al., 2015).

One of the fundamental questions that confronted the formulation of the NDCs in numerous countries and was highlighted in Nepal and South Africa, was whether they should be based on existing policies only, or go beyond existing policies to drive ambition (Laudari et al., 2021; Marquard, 2020). The upside of being solely based on existing policy is that an NDC is then situated in a policy infrastructure and institutional arrangements, with their established roles and resources. If a country's NDC decides to go beyond existing policy, it may drive ambition and garner more international support, but implementation may be less likely domestically.

Authors highlighted that assessing the NDC processes can help to guide the design of future processes to deliver on the obligation of progression (Dash & Gim, 2019; Kurdziel et al., 2016; Laudari et al., 2021; Zheng et al., 2021). Article 4.3 highlights the important principle of progression in the Paris Agreement that seeks to close the gap over time between countries' contributions and the long-term goals of the Agreement (UNFCCC, 2015).

2.1.2 Information and guidance for the formulation of NDCs

Given that the iNDCs were formulated and submitted before a global agreement was reached in Paris, limited guidance was provided to countries about how to formulate their iNDCs and what to include (Pauw et al., 2018; Pauw & Klein, 2020). At COP 20 in December 2014, however, countries agreed to provide the information necessary to facilitate the clarity, transparency and understanding (ICTU) of their iNDC submissions. The information requirements for ICTU included the types of targets, reference points, time frames or periods of implementation, scope and coverage, assumptions and

methodological approaches, planning processes, and fairness and ambition (UNFCCC, 2015; UNFCCC Secretariat, 2016). Some authors sought to respond to the lack of guidance by providing their own guidance for the iNDCs in the lead up to COP 21. This guidance ranged from the suggested steps for formulating an iNDC, to content requirements and how to communicate an iNDC (Höhne et al., 2014; Levin et al., 2015), such as identifying the benefits, organising the process, identifying data and the analysis to inform the development of an iNDC, and designing and communicating an iNDC (Levin et al., 2015). Within these activities, important elements identified were the role of stakeholder engagement, technical elements, and evaluations about the level of ambition and support needs associated (Höhne et al., 2014). Still, the content of iNDCs varied greatly, as did the information provided on data and methodologies, and the information about the iNDC formulation processes was limited, which made comparison difficult (Dash & Gim, 2019; De Pinto et al., 2018; Pauw & Klein, 2020).

Reaching an agreement in Paris was a crucial milestone for determining the long-term goals and the overall policy architecture to govern the global response to climate change, including guidance for Parties' NDCs. Article 4.8 of the Paris Agreement stipulated the ICTU requirement for Parties (UNFCCC, 2015). While this information is only required for countries' second NDCs in 2025, Parties were *strongly encouraged* to provide this information in their updated NDCs in 2020 (decision 4/CMA.1, paras. 6-10 and annex I). This was an important development for addressing the lack of guidance that Parties had struggled with in preparing their iNDCs. The Paris Agreement's Enhanced Transparency Framework, which will come into effect from 2024, is intended to provide further guidance on information, reporting, and tracking of action and support under the Agreement (Winkler et al., 2017).

2.1.3 Knowledge in the NDC formulation processes

In their provocative article, *The tragedy of climate change science*, Glavovic et al. (2021) critique the science-society contract for climate change, and argue that despite the compelling and well-accepted scientific basis about the causes of climate change, the devastating impacts, and the pressing need to respond, emissions and other indicators of climate change continue to rise. On this basis, they posit that the science-society contract for climate change is broken, and call for a moratorium on climate change research as a strategy for exposing the situation, and for renegotiating this contract (Glavovic et al., 2021). This research takes this conversation seriously. Instead of seeing a moratorium on climate change research as way forward, however, the following section investigates the ways in which knowledge has shaped NDC formulation processes. Mindful of the critique levelled by Glavovic et al. (2021), the discussion here is related but distinct. Instead of framing the discussion around a science-

society contract, the discussion is organised around the knowledge-policy interface. A discussion about the relevance of the knowledge-policy interface is elaborated on in Chapter 3. In summary it is deemed more appropriate for guiding this research, as it acknowledges that different types of knowledge held by different actors are relevant for a response to climate change, instead of a narrow focus on science only (Keeley & Scoones, 2003; Muñoz-Erickson, 2014; van Kerkhoff & Lebel, 2006; van Kerkhoff & Pilbeam, 2017; Ziervogel et al., 2016). The interface with policy is deemed more appropriate than society, as this research seeks to identify change in policy processes and their outcomes (specifically NDC processes), that are driven by the evolution of knowledge systems. Still the intention of this research is similar to that of Glavovic et al. (2021) in that it aims to identify ways that knowledge for climate change responses can support more radical change, acknowledging the power dynamics and lock-ins that confront knowledge.

This research draws on Rorty's (1979) understanding of knowledge as a justifiable belief. This definition acknowledges as important, how different forms of knowledge are justified, and the criteria used to justify and evaluate knowledge (Jasanoff, 2010; Klement & Strambach, 2019; Rorty, 1979; van Kerkhoff & Lebel, 2006). Knowledge in climate policy has been critical in establishing a link between knowledge and policy, and in establishing an ecosystem of actors working at this interface. Although the knowledge base for NDCs is still relatively new and evolving, it is evident that the interaction between knowledge, capacity, and resources played a key role in shaping the processes and outcomes of the iNDCs (Pauw & Klein, 2020; Röser et al., 2020). Understanding the areas of knowledge that are relevant for the task of formulating NDCs is a first step to developing robust and credible NDCs (Pauw & Klein, 2020). The decision on ICTU offered guidance on the types of information to be included in the NDCs, which, as already mentioned, include the types of targets, reference points, time frames, scope and coverage, assumptions and methodological approaches, planning processes, and fairness and ambition (UNFCCC, 2015; UNFCCC Secretariat, 2016). The literature on the NDCs illustrates other forms of knowledge to consider, which are discussed in the paragraphs that follow.

Given the focus of this research on the formulation of NDCs in developing countries, information on national priorities is important for situating the knowledge system and understanding how national priorities relate to the content of the iNDCs (Kurdziel et al., 2016; Makomere & Mbeva, 2018). Data and analysis on co-benefits (Kurdziel et al., 2016; Röser et al., 2020), socioeconomic impact assessments necessary to demonstrate their benefits, risks and trade-offs, and how to best manage these, are all important for understanding the implications for development of NDCs (Kurdziel et al., 2016; Röser et al., 2016, 2020).

From a mitigation perspective, the emissions profile and projections of a country locate the main sources of emissions and where growth is likely, and in turn the areas with major emissions abatement potential (Dash & Gim, 2019; De Pinto et al., 2018; Fransen et al., 2019; Levin et al., 2015). Whereas from an adaptation perspective, as a result of vulnerabilities, climate impacts, and risks becoming increasingly apparent, so too is the urgency for strengthening these forms of information and knowledge to inform a more robust adaptation response (NDC Partnership, 2022; UNFCCC, 2021). For operationalising both adaptation and mitigation responses, sector-specific knowledge is crucial and has advanced dramatically in recent years. Progress, though, has differed markedly between sectors, with different technoeconomic cases and socioeconomic impacts in each sector, and therefore timeframes for implementation (Brandt et al., 2018; Dash & Gim, 2019; Dodwell et al., 2015).

Defining and communicating support needs and the strategies to mobilise public and private finance (Kurdziel et al., 2016; Levin et al., 2015; Röser et al., 2020) is a key part of the knowledge to enable implementation (NDC Partnership, 2022; UNFCCC, 2021). Implementation depends on investment plans not only to attract support but to operationalise it (Levin et al., 2015; NDC Partnership, 2022; WWF, 2021). All these types of knowledge rely on the accessibility and quality of the underlying data and the analytical capacities (NDC Partnership, 2022; Röser et al., 2020; UNDP, 2016) available for converting the existing information into the desired and usable knowledge for the NDCs, through the development and application of tools for producing and applying knowledge (De Pinto et al., 2018; Kane & Boulle, 2018). The state of knowledge and level of capacity is also an important determinant of the scope, types, and robustness of targets set by the NDCs (Dodwell et al., 2015; Kurdziel et al., 2016; Röser et al., 2020).

The literature finds that the role of knowledge went far beyond determining the iNDC targets, and sought to build consensus, and public and political support through involving policy actors in the development of the knowledge and the formulation of the iNDCs (Kane & Boulle, 2018; Rennkamp & Boulle, 2017; Röser et al., 2020; UNFCCC Secretariat, 2016). This created a level of transparency, particularly of the targets and their underpinning data and analyses (De Pinto et al., 2018; Levin et al., 2015; Pauw et al., 2018; Pauw & Klein, 2020; Röser et al., 2020). Knowledge also played a role in aligning iNDCs with existing national policies, by identifying technical barriers and communicating the costs and benefits of actions. This assisted with prioritisation and selection of actions for iNDCs, and communicating support needs for implementation (Kurdziel et al., 2016; Röser et al., 2020; Zheng et al., 2021).

But it is also clear from the decades of enhancements in the knowledge base informing a climate response, that the commensurate level of action has not resulted. This has to do with the entrenched power dynamics of the status quo, and the accompanying constellation of interests (Cozzens & Woodhouse, 1995; Jasanoff & Wynne, 1998; Latour, 1987; van Kerkhoff & Lebel, 2006). While this may be shifting, these established power dynamics have resisted change and created lock-ins, which knowledge and policy processes for climate change have struggled to break. There is a well-established body of literature on how power influences the interaction between knowledge and policy processes, and how this enables and constrains change. This literature will be discussed in more detail in the following chapter. For knowledge to have impact, much rests on the capacities of policy actors, pointing to an important relationship between knowledge and capacities for NDCs, which is discussed next.

2.1.4 Building capacities through NDC processes

Reflecting on the NDC experiences reveals that capacities and knowledge are inseparable. A factor to consider is that the knowledge used for framing the policy problem also influences the knowledge needed for the policy response (Daviter, 2019; Head, 2022). This then determines which capacities are deemed to be necessary and relevant. As capacity is built to supply policymakers with knowledge to inform policymaking and implementation, it is necessary to identify which capacities and forms of knowledge have gained most traction in the NDC processes. Doing so can point to how NDC formulation processes also require transformation, to allow for and value more diverse capacities and forms of knowledge. At the core of this thesis's understanding of capacity as a concept is the ability of policy actors to meaningfully participate in a process by drawing on and communicating the knowledge they hold, to represent their interests and establish their own agenda, rather than implementing someone else's (Nautiyal & Klinsky, 2022; Sokona, 2021).

2.1.4.1 *Capacity building under the Paris Agreement and UNFCCC for participating in the NDCs*

Since 1992, the UNFCCC has highlighted the role of capacity building in achieving the goals of the Convention, identifying 15 priority areas that range from institutional capacity-building, GHG inventories, and capacity for implementation of adaptation, mitigation, and improved decision-making, to research, and education, training, and public awareness (Khan et al., 2019; SBI, 2020, 2021).

Building on the previous work under the Convention, the Paris Agreement included capacity building in four of its articles. Article 2.1b refers to the long-term goal to increase the ability to adapt, foster

resilience, and pursue low emissions development. Articles 11, 12, and 13 explicitly aimed to address capacity building: the Paris Committee on Capacity Building (PCCB) was established under Article 11; promoting education, training, and public awareness to deal with climate change was stipulated under Article 12; and the Capacity Building Initiative for Transparency (CBIT) was established under Article 13 (Khan et al., 2018; Nautiyal & Klinsky, 2022; Sokona, 2021; UNFCCC, 2015). Although capacity building is also part of the means of implementation for the Paris Agreement (UNFCCC, 2015), it has been low on the negotiation agenda. Still, capacity is a key determinant of the success of the Paris Agreement (Khan et al., 2018) reiterated by 113 developing country's iNDCs (out of a total of 169 iNDCs), which communicated that capacity building is a condition for the implementation of their iNDCs (Pauw et al., 2019).

Taking a step back though reveals that much capacity building has been premised on the assumption that capacities, knowledge, and resources are lacking in the global South, and external assistance is required (Hagelsteen et al., 2021; Nautiyal & Klinsky, 2022). While it is indeed true that certain capacities for the NDCs, such as climate modelling, emissions modelling, monitoring and reporting, financial tracking, data gaps, and knowledge management present challenges in developing countries, it is at the same time true that there are diverse forms of knowledge and capacities that are being effective in spite of the constraints (Khan et al., 2018, 2019; Nautiyal & Klinsky, 2022). Khan et al (2018) identify the roles that local knowledge and capacities play in developing countries, in understanding local issues, identifying risks, monitoring climate impacts, selecting and prioritising mitigation and adaptation options to contribute to national development objectives, and support implementation. Recognising and building on these capacities represents a fundamentally different starting point than ignoring them, and may well reveal new ways of working that depart from the conventional, prevailing wisdoms of the global North.

This research stresses that capacity building is needed in industrialised and developing countries, and that countries need to work with existing capacities, adapt them, and build new capacities. A critical area is building capacities for new ways of working between developing and industrialised countries. Many forms of cooperation under the UNFCCC are still locked into official development assistance (ODA)-type paradigms, that place emphasis on one way donor contributions to recipient countries, that have shown that they are not fit for purpose for the climate crisis and need to be radically overhauled to support a global and systemic approach to capacity building equipped for the global commons problem of climate change (Khan et al., 2018). This will require new knowledge, capacities, and ways of working.

2.1.4.2 *Types of capacities and gaps*

Capacity building is messy, objectives are contested, and outcomes are often unpredictable and difficult to quantify, with time lags common, which make it difficult to assess impact (Khan et al., 2018). Capacity for addressing climate change can be classified as understanding the nature of the problem of climate change, its causes and impacts, the ability to develop and implement national policy actions for mitigation and adaptation, and the ability to articulate and represent national interests in the negotiations under the UNFCCC (Khan et al., 2018, 2019). Technical and analytical capacity (Dodwell et al., 2015), and policy capacities such as decision-making, policy design, and policy assessment are all relevant (Levin et al., 2015; Röser et al., 2020).

iNDC processes have built requisite capacities in countries (Röser et al., 2020). Modalities have included training workshops, seminars and educational courses, and scholarship programmes supported by development agencies (SBI, 2020, 2021). Peer-to-peer learning, technical exchange, and learning by doing have been some of the ways that capacities have been built through communities of practice working at the knowledge-policy interface (Kane & Boule, 2018; Raubenheimer & the MAPS team, 2015; Rennkamp & Boule, 2017). A survey on the iNDC formulation processes found that over 50% of respondents indicated that inadequate capacities was a core challenge experienced by countries in preparing their iNDCs in time for Paris (Röser et al., 2020). Specifically, the level of technical expertise in many countries constrained what was possible with the iNDCs, with implementation plans, assessing costs, socioeconomic impacts, and co-benefits identified as some of the main weaknesses (Kurdziel et al., 2016). Six years later, an assessment of the NDC Updates revealed prominent capacity challenges that continue to plague the progress of NDCs, such as addressing uneven awareness and capacity vertically (from national to local) and horizontally (across sectors), capacities to more effectively attract climate finance, and mainstreaming climate change as a priority concern within the state, local communities, the private sector, and society more broadly (SBI, 2021; UNFCCC, 2021).

2.1.4.3 *Critiques of approaches to capacity building*

Despite the work on capacity building under the UNFCCC, the concept still struggles with ambiguity in terms of its goals, processes, outcomes, and relevant actors (Nautiyal & Klinsky, 2022), with numerous authors questioning its efficacy (Khan et al., 2018, 2019; Nautiyal & Klinsky, 2022; Sokona, 2021). Common criticisms centre around the type of capacity building that has been institutionalised and supported by the UNFCCC, with it being *ad hoc*, short-term, rigid, supply-driven, and project-based,

and also driven by external consultants from donor countries (Khan et al., 2018, 2019; Nautiyal & Klinsky, 2022; Upadhyaya et al., 2021). Such rigid and prescribed forms of capacity building leave little space for local actors to meaningfully participate (Hagelsteen et al., 2021; Nautiyal & Klinsky, 2022), and have made it difficult to establish the long-term, institutions-based capacity required for formulating and implementing NDCs (Khan et al., 2019). Conversely, efforts to open up capacity building to include different types of knowledge, and meaningfully engage diverse knowledge holders using transdisciplinary approaches, have received fragmented and far less support from the UNFCCC (Nautiyal & Klinsky, 2022). Such different types of knowledge include contextual, cultural and traditional knowledge held by communities, indigenous peoples, and other subnational, non-state actors in local languages (Nautiyal & Klinsky, 2022; SBI, 2020, 2021). Experience has shown that approaches that value and incorporate diverse forms of knowledge and knowledge holders are sorely needed. In their analysis of UNFCCC bodies for capacity building, Nautiyal and Klinsky (2022) highlight three knowledge boundaries that currently characterise capacity building under the UNFCCC, which include developing-developed countries, local-global knowledge, types of expertise. To summarise, they point out that capacity building is focussed on developing countries, with developed countries the producers of knowledge and developing countries as the consumers, an outdated model that is proving slow to shift. Aggregate, universal, global knowledge is prioritised over local, context-specific knowledge. And that the types of expertise that are recognised include technical and managerial forms of knowledge, whilst traditional and local knowledge, social science, arts and humanities are marginalised (Nautiyal & Klinsky, 2022).

At the heart of capacity building are questions of power and politics that have, for the most part, been obscured by technocentric approaches (Nautiyal & Klinsky, 2022; Sokona, 2021). Identifying which forms of knowledge have been privileged and which forms have been marginalised by the UNFCCC and the NDCs (Laudari et al., 2021; Nautiyal & Klinsky, 2022) is a necessary step to move towards more equitable and impactful forms of capacity building. Whose knowledge holds currency in a process is partly defined by the broader socio-political context and who is perceived, for a specific policy or topic to hold authority, credibility and legitimacy, which in turn shapes their influence (Jasanoff, 2006, 2010). Such a perspective reveals how an over emphasis on the technical excludes contextual, plural forms of knowledge, while the expertise that underpins a techno-managerial framing enjoys disproportionate influence (Nautiyal & Klinsky, 2022; Sokona, 2021). Capacities therefore are fundamental to enabling and constraining the participation of actors.

2.1.5 Stakeholder participation in the NDCs

Assessing stakeholder participation in policy processes is an important part of understanding the roles and capacities of different actors, and the extent to which they were included or excluded by these processes. Public participation is regarded as an essential part of planning and policymaking in most liberal democracies in the world. However, the scientific literature on public participation for climate governance is inconclusive about whether participation contributes to more ambitious and transformative climate governance (Burton & Mustelin, 2013; Cattino & Reckien, 2021; Sprain, 2016). Studies have shown that public participation has contributed to enhancing the transformative impact of adaptation and the ambition of mitigation for local climate governance (Cattino & Reckien, 2021). Although public participation raises awareness, enables exchange between actors, and contributes to improving the content of policies, it often fails to gain traction with the political elite (Prutsch et al., 2018). Others have identified the need for discursive work to open up the climate change policy debate beyond a narrow technocratic discussion, to one that can speak to the diverse needs of the range of participating actors, thereby enhance the legitimacy of the policymaking process (Laudari et al., 2021). Although there has been a major increase in the literature on public participation in climate change policymaking since 2000 (Hügel & Davies, 2020), a limited portion covers the NDCs.

Most countries ran some kind of stakeholder consultation as part of the processes to formulate their iNDCs and Updates, albeit to varying degrees (De Pinto et al., 2018; Kurdziel et al., 2016; Röser et al., 2020; UNFCCC Secretariat, 2016, 2021). The purposes of stakeholder participation in the iNDCs were numerous, assisting with both the collection and interrogation of the data for the iNDCs, which also helped to educate and build the capacities of those who participated (Dash & Gim, 2019). Broad stakeholder participation aimed to communicate the relevance of iNDCs and raise the awareness of society about the roles of NDCs in countries (Nautiyal & Klinsky, 2022; Röser et al., 2020). Communicating the implications of iNDC processes for the development aspirations of countries, was central to creating buy-in (Atteridge et al., 2019). The ultimate objective intended with the participation of stakeholders in the iNDCs was to inform and influence decision-making and the formulation of the iNDCs (De Pinto et al., 2018).

Processes to engage stakeholders in the NDCs came in diverse forms, such as public consultations, parliamentary hearings, sectoral dialogues, and workshops. Cross-cutting working groups, research cooperations, expert teams, and technical peer review were instrumental in establishing the knowledge base of the NDCs. To encourage information exchange, the processes utilised platforms such as media and education campaigns, and invitations for written submissions (UNFCCC Secretariat,

2016, 2021). The UNFCCC's 2016 and 2021 synthesis reports consolidated the information included in the iNDCs and Updates based on the ICTU requirements. Of particular interest for this research was the information contained under planning processes, which consisted of institutional arrangements, priority areas for implementation, and stakeholder engagement. For stakeholder engagement, "several" Parties (40-70%) subjected their iNDCs to stakeholder consultation processes, compared to "almost all" Parties (more than 90%) for the Updates (UNFCCC Secretariat, 2016, 2021). Based on this evidence, stakeholder involvement strengthened between the iNDCs and Updates, and there is growing recognition of the need for whole-of-society approaches to formulating NDCs. A whole-of-society approach refers to an approach to formulating an NDC which is led by a country's government (as it is ultimately their responsibility to submit an NDC), but the design and operation of the process intentionally creates the space and modalities for meaningful and effective participation from civil society, research, and business (UNFCCC, 2021). Still, it is common for NDCs to simply state that they were conducted via stakeholder processes, with little detail or documentation about the consultations and how they enabled the participation of stakeholders, which is evidence of superficial reporting on NDC formulation processes.

Designing effective whole-of-society approaches to NDC formulation can be thought of as managing the interaction between formulation processes and actors, their knowledge and capacities, and access to information, based on the needs of the processes. The literature has identified ingredients for inclusive participation processes for formulating NDCs. Involving stakeholders from the start of the process allows actors to shape the design of processes and engage with the technical basis of iNDCs (De Pinto et al., 2018; Kane & Bouille, 2018; Levin et al., 2015). For stakeholders to participate in a robust manner, the relevance of their participation and of an NDC itself needs to be communicated (De Pinto et al., 2018; Kurdziel et al., 2016; Levin et al., 2015). Giving actors a hand in the NDC formulation is an effective way of raising awareness and cultivating ownership and support of NDC processes and their outcomes (Dodwell et al., 2015; Fransen et al., 2019; Levin et al., 2015; NDC Partnership, 2022; Röser et al., 2020). This then contributes to enhancing the likelihood of implementation (Day et al., 2015; Hsu et al., 2019; Röser et al., 2020). Part of this is about identifying and working with local champions who have the mandate to act (De Pinto et al., 2018; Fransen et al., 2019). International support, both through the technical and financial resources provided, was also identified as a key determinant of the shape and content of the iNDCs (Day et al., 2015).

Box 1 below provides an example of how knowledge creation and stakeholder participation can be conducted to establish legitimate and inclusive processes, and robust and well-supported knowledge to inform the formulation of NDCs.

Box 1: The role of knowledge creation and participation in preparing for iNDCs – The MAPS programme

De Pinto et al. (2018) highlight not only the quality of knowledge produced, but the importance of the knowledge creation process in the formulation of an iNDC. An example of this was the value in different modelling groups adopting different approaches to develop well-supported results, and the importance of communicating the knowledge base transparently to build trust in Colombia (De Pinto et al., 2018). Colombia was one of four countries, along with Brazil, Chile, and Peru, that participated in the Mitigation Action Plans and Scenarios (MAPS) programme. The programme lasted from 2010 to 2015 and sought to build the knowledge, scenarios and community of practice for low emissions development in these four countries (Raubenheimer & the MAPS team, 2015). It is important to note that the programme was well under way before the iNDCs had even been agreed to. Therefore, while these country processes were not explicitly designed around the iNDCs, they did the relevant analytical and process work that could be drawn on when these four countries were developing their iNDCs.

To start with, the processes were government-mandated and exposed data and scenarios to in-depth stakeholder processes through so-called ‘scenario building teams’. The role of professional facilitation for both process design and operation was instrumental in establishing a robust and inclusive conversation between the researchers responsible for developing the evidence base, and carefully selected representatives from government, civil society and business. Consequently, the stakeholder processes were equipped to inform the iteration of the data, assumptions, and scenario development based on stakeholder inputs and deliberation. The southern community of practice, which was established over five years and was made up of local teams in each country, was invaluable for fostering south-south knowledge exchange and learning (Boulle et al., 2015; Kane & Boulle, 2018; Rennkamp & Boulle, 2017). Creating knowledge in this manner enhanced the credibility, salience, and legitimacy of the knowledge base, thereby improving its usability and uptake by policy, and overall ownership (De Pinto et al., 2018). The experience also illustrated the time needed for robust processes, as the countries were able to leverage off four years of work, rather than having to run a full process in the year leading up to Paris (Boulle et al., 2015; De Pinto et al., 2018; Kane & Boulle, 2018; Raubenheimer & the MAPS team, 2015). Lastly, providing the space for local researchers to work alongside policymakers over an extended period of time, allowed for continuity that was

imperative for strengthening the knowledge-policy interface and for building trust (De Pinto et al., 2018). While the initiation of MAPS long preceded the NDCs, the results and the communities of practice from the programme built support for and informed the development of iNDCs in all four countries (Kane & Boulle, 2018; Raubenheimer & the MAPS team, 2015; Rennkamp & Boulle, 2017).

This section has discussed the interaction between knowledge, capacities, and participation, and the implications for formulating NDCs. Laudari et al. (2021) highlight that stakeholder participation is both inherently technical and political, and influences whose interests are represented and whose are marginalised. Given the technical and political nature of the NDC processes, those that lack these types of capacities struggle to participate and be heard (Nautiyal & Klinsky, 2022). To have influence in a process, policy actors need to hold something valued by a process, which can be knowledge or roles, such as knowledge production, communication and translation of knowledge, legitimisation, or providing financial resources. The following section elaborates on this discussion, with a focus on the politics of knowledge and its relevance for NDC processes.

2.2 Geographical divides in the politics of knowledge

Studying the politics of knowledge is concerned with how and why knowledge is produced and distributed between different actors, the ways in which it is used, and the distribution of power that is associated with having knowledge. Therefore, drawing attention to the politics of knowledge aims to demonstrate the inherent power dimensions of the interaction between actors, knowledge, and policy and how policy actors mobilise knowledge to represent their interests in a policy process. To assess how policy actors exercise power, the chapter discusses how knowledge is used as a tool by policy actors for substantiating and legitimising their interests and political strategies (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). The politics of knowledge is a term that applies to both a national context, in which knowledge and power is typically unevenly distributed across actors, and internationally, where it is particularly visible in the divide between the global North and South (Borland et al., 2018; Corbera et al., 2016; Nightingale et al., 2019). Such a critical perspective of knowledge enables an under-examined view of how these inequalities and imbalances in knowledge creation and use are reflected in the ways that the NDCs are formulated.

Implicit in recognising the politics of knowledge is acknowledging the global South as more than a geographical term: “It references an entire history of colonialism, neo-imperialism, and differential economic and social change through which large inequalities in living standards, life expectancy and access to resources are maintained; and opens new possibilities in politics and social science” (Dados

& Connell, 2012, p. 13). If taken seriously, this understanding of the term 'global South' brings into view the need to examine what Mahony and Hulme (2016) refer to as the 'epistemic geographies' of global knowledge, and the need to address the imbalance in the influence of knowledge from the North and the South (Borland et al., 2018; Mahony & Hulme, 2016). The imbalance and divides exist too between science and policy, science and society, and between policy actors (Corbera et al., 2016; Cornell et al., 2013).

The divergent interests of policy actors and the negotiation process between these groups shape the role of knowledge and its influence in policy processes. Understanding the power dynamics implicit in these negotiations forms an integral part of understanding the potential and limitations of knowledge to contribute to change. A growing body of work identifies the need to interrogate commonly held assumptions underpinning much of the work on climate change, and particularly the ways in which processes to create and use knowledge for policy legitimise and elevate certain knowledge contributions and marginalise others (Borland et al., 2018; Jasanoff, 2010; Keeley & Scoones, 2003; Leyshon, 2014; Mahony & Hulme, 2016; Patterson et al., 2017). Ison (2010) highlights how a critical examination of 'how we do what we do' offers the possibility to more deeply understand the implications of how we choose to work, for coming to terms with the complexity of the realities we seek to change (Ison, 2010; Leyshon, 2014; Tyler, 2019).

The IPCC and the UNFCCC have been fundamental in shaping climate change as a global problem, building a knowledge base, and in working towards international consensus on the causes and impacts of climate change, and need to act. The IPCC was formed to bring together the leading scientists from countries to assess, synthesise and communicate the state of knowledge on climate change in terms of its causes, impacts and response options. The knowledge base developed by the IPCC over the more than three decade history, has been central to informing the international climate negotiations under the UNFCCC, agreements under the Convention such as the Paris Agreement, and countries' responses. The UNFCCC is a framework convention that has gradually established the governance architecture to govern the global response to climate change (Corbera et al., 2016; Jasanoff & Wynne, 1998; Kuyper & Schroeder, 2018; O'Riordan et al., 1998). Through their interaction, the IPCC and UNFCCC have also been influential in determining the types of knowledge required and recognised by NDC processes. Given that the patterns of authorship in the IPCC show serious inequalities between authors from the North and South, with northern individuals and institutions dominating authorship (Corbera et al., 2016), such inequalities influence what knowledge counts in the NDC processes. As a result, these inequalities are reflected and perpetuated in the ways that NDCs are formulated.

There is a growing body of literature that highlights that western universalism marginalises other ways of knowing and the plurality of alternative knowledge systems (Amo-Agyemang, 2021; Chilisa, 2017; Ndofirepi & Gwaravanda, 2018; Nyamnjoh, 2019). As a result, local African knowledges are excluded across disciplines (Ndofirepi & Gwaravanda, 2018). This has led to a situation in which injustices of the past are repeated, instead of knowledge production driving change on the continent (Ndlovu, 2018). Re-centring African knowledge systems, and methodologies aims to recognise a plurality of knowledges held by different actors, who are equipped to address the most pressing problems facing the continent, through relevant and locally-based solutions (Amo-Agyemang, 2021; Chilisa, 2017; Ndofirepi & Gwaravanda, 2018; Nyamnjoh, 2019). A shift to greater emphasis on national and local knowledge in African countries, produced by African researchers and other policy actors will be critical if NDCs are to be relevant and impactful on the African continent.

Translating the progress achieved in terms of agenda-setting at the international level of climate policy, to action in the diverse contexts of participating countries has encountered serious challenges (Edwards, 2010). Part of the challenge of translating the international to the national is creating what Gibbons et al. (1994) call 'socially robust knowledge', which is created in the context within which it will be applied, with the involvement of affected parties. Ultimately for knowledge to drive the change envisaged under agreements like the Paris Agreement, through commitments such as the NDCs, knowledge requires the participation of local constituencies to create rigorous, socially robust, and long-lasting knowledge systems. Such a perspective shines a light on and critically examines how NDCs are formulated in African countries, as well as the participation of policy actors, the role of knowledge, and the terms under which support is offered. This perspective also raises questions about the ways in which these processes are conducted, and where change is needed. The prevalence of international framings, methodologies, and consultants in NDC processes in Africa suggests that much work still needs to be done to move towards African-developed NDCs.

Re-defining an understanding of knowledge for developing and implementing NDCs in the global South, and particularly African countries, involves a greater appreciation for the partial nature of research-based knowledge, the uneven distribution of knowledge and power, the influence of different policy actors, and the global dynamics of knowledge systems (Borland et al., 2018; Mahony & Hulme, 2016; van Kerkhoff & Lebel, 2006). Placing emphasis on creating conversations that honour and value diverse perspectives is an endeavour to recognise the imbalances that currently exist, and the opportunities for better equipping knowledge systems to work with these differences (Cornell et

al., 2013; Green, 2013; Leyshon, 2014; Mahony & Hulme, 2016; van Kerkhoff & Lebel, 2006). Critical southern voices from the literature have shown the potential of examining knowledge practices and knowledge systems, to open up spaces for the sharing of diverse knowledge practices, which are rooted in context-specific perspectives, as the building blocks of processes that are relevant and responsive to the realities of different contexts of the South (Borland et al., 2018; Chilisa, 2017; Green, 2013, 2017; Kane & Boulle, 2018; Ndofirepi & Gwaravanda, 2018).

Part of addressing these imbalances lies with concentrating on knowledge systems and knowledge workers, and in applying knowledge to action, identifying the possibilities of developing new conversations and new ways of working in unfamiliar relationships through learning-by doing (Blanco et al., 2009; Boulle et al., 2015; Connell, 2014; Kane & Boulle, 2018; Rennkamp & Boulle, 2017; Watson, 2016). For this, NDC processes offer a unique testing ground that have up to now been reluctant to really push the envelope in addressing the imbalances associated with the politics of knowledge.

2.3 Concluding remarks

This chapter has provided an overview of the literature on NDC formulation processes. Majority of this literature, however, assessed the iNDCs, with limited literature on the NDC Updates and even less comparing the Updates with the iNDCs. This chapter demonstrated how the literature paid limited explicit attention to the NDC formulation processes, although the growing body of literature offered insights from the NDC experience that are relevant reflections on the process. It is evident that much of the literature focusses on global, state of play assessments of the NDCs, but far less literature is available at the country-level to understand the underlying dynamics of the NDC processes. Most of the literature on country-level assessments includes survey-type data, that gives a high-level perspective of countries, and is suitable for aggregation or inclusion in publications like UNFCCC Synthesis Reports, which aim to give a global picture of the state of play in relation to NDCs. But these analyses do not provide the granular type of assessments needed to understand the drivers of country-level dynamics. More specifically, African-based knowledges have been underappreciated by these processes, and are needed to move to granular, country-level analysis of NDC processes in African countries. To make its contribution to the literature, this research develops and applies a policy knowledge systems conceptual framework to assess the iNDC and NDC Update formulation processes in South Africa, Ghana, and Kenya. The intention with this framework is to move from describing “what” these processes consisted of, to characterising “how” and “why” these processes unfolded according to their country contexts, and their implications. In service of this objective, the research

developed a policy knowledge systems conceptual framework, which is discussed in the following chapter.

CHAPTER 3: Reviewing the theoretical literature on the roles of knowledge in policy processes to develop a conceptual framework

This chapter draws attention to the theoretical literature on knowledge in policy processes. While this is a rich body of literature, it has been drawn on by the research literature on the NDCs to a limited extent only. The chapter starts by reviewing the body of literature on knowledge and knowledge systems in policy processes. The second half of the chapter then brings together the literature on NDC processes and on knowledge systems in policy processes, to develop and present a unique policy knowledge systems conceptual framework. The framework was applied to the data collection and analysis to reveal how and why NDC processes unfolded as they did, according to their country contexts, and how they arrived at their knowledge system outcomes. Although not the focus, this conceptual framework also uncovered insights about the implementation prospects of the NDCs, which can inform future NDC processes.

3.1 What counts as knowledge?

Knowledge can be defined as a justifiable belief (Rorty, 1979). Understanding knowledge in this way moves the emphasis from what knowledge is, to how a belief or set of knowledge is justified, which opens the space for different forms of knowledge and for the importance of knowledge-in-the-making (Jasanoff, 2010; van Kerkhoff & Lebel, 2006). The form of knowledge determines the criteria for justification of what counts as knowledge (Strambach & Klement, 2012; van Kerkhoff & Lebel, 2006). For example, scientific knowledge uses the standards of a particular discipline and the peer review process to create and validate knowledge. Local knowledge is assessed on whether it is situated in a particular place, whereas practical knowledge comes from experience; knowledge acquired through practice (van Kerkhoff & Lebel, 2006). Gibbons et al. (1994) differentiate between Mode 1 and Mode 2 knowledge. Mode 1 refers to the type of knowledge produced by an academic discipline, according to its disciplinary standards. Mode 2 knowledge is created through application in a context, and is therefore responsive to the context and includes a broader range of actors than just scientists (Gibbons et al., 1994). The focus of this research is on research-based knowledge, but it is concerned too with broader forms of knowledge held by policy actors in policy processes. Further disaggregating the characteristics of knowledge, de Jong and Ferguson-Hessler (1996) demonstrate the implications of different types and qualities of knowledge. Types of knowledge they identify consist of situational, conceptual, procedural and strategic. Situational is the knowledge of a problem situation. Conceptual knowledge refers to principles, facts and concepts. Procedural knowledge has to do with actions that

can support a transition from one problem situation to another, and strategic knowledge guides the stages of a problem solving process to reach a solution (de Jong & Ferguson-Hessler, 1996).

Qualities of knowledge include: level, structure, automation, modality, and generality. Level of knowledge distinguishes between deep and surface level. The structure of knowledge determines storage and recall of knowledge, whilst automation refers to the degree to which it is tailored for a particular purpose and enables continual application and execution. Modality refers to storing knowledge verbally or in images, and generality of knowledge ranges from being general to specific (de Jong & Ferguson-Hessler, 1996). These knowledge types and qualities are represented in Table 2 below.

Table 2: A matrix of knowledge types and qualities (de Jong & Ferguson-Hessler, 1996)

		Types			
		Situational	Conceptual	Procedural	Strategic
Qualities	Level				
	Structure				
	Automation				
	Modality				
	Generality				

This research seeks to uncover different forms of knowledge held by actor groups participating in policy processes. For this purpose, a framing of a knowledge-policy interface is more appropriate than a science-policy interface (Keeley & Scoones, 2003; Muñoz-Erickson, 2014; van Kerkhoff & Lebel, 2006; van Kerkhoff & Pilbeam, 2017; Ziervogel et al., 2016). Knowledge held by actors is understood as part of their basis for reasoning, decision-making, and action. Knowledge can be both tacit and explicit, two forms of knowledge that are interrelated, dependent on one another. Tacit knowledge refers knowledge that is held by an actor such as experience and skills. Explicit knowledge is knowledge that has been codified, usually written down, and therefore more easily transferred, but is at the same time, dependent on tacit knowledge for understanding and application (Polanyi, 1966). The processes through which knowledge is assembled, processed, and updated are complex processes of judgement that evolve continuously and are influenced by negotiation and contestation between interests (Cornell et al., 2013; Jasanoff, 2006, 2010; Muñoz-Erickson, 2012; van Kerkhoff & Pilbeam, 2017). Given the focus on actors, the interface can be thought of as an actor-knowledge-policy interface.

As Jasanoff (2006, 2010) suggests, adopting a broader view of knowledge aims to identify what forms of knowledge are produced, held, and used by different actors in a policy process, and indeed what

forms of knowledge are recognised and represented by a process and its outcomes. Considering and addressing issues of inclusion and exclusion of knowledge and actors is of particular importance when studying African countries, given the inequalities in global knowledge production for climate change (Borland et al., 2018; Corbera et al., 2016; Mahony & Hulme, 2016) and the marginalisation of African knowledges, methodologies, and epistemologies, as discussed in the previous chapter (Amo-Agyemang, 2021; Chilisa, 2017; Ndlovu, 2018; Ndofirepi & Gwaravanda, 2018; Nyamnjoh, 2019).

For understanding the transfer and uptake of knowledge, paying attention to the micro-dynamics of knowledge provides useful insights into how knowledge types differ in terms of their learning processes, evaluation criteria, and institutional dimensions (Klement & Strambach, 2019; Strambach & Klement, 2012; Strambach & Surmeier, 2013). The flow of knowledge is not straight forward, but is rather the result of complex interactions between context dependence of knowledge, process character, tacit dimensions, institutional features and actor ecosystem (Strambach & Klement, 2012; Strambach & Surmeier, 2013). The distinction between cumulative and combinatorial dynamics of knowledge highlight the geographical, social, and institutional dimensions of learning. Cumulative knowledge refers to how new knowledge draws on existing knowledge, therefore resulting in path dependency. Contrastingly, combinatorial knowledge seeks to bring together separate knowledge bases from different institutional environments, but given the geographical, social, and institutional dimensions of learning that differ between different types of knowledge, bringing them together often poses challenges (Strambach & Klement, 2012). These features from the literature help to explain the capabilities and limitations of knowledge for driving change, and move from an understanding of knowledge as object, to recognising the dynamic nature and process features of knowledge, knowledge as competencies for action (Ibert, 2007; Strambach & Klement, 2013). To further explore how knowledge contributes to change, the following section demonstrates how knowledge systems, which are made up of actors and knowledge, interact with and shape policy processes.

3.2 Knowledge and change in policy processes

Uncertainty remains in explaining why and how knowledge leads to change and the ways in which the roles of knowledge for policy are enabled and constrained (Cornell et al., 2013; Never, 2012b; O'Brien et al., 2013; van Kerkhoff & Lebel, 2006). Significant evidence across fields demonstrates that advances in knowledge, and specifically science, have not translated to commensurate progress in action, particularly when it comes to sustainability or climate action (Glavovic et al., 2021; Haines et al., 2004; van Kerkhoff & Lebel, 2006; van Kerkhoff & Szlezák, 2016; West et al., 2019). Unpacking the interactions between knowledge and policy processes offers opportunities to better understand the

different roles that knowledge plays, including reasons for what makes some bodies of knowledge influential in a policy process whilst others are marginalised, and the underlying contestation (Chilisa, 2017; Cornell et al., 2013; Jasanoff, 2006, 2010; Muñoz-Erickson, 2014; Nightingale et al., 2019).

There is a well-established body of literature on linking knowledge and action for impact. Impact is considered broadly and includes problem framing, shaping the consideration of response options, policy formulation, policy implementation and policy evaluation, and how knowledge influences these activities and decision-making therein (Cash et al., 2003; Pohl et al., 2017). In early work on knowledge and action, the 'trickle down' model was based on the assumption that high quality, rigorous research would automatically be taken up in decision-making, without the need for researchers to dedicate additional efforts to communicate and translate their work to enhance its uptake (Latour, 1998; van Kerkhoff & Lebel, 2006). Given the limited impact of the 'trickle down' approach, the 'transfer and translate' model emerged in the 1970s, which saw research as a product that required efforts to be communicated and translated, and then transferred to users for it to have impact outside the research community. The transfer was conceived as a one-way flow of information from the scientific community to the users of knowledge (Gibson, 2003; Muñoz-Erickson, 2012; van Kerkhoff & Lebel, 2006).

These oversimplified models obscured from view the complex, multi-dimensional, multi-directional character of the relationship between knowledge and action. As a result, these models have been subject to extensive critique that makes the case for moving away from such oversimplified models. In line with these critiques, van Kerkhoff and Lebel propose (2006, p. 473) that "the relationships between research-based knowledge and action can be better understood as arenas of shared responsibility, embedded within larger systems of power and knowledge that evolve and change over time". This represents a move away from a simplistic, linear understanding of the relationship between knowledge and action, and acknowledges that the impact of research-based knowledge needs to be considered in relation to other forms of knowledge, the holders of knowledge, the characteristics of the governance context, and the authority and marginalisation of knowledge that is determined by the interaction between knowledge and politics (Jasanoff, 2006; Keeley & Scoones, 2003; Muñoz-Erickson, 2014; Patterson et al., 2017; van Kerkhoff & Lebel, 2006; van Kerkhoff & Pilbeam, 2017). The evolution of knowledge and the systems it is embedded in highlights that neither are static; both are dynamic and therefore change over time (van Kerkhoff & Lebel, 2006). Concepts such as knowledge systems emerged out of this shift to a more systemic understanding of the role of knowledge.

3.3 Knowledge systems and policy processes

This thesis draws on the critical perspectives of science and technology studies (STS) and sustainability science for its understanding of knowledge systems in policy processes. These perspectives are problem-oriented, have drawn on a broad range of fields, and adopt a systems perspective of the role of knowledge in policy processes. Therefore, they offer perspectives that move beyond a linear, mechanical perspective of how knowledge operates in policy processes, to analyse the production of the scientific and political elements of policy processes as parallel, intertwined processes (Cornell et al., 2013; Jasanoff, 2010; Nightingale et al., 2019; Pohl, 2008; van Kerkhoff & Lebel, 2006; van Kerkhoff & Pilbeam, 2017; West et al., 2019). Cornell et al. (2013, p. 61) understand knowledge systems as the following: “Knowledge systems are made up of agents, practices and institutions that organise the production, transfer and use of knowledge”.

Knowledge systems are made of knowledge and actors and shape how knowledge is created, used, the impact of knowledge (Cornell et al., 2013; Never, 2012b; O’Brien et al., 2013). Knowledge systems is a concept that has been applied in a variety of settings and is not limited to policy processes. The primary interest of this research in knowledge systems is in their role in policy processes. Oliver et al. (2021) bring together policy and knowledge systems, which they refer to as policy-knowledge systems, and call for a coordinated reform of policy and knowledge systems to better equip them to drive the scale and speed of necessary sustainability transitions (Oliver et al., 2021). Reforms proposed include mainstreaming systems thinking and participatory policy-making, expanding capacities for transdisciplinary research, enhancing adaptive governance, and prioritising organisational development. These reforms are intended to establish more holistic and iterative processes for knowledge creation and use in policy (Oliver et al., 2021). To demonstrate and elaborate on the relevance of knowledge systems in policy processes, the follow sub-sections break down and discuss the constituent features of knowledge systems.

3.3.1 The different types of knowledge that make up knowledge systems

As discussed in Section 3.1, what counts as knowledge is determined by its intended use and its criteria for justification. For sustainability goals such as climate action, scientific knowledge continues to be the primary source of knowledge, with claims to credibility and authority (Jasanoff, 2006, 2010; van Kerkhoff & Lebel, 2006). Gibbons et al. (1994) refer to this type of knowledge as Mode 1 knowledge. At the same time, scientific knowledge interacts with other types of knowledge to influence decision-making (Muñoz-Erickson & Cutts, 2016; van Kerkhoff & Lebel, 2006; Ziervogel et al., 2016). While local

knowledge is important for tailoring knowledge to the specificities of a context, practical knowledge is crucial for practice and implementation, and political knowledge is needed to navigate policy processes (van Kerkhoff & Lebel, 2006). These types of knowledge can be thought of as Mode 2 knowledge, as they are context-specific, created through application, and include a broad range of actors (Gibbons et al., 1994). Jasanoff and Wynne (1998) and Pohl (2008) highlight that sustainable development is dependent on the participation of the whole of society; therefore a diversity of actors and forms of knowledge are necessary.

Sustainability science identifies how scientific knowledge can contribute to sustainability by producing specific types of knowledge. Therefore, the intended use of knowledge is clear (Cornell et al., 2013; Pohl, 2008; Pohl et al., 2017). Scientific knowledge can contribute to sustainability by providing systems knowledge, target knowledge, and transformation knowledge (Pohl et al., 2017; ProClim, 1997). Systems knowledge includes concepts that allow us to understand the status quo, or the existing system. Therefore, systems knowledge is important for problem definition and policy development for responding to the problem, and for policy evaluation to ascertain the degree to which the baseline situation has been transformed (Kueffer et al., 2019; Pohl et al., 2017; ProClim, 1997; Schneider et al., 2019). Systems knowledge responds to the question ‘What is?’ (Pohl et al., 2017; Pohl & Hirsch Hadorn, 2008; ProClim, 1997). Given that knowledge used for framing the policy problem also influences the knowledge needed for the policy response, systems knowledge is influential for shaping how knowledge and the policy process interact, and which knowledge is recognised and marginalised (Daviter, 2019; Head, 2022).

Target knowledge, on the other hand, describes the need for change and the desired goals or vision that society should be aiming for. This includes scenarios and indicators to represent these visions and goals. Target knowledge responds to the question, ‘What ought to be?’ (Pohl et al., 2017; Pohl & Hirsch Hadorn, 2008; ProClim, 1997). This knowledge type is relevant for policy development and policy evaluation to assess progress made by policies developed to attain the target formulated (Pohl et al., 2017).

Finally, transformation knowledge deals with how to transform technical, political, institutional, and socioeconomic dimensions of the current system to the target system, which include developing scenarios and assessing and choosing options to enact this transformation (Hubeau et al., 2017; Kueffer et al., 2019; ProClim, 1997). Transformation knowledge responds to the question, ‘How to?’. Such knowledge is relevant for policy development and implementation required to enact a

transformation to reach the target status (Pohl et al., 2017; Pohl & Hirsch Hadorn, 2008; ProClim, 1997). For impact, these different types of knowledge need to be produced or used by actors.

3.3.2 Actors are central to the operation of knowledge systems

Actors are central to the composition and operation of knowledge systems. Actors can be individuals or organisations that participate and compete for influence in knowledge systems and policy processes (Cornell et al., 2013; Jasanoff & Wynne, 1998; Pohl, 2008; Rafey, 2013). The term ‘policy cultures’, which was coined by Elzinga and Jamison (1995), was initially used in STS to investigate the ways in which different societal interest groups interact to shape the relationship between science and politics; specifically the direction of science and technology policy. Since then, the concept has been applied more broadly to investigate the roles of actor groups, and how they mobilise knowledge to represent their interests and those of their political constituencies (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998; Muñoz-Erickson, 2012; Pohl, 2008). There are four policy cultures that represent main actor groups in policy processes: bureaucratic-political; civic-social; academic; and economic policy cultures (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998). This is discussed in more detail in Section 3.4.1, including how these concepts are operationalised by the conceptual framework developed for this research. The knowledge of actors differ according to their skills, domain expertise, location of capacities, size of teams, and whether the work to build these capacities is sustained over time or *ad hoc* in nature (Khan et al., 2019; Nautiyal & Klinsky, 2022; Sokona, 2021).

Closely related to the capacities of actors are their roles at different stages of a policy process; with a focus on knowledge, these roles can be differentiated according to producers, users, and contestants of knowledge (Rafey, 2013). Drawing on approaches from STS, Rafey (2013) highlights the roles of producers of technical knowledge, such as scientists and policy analysts, the users of knowledge, such as decision-makers in government, and contestants of that knowledge, such as civil society, business, and lobbyists. The interaction between the actors and their roles determines what is possible in a policy process (Rafey, 2013).

How actors manage the boundaries between knowledge and policy determines how policy actors shape the knowledge-policy interface (Cash et al., 2003). Continuity in co-creating knowledge at the knowledge-policy interface, and the quality of the space established to support the working together between local researchers and policymakers, are important ingredients for enhancing the relationship between knowledge and policy, and for building trust and legitimacy (De Pinto et al., 2018; Ryan & Bustos, 2019). Managing these boundaries then has implications for the support of actors, for the

knowledge produced, and the policy developed. Here the concept of boundary objects is relevant, which refers to objects that enable actors to organise around and engage with, while also holding divergent interpretations of the boundary object (Cash et al., 2003; Lahn & Sundqvist, 2017). Relevant examples include assessment reports, scenarios, or targets that organise interactions at the knowledge-policy interface. Knowledge plays a fundamental role in establishing boundary objects. Latour (1987) and Lahn and Sundqvist (2017) draw attention to how, as boundary objects become accepted, they tend to get black-boxed; meaning their assumptions and historical and methodological origins are removed from view, as is their importance. The resultant black box is therefore in essence a taken-for-granted container of perceived-to-be apolitical factors (Lahn & Sundqvist, 2017). Knowledge systems that perform boundary work, such as communication, translation, and mediation, can help to open a black box and build credibility, relevance, and legitimacy to garner support.

3.3.3 Credibility, relevance, and legitimacy in knowledge systems

Knowledge systems responding to wicked problems need to go beyond producing technically sound knowledge to manage the role of knowledge and the boundaries between knowledge and policy (Cash et al., 2003; Cash & Belloy, 2020). This includes determining how participatory and transparent the knowledge production and use of knowledge in a policy formulation process is, which has implications for the acceptance and support of the process, knowledge, and resultant policy (Cash et al., 2003; De Pinto et al., 2018; Haas, 2004).

Cash et al. (2003) find that knowledge systems that perform boundary work, such as communication, translation and mediation, help to bring along actors in the policy formulation process. Effective knowledge systems carry out these functions in the attempt to enhance the salience, credibility, and legitimacy of the knowledge produced. They do so by incorporating the needs of end users, drawing on expertise, and allowing access of a range of stakeholders to information and processes, thereby enhancing the likelihood of support for and impact of the knowledge system (Cash et al., 2003; Cash & Belloy, 2020; Lahn & Sundqvist, 2017). Communication refers to the communication between experts, decision-makers and other actor groups and how this communication is characterised. Important characteristics of effective communication include its inclusivity, its regularity, and whether it enables the flow of information between actors instead of being one-way communication with a dominant provider of information and a passive recipient (Cash et al., 2003). Translation is required to traverse the different backgrounds and views of actors, to establish a mutual understanding of the knowledge, and communicate its relevance and that of the policy. Lastly, knowledge systems need to play a mediation role given the conflict that arises between the different interest of actors and how

these are represented by the knowledge system. It follows that mediation is required to build consensus (Cash et al., 2003).

Boundary work has implications for the qualities of the information that knowledge systems produce, namely their credibility, salience, and legitimacy (Cash et al., 2003; Cash & Belloy, 2020; Haas, 2004). Credibility refers to the adequacy of the technical evidence; whether it is regarded as scientifically adequate by the standards of its field of study. Salience refers to the degree to which knowledge produced is relevant, in terms of meeting the needs of decision makers and other knowledge users. Finally, legitimacy points at the process through which knowledge is created and its ability to involve policy actors and represent opposing views and competing interests (Cash et al., 2003; Cash & Belloy, 2020). The proposition is that enhancing the credibility, salience, and legitimacy of knowledge also improves the usability of knowledge for policymakers or decision makers, and contributes to strengthening its impact (Cash et al., 2003; Cash & Belloy, 2020; De Pinto et al., 2018; Haas, 2004). The value of discussing these qualities is that they illuminate not only the technical quality of knowledge, but also the contested nature of knowledge creation and use, and shine a light on features of knowledge-in-the-making (Haas, 2004; Jasanoff, 2010; Muñoz-Erickson, 2012).

3.3.4 Consensus and contestation in knowledge systems

Understanding knowledge as a product of negotiation places values, interests, and contestation at its centre (Cozzens & Woodhouse, 1995; Rafey, 2013). This view of knowledge demonstrates that policy is not only an administrative and technical challenge of alignment and implementation, but is inherently political (Cozzens & Woodhouse, 1995; Wijsman & Feagan, 2019).

Rafey (2013) identifies the importance of studying scientific and political processes as parallel and inter-related, highlighting the need to consider the producers, users, and contestants of knowledge, and specifically technical knowledge in policy processes. Central to this analytical contribution is the use of ‘essentially contested concepts’ (Gallie, 1956), which refer to concepts that allow for multiple interpretations, all of which are substantiated by seemingly credible arguments or evidence but represent divergent valuations of the concept (Rafey, 2013). These contestations are therefore difficult to resolve, and while appeals are often made for more technical knowledge, simply more technical knowledge is unlikely to suffice (Gallie, 1956; Rafey, 2013). The result is that contestation continues to play out until some kind of consensus is established or compromise is reached (Gallie, 1956; Rafey, 2013). Contestation plays out at multiple, interconnected points and is thus systemic (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). This adds to the complexity

of trying to build consensus, but also highlights the dangers of proceeding with policy formulation or implementation without paying explicit attention to these conflicts. Political work is needed to illuminate conflicts and build a degree of consensus that is politically feasible and durable. 'Cooling down' a controversial issue can be a strategy for building consensus adopted by scientific expertise intervening in policymaking, rather than adding to the politicisation of an issue (Lahn, 2018; Sundqvist, 2014).

One of the sources of contestation implied by this perspective is that which arises between the different framings that actors bring. This is particularly stark in the heterogeneous framings of climate change as a problem and the response options proposed (Jasanoff & Wynne, 1998). Controversies over science are not a phenomenon unique to climate policy (Cozzens & Woodhouse, 1995; Jasanoff & Wynne, 1998; Rafey, 2013), but engaging with these controversies does require a precise characterisation of the knowledge that encounters contestation, and of the contestation itself.

Inherent to contestation in knowledge systems is the politics of knowledge, which is concerned with: how and why knowledge is produced and distributed between different actors; the ways in which it is used by different actors vying for influence at the knowledge-policy interface; and the distribution of power associated with these bodies of knowledge and actor-interests (Amo-Agyemang, 2021; Cozzens & Woodhouse, 1995; Lahn, 2018; Nautiyal & Klinsky, 2022; Ndofirepi & Gwaravanda, 2018). The politics of knowledge applies as much to a national context, in which knowledge and power is typically unevenly distributed across actors, as it is internationally. The latter is particularly visible in the divide between the global North and South (Borland et al., 2018; Corbera et al., 2016; Nightingale et al., 2019), and the marginalisation of African countries, in terms of knowledge production and recognition of knowledge (Amo-Agyemang, 2021; Chilisa, 2017; Ndofirepi & Gwaravanda, 2018).

This section has reviewed the literature on knowledge systems in policy processes to surface the interactions between actors, knowledge, and policy. In this section, knowledge is viewed as a tool employed by actors for substantiating and legitimising political strategies (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). The relevance of these interactions has only been acknowledged to a limited extent in the current literature on NDCs, as demonstrated by the literature reviewed in Chapter 2. A growing body of work identifies the need to interrogate commonly held assumptions underpinning work on climate change and particularly the ways in which our processes to construct knowledge, elevate certain knowledge contributions and marginalise others (Keeley & Scoones, 2003; Leyshon, 2014; Mahony & Hulme, 2016; Patterson et al., 2017). To contribute to this

growing body of work, the following section presents a conceptual framework that brings together these disparate bodies of literature on NDC processes and knowledge systems in policy processes, to offer a unique lens through which to study NDC processes.

3.4 A conceptual framework for understanding NDC processes through the lens of policy knowledge systems

Understanding how climate action, both mitigation and adaptation, contribute to achieving the long-term goals of the Paris Agreement requires research and new knowledge. How does the necessary knowledge emerge? How is it used? Whose knowledge contributes to these critical climate policy processes, and whose is left out? Exploring these questions requires understanding knowledge creation and its translation for use in policy processes. Knowledge creation can be understood as a dynamic process that evolves in a system of interconnected actors, or a knowledge system.

While Oliver et al. (2021) use the term policy-knowledge system, they do not propose a definition for it nor utilise it as a single concept. Rather, they use the term to refer to the interaction between policy and knowledge systems, and the need for both of these and the relationships between them to be reformed in a coordinated manner (Oliver et al., 2021). A policy knowledge system is defined by this thesis as a system of interconnected policy actors that, based on their roles and capacities, the knowledge they hold, and the access they are permitted to a policy process, attempt to influence a policy process and its outcomes in ways that represent their interests (Cornell et al., 2013; Muñoz-Erickson, 2014; Never, 2012a; Oliver et al., 2021; Pohl, 2008). This definition includes interests, influence, marginalisation, and contestation between actors, knowledge, and policy. The concept of a policy knowledge system, operationalised by the conceptual framework that will be presented in this section, offers a lens for revealing how and why these intersections shape NDC processes, their knowledge system outcomes, and implementation prospects.

The conceptual framework presented here seeks to bring together the disparate bodies of literature on NDC processes and knowledge systems in policy processes, in order to make an original contribution. It is important to acknowledge here that much of the literature cited on knowledge systems from STS and sustainability sciences is published by authors in industrialised nations. By drawing on other bodies of literature, such as the politics of knowledge, this research has sought to adapt the body of literature on knowledge systems for use in African countries. The limited literature written by African authors is indicative of the small community of practice working on climate policy in African countries, many consumed with providing technical support to governments. This means

that there is little capacity for this type of meta-analysis on knowledge systems and the politics of knowledge in climate policy and the NDCs. This, despite it being important work for addressing the inequalities in knowledge production that many African countries are struggling with in their formulation and implementation of NDCs. This research endeavours to contribute to this type of analysis on the continent; a contribution that others can build on.

What follows is a description and presentation of the conceptual framework and its constituent elements. The conceptual framework starts by discussing the policy actors who represent the main actor groupings in NDC processes, what knowledge they hold, and how they interact with one another and mobilise knowledge to participate in shaping NDC processes. The features shaping the participation of policy actors in NDC processes are then presented, which include: how actors are granted policy access; the roles and capacities of actors; and the knowledge and interests they hold. These features are utilised as the anchor points for exploring how the interactions between actors, knowledge, and policy plays out in NDC processes, and their implications. The final component of the framework relates to the knowledge system outcomes of NDC processes, namely the knowledge base and its qualities, consensus and contestation, and representation and marginalisation of policy actors.

3.4.1 Policy actors participating in NDC processes

The flow of knowledge is shaped by the actor ecosystem (Strambach & Klement, 2012; Strambach & Surmeier, 2013). This conceptual framework incorporates policy actors by adapting the four policy cultures that represent main actor groups in policy processes (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998). Figure 3 represents interacting policy cultures, renamed as policy actors, and includes a number of adaptations to the models proposed by Elzinga and Jamison (1995), Jasanoff and Wynne (1998), and Pohl (2008). Each of the four policy cultures are renamed as policy actor groupings in brackets: bureaucratic-political (government); civic-social (civil society); academic (research); and economic (business). A fifth policy actor grouping, international, has been added to represent the international dimensions of NDCs.

The production, transfer, and use of knowledge for climate policy involves a wide range of actors across society (Jasanoff & Wynne, 1998; Muñoz-Erickson, 2014; Pohl, 2008; Rafey, 2013). Government is represented by ministries, its agencies, committees, and advisors. It is primarily concerned with running an effective administration, which includes planning, development, coordination, and implementation of policy (Dubash & Joseph, 2016; Elzinga & Jamison, 1995; Pohl, 2008). Government, as the gatekeeper to policy processes, enables and constrains the influence of actors, and the

knowledge and interests they hold (Cozzens & Woodhouse, 1995; Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998; Pohl, 2008). For the purposes of this conceptual framework, government is central in mediating the negotiations between actors in NDC processes and their use of knowledge. It also decides the access of different policy actors to NDC processes. For these reasons, the research policy actor grouping is not included here as the central policy actor as Pohl (2008) does. This central position is instead given to the government, as illustrated in Figure 3, due to their central role as a gatekeeper of NDC processes.

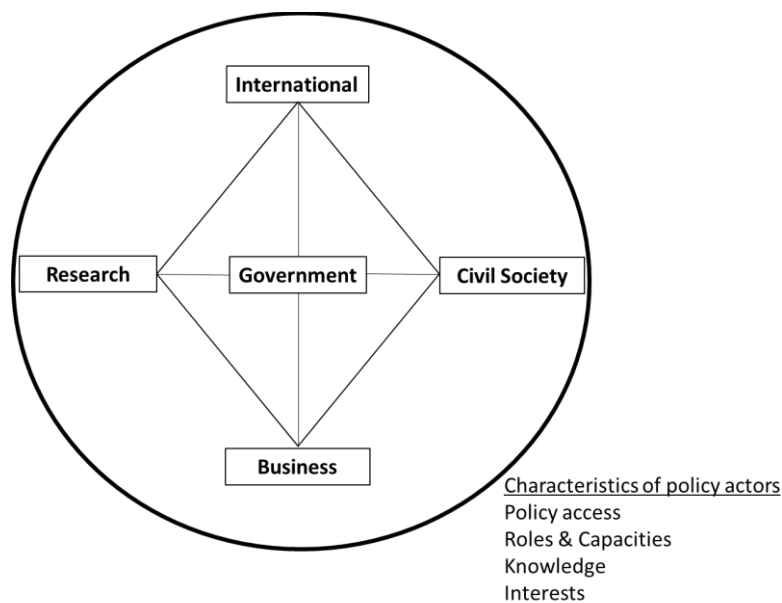


Figure 3: Interacting policy actors to represent actor groups and their relationships in the policy knowledge system, and their core characteristics. (Adapted from by Elzinga and Jamison (1995), Jasanoff and Wynne (1998), and Pohl (2008))

The theoretical literature has highlighted researchers' involvement in policy processes. Researchers typically seek to maintain independent and robust analysis, as the basis of their contribution to policy (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998). It is necessary to recognise the privileged access that certain experts are granted to the policy process (Cozzens & Woodhouse, 1995; Jasanoff, 2006, 2010; Nautiyal & Klinsky, 2022). Members of the research policy actor grouping need to protect independence in the policy process to maintain legitimacy, while at the same time pursuing integration in the policy process to ensure relevance of their work and to increase the likelihood of impact of their knowledge (Sundqvist et al., 2017). All these features are relevant for assessing the participation of the research policy actor grouping in NDC processes. The research policy actor grouping in this conceptual framework is made up of universities, research organisations, and consultancies that are responsible for creating the research-based knowledge for NDCs.

Business represents the private sector actors that attempt to shape the relationship between knowledge and policy processes in directions that will benefit their economic interests. To do this, actors from business, particularly lobbyists, contest knowledge or produce their own evidence to make the case for policy interventions that align with their economic interests (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998). The business policy actor grouping in this conceptual framework aims to reflect how business participates in NDC processes. Two features set the influence of business apart from others. First, business has detailed understanding of its own operations and therefore there is an information asymmetry in understanding how it would be impacted by policy. Secondly, business' importance to the economy translates into political bargaining power. In combination, these features put business in a uniquely powerful position in the negotiations associated with NDC processes.

Civil society represents social movements and public interest organisations whose primary concern is the social and environmental implications of knowledge and policy. They seek to mobilise public opinion and support to put pressure on political processes to deliver beneficial societal outcomes (Elzinga & Jamison, 1995; Pohl, 2008). Labour and trade unions are considered as actors in civil society. Including civil society in this conceptual framework is critical for representing how broader society perceives the NDC processes, how they engage with them, and how they mobilise knowledge in their attempts to shape these processes, in the interests of the public good.

The inclusion of the international policy actor, as a fifth policy actor grouping, is an original contribution to the evolution of policy cultures. Jasanoff and Wynne (1998) identify the role of hybrid cultures, such as international organisations, as one of linking different groupings of policy actors. However, a defining feature of climate policy and NDC processes are their international dimensions, such as international funding, project support, donors, and technical experts. Therefore, incorporating a dedicated policy actor grouping to represent the influence of international actors on NDC processes is a necessary addition. It is worth noting here that the international policy actor grouping, differs from the four other groupings in that it could be conceptualised as a dimension of the other four. However given the role that the UNFCCC, international climate finance, and international expertise play in climate change, it was deemed necessary to separate out the international dimensions of climate policy to reveal how it shapes the evolution of these processes, in ways that do not happen in policy fields that lack a dedicated international policy process and ecosystem of actors. This approach then allows the research to discuss the international as dimensions of each policy actor grouping, and to identify how the international process and actors exert their own influence as a fifth policy actor grouping, as distinct from the ways in which it exerts influence through other policy actor groupings.

This model of policy actors is now incorporated in the full conceptual framework represented by Figure 4 below. The framework demonstrates how policy knowledge systems operate and evolve over time and come into contact with NDC processes during policy windows, opened by deadlines for new NDC submissions every five years. Policy actors vie for influence in NDC processes by utilising their policy access, and mobilising their knowledge, roles and capacities, and interests. These interactions then shape NDC processes and their outcomes, which along with the policy knowledge system itself, continue to evolve over time; constrained and enabled by the interaction between international diplomacy and domestic politics.

Figure 4 positions policy knowledge systems for NDCs in a timeline to reflect the dynamic nature of policy knowledge systems and their evolution over time. This is important as the conceptual framework seeks to assess change that occurred between the iNDCs and Updates. The timeline, however, does not imply linearity in the evolution of knowledge systems. The focus is on the systemic nature of the interactions between, actors, knowledge, and NDC processes that shape NDC processes and their knowledge system outcomes.

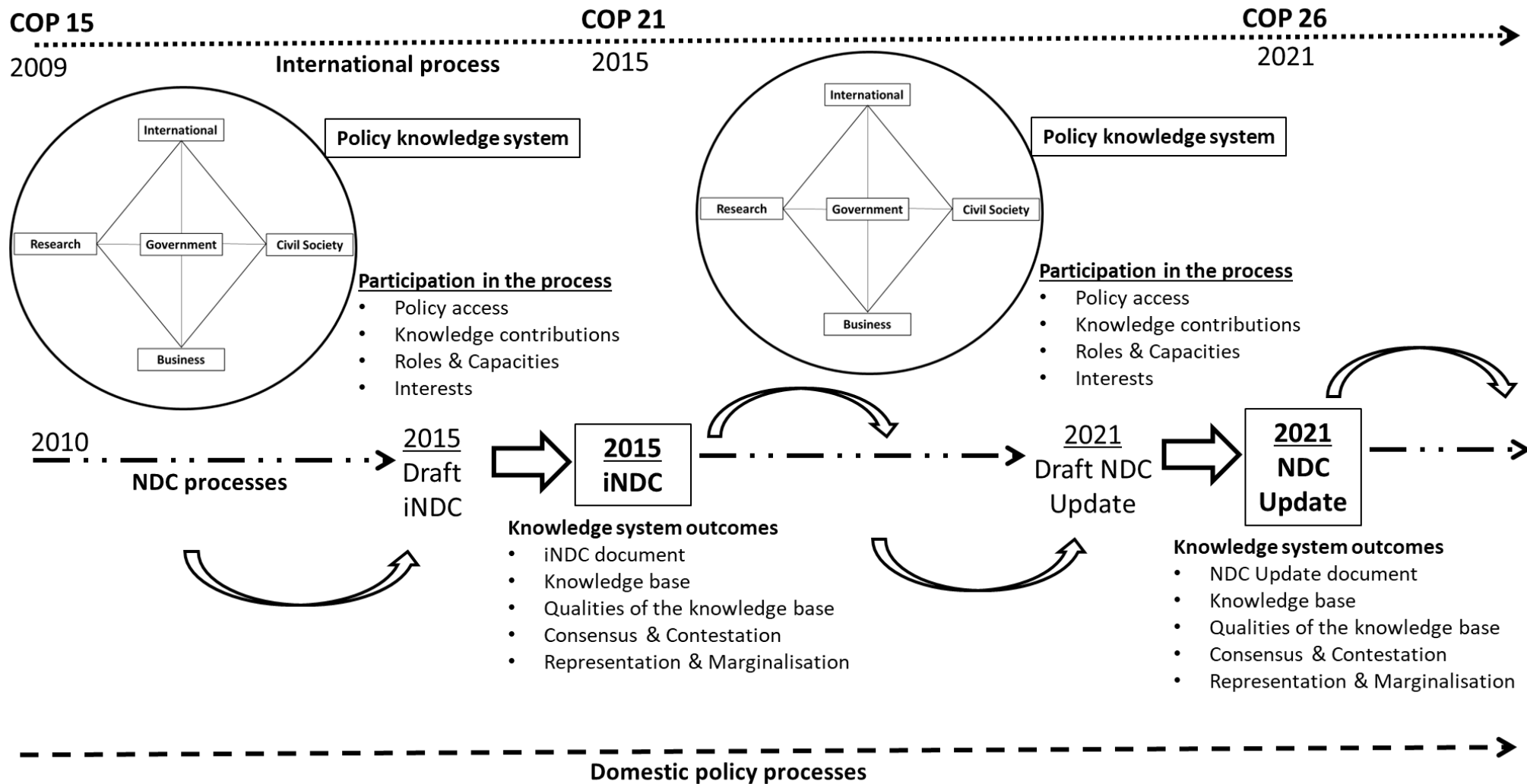


Figure 4: Policy knowledge systems conceptual framework. The figure illustrates the conceptual approach for this research to understand the roles of policy knowledge systems in NDC processes and how this has changed over time. (Source: Author's own)

Why turn to policy knowledge systems to understand the NDCs? What do they reveal? A policy knowledge system offers a structured set of concepts organised according to the logic and form of a framework, with which to assess NDC processes, their knowledge system outcomes, and implementation prospects.

Policy knowledge systems can influence NDC processes, their knowledge system outcomes, and implementation prospects through:

- the actors they bring together, their roles and capacities, knowledge, interests, and policy access, which determines their influence;
- providing different types of knowledge;
- how they produce, use, and contest knowledge; and
- how they communicate, translate, and mediate knowledge.

The roles that policy knowledge systems play in NDC processes can:

- influence the levels of development of different features of the NDCs' knowledge base;
- shape the credibility (technical rigour), salience (relevance, usefulness), and legitimacy (process inclusivity) of the NDCs and their supporting knowledge bases;
- establish areas of consensus and contestation;
- represent and marginalise policy actors; and
- reveal insights about the implementation prospects of NDCs.

3.4.2 Features shaping the participation of policy actors in NDC processes

Building on the previous section and the concepts from the literature discussed in Section 3.3, this section demonstrates how the conceptual framework organises and operationalises these concepts to unpack participation in the process in Figure 4 above, which refers to the participation of policy actors in NDC processes.

Policy access in Figure 4 points to the different ways in which governments allow access to NDC processes for different policy actor groupings. Policy access to NDC processes can take on various forms, such as government-commissioned technical work, bilaterals between government and specific actor groups, and public consultation processes such as workshops. These avenues establish the terms of participation for policy actors. It follows that not all policy actors are allowed the same levels of access, which contributes to the uneven influence. This is dependent on the different relationships between the government, experts, and other policy actors, which enables and constrains

different policy actors in different ways (Keeley & Scoones, 2003; Torgerson, 1986). That said, simply offering uniform policy access to actors is often not sufficient to enable equal influence, as influence also depends on the level of organisation, resources, and knowledge, all of which differ across actors (Cozzens & Woodhouse, 1995).

Knowledge contributions of policy actors in Figure 4 refers to the different types of knowledge held by policy actors (de Jong & Ferguson-Hessler, 1996; Gibbons et al., 1994; Jasanoff, 2010; van Kerkhoff & Lebel, 2006), which are valued differently by NDC processes. The inclusion of this aspect in the conceptual framework acknowledges the importance of knowledge contributions made by policy actors as a strategy for exerting influence on the NDC processes. Taken together, knowledge contributions are used to assess the state of the knowledge base, its composition, and areas that are well developed and underdeveloped. Analysing knowledge contributions also helps to shine a light on whose knowledge is valued and marginalised by NDC processes. The literature reminds us that not all forms of knowledge hold equal weight, and that scientific knowledge in particular holds influence due to its claims to credibility and authority (Jasanoff, 2006, 2010; van Kerkhoff & Lebel, 2006). These differences need to be considered when assessing NDC processes.

Roles and capacities are included in Figure 4 to represent the ways in which policy actors attempt to shape NDC processes. Policy actors can be distinguished between knowledge producers, knowledge users, or knowledge contestants (Rafey, 2013). This conceptual framework operationalises these categories to reveal how and why different policy actors participate in the NDC processes as they do, through engaging with knowledge. Roles are underpinned by capacities, which refers to thematic and policy skills as well as the size of teams. Producers of knowledge can produce technical work, conduct implementation diagnostics, provide information and data for policy formulation, or share knowledge from their experience. Users of knowledge, on the other hand, might do so for the purposes of policy formulation or policy evaluation, or for justifying their policy position or those of their constituencies. They may mobilise knowledge as a tool for facilitating an evidence-based conversation between competing interests. Lastly, contestants of knowledge might interrogate the credibility of the knowledge underpinning NDCs and the NDCs themselves, and assess whether they adequately represent the interests of contestants. These roles are primarily determined by NDC processes, which enable and constrain policy actors in different ways depending on the roles that they are assigned. This conceptual framework also draws on the work of Cash et al. (2003) on boundary work, to investigate how policy actors and policy knowledge systems as a whole, carry out boundary work such as communication, translation, and mediation. As mentioned in Section 3.3.2, NDCs resemble

boundary objects that get 'black boxed' (Latour, 1987; Sundqvist et al., 2017), meaning that the historical and methodological origins, particularly of their numbers, are often obscured from view and their importance is overlooked. It follows that approaching NDCs as boundary objects and opening the black boxes that they represent is a way of interrogating the origins of these numbers and how they were arrived at.

Interests in Figure 4 is used to capture the interests of different policy actors and how these dictate their participation and use of knowledge in NDC processes. The view of knowledge in this conceptual framework is that actors primarily mobilise knowledge as a strategy for representing their interests at the knowledge-policy interface (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). One of their objectives is to shape the NDC processes and their outcomes in ways that align with their interests and with those of their constituencies. It follows that in order to effectively represent their interests in NDC processes, actors need to be capable of representing their interests in ways that are relevant for the specific purpose of formulating an NDC, and to provide evidence to substantiate their positions. This demonstrates the associated interests and inherently political dimensions of the technical processes responsible for formulating NDCs.

The way this conceptual framework deals with power is specific in that it seeks to reveal how policy actors attempt to exert influence in knowledge systems and policy processes, through their policy access, knowledge contributions, roles and capacities, and interests. These features together determine the influence of policy actors, which is a product of the power they exert, and the power exerted on them by other policy actors, and enable an examination of the specific ways in which power operates in knowledge systems and policy processes.

3.4.3 Knowledge system outcomes of NDC processes

While the outcome of NDC processes that has received most attention are the NDC documents themselves (which are also represented in Figure 4), underlying these documents is a range of other knowledge system outcomes. Knowledge system outcomes are grouped in terms of the knowledge base, qualities of the knowledge base, consensus and contestation, and representation and marginalisation.

The knowledge base of an NDC represented in Figure 4 is determined by the knowledge contributions of different policy actors. Building on the theoretical literature reviewed earlier in this chapter, this research coins the phrase 'knowledge base' for a policy, which is made up of research-based

knowledge and other forms of knowledge held by policy actors other than researchers participating in NDC processes. Features such as context dependence, process character, and institutional dimensions of knowledge, are important for determining learning and the flow of knowledge between actors, and therefore have implications for the formation of the knowledge base (Strambach & Klement, 2012; Strambach & Surmeier, 2013). Of interest are the areas of the knowledge base that are well developed, and which are underdeveloped. This has implications for the consensus and contestation associated with different parts of the knowledge base, and for different elements of the NDCs. Equally important is which types of knowledge are recognised by NDC processes, and how are different actors are granted access to these processes, as well as their ability to package their knowledge so that it holds relevance for the purpose of formulating an NDC. Therefore, the knowledge base has not only to do with its technical rigour, but also with issues of relevance, participation, and representation, or the qualities of the knowledge base.

Qualities of the knowledge base included in Figure 4, is used to refer to the conceptual framework's use of credibility, legitimacy, and salience (Cash et al., 2003; Cash & Belloy, 2020; Haas, 2004), to characterise the qualities of the knowledge bases of NDCs. A minor adaptation in how this conceptual framework utilises these concepts is that the term 'relevance' is used in place of 'salience' because the meaning of relevance is widely understood, whereas salience may be unfamiliar to some readers. These concepts are used to establish the perceived robustness of NDCs and their knowledge bases, the degree to which the societies perceive them to be relevant or lack relevance, and the perception of how well policy actors think that they have been able to meaningfully participate; thereby suggesting the legitimacy of a knowledge base, process, and its resultant NDC.

These qualities are also useful for assessing the 'consensus and contestation' that shaped NDC processes, and how they represented some policy actor groupings while marginalising others. The point here is not that NDC processes deliberately try to marginalise some policy actors and benefit others, but rather that the design and operation of a process implicitly biases some but not others. Revealing these biases can be a first step towards designing and running NDC processes that are more inclusive. This conceptual framework draws on the body of literature dealing with knowledge, consensus, and contestation in policy processes (Cozzens & Woodhouse, 1995; Jasanoff & Wynne, 1998; Rafey, 2013) to investigate how these features played out and shaped NDC processes. Although these features are often side-lined by the literature on NDCs, they are important indicators of NDC processes and their outcomes. That is to say, the design and operation of NDC processes can either contribute to building consensus and addressing contestation or fail to do so. The aim here is to assess

how well the NDC processes in specific countries have done this, and how this has changed been the INDCs and Updates. The use of consensus here is specific, in that it does not necessarily mean that everyone agreed on every outcome, but rather that the processes, were able to produce outcomes that were acceptable to most of the actors participating in the processes.

Representation and marginalisation in Figure 4, indicates which issues and knowledge held by which actors have been picked up and represented by NDC processes and are observable in the final NDC documents. This is a product of whose knowledge counts or holds authority, as determined by a NDC processes, and whose is marginalised. So too do the issues that are not picked up by NDC processes and their final documents tell us something about which issues, raised by which actors, have been marginalised. Unpacking representation and marginalisation is a way of getting at the influence of actors, their roles, capacities, and interests, and varying abilities to mobilise knowledge to represent their interests in terms relevant to NDC processes.

Lastly, implementation prospects of NDCs are included. While this conceptual framework will not aim to provide an exhaustive implementation assessment, it acknowledges that the different components of NDC processes are not separate but are interconnected and therefore influence each other. It follows that, as Laudari et al. (2021) and Röser et al. (2020) suggest, this conceptual framework, through its focus on NDC formulation, may generate relevant insights useful to consider during implementation.

3.5 NDC processes as a two-level game

The last two concepts that are partially drawn on by this conceptual framework are that of Putnam's (1988) two-level game and Kingdon's (2014) policy windows. Putnam (1988) characterises the interaction between international diplomacy and domestic politics as a two-level game, in which there is a complex interaction between the domestic and international levels and the actors operating between and within them, in the attempt to appease the respective interests groups. These interactions then result in the domestic politics influencing what is possible in international diplomacy, and international diplomacy influencing what is possible in domestic politics (Putnam, 1988). Putnam (1988) explored when and how this interaction played out and its implications. NDCs are representative of what commitments are made possible by the interaction between national and international policy processes. This research uses the NDCs as an empirical object to explore the NDCs as examples of a two-level game, and their implications.

Kingdon (2014) identifies policy windows as unique opportunities for progress in policy to either put a policy problem on the agenda, or to get a specific policy option accepted. Policy windows are typically opened by political developments of the time, or the emergence of a compelling problem to be addressed. Policy windows allow for the coupling of the problem, policy, and politics streams to unlock progress. Importantly, policy windows typically only remain open for a short period of time. There is therefore not enough time to develop new options but instead make use of what is available at the time (Kingdon, 2014). The design of the Paris Agreement, with the NDCs every five years, has effectively built in predictable and regular policy windows for the long term. In a sense, the two-level game between the milestones in the international process opens up windows of opportunity at the domestic level, with the requirement to prepare and submit a new NDC every five years. This creates opportunities for policy knowledge systems to make preparations between these policy windows and then attempt to maximise their impact every time these windows open. These predictable windows allow domestic actors to put pressure on domestic policy processes. As NDCs are typically based on domestic policy, the work between NDC submissions is to ensure that domestic policy is up to date and aligned with the NDC. NDCs on the other hand can drive ambition which can exert pressure on domestic policy processes to align with this ambition, but can also result in domestic pushback. NDCs can also be utilised as instruments to crowd in funding to support implementation, to prove their relevance for domestic policy objectives. On this basis, the iNDC and NDC Updates submission deadlines are regarded as policy windows for which policy knowledge systems can prepare, and which drive a two-way interaction between NDCs and domestic policy, thereby putting pressure on one another. This pressure can be in the direction of greater ambition or path dependency that locks in the status quo.

3.6 Concluding remarks

This chapter has presented the theoretical literature on the role of knowledge systems in policy processes. It has brought this together with the literature on NDCs presented in Chapter 2, to develop a unique policy knowledge systems conceptual framework for studying NDCs.

Policy knowledge systems need to manage the interplay between actors, knowledge, and policy, and perform boundary work such as communication, translation, and mediation to enhance the credibility, relevance, and legitimacy of the knowledge produced and the resultant NDC. Varying levels of policy access, as well as the knowledge, roles, and capacities of actors, determine how different actors shape NDC processes, and the degree to which their knowledge and interests are represented by a process and its outcomes. The framework reveals insights into the knowledge system outcomes of NDC

processes, namely their knowledge bases, their credibility, relevance and legitimacy, consensus and contestation, and finally, how policy actors are represented or marginalised by NDC processes and their supporting knowledge.

The components of this conceptual framework aim to provide criteria with which to assess the knowledge aspects of NDC processes in a granular way, to identify some of their underlying drivers and their outcomes, as well as to offer insights on the implementation prospects of NDCs. In so doing, these components come together to provide a unique lens through which to analyse the progress achieved by the consecutive NDC processes. The aim is to better understand how and why NDC processes have evolved as they have, in specific countries, and to identify which areas require more work for future NDCs. The next chapter shifts attention to how this conceptual framework is operationalised through the methodology of this research.

CHAPTER 4: Methodology

This chapter presents the methodology for this thesis, provides an overview of the research design, and explains how the conceptual framework is operationalised through a comparative case study design. The weaknesses and capabilities of case studies are discussed, and a justification provided for their appropriateness and robustness as a research design strategy for answering the research questions of this thesis. The research process is then described, consisting of data collection and data analysis methods, as well as the rationale for their selection. The chapter explains the rationale for choosing NDCs as an appropriate empirical object. This chapter ends with a discussion on the quality of the research and some reflections about doing a PhD during the time of a pandemic.

4.1 Operationalising the conceptual framework through a tailored and emergent research process

This research used an abductive approach, which refers to the relationship between theory, the empirical world, the case (or cases), and the conceptual framework. Dubois and Gadde (2002) note that often the process of abduction remains hidden from the view of the reader. It is therefore the intention of this section to document and communicate this process. The approach to theory and the empirical work was one in which they informed each other as the research unfolded, so that the conceptual framework evolved throughout the course of the research, based on the empirical work, and in turn shaped how the empirical work was conducted (Davies, 2021; Dubois & Gadde, 2002, 2014; Kruger, 2021).

The research approach drew on the work of Dubois and Gadde (2014) by utilising and developing a tight and emergent framework. This differs from other authors, such as Miles and Huberman (1994), who set up a seeming binary between a tight and pre-structured framework, or a loose and emerging framework. To do so, the research drew on and brought together bodies of literature on knowledge systems and policy processes and the NDCs to develop a novel conceptual framework for understanding policy knowledge systems. The initial framework guided the first phase of data collection and analysis. Grappling with the empirical through the lens of the conceptual framework necessitated an iteration of the framework so that it was fit for purpose for the empirical cases (Dubois & Gadde, 2002; Yin, 2003). Figure 5 gives an overview of the timeline of research activities the research process consisted of.

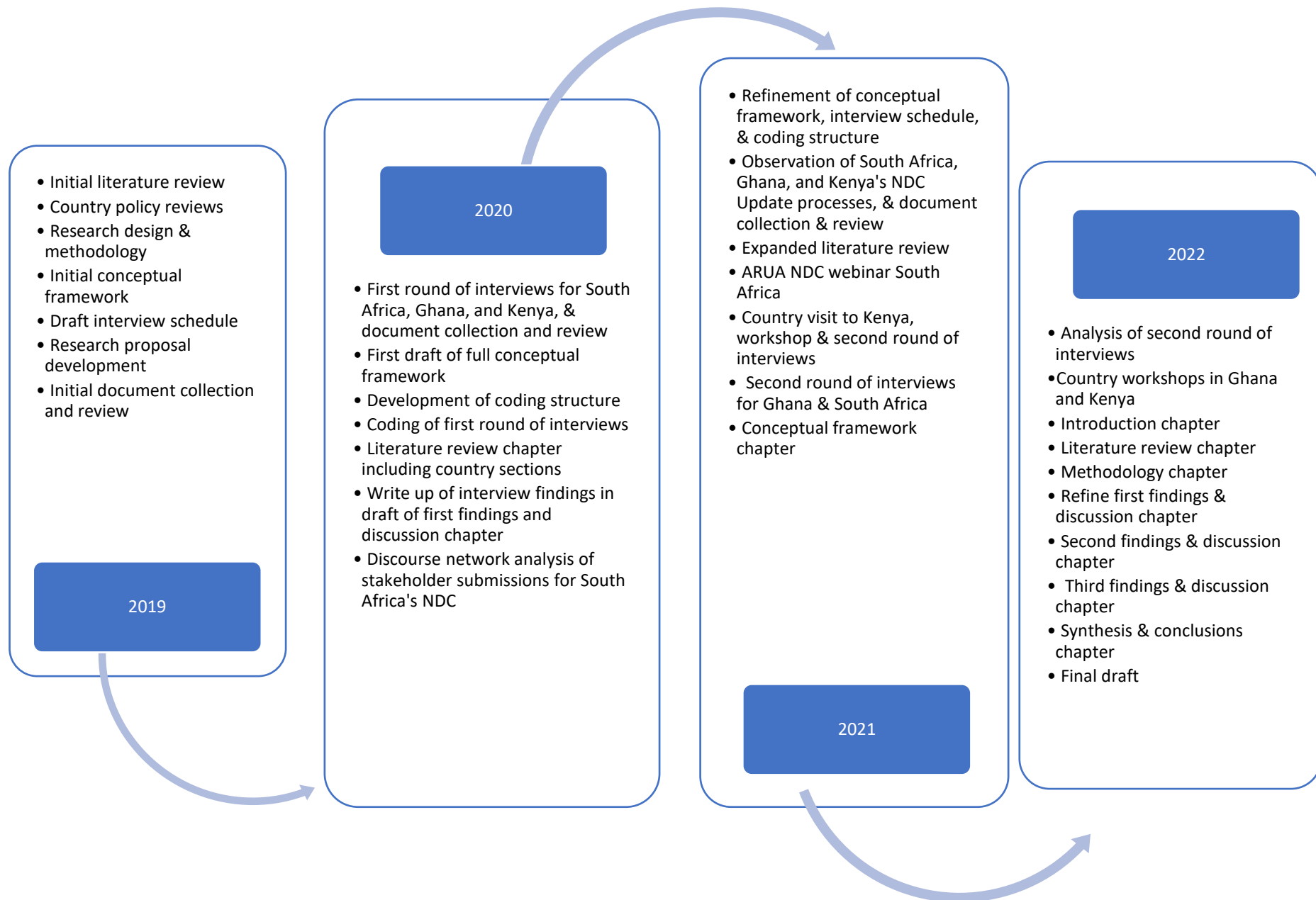


Figure 5: Timeline of research activities – An abductive research process

Ultimately, the research process, guided by conceptual framework, helped to explore and unpack how and why the cases unfolded as they did, and why they produced the outcomes that they did. The conceptual framework was operationalised by breaking it down into its core concepts, which were used as anchor points for data collection and analysis. The structure of the framework organises the results and discussion chapters.

4.2 Research design – Case studies

4.2.1 Case studies – Their potential and criticisms

Deciding on whether a case study is an appropriate research strategy depends on a number of factors. Part of this is reflecting on the research questions guiding the research. Research questions consist of both form (why and how) and substance (what the study is about). So a decision about using case studies as a research strategy needs to examine the types of information relevant for answering the research questions, determine whether case studies are appropriate for uncovering such information, and whether they are capable of linking the conclusions to the data collected and the research questions stated (Landman, 2008; Yin, 2003, 2014).

Despite being widely used, Yin (2014) note that conducting robust case study research is difficult and encounters criticism. Some of these criticisms are that case study research is not systematic or rigorous enough, and that issues of bias creep into the design and influence the findings and conclusions (Yin, 2014). Other criticisms are that it can be difficult to generalise from a single or few case studies, and that they can be too time-intensive and produce volumes of data, with the end product becoming too burdensome for the reader (Dubois & Gadde, 2002, 2014; Yin, 2003).

Criticisms around rigour and bias can be addressed, however, as this research has sought to do, by following systematic procedures and documenting and communicating these procedures to make the research process and its robustness clear to the reader (Yin, 2014). In terms of the criticisms about generalisability, I agree with Yin's (2003, p. 10) statement concerning generalising from case studies: "The case study does not represent a sample, and in doing a case study your goal will be to expand and generalise theories/generalise a set of results to a broader theory (analytic generalisation) and not to enumerate frequencies (statistical generalisation)". Furthermore, using theory can help refine and focus the data collection and analysis, thereby managing the scope and focus of case studies and strengthening their explanatory capabilities (Dubois & Gadde, 2002; Yin, 2003).

What case studies do well is explore the interaction between the phenomenon and their contexts, particularly where these relationships and their implications are not well understood (Landman, 2008; Yin, 2003). They also allow the researcher to draw on a variety of sources of evidence, such as documentation, archival records, interviews, and observations, which make triangulation possible. There are various types of triangulation, with data and methodological triangulation most relevant for this discussion (Yin, 2014). This means that the findings of the case studies are supported by multiple sources of data and multiple methods to collect and analyse the data, thereby lending greater credibility to the findings (Sovacool et al., 2018; Yin, 2003, 2014). Case studies can also offer both rich empirical descriptions and material for theory development (Saunders et al., 2016).

4.2.2 Case studies as an appropriate research strategy for this thesis

The purpose of using case studies for this thesis is to open up the NDC processes to move from an understanding of “what” happened to “how” and “why” it happened. In service of this aim, the research questions of this thesis are primarily “how” and “why” questions. Case studies are therefore an appropriate form of qualitative inquiry for this thesis. The in-depth investigation made possible through case studies is capable of revealing key features and relationships that can be traced over time to help to answer these questions (Landman, 2008; Sovacool et al., 2018; Yin, 2003). This research resonates with the aims of in-depth case study research, which places value on depth, granularity, and specificity, to reveal the influence of context (Dubois & Gadde, 2002). The research also sees the value of the comparative research made possible by multiple case studies (Landman, 2008; Yin, 2003, 2014). Here, the intention is not for some kind of statistical inference or generalisability (Yin, 2003). Rather, the use of case studies aims to unpack how domestic policy processes responding to requirements of an international process plays out according to different country contexts. Therefore, the case studies are generalisable to theoretical propositions associated with the conceptual framework of this research, not to populations or universes (Yin, 2014).

Deciding on the number of case studies is dependent on the research questions, methods, data, and conceptual framework. Whether many, few, or single case studies, all three approaches have limitations and strengths, and involve making trade-offs. Approaches to comparing many case studies approximates natural science experimental methods, typically dependent on quantitative data and quantitative, statistical analysis. Due to the coverage of many countries, a strength of these types of analyses are the inferences with global applicability that are made possible. But large N studies are not well-suited to studying complex causal mechanisms, establishing deeper meanings and

understandings, or for uncovering contextual specificities. On the opposite end of the spectrum, single case studies provide rich contextual description and analysis, can develop new classifications, generate hypotheses and confirm theories, and explain country specificities. Unlike with large N studies, the level of inference to other cases is limited with single case studies. This research has opted to compare few countries. This design was selected as most appropriate for the research questions, accessible empirical data, and conceptual framework. Comparing few countries allows for the intentional selection of cases from the universe of cases. This type of research is intensive because it aims to represent and compare country nuances, and explore multiple causal factors that interact to produce the outcomes observed. This approach typically involves qualitative analysis, and allows for a middle level of conceptual abstraction; greater than would be possible with a single case study but smaller than when comparing many countries (Landman, 2008).

Much of the literature on NDCs has focussed on comparing many countries. Such approaches have not, however, been able to explore how and why NDC processes unfolded as they did. This is a key contribution of this thesis, and motivation for comparing few countries. This decision was also guided by the data required by each of the three design approaches. Data constraints were a major feature of the NDC processes in all three countries. Because of this, interviews were critical for uncovering the types of data needed by a small N study, which would have been inappropriate for a large N study. Lastly, a policy knowledge systems conceptual approach to studying NDC processes acknowledges the systemic nature of these process, how knowledge operates, and how actors participate. Such a systemic view is characterised by complexity and multi-causality that would be ill-suited to a large N study but can be analysed through comparing few countries.

This research has opted for a most similar systems design (MSSD). MSSDs aim to compare a selection of countries that share similar characteristics. Key explanatory factors are then identified to explain different outcomes across these similar countries. Important for MSSD is the cases, units of analysis, features that make cases similar and comparable, key explanatory factors, and outcomes to be explained (Landman, 2008). The cases for this research are South Africa, Ghana, and Kenya. The units of analysis are policy knowledge systems in NDC processes in these three cases. Features that make these countries similar, appropriate to compare, and which underpin the country selection are presented below.

Ghana, Kenya, and South Africa are located in three different regions of sub-Saharan Africa and are the biggest economies in their respective regions (with the exception of Ghana, which is the second

biggest economy in west Africa). Ghana and Kenya are ranked as lower-middle income countries and South Africa as higher-middle income, although recent research suggests South Africa may become a lower-middle income country before the end of this decade (Sguazzin, 2021). South Africa, Ghana, and Kenya have well-established stable governance and are ranked 6th, 7th, and 13th respectively out of the 54 African countries (Mo Ibrahim Foundation, 2021). The interest in policy knowledge systems in NDC processes in African countries is down to a number of factors and are the subject of a small body of literature when compared to other continents. The majority of African countries are minor emitters with pressing development challenges, and have some of the youngest and fastest growing populations in the world. NDC processes and their supporting knowledge systems can contribute to transitions to alternative pathways and prevent these countries from going down carbon-intensive development pathways to become major emitters. This is not only important for avoiding future emissions, but also to ensure these countries' economies can become more competitive in an increasingly decarbonised, global economy (WWF, 2021). For South Africa, the question is how these transitions can decarbonise and revitalise the country's ailing, emission-intensive economy. For Ghana and Kenya, the question is how transitions can provide more competitive and prosperous development trajectories, given that these countries are minor emitters.

The iNDCs and Updates of these three countries highlight the pressing development challenges that the countries have in common, as well as being endowed with fossil fuel reserves that have, and are intended to play a role in addressing development challenges. At the same time, all three countries are expected to be severely hit by the impacts of climate change, making adaptation imperative. A key priority outlined is NDCs' contributions to the development objectives of these three countries (Government of Kenya, 2020; MESTI, 2021b; Republic of South Africa, 2021b)

Ghana, Kenya, and South Africa all have well-established national climate policy processes, having developed their first national climate change policies in 2010 and 2011, after which other climate policy activities followed. They have actively and progressively engaged in the UNFCCC process since the early 2000s, and in 2015 developed and submitted their iNDCs and updated them in time for COP 26 in 2021. These three countries have strong political cultures of consultation for policy formulation, and the public consultations run by all three governments for the iNDCs, and Updates provided rich material for analysis.

The country selection was also informed by practical considerations based on my involvement in the in the African Research Universities Alliance, Centre of Excellence in Climate and Development (ARUA

CD). ARUA CD is a partnership between the University of Ghana, University of Nairobi in Kenya, and University of Cape Town in South Africa. The hubs located at each of these universities are: the Institute for Environmental and Sanitation Studies at the University of Ghana; the Institute for Climate Change and Adaptation at the University of Nairobi; and the African Climate and Development Initiative at the University of Cape Town. ARUA CD is an indication of the work being done by the knowledge systems for climate and development in these three countries, and the roles of universities therein. The network provided me with access to people, NDC processes, and contexts necessary to come to grips with the particularities of exploring these questions in these countries. Given the importance of access to information for the type of in-depth case studies conducted during this research, this practical consideration was non-trivial.

It is important to note here the differences in the research process for the three country case studies. Most notably, access to the NDC processes in these three countries varied, which has had implications for the depth and coverage of analysis, as well as the impact of COVID-19 on the research process itself. These challenges in access led to the decision to foreground the South African case, based on better access to the process and data. Although the fruits of my research efforts in all three countries varied significantly, I engaged deeply with the NDC processes of all three countries and the opportunities and constraints posed by each. This meant that the development of the conceptual framework was done in parallel with the empirical work, and therefore deeply informed by the empirical work in each case in an iterative manner. It also meant that in refining the conceptual framework, I constantly went between the observations of the three countries, to ensure the framework was tailored and relevant for all three countries. So, while the fruits of my investigations disproportionately represented South Africa, resulting in a one-case dominant study, the influence of the empirical work on the development of the conceptual framework was more evenly distributed between the three countries. Given that the conceptual framework was developed and applied in the contexts of these three countries, it can authentically lay the claim that it has been shaped by the insights from closely studying these three countries' NDC processes.

The conceptual framework's 'key explanatory factors' and 'outcomes to be explained' were used to differentiate the roles of policy knowledge systems and NDC processes in these three countries, between the iNDCs and NDC Update, and to explain how the outcomes differed. The cases, units of analysis, country features, key explanatory factors, and outcomes to be explained by this research are summarised in Table 3 below.

Table 3: The cases, units of analysis, country features, key explanatory factors and outcomes to be explained by this research

Cases	South Africa Ghana Kenya
Units of analysis	Policy knowledge systems in NDC processes
Features that make countries similar and comparable	Located in sub-Saharan Africa. Lower to higher-middle income countries. Well-established stable governance and democracies. Policy cultures of public consultation for policy formulation. Pressing development challenges. Vulnerable to the impacts of climate change. Developed their first national climate policies around 2010. Active and progressive participants in the UNFCCC, with regular Biennial Update Report (BUR) and National Communication submissions, and submission of iNDC and NDC Updates. Ran consultation processes for the formulation of their iNDCs and NDC Updates and have established knowledge systems for formulating these. Actively participate in ARUA CD.
Key explanatory factors that differ between countries and the iNDCs and Updates	Policy knowledge systems and their composition. The roles, capacities, knowledge, and interests of policy actors. The iNDC and NDC Update processes their design and operation, use of knowledge, and how they enabled and constrained the participation of policy actors. The roles of knowledge and the evolving knowledge dynamics over time. Circumstantial factors such as COVID-19 and pressure created by milestones in the international processes.
Outcomes to be explained that differ between countries and the iNDCs and Updates	NDC documents, their baselines, targets, and robustness. The knowledge base of the NDCs and their qualities such as credibility, relevance, and legitimacy. The consensus and contestation associated with the NDCs and their knowledge bases. Representation and marginalisation of policy actors.

The intention with drawing on these cases, selecting these units of analysis, and isolating and analysing the key explanatory factors and outcomes was to demonstrate how the characteristics of policy knowledge systems and how they operate varies from country to country, and the implications of these differences for the NDC processes. The research also sought to uncover change that occurred between the iNDCs and Updates. Furthermore, the insights uncovered in these three cases may turn out to have relevance for other countries in sub-Saharan Africa, and for developing countries more generally. This has the potential to broaden the relevance of these research findings to a larger group of countries. Lastly, the research highlighted how more comparative analytical work between countries across the continent would be useful.

A granular, country-specific approach allowed the research to go from describing “what” to “how” and “why” NDC processes unfolded in specific countries as they did. NDCs are relevant empirical objects for assessing progress on climate change, as they demonstrate what is politically feasible from

the interaction between the national and international climate policy processes. With new NDCs needing to be communicated every five years, it is possible to assess progress and evolution between each NDC process, to identify what has changed and what has failed to change in terms of the policy knowledge systems, NDC processes, and their outcomes. Such insights can inform future NDC processes. These factors were all important for deciding on a research design that employed a few case studies, rather than a single case study or many case studies.

In the endeavour to allay the concerns about a lack of rigour of case studies (Dubois & Gadde, 2014; Yin, 2014), the specific procedures employed by this research are clearly stated here and discussed throughout this chapter. As summarised in in Table 4 below, there were three principles guiding this case study research draw on different sources of data; use different methods; and establish and communicate a clear chain of evidence.

Table 4: Establishing a chain of evidence

Data source	Record of data	Data analysis technique
Literature	Filing system and Mendeley	Literature review
Documentation and written submissions	Collation and filing of available documentation	Document review Qualitative coding with Discourse Network Analyzer Discourse analysis with Visone
Direct observation of consultation processes	Extensive note-taking Collation of documentation	Content analysis of notes
Semi-structured interviews	Note-taking Audio recordings Transcriptions	Qualitative coding with NVivo

4.3 Research process – Data collection

Conducting multiple interviews per country with a diverse collection of policy actors captured diverse perspectives. Drawing on different data sources from each country, including direct observation and taking my own notes, allowed for triangulation of findings. Drawing on more recent literature that has emerged, driven by the NDC Update processes and COP 26, provided the body of literature for this research. Figure 6 provides a summary of the spheres of evidence, data collection, and analysis techniques.

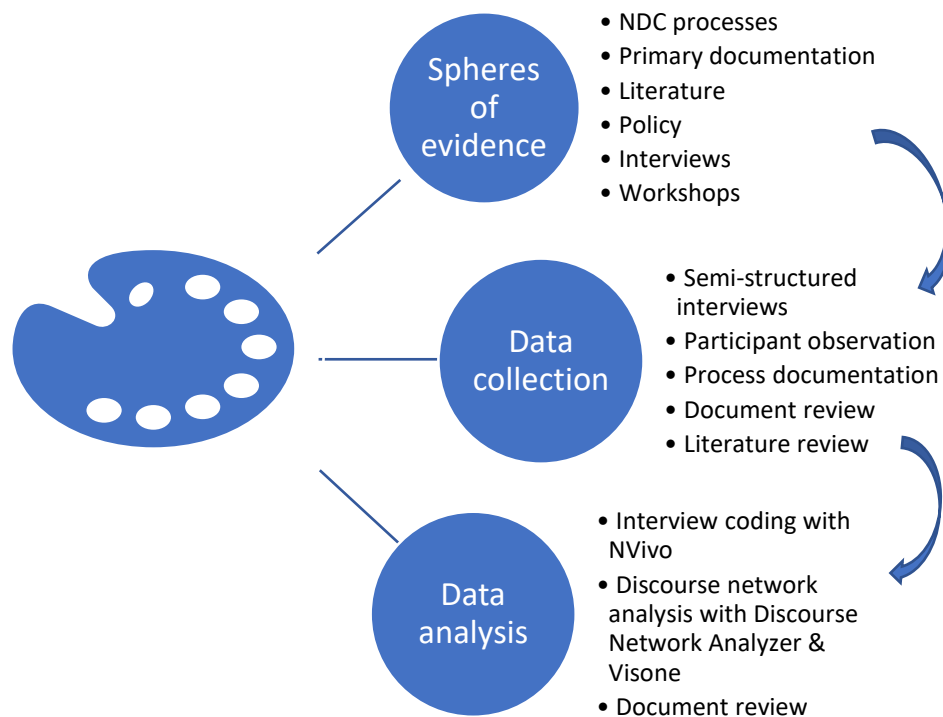


Figure 6: Spheres of evidence, data collection, and analysis used for this research

Spheres of evidence refer to the data sources that the research drew on, which included NDC processes, primary documentation such as technical reports, written submissions, presentations, and draft NDC documents. Literature, policy documents, interviews, and workshops served as the other spheres of evidence. The main data collection methods employed were the review of the relevant literature, document collection, participant observation and documentation of the NDC consultation processes, and semi-structured interviews. Data analysis techniques included document review, qualitative coding of interviews using Nvivo, and discourse analysis of written submissions – first coding with Discourse Network Analyzer and then visualising the results with Visone. Document review was conducted on the primary documentation and on the notes taken from the provincial consultations. The data collection methods are elaborated on in the following sections.

4.3.1 Literature and document review

In line with an interdisciplinary approach to the literature, the literature review did not try to replicate the depth of a disciplinary inquiry. Instead, it sought to strike a balance between breadth and depth, placing value in traversing different disciplines and literature and on integrating these; thereby building on and extending, not replacing disciplinary research (Tyler, 2019; Willetts & Mitchell, 2017). This research drew on a broad range of disciplines and literature to grapple with the empirical and conceptual problems. The main disciplines that this research drew on were STS, sustainability science, political science, and public policy. Three main bodies of literature were drawn on: climate policy and

governance; knowledge systems and the role of knowledge in policy processes; and literature on NDCs.

Documents represent a key data source for qualitative research and are typically used alongside other methods to uncover information, address gaps, and contribute to triangulation (Bowen, 2009; Creswell & Poth, 2018; Sovacool et al., 2018). The contextual information provided by documents can help to understand and characterise the contexts within which participants are situated, and can also provide insights on past events, which can be more reliable than interviewees' memories. Reviewing documents helps to assess change, or lack thereof, by tracing the journey of a draft version of a document to a final one, which may provide clues as to why these changes did or did not occur (Bowen, 2009; Creswell & Poth, 2018; Yin, 2003).

Some of the advantages of document analysis is that it is cost effective and time efficient. Unlike with interviews or observation, in which the interviewee may be influenced by the researcher, documents are stable because they do not possess the same reactivity. The exactness and coverage of documents can also help to unearth details that are difficult to uncover through interviews and observation (Bowen, 2009; Yin, 2003). Often there is only partial documentation of a process, however, or the documentation disproportionately represents certain issues, groups of actors, and their perspectives or biases, while marginalising others. Documents can also be difficult to access, particularly for policy processes or internal government documents, which are often kept confidential or remain hidden by poor knowledge management systems. Document analysis is also open to selectivity bias, meaning that a researcher can tend to only engage with documentary evidence that supports their research, and leave out those that may challenge their research findings (Bowen, 2009; Yin, 2003). In this case, all documentation about the NDC processes that could be accessed, was utilised. As with all research methods, researchers need to be critical in their use of documents; understanding their purposes, capabilities, and limitations. When used critically and in combination with other research methods, documents can provide valuable material and insights into the research problem.

Documents were an important source of information for this research, and they varied significantly between countries and between the iNDC and NDC Update processes. National climate policy documents and climate policy analyses were vital for establishing an understanding of the policy contexts within which the NDCs were situated, thereby providing contextual information as Bowen (2009) suggests. The main sources of documentary evidence per country are summarised in Table 5 below. These data sources included process information such as presentations from the NDC

consultations processes, draft versions of the NDCs, agendas, meeting summaries, and written stakeholder submissions to the processes. Written stakeholder submissions were only available in South Africa.

Table 5: An overview of data sources for analysing the iNDCs and NDC Updates of South Africa, Ghana, and Kenya

	iNDC data sources	NDC Update data sources
South Africa	National workshops, written submissions, parliamentary hearings, technical reports, Department of Forestry, Fisheries & the Environment (DFFE) presentations, draft NDC document, final NDC, literature and policy documents, interviews	National workshops, academic reflection workshops, provincial consultations, written submissions, draft NDC Update, final NDC update, technical reports, DFFE presentations, Presidential Climate Commission (PCC) process, literature and policy documents, interviews
Ghana	Interviews, literature and policy documents, NDC document	National workshops, meeting agendas, academic reflection workshops, templates for written submissions, interviews, literature and policy documents, NDC Update document
Kenya	Interviews, literature and policy documents, NDC document	Interviews, Ministry of Environment and Natural Resources (MENR) presentations, academic reflection workshops, literature and policy documents, NDC Update document

The technical analysis reports, which were typically commissioned by Ministries of Environment for the adaptation, mitigation, and support components for the NDCs, were important sources of information to assess the knowledge bases of the NDCs. Although presentations of these were made during the NDC processes, the technical documents were not released during either the iNDC or NDC Update processes in any of the countries studied. South Africa was the only country to make these reports publicly available after the processes had concluded. This presented challenges for assessing the technical credibility of the final NDC documents. Part of the endeavour to assess this credibility was comparing the draft and final versions of the iNDCs and NDC Updates, as a way of tracing development and change that resulted from the processes. Again, draft versions were only made available in South Africa, which, to a degree, obscured from view the change that occurred during, and by virtue of, the NDC processes in Ghana and Kenya.

Documented evidence was an important source of data in some countries, while the equivalent documentation was inaccessible in others. As I will discuss in the next section, I had better access to South Africa's NDC Update process than for the iNDC process or any of the processes in Ghana and Kenya. There was also far less documentation available for the iNDC compared to the Update processes. This was mainly because it was possible to track the NDC Update processes in real time, and in so doing, gather documentation as it emerged. For the iNDCs, locating whether such

documentation existed and where it was located was a major challenge. This demonstrated the value of documenting these processes first hand.

4.3.2 Direct observation and documentation of the NDC processes

Observation typically consists of observing people or organisations in their everyday settings over an extended period of time (Wästerfors, 2018). Observation allows the researcher to collect data and insights based on first-hand experience (Creswell & Poth, 2018; Wästerfors, 2018; Yin, 2003), allowing the researcher to understand a setting, process, or phenomenon from the perspectives of those participating in it (Yin, 2003, 2014).

How a researcher conducts observation depends on the research problem, theoretical perspective, the researcher's experience, and the way that the phenomenon under observation unfolds in reality (Wästerfors, 2018). Thus, observation needs to be tailored to these features to ensure it is fit for purpose. Wästerfors (2018) proposes three features of robust observation. The first is details that the researcher should endeavour to capture, such as what people say and do, to develop a granular understanding. Second is paying attention to sequences. The sequence in which activities or events unfold, and how, depends on the interaction between features and in turn shapes the evolution of the process. Third is atmosphere, which is the unspoken elements or tone of a social context (Wästerfors, 2018). Taking fieldnotes is an important part of observation, to record what is happening and for the researcher to record their impressions (Creswell & Poth, 2018; Yin, 2003). To operationalise this guidance and to aid with the consistency of recording observations, I used the three features of robust observation identified by Wästerfors (2018) as criteria with which to structure and record my observation of the process in my PhD journal.

Observation was particular in that it was limited to the observation of defined policy processes, namely the NDC Update processes, and it also had to happen virtually due to the COVID-19 pandemic. Documentary evidence from these processes was also collected. The ability to engage with these processes differed markedly between countries and between iNDC and NDC Update processes. Being South African and being based in South Africa meant that I already had better access to the South African NDC Update process and knowledge systems than was the case in Ghana and Kenya. Another crucial factor was that I provided support to the Energy Systems Research Group (ESRG) at the University of Cape Town (UCT), which was the research team commissioned by the Department of Forestry, Fisheries and the Environment (DFFE) to do the technical work for the mitigation component of South Africa's NDC Update. I also supported the DFFE, South Africa's lead government department for the Update, by attending all the consultations and taking notes that I then shared with the DFFE in

meetings. Together, these factors meant I was able to engage more deeply in the NDC consultation processes in South Africa, and have better access to networks in the knowledge system, than was the case in Ghana and Kenya.

For the iNDC process in South Africa, I was reliant on documentary evidence that included the NDC draft discussion document, final iNDC document, the supporting technical reports for adaptation and mitigation, as well as presentations and recordings from the Parliamentary Hearings that were part of the process of finalising the iNDC. The major difference with the NDC Update process was that I was able to observe it in real time. This included writing a formal submission to the process as a stakeholder at UCT, and analysing the written submissions of some stakeholders. I was also able to participate in all nine provincial consultations held by the DFFE online, consultation with the youth, and the consultations held by the Presidential Climate Commission (PCC). This allowed for a much richer engagement with the process real time participation, which helped me to develop my own documentation that I could then triangulate with interviews and other documentary evidence. As Creswell and Poth (2018) and Yin (2003) suggest, I documented my impressions of the processes, which assisted with interpreting these processes.

In the cases of Ghana and Kenya, I was more constrained given that I was unable to observe the iNDC or NDC Update consultations, partly due to COVID-19 and the travel restrictions, and partly due to these processes being seemingly closed to outsiders. Therefore, observation of the process was limited to attending online consultations when this was possible. The documentary evidence from these processes was also thin; a finding corroborated by numerous interviewees who indicated that documentation is a weakness across policy processes in these two countries.

4.3.3 Semi-structured interviews

Interviews are an appropriate method for capturing in-depth insights and for uncovering the experiences, motivations, and meanings of participants of a process (Sovacool et al., 2018; Yin, 2014). Interviews also offer an approach to data collection that is tightly focused on the topic of the case study, thereby ensuring relevance. Interviewers need to guard against biases in their interview questions, in the interviewee responses, and in the interpretation of these responses (Creswell & Poth, 2018; Yin, 2003, 2014). It is worth noting here my positionality as an interviewer. Given that I am a South African, based at a South African university and part of the community of practice working on climate policy in the country, this allowed me better access to interviewees. It also meant, however, that I was interviewing professional acquaintances and colleagues. Following a consistent and

systematic process to prepare for, conduct, record, and analyse interviews using Nvivo and the coding structures outlined in Appendix 7 and Appendix 8 was part of working towards a robust approach (Creswell & Poth, 2018; Yin, 2003).

Given that the research questions for this thesis are “how” and “why” questions, interviews represented one of the best ways for accessing the type of information required to answer them (Creswell & Poth, 2018; Sovacool et al., 2018; Yin, 2003). Semi-structured interviews were deemed to be the most appropriate form of interview because they provided some structure to the line of questioning by aligning with the core concepts of the conceptual framework. At the same time, semi-structured interviews allowed enough flexibility for interviewees to share their experiences and for new insights to emerge (Yin, 2014); thereby informing the ongoing evolution of the conceptual framework and the interview approach.

The interview approach adopted the main elements of a robust interview procedure proposed by Creswell and Poth (2018), which consisted of several steps. A preliminary interview schedule was developed based on the research questions and conceptual framework. The final interview schedule is available in Appendix 3. The initial interview schedule was piloted with one researcher and one non-researcher. Based on the feedback, the schedule was adapted and finalised for the first round of interviews. The interview schedule continued to evolve throughout the different interview rounds and based on the evolution of the research questions and conceptual framework. A purposive sampling strategy was followed to select the appropriate interviewees (Creswell & Poth, 2018). Two key criteria used for selecting interviewees was that they needed to have direct experience of participating in national climate policy and NDC processes in one of the three countries, and that there was representation of the main policy actors: government; civil society; research; business; and the international community. The intended sample size was 15 to 20 interviews per country. Consent was obtained from all participants prior to conducting the interviews, via signature of an informed consent form, and verbally at the start of each conversation. Given the impact of the COVID-19 pandemic on in-person gatherings, all interviews were conducted virtually, with the exception of the second round of interviews in Kenya, which were conducted in person.

Interviewees were invited to participate in this research by email, which included an informed consent form. The form clearly communicated to prospective interviewees what was expected of them as an interviewee, and how the research process sought to protect them as interviewees and maintain their anonymity. Interview recordings and notes were kept confidential and stored in a password-protected

cloud service. To cite interviews in text and attribute direct quotes to interviews in Chapters 5 to 7 of this thesis, a numbering convention was used, which is reflected as a number in a bracket. For example, if it was the second interview conducted, the citation is (2). In instances where numerous interviews are being drawn on, the numbers of each interview are included in the brackets, separated by a comma: for example (2, 5, 7). This numbering convention was used to keep interviewee contributions anonymous. In cases where direct quotations from interviews were used, these were anonymised and permission to use the quotation was requested from the respective interviewee via email, before inclusion in the final thesis. The informed consent form also communicated to interviewees that they were free to withdraw from the interviews at any time, should they have felt it necessary. A commitment was made to use none of the content from interviews had Interviewees decided to withdraw. Two sets of ethics approval were applied for and granted to address any risks posed to interviewees. The second ethics approval was required for the dedicated measures put in place to protect interviewees during the COVID-19 pandemic.

Interviews were recorded using a laptop audio recorder, with shorthand notes taken during the interviews to capture the most important points. This allowed me as the interviewer to dedicate my attention to listening to the interviewees' responses and guide the conversation. Interviews typically lasted between an hour and an hour and a half, with one or two 30-minute follow up interviews and some interviews lasting as long as two hours. Audio recordings of the interviews were then transcribed using the software Otter.ai and each transcription was proofread and corrected.

Interviews provided in-depth varied perspectives from a wide range of policy actors. Given the lack of documentation about the NDC processes in all three countries, interviews were imperative for collecting detailed accounts of the policy contexts, NDCs processes, and policy knowledge systems. This type of granular information was not available via documentary sources and helped to uncover the less visible elements of these processes. Interviews helped to shed a light on how consensus and contestation played out in these NDC processes, the roles of different actors, and the operation of power that resulted in the representation of certain actor groups and the marginalisation of others. Without these in-depth interviews, it would have been very difficult to uncover these types of insights. In total, 54 interviews were conducted, broken down according to policy groupings as follows: Government – 9, Research – 17, Business – 7, Civil Society – 11, International – 10. 19 interviews were conducted in South Africa, 16 in Ghana and 19 in Kenya. The list of interviewees is available in Appendix 2

4.3.4 Regional NDC workshops of the ARUA CD network

My involvement with ARUA CD provided a platform led by African universities and local researchers, through which to assess the NDC processes. NDC workshops were held as part of the network's project activities, with one in South Africa, two in Kenya, and three in Ghana. These workshops brought together representatives from ARUA, policymakers, academia, and civil society to discuss the NDC Updates. While the workshops were not able to get to the same depth as the interviews, the value they brought was in bringing together a group of involved actors, to discuss their perspectives of the processes. This played a validation role and surfaced new findings. Extensive notes were taken during these workshops for both my PhD and for the broader projects, after which they were analysed and compared to interview findings. The workshops also helped to identify interviewees for the research. These workshops were designed by the ARUA CD team, as part of the activities for the Supporting Partnerships and Networking (SPaN) project, and Transforming Social Inequalities through Inclusive Climate Action (TSITICA) project, which sought to understand the actor networks that influenced the NDC processes of these three countries, and how issues of inclusions and inequalities were addressed or perpetuated by these processes. I made my positionality clear to stakeholders participating in the process, indicating I was both a participant in the workshops, but that I was also observing the workshop as a data source for my PhD research. This meant different parts of the workshop held varying levels of relevance for my PhD research.

A last note about the data collection methods and NDC processes in these three countries, is that they were all conducted in English, despite each country having numerous other official languages. While English is the official policy language of all three countries, the exclusive use of it raises questions about the accessibility of these processes for non-English speakers. This theme will be returned to in the results and discussion about representation and marginalisation.

4.4 Research process – Data analysis

The research process used the following data analysis techniques: document review; qualitative coding; and discourse network analysis. Figure 7 illustrates the comparative dimensions of this research, which were a comparison in the role of policy knowledge systems between the iNDC and NDC Update processes within each country, and a comparison between the processes across countries.

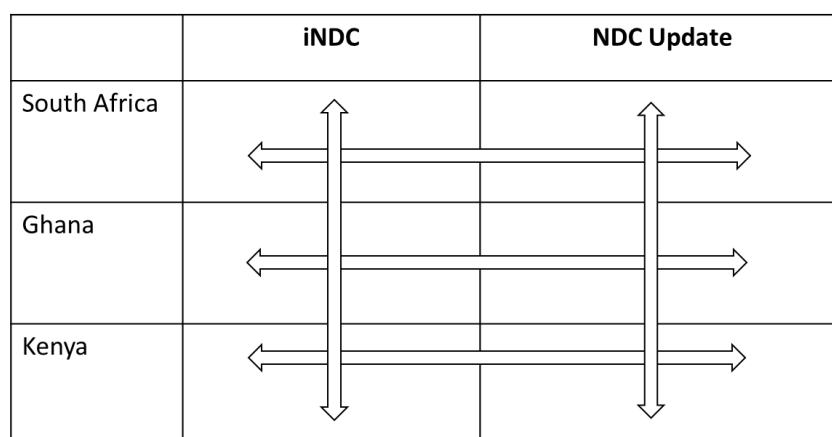


Figure 7: The directions of comparison between iNDC and NDC Updates within a country, and between countries

4.4.1 Analysis of provincial consultations

Provincial consultations were run for the iNDC process in South Africa from August to September 2015, and for the Update in April 2021. In 2015 they were run as in-person workshops by the DFFE, with one workshop held in each of South Africa's nine provinces. Although the Update process held similar consultations, they had to be held through a hybrid format of in-person and online participation to limit the number of in-person participants during the COVID-19 pandemic. Being held online meant that I could attend every provincial consultation for the NDC Update, compared to the iNDC where I attended none of the workshops. The documentation of provincial consultations in South Africa consisted of the presentations made by DFFE and the respective provincial governments, as well as the notes I developed through direct observation. These notes sought to capture the major themes and comments made by policy actors during the consultations, where there was consensus and contestation. The notes were used to record the more implicit issues related to a policy knowledge systems perspective, such as policy access, knowledge, roles and capacities, and interests of policy actors. Thus, by drawing on the conceptual framework, the analysis of the consultations sought to characterise the participation of policy actors.

4.4.2 Coding as qualitative data analysis

Coding is a well-established qualitative data analysis technique used to make sense of text data collected from interviews, documents, observations, and other sources (Creswell & Poth, 2018; Saldana, 2013). It does so by systematically breaking down the text data into smaller parts, selecting the relevant parts of the text, and attaching labels that assign them meaning within a larger, coherent structure (Miles et al., 2020). Out of these pieces of information, the researcher can assemble a unique, coherent picture to reveal relationships, patterns, and meanings (Elliott, 2018; Miles et al., 2020; Saldana, 2013). As the actual process of coding can run the risk of being somewhat mechanical,

it is important that the starting point is one that interrogates the purpose of the coding approach. Identifying the purpose depends on the research questions, conceptual framework, and methodology upon which the coding rests (Bazeley, 2009; Elliott, 2018).

There are varying interpretations of what makes up a code, a concept, a category, or a theme; sometimes these terms are used interchangeably, with the same term meaning something quite different, depending on the author (Bazeley, 2009; DeCuir-Gunby et al., 2011; Elliott, 2018; Miles et al., 2020; Saldana, 2013). Therefore, it is important to define these terms to be clear about how they are understood by this research, and to apply them consistently. This research uses the terms ‘concepts’ and ‘codes’. Concepts refer to the main pillars of the conceptual framework, while codes refer to the features of these concepts. Therefore, concepts refer to higher level, more abstract terms, whereas the codes are more concrete characteristics of the concepts, to enable a granular assessment of the concepts being applied. Later in this section, I provide examples of the concepts and codes used by the coding approach of this research, based on the conceptual framework and research questions, and demonstrate how these were operationalised. There is a level of agreement in the literature that there are broadly two levels of coding: first- and second-level coding. First-level coding is typically descriptive and useful for summarising the data contained in the text but includes a limited degree of inference. Second-level coding, or pattern coding, takes first-level coding further, and involves a greater level of interpretation, abstraction, and inference to establish a smaller number of units of material that contain patterns and meanings, placed within a bigger picture (Elliott, 2018; Miles et al., 2020; Punch, 2014; Saldana, 2013).

One of the major debates in the literature on qualitative coding is using *a priori* versus emergent codes, or theory-driven versus data-driven codes (Bazeley, 2009; DeCuir-Gunby et al., 2011; Elliott, 2018; MacFarlane & O’Reilly-de Brún, 2012). *A priori* codes are those that are developed by drawing on the conceptual framework, research questions, and methodology to establish a preliminary set of codes based on which an initial round of coding is conducted (Bazeley, 2009; DeCuir-Gunby et al., 2011; Elliott, 2018; MacFarlane & O’Reilly-de Brún, 2012). Emergent codes, on the other hand, rely solely on the data to establish codes, with little or no use of theory (Bazeley, 2009; Elliott, 2018; Miles et al., 2020; Saldana, 2013). Two of the main benefits of a theory-driven approach is that it ensures that the coding process is guided by the conceptual foundations of the research, making the coding process focussed and relevant for the questions for which the research seeks answers. The second benefit is that it integrates the coding approach and single codes into a coherent picture. Connecting themes to an explanatory model is a key part of ensuring that codes and themes take on their full

meaning and significance (DeCuir-Gunby et al., 2011; MacFarlane & O'Reilly-de Brún, 2012). A weakness of theory-driven approaches is that if they are overly restrictive, they can fail to accurately capture additional elements that emerge from the data. Therefore, if adopting a theory-driven approach, it is crucial to do so in a flexible and iterative manner, to allow the data to guide the process, and in turn the refinement of the conceptual framework and coding structure. For this reason, it is advisable to conduct multiple rounds of coding (Bazeley, 2009; Elliott, 2018; Miles et al., 2020).

Part of the coding journey is the move from description to interpretation and explanation. As Bazeley (2009, p. 8) reminds us, "Description is part of the analytic journey, and 'thick description' is a valuable component...but description alone is not sufficient. The data must be challenged, extended, supported, and linked in order to reveal their full value."

This research followed the logic of first- and second-level coding (Miles et al., 2020). Given the benefits described above (DeCuir-Gunby et al., 2011; MacFarlane & O'Reilly-de Brún, 2012), a theory-driven approach was selected as the most appropriate for the purposes of this research and its research questions. Two rounds of coding using the software Nvivo were conducted for each batch of interviews, and with each round the approach was refined. The first round of interview coding used as its basis the initial version of the conceptual framework, available in Appendix 6. The interviews themselves were guided by the interview schedule available in Appendix 3. Out of the initial conceptual framework, interview questions, and research questions, an initial codebook (see Appendix 8) was developed and applied. As the framework was loosely defined at that stage of the research, so too was the coding approach open and broad, which allowed for new insights to be captured and new codes to be developed. As can be seen in the initial codebook in Appendix 8, the main concepts of the conceptual framework were used to structure the codebook, and each concept was then made up of codes, which were applied to code interview text. For example, the core concepts that make up the conceptual framework included policy knowledge system, participation of policy actors, and knowledge system outcomes. These concepts were broken down into their constituent features and represented by codes. Policy actors included their types: government; research; civil society; business; and international. Participation of policy actors were also broken down into policy access, knowledge, roles and capacities, and interests, and applied as codes. Knowledge system outcomes were broken down into knowledge base, qualities of knowledge base, consensus and contestation, and representation and marginalisation. Table 6 is an example of how the concepts and codes were applied for coding the first round of interviews, and Table 7 the second round of interviews. The full codebooks can be found in Appendix 7 and Appendix 8.

Table 6: Example of the operationalisation of the initial codebook for analysing the first round of interviews

Concept	Concept	Code	Coded text	Associated research question
Knowledge system	Knowledge	Knowledge base	<i>I think I mean, so a lot of the work that we do is kind of demonstrating trying to build an evidence base, particular position around ambition. So a lot of the work we've done outside of government for the last</i>	<i>How has the policy access, roles and capacities, knowledge and interests of policy actors shaped their participation in the NDC processes?</i>
		Climate knowledge categories	...	...
		Knowledge gaps	...	...
		Knowledge flows Actors?	...	...

A description for each code was developed, so that the meanings of these codes were clear, and their application consistent; this ensured that their application was informed by a logic of the overarching conceptual framework. The codes were applied by selecting excerpts of text from interviews that represented the meanings of codes. This was an approach to break up the text from interviews and to organise and assess them according to a structured set of concepts and codes. The content of the interviews were interpreted through the lens of the conceptual framework to develop a picture and understanding of how interview insights answered the research questions.

By the time of the second round of interviews, the conceptual framework was more tightly defined (see Appendix 4). This meant that the second round of coding was able to build on and refine the initial list of codes. The coding approach therefore refined both the codes and concepts used, as well as the overall conceptual framework. This dual process was important for strengthening the reliability and appropriateness of codes, and for enhancing the overall framework within which the codes fitted; thereby giving them their full meaning (DeCuir-Gunby et al., 2011). Demonstrating the evolution of the coding structure and conceptual framework, a second codebook was developed for the second round of interviews (see Appendix 7). An example of how the codebook was operationalised to analyse the second round of interviews and answer the research questions is provided by Table 7 below.

Table 7: Example of using a codebook to code the second round of interviews

Concept	High-level code	Code	Coded text	Associated research question
Policy knowledge system	Knowledge system outcomes	Knowledge base	<i>knowledge helps to deal with some of the, with some of the grey areas and, you know, some of the modelling has helped us to understand that, you know, in what we're trying to do, there are, you know, significant disruptions that will be experienced by various especially the high emitting sectors</i>	<i>How has the policy access, roles and capacities, knowledge and interests of policy actors shaped their participation in the NDC processes?</i>
		Knowledge qualities	...	...
		Consensus & contestation	...	...
		Representation & marginalisation	...	...

In order to capture the multidimensional nature of the codes, the definitions of the codes from the theoretical literature were drawn on and operationalised in this coding approach. A key example of this were the knowledge qualities, namely, credibility, relevance and legitimacy. Drawing on Cash et al.'s (2003) definition of credibility, the concept was used by this coding approach to capture reflections on the adequacy of the technical evidence; whether it was regarded as scientifically robust, who it was produced by, and whether it held up to comparison with other analysis. Relevance aimed to capture the degree to which policymakers and all policy actors deemed the knowledge produced to be relevant and usable for meeting their needs. Lastly, legitimacy was utilised to assess the process through which knowledge was created and its ability to involve policy actors and represent opposing views and competing interests (Cash et al., 2003; Cash & Belloy, 2020), how processes allowed the participation of policy actors, the transparency of processes and technical work, and how inputs were taken up by the process. Breaking down these core concepts into their constituent parts, provided the empirical indicators with which to capture the relevant insights from the interviews to reveal the multidimensional nature of these concepts.

Keeping a journal, recording my reflections on coding throughout the process was useful for recording impressions and the evolution of thinking, codes and conceptual framework as I engaged with the data (Miles et al., 2020; Saldana, 2013). Starting to write about the findings and analysis of the interviews from early on in coding the process, was an important driver of the evolution of the coding approach. As part of my process I noted my reflections in my PhD journal throughout the process, and

used these to aid my coding approach, and to guide the interpretation of my coding. A concrete example of this was when noting instances of actors talking past each other in consultations in the provincial consultations of South Africa. By capturing these instances they were then eventually taken up, reflected on, and communicated as the higher level theme of a crisis of relevance in these particular consultations..

4.4.3 Discourse analysis of written submissions

Discourse analysis recognises the role of actors, and their power and interests as drivers of change; and it is interested in how the discursive elements of policy processes interact with these features to influence how policy processes unfold (Hajer, 2002; Laudari et al., 2021; Leifeld & Haunss, 2012; Rennkamp, 2019). While content-oriented and actor-oriented approaches to discourse analysis are well established, Leifeld (2010) identifies that approaches to link actors and concepts in a discourse are underexplored by the literature. Linking actor and content-oriented approaches can illuminate how the interaction between contents and actors shape one another, and in turn the definition of a problem, development of solutions, and selection of options (Hajer, 1993; Leifeld & Haunss, 2012). This demonstrates that how phenomena are framed linguistically has implications for who is responsible for getting a problem on the agenda, how options are considered, what should be done to address the problem, and who is responsible. Discursive work therefore has a hand in influencing which problems make it onto the agenda, and which policy actions are deemed to be feasible or preferable (Hajer, 2002; Leifeld & Haunss, 2012).

With argumentative discourse analysis, Hajer (1993, 2002) emphasised the importance of the stories that participants in a policy process tell. The significance of stories can be thought of in terms of their ability to establish consensus and contestation, and shift the mindsets of actors (Hajer, 1993, 2002). Laudari et al. (2021), building on the work of Hajer (1993, 2002), Kern (2011), and Schmidt (2008), identify the value of discourse analysis in policy processes. The interests and needs of policy actors are core motivations for participating in a policy process. Analysing discourse and the discursive practices of policy actors in NDC processes is a way of uncovering their interests as they relate to the NDCs (Laudari et al., 2021). Specifically, discourse analysis can help to reveal how different policy actors participate in NDC processes to shape NDCs discursively, and how this influences the perception of policy actors of NDCs. The communicative spaces that were established around NDC processes set the terms for participation, the direction of flow of information, and the uptake of what was communicated, thereby determining the participation, ownership, and trust in the NDC (Laudari et al., 2021). Discourse analysis reveals relational dynamics and ways of working, and endeavours to

demonstrate how and why policy actors use discourse to represent their interests in a policy process, which in turn reveals whose voices are represented or marginalised (Hajer, 2002; Laudari et al., 2021; Schmidt, 2008, 2015).

Discourse network analysis (DNA) is a specific approach for carrying out discourse analysis and can be used for mapping the prominent actors and concepts that shape a discourse, and the relationships between them (Leifeld, 2010). The results of a DNA can then be used to interpret how actors mobilise concepts as part of their broader narratives to influence policy processes, and the decision-making therein, to represent their interests in these processes (Muñoz-Erickson & Cutts, 2016).

DNA therefore allows the researcher to uncover discourse coalitions empirically and reveals the multidimensional nature of the discursive elements of policy processes. In so doing, discourse analysis demonstrates why and how discourse networks matter in policy making (Hajer, 1993, 2002; Leifeld, 2010; Leifeld & Haunss, 2012). It is up to the researcher to reveal why actors choose the concepts they do to structure their inputs to a discussion, and how politics can be perceived as the positioning of actor groups at particular sites of discursive production in policy processes (Hajer, 2002; Leifeld, 2010). Discourse analysis can also provide insights into the influence of policy actors or coalitions by revealing their characteristics. Some of the characteristics of successful coalitions are that their constituencies are large and core frames are stable over time. They enjoy high levels of organisation in terms of their members and their use of core frames or issues, which they effectively integrate into coherent and compelling storylines that are capable of influencing the discourse (Leifeld & Haunss, 2012).

A DNA was originally planned to map the actors and issues that shaped the NDC discourses in Ghana, Kenya, and South Africa. The intention was to map the discourse based on the written submissions of policy actors. However, this was only possible for South Africa, as it was the only country for which written stakeholder submissions were available.

These submissions for South Africa's iNDC and NDC Update processes were coded using the software Discourse Network Analyzer, developed by Leifeld (2010). The coding structure was based on the research questions and conceptual framework of this thesis in which policy actors were coded, and their positions related to the draft iNDC and Updates were captured as areas of opposition or support. Doing so mapped the substance of the discourse, the major issues, and the areas of support or opposition of policy actors. The analysis also went a step further to capture the process reflections of policy actors to provide insights on their participation in the process in terms of their policy access,

knowledge, roles, and interests. Lastly, the analysis sought to capture reflections on the outcomes of the NDC processes. In so doing, the coding approach sought to operationalise a policy knowledge systems perspective of the discourse that emerged around the NDCs, which revealed the interactions between actors, knowledge, and policy. The software Visone was used to visualise the coded submissions in the form of discourse networks. Two rounds of coding were conducted for each network. The findings and their implications are discussed in detail in Chapters 5 and 6.

4.5 Positionality, research quality and reliability

Positionality is an aspect that every researcher must deal with when considering research quality, particularly those in positions of privilege, to examine how this privilege and perspective has shaped the research methods and findings. Devising and applying strategies to address this positionality and making this positionality explicit, is imperative for mitigating undue influence of positionality on the research (Massoud, 2022). I am a white, male South African, based at a South African university and have a decade of experience working in climate policy in the country. My background as an interdisciplinary researcher, working in applied policy research with a mitigation focus in South Africa, has shaped how I have constructed and investigated my research problem. This gave me a granular understanding of the policy context, and access to the climate policy process in the country and people to interview. At the same time, I needed to be aware of engaging with and representing the views of those with different gender, and racial and economic backgrounds to mine own, to authentically represent the diverse views that exist on my research problem in the three countries of study. In comparison to this position as relative insider in South Africa, in Ghana and Kenya I was an outsider. This meant I did not enjoy the same access to these processes and the relevant people as was the case in South Africa. Still, interviewees from these countries did indicate that it was important for them that I too was an African, grappling with some of the same problems as they were, and were therefore willing to be more open with me than they might have been with an outsider from the Global North. My dual role as researcher and stakeholder in the South African NDC Update process meant I was actively involved in the process, and observing the process as a researcher. As a result, my perspective as a researcher was influenced by my positionality as a stakeholder pushing for greater transparency, ambition and implementation in the NDC process. This position as a stakeholder, could have influenced my research and therefore it was important for me to adopt systematic observation, documentation and analysis techniques, as well as to conduct triangulation across data sources, to ensure balanced and objective research process. Discussing specific instances of these concerns with my supervisors was another strategy for addressing my positionality as a research and stakeholder.

This research acknowledges that mitigation and adaptation are of equal importance in the NDCs and as long-term goals of the Paris Agreement. While I adopted an open approach to my research to include adaptation and mitigation, my training and experience in climate mitigation policy and the community of practice that I am part of, led to a mitigation focus. Additionally, when unpacking and assessing the role of knowledge systems in the NDC processes and their knowledge system outcomes, mitigation components with their quantitative emissions targets and underlying technical work made this kind of analysis more feasible for my research. Therefore, the contribution of this research primarily relates to mitigation. In addition, the research endeavours to lay the foundation for similar types of assessments of the adaptation components of NDCs in the future, and to reduce the gap between adaptation and mitigation going forward.

Qualitative research is most commonly criticised on the grounds of reliability, and ability to generalise findings and make theoretical contributions. Such criticisms have at least in part to do with the failure of qualitative research to transparently communicate the systematic and robust procedures that were followed by the research, and to do with criticisms from positivist perspectives, which have for the most part been debunked (Creswell & Poth, 2018; Kruger, 2021; Yin, 2014). This chapter has endeavoured to communicate the systematic and robust procedures adopted by this research, to ensure the quality of the research process and its findings.

One of the benefits of case study research is that it allows the researcher to collect multiple sources of data, which contributes to establishing credibility and validity of the findings (Creswell & Poth, 2018; Yin, 2014). Through drawing on literature, primary documentation, interviews, workshops, and direct observation, the research utilised multiple sources of information that assisted with triangulation of the findings. As demonstrated in Table 4 (in Section 4.2.2), the research recorded and analysed the data with different techniques, making possible data and methodological triangulation. Triangulation is an attempt by the researcher to traverse different data sources to establish convergence or a confluence of evidence, which minimises biases and enhances the credibility of the research findings.

Peer review of the data and research process is a way of asking questions of the methods and interpretations to assess their basis, reliability, and biases (Creswell & Poth, 2018; Kruger, 2021). For this thesis, my three supervisors played this role in supervisor meetings and in reviewing drafts of each chapter. This ensured a critical, independent assessment of my research process, its material, and interpretations throughout the course of the research (Creswell & Poth, 2018; Kruger, 2021). Given the different backgrounds and expertise of my three supervisors, which include political science,

complexity studies, and climate science, the diverse perspectives they brought to my work was well suited to the interdisciplinary nature of my inquiry.

Keeping a record at every step of the coding process was important for establishing a trail of evidence (see Table 4 in Section 4.2.2) to demonstrate the process of how I got to the results that I did, which also formed part of communicating the reliability of my research approach and its findings (Bazeley, 2009; Yin, 2014). On reliability, Spencer et al. (2014, p. 278) notes that “the objective is to produce a meaningful account of the phenomenon that addresses key aspects of the research question, and to produce this account in a systematic and transparent way, so that the reader can see how concepts, themes or categories were developed. Other researchers might well have devised alternative themes or developed different categories, but they should be able to see how the researcher(s) “got there” and be able to assess the value of the analysis”. I agree with this interpretation of reliability, and have sought to document and communicate my research process to demonstrate its reliability, as shown in Figure 5, the codebooks, and throughout this chapter.

4.6 A PhD during a time of pandemic

This research was carried out from 2019 to 2022 during the height of the COVID-19 pandemic. The pandemic shaped my process, imposed constraints, and opened up new possibilities.

As I am based in South Africa, I was able to embed myself in the policy context, not least of all because the NDC Update process was held online. Travel bans imposed on anyone travelling from South Africa made the timing of travelling to Ghana and Kenya challenging. Furthermore, aligning country visits with the NDC Update processes in Ghana and Kenya, given the disruptions and uncertainties of the pandemic, was simply unfeasible. Still, I did manage to get to Kenya for a two-week visit. In Ghana, due to constraints on travel and the challenges with the NDC Update process itself, it was not possible for me to travel to Ghana.

Apart from my second round of interviews in Kenya, all my interviews were conducted online. In some cases, this allowed me access to people that otherwise may have been reluctant to meet with me in-person, as meeting online was seen to be more flexible for their schedules, and less of an onerous time commitment. Although I honed my craft of conducting interviews online, the interviews were at times constrained by poor internet connectivity, or interviewees simply not showing up. Interviewees also indicated that their meeting load had increased due to the pandemic, which made some unwilling to participate. Perhaps most significant of all, was what was lost in online conversations when

compared to in-person conversations. In-person conversations enable the interviewer to establish a more relaxed rapport with their interviewees, and interviewees are more likely to add asides or informal anecdotes in a way that was less common with online interviews.

As the pandemic imposed constraints on the research process, so too did it open up possibilities. The pandemic has cultivated a greater openness and capacity to conduct meaningful, in-depth online conversations. Conducting virtual conversations during the time of this pandemic was likely able to get to greater depth than would have been possible if I had conducted online interviews during ordinary times. The pandemic also forced all three of these countries to run online NDC Update consultation processes, which made it possible for me to participate in parts of these processes.

4.7 Concluding remarks

This chapter has explained the research design and research process adopted by the research, and its justification based on its appropriateness for operationalising the conceptual framework and guiding data collection and analysis. A qualitative comparative case study analysis between few countries was selected due to the nature of the research questions, and the necessary data and insights required to answer them. Data collection techniques employed included literature and document review, direct observation, semi-structured interviews, and regional workshops. Data analysis methods included content analysis, qualitative coding, and discourse analysis. The chapter has sought to represent the systematic and rigorous approach adopted to demonstrate the robustness of the research process and its findings.

CHAPTER 5: Rushed processes and existing policy knowledge systems for the iNDCs in South Africa, Ghana, and Kenya

This is the first results and discussion chapter of this thesis. Building on the literature reviewed, the chapter analyses how policy knowledge systems shaped the iNDC processes in South Africa, Ghana, and Kenya, which emerged in response to the requirements of the international process and led to the Paris Agreement. A policy knowledge systems conceptual framework introduced in Chapter 3 is adopted to structure the chapter and guide its analysis, represented by the left-hand side of Figure 8, inside the blue square. Units of analysis include policy knowledge systems in the iNDC processes in the three cases. This includes examining the origins of the iNDCs located in the national climate policy processes, and how they evolved into the iNDCs. Explanatory factors assessed include the iNDC processes, the roles of knowledge, and the participation of policy actors in terms of their policy access, knowledge, and capacities. This chapter demonstrates how the knowledge system outcomes of the iNDC processes go beyond the iNDC documents, and include knowledge bases, their credibility, legitimacy, and relevance, consensus and contestation, and the representation and marginalisation of policy actors. These outcomes are determined by the design and operation of the processes, the participation of policy actors, and their use of knowledge.

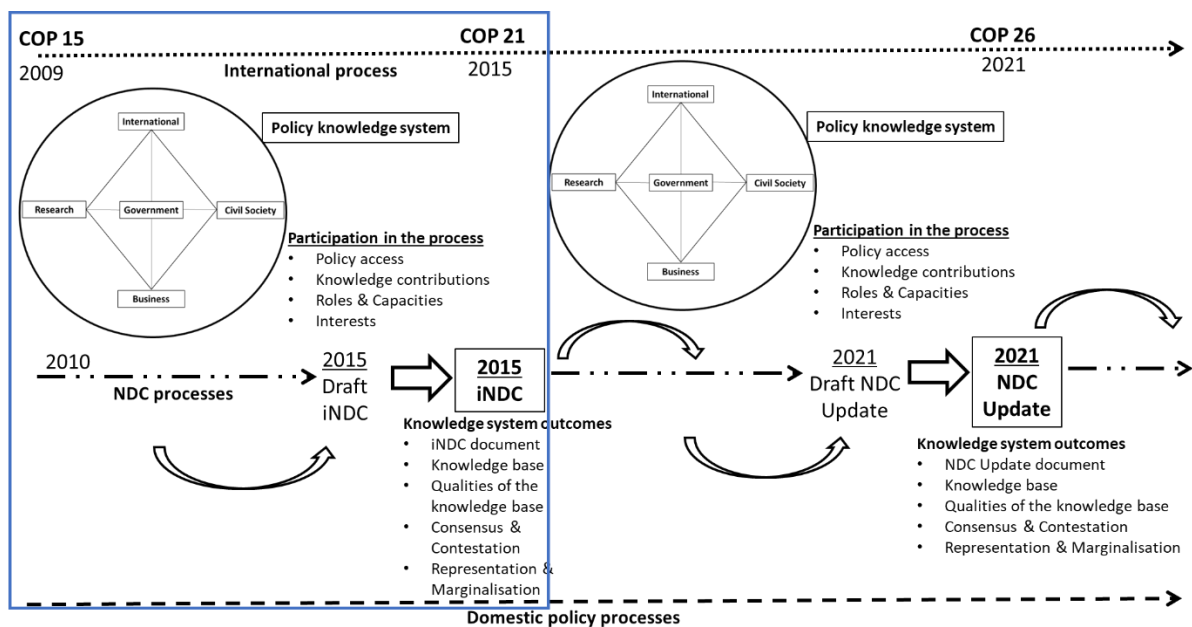


Figure 8: Situating findings in relation to the conceptual framework, namely participation of policy actors through the use of knowledge to shape iNDC formulation processes and their knowledge system outcomes

Figure 8 situates the iNDC processes within context and time. Context includes what happens outside the iNDC processes, such as in the international and domestic policy processes; both of which

influence what is possible within the iNDC formulation processes. By incorporating time as a component, the framework seeks to capture the temporal dimension and dynamic nature of policy knowledge systems and iNDC processes, to assess change over time.

5.1 South Africa, Ghana, and Kenya's iNDC documents

Table 8 provides an overview and breakdown of the emissions profile of each country, demonstrating the different contexts which shape the mitigation responses of each of these three countries. These differences are discussed in the following section.

Table 8: An emissions comparison between South Africa, Ghana and Kenya

	South Africa	Ghana	Kenya
Population	60 million	31 million	48 million
Total GHG emissions	512 MtCO ₂ e	42 MtCO ₂ e	93.7 MtCO ₂ e
Energy	80%	36%	18%
AFOLU	10%	54%	78%
IPPU	6%	2%	3%
Waste	4%	8%	1%
Per capita emissions	9.42 tCO ₂ e	1.3 tCO ₂ e	1.6 tCO ₂ e
Historical responsibility	1%	0.1%	0.1%

South Africa has a population of close to 60 million and represents an anomaly in that it is by far the largest emitter in Africa, with emissions totally 512 MtCO₂e. The sectoral breakdown of emissions is represented in Figure 9 below, showing that energy is responsible for more than three quarters of emissions, illustrating that the sector is the priority for the mitigation response of the country (DFFE, 2021b).

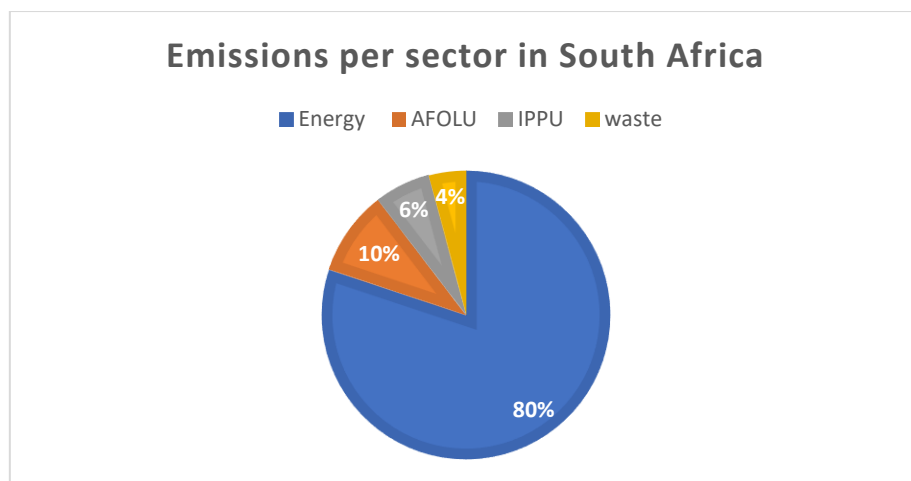


Figure 9: A breakdown of sectoral emissions in South Africa (DFFE, 2021b)

The country's per capita emissions of 9.42 tCO₂e resemble those of industrialised countries, and it is responsible for roughly 1% of global emissions (DFFE, 2021b). At the same time, the country is confronted with high levels of poverty, inequality, and unemployment. The Quarterly Labour Survey showed that in quarter 2 of 2022, the official unemployment rate stood at 33.9%, whereas the expanded definition was 44.1%, and youth unemployment stood at 46.5% (Statistics South Africa, 2022). Added to this, the country is particularly vulnerable to the impacts of climate change (DEFF, 2019). These features, which are a product of the economic structure, political history, and geographical location of the country, make pursuing development and climate goals particularly challenging (Fine & Rustomjee, 1996; Gnielinski, 2019; Marquard, 2020; Rennkamp, 2019).

South Africa's iNDC highlighted the commitment to 'no backsliding' to contribute to the 1.5°C temperature goal and the global goal to transition to net zero emissions. The adaptation component of the iNDC included developing a National Adaptation Plan, integrating climate considerations in national, subnational, and sectoral policy frameworks, and building institutional capacity. Other elements were developing an early warning system, a vulnerability and adaptation monitoring system, a vulnerability assessments and adaptation needs framework, and communication of investments in adaptation (Republic of South Africa, 2015).

At the centre of South Africa's mitigation commitment was the Peak Plateau and Decline (PPD), which claims to represent the country's full mitigation potential. The commitment was divided into three time periods: 2016-2020 for developing and demonstrating the mix of measures and meeting the Cancun Pledge; 2021-2025 as the first implementation period; and 2026-2030 as the second implementation period. Implementation was to be driven by the near-term flagship programmes,

carbon tax, desired emissions reductions (DEROs) for sectors, carbon budgets for companies, and regulatory standards for GHG pollutants and emitters (Republic of South Africa, 2015).

The support component detailed investment requirements with the assumptions highlighting the expectation for a binding global agreement, and international support to enable full implementation of South Africa's iNDC (Republic of South Africa, 2015). South Africa considered its iNDC to be an equitable contribution to the global mitigation effort, given the country's current and historical emissions and its national circumstances, which include serious development challenges and a constrained fiscus (Republic of South Africa, 2015). The Climate Action Tracker (CAT) rated South Africa's iNDC as 'highly insufficient', in line with a 4°C world (Climate Action Tracker, 2017).

Ghana has a population of 30.8 million people, and emissions totalling roughly 42 MtCO₂e. With a population half the size of South Africa but emissions not even a tenth of South Africa's, Ghana is a minor emitter, responsible for only 0.1% of global emissions (MESTI, 2021a). As illustrated by Figure 10 Agriculture Forestry and Other Land Use (AFOLU) is the main emitting sector responsible for over half of emissions, followed by energy which makes up slightly more than a third of emissions.; Waste and Industrial Processes and Product Use (IPPU) are minor emitters (EPA, 2020). The country, like South Africa, is highly vulnerable to climate change, already suffering from climate impacts, particularly in the agriculture and other climate-sensitive sectors.

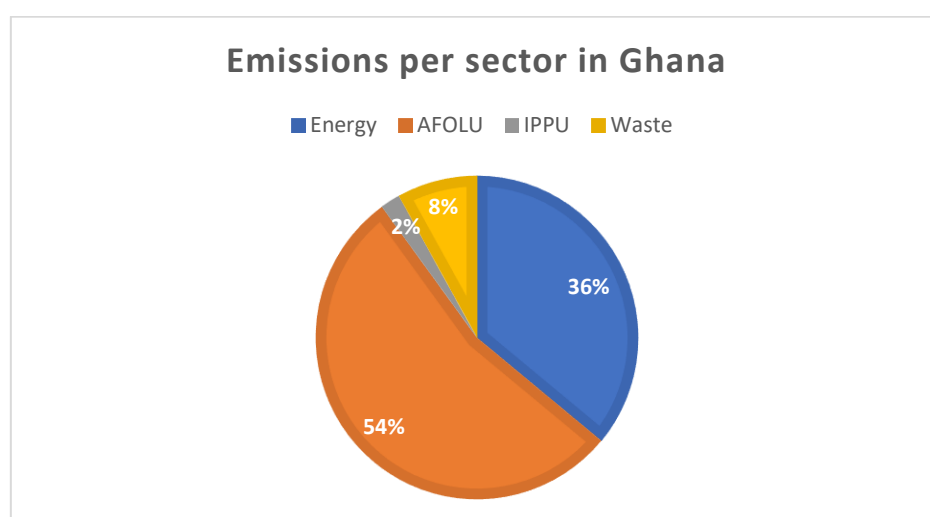


Figure 10: A breakdown of sectoral emissions in Ghana (EPA, 2020)

Ghana's iNDC communicated an unconditional mitigation goal of a reduction of 15% below a Business as Usual (BAU) scenario of 73.95 MtCO₂e by 2030, and 45% conditional reduction. The adaptation goal was to increase resilience and reduce vulnerability to climate change to support sustainable

development. Annexes 1 and 2 of the country's iNDC provided a level of detail about the iNDC's actions that was quite rare in iNDCs globally, listing the policy actions associated with each sector mentioned in the adaptation and mitigation targets. Each policy action was then broken down into its programmes of action, its investment needs, co-benefits, whether it was conditional or unconditional, and which national policies and measures supported the stated policy action (Republic of Ghana, 2015). This granular view was valuable both for communicating the basis of the iNDC, how it would be implemented, and the finance required per action. However, it was not clear how the policy actions added up to the overall targets. The exclusion of emissions from future activities in the growing extractives industry, and the intention to explore clean coal technologies, demonstrated some of the future plans for fossil fuels in Ghana.

The total estimated investment needs were USD 22.6 billion, with USD 16.3 billion to come from international sources. Investment costs for adaptation were estimated to be USD 12.79 billion, reflecting adaptation as a priority for the country; USD 8.29 billion of which was to come from international sources. A full financial analysis to accurately cost adaptation was earmarked for completion before 2020. The mitigation investment need totalled USD 9.8 billion, with international sources expected to provide USD 7.5 billion. The iNDC monitoring reporting and verification (MRV) system aimed to build on the existing annual progress report system.

Ghana assessed its iNDC to be fair and ambitious based on it being a minor historical emitter (0.1% of global emissions), low per capita emissions of 1.3 tCO₂e, lack of fiscal space, and the need to prioritise adaptation to reduce vulnerability (Republic of Ghana, 2015).

Kenya has a population of roughly 48 million, and total emissions of 93.7 MtCO₂e. Similar to Ghana, it is a minor emitter, responsible for only 0.1% of global emissions. Emissions are broken down by sectors as illustrated in Figure 11, showing AFOLU is the main emitter, followed by energy. The country estimates it loses 3-5% of GDP to the impacts of climate change, showing that Kenya, like Ghana and South Africa, is vulnerable to the impacts of climate change, not least of all due to the country's reliance on climate-sensitive sectors (Government of Kenya, 2015b, 2020).

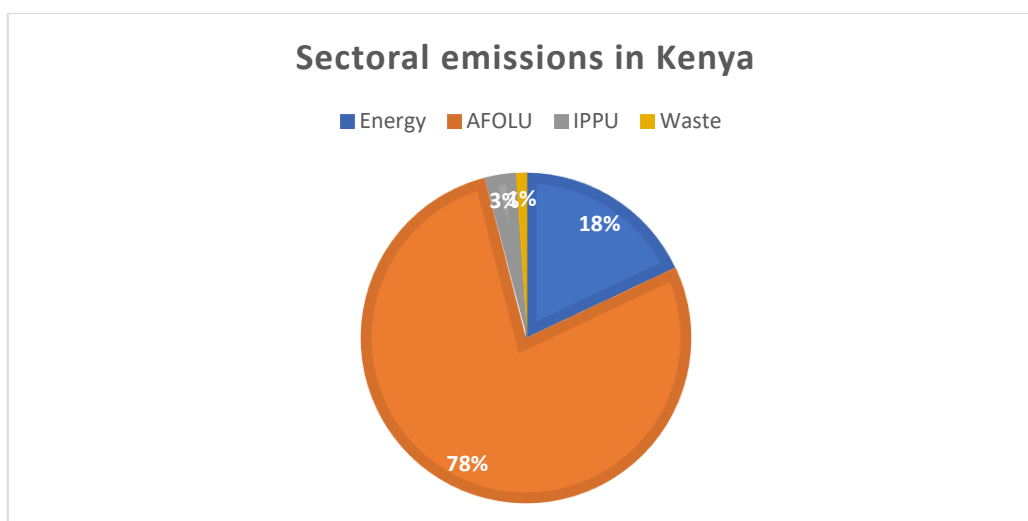


Figure 11: A breakdown of sectoral emissions in Kenya (Government of Kenya, 2020)

Kenya's iNDC stated a mitigation goal to reduce emissions by 30% by 2030, relative to the BAU scenario of 143 MtCO₂e. Emissions from biomass and future emissions from extractives industries were excluded. The section on ICTU mentioned the significant uncertainty that existed in the BAU and mitigation potential of LULUCF, and that work had commenced to update these numbers. Given that 75% of emissions in Kenya came from LULUCF and agriculture in 2010, these represent key sectors for establishing an accurate baseline and mitigation potential.

The adaptation target was to enhance resilience by mainstreaming adaptation in the Medium Term Plans (MTPs) and implementing adaptation actions. For both adaptation and mitigation, the list of actions was broad and vague, and the connections between the actions and targets unclear.

Kenya assessed its iNDC to be fair and ambitious, given its low historical contribution to global emissions of 0.1%, its low per capita emissions of 1.6 MtCO₂e, and the national circumstances of limited fiscal space and national priorities of poverty alleviation and sustainable development (Government of Kenya, 2015a). The CAT rated Kenya's iNDC as 2°C compatible (excluding LULUCF) but not Paris compatible (Climate Action Tracker, 2019a).

USD 40 billion was estimated for iNDC implementation up to 2030. The commitment acknowledged the need for a more comprehensive analysis to determine the investment requirements for the iNDC. The NCCAP was highlighted as the implementation mechanism of the iNDC, and the National Climate Change Council, Climate Change Directorate, and Kenya Climate Fund, were some of the institutional features tasked with implementation (Government of Kenya, 2015a).

5.2 The origins of the iNDCs in South Africa, Ghana, and Kenya

Prior to the announcement of the iNDCs, South Africa, Ghana, and Kenya had national climate policies in place, established knowledge systems, and involved policy actors. These factors shaped the formulation of the iNDCs and their knowledge system outcomes, by the knowledge they created, the evidence-based conversations they enabled, and the support they built. The following section traces the origins of the iNDCs. It does so by characterising the interaction between domestic climate policy, its knowledge base, and involved policy actors, as a way of uncovering how the iNDCs in these three countries emerged.

5.2.1 South Africa – The legacy of the Peak Plateau and Decline

The first major development in the history of climate policy in South Africa was hosting the World Summit on Sustainable Development in Johannesburg in 2002, and not long after, signing the Kyoto Protocol in 2003. The following year, the 2004 National Climate Change Response Strategy was released, which drew on existing policies, country climate change studies, the initial national communication to the UNFCCC, and the IPCC's Third Assessment Report (Lukey, 2020). This initiated the domestic climate policy activities that would be carried out over the following decade. Figure 12 illustrates the evolution of the policy context and knowledge base for climate policy in South Africa from 2000 to 2015, the year the submission of the iNDC was due.

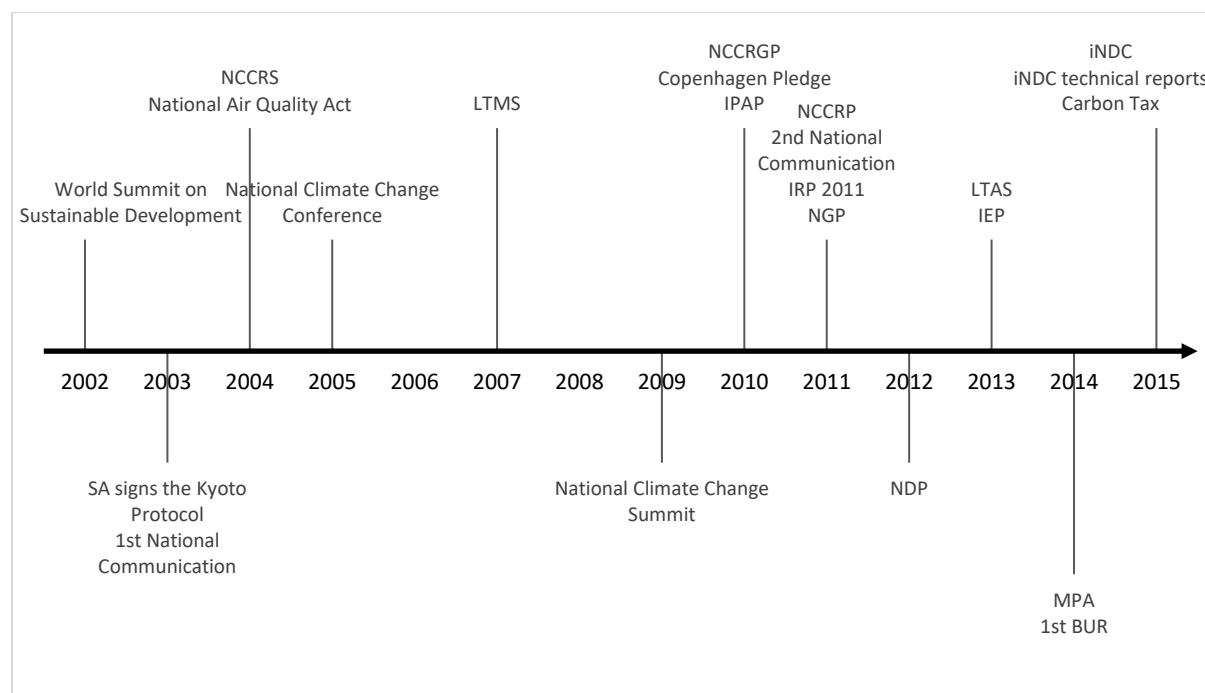


Figure 12: A timeline of the evolution of the policy context and knowledge base for climate change in South Africa from 2000 to 2015 (Key: SA – South Africa; NCCRS – National Climate Change Response Strategy; LTMS – Long Term Mitigation Scenarios; NCCRG – National Climate Change Response Green Paper; IPAP – Industrial Policy Action Plan; NCCRP – National Climate

In 2005, the Department of Environmental Affairs (DEA) hosted a National Climate Change Conference to build public participation. The conference gave rise to the goal to develop the country's first national climate change policy. Consequently, the Long Term Mitigation Scenarios (LTMS) were mandated by Cabinet in 2006 to develop the evidence base for the climate policy through a facilitated stakeholder process. The results of the LTMS were well supported by a range of actors, due to their technical robustness and the consultative manner in which they were developed (Lukey, 2020; Trollip & Bouille, 2017; Tyler & Torres Gunfaus, 2016). Using the results from the LTMS, the DEA developed a memo for cabinet, a national discussion document for the 2009 Climate Change Summit, and in 2010 ran a climate change policy roundtable. Out of these consultations, the National Climate Change Green Paper (NCCGP) was developed and subject to further consultations (Lukey, 2020). In 2011, the DEA published South Africa's first National Climate Change Response Policy (NCCRP), the culmination of a multi-year evidence-based, stakeholder process (Lukey, 2020).

To understand the origins of South Africa's iNDC, requires paying attention to how this domestic process interacted with the international process. The peak plateau and decline (PPD) GHG emissions trajectory range lies at the centre of the mitigation component of the NCCRP and iNDC. The PPD was first announced by President Zuma at COP 15 in 2009, as South Africa's pledge to the Copenhagen Accord to peak emissions between 2020 and 2025, plateau for a decade, and bring emissions into decline thereafter (DEA, 2010b, 2011a). The LTMS provided the domestic knowledge base considered by Cabinet to inform the commitment (DEA, 2011a) but did not recommend the PPD; rather, this was a political decision taken by the DEA (2, 11, 54). Although the LTMS was highly regarded by its participants, there were concerns about how the results would be used, as they regarded the process as a technical exercise to explore mitigation potential and not to inform policy (Lukey, 2020; Raubenheimer, 2011; Tyler & Torres Gunfaus, 2016). When the Copenhagen Pledge was made, and it seemed to clearly draw on the analytical work of the LTMS, participants felt that they had been misled and the results misused, which created mistrust between those who had participated (most notably big emitters) and the DEA (Tyler & Torres Gunfaus, 2016) (2, 5, 11). This legacy of mistrust between big emitters and the DEA persisted throughout the first half of the 2010s, observable in the formulation processes of most of the country's climate policy instruments, and demonstrative of the inseparable interaction between the technical and political features of a policy process, as identified by Rafey (2013). Pushback to the iNDC was also observable, which will be discussed in relation to the written submissions to South Africa's iNDC in 5.4.2.

Following COP 15, the PPD was incorporated into the Green Paper in 2010, and finalised in the NCCRP in 2011 (DEA, 2010a, 2011b). The PPD in the NCCRP was transformed from a deviation below BAU scenario in the Green Paper, to an emissions trajectory range with absolute numbers (DEA, 2011a, 2011b). This was a major development and enhancement in both transparency and ambition of the target. The range for the peak period was between a lower limit of 398 Megatonnes (Mt) CO₂e and upper limits of 583 MtCO₂e in 2020 and 614 MtCO₂e in 2025. For the plateau period, the range was between 398 MtCO₂e and 614 MtCO₂e. For the period of decline, from 2036 onwards, the range was 212 MtCO₂e and 428 MtCO₂e by 2050, as illustrated in Figure 13 below (DEA, 2011b).

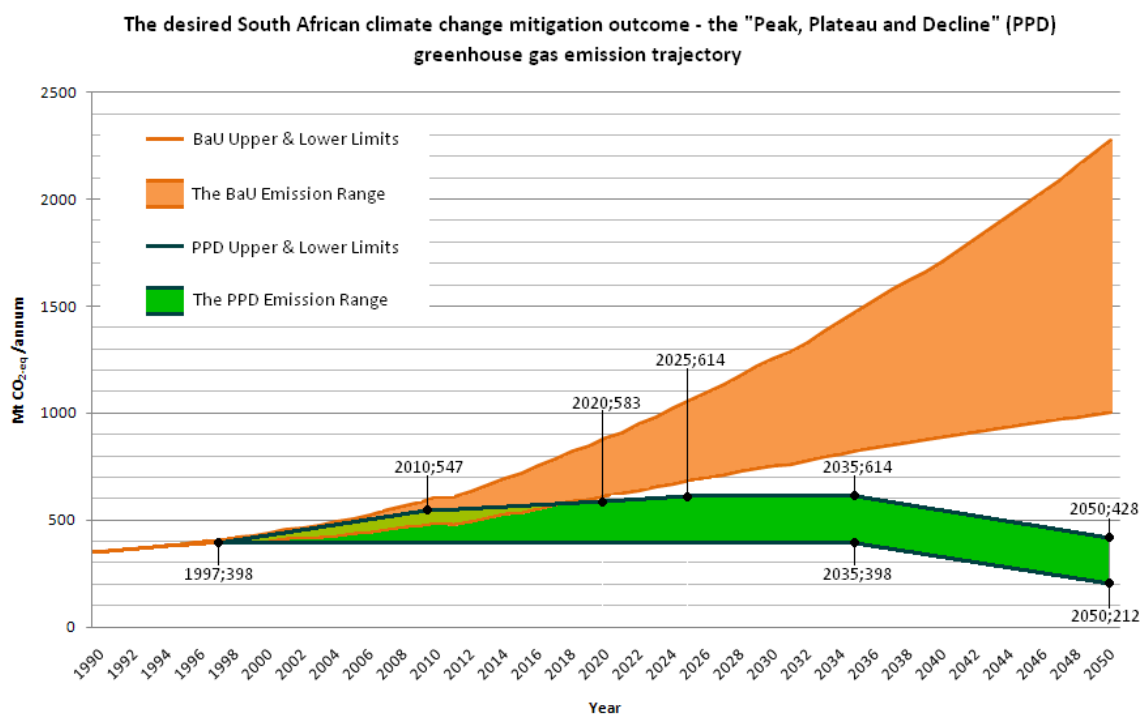


Figure 13: South Africa's Peak Plateau Decline greenhouse gas emissions trajectory range (DEA, 2011a, p. 7)

A milestone in the international process, with South Africa hosting COP 17, provided the impetus to accelerate the finalisation of the NCCRP, so South Africa could add legitimacy to its COP presidency, illustrative of the need to deliver progress domestically to maintain international legitimacy as identified by Putnam's two level game between international diplomacy and domestic politics (1988). The PPD also led to a carbon constraint in the 2011 Integrated Resource Plan (IRP), the capacity expansion plan for the electricity sector, which drove the subsequent introduction of renewable energy in the sector (2, 9) (Trollip & Boule, 2017; Tyler & Torres Gunfaus, 2016).

Four years later, on the 26th of March 2015, the DEA launched South Africa's iNDC process (DEA, 2015c). Despite the original timelines for stakeholder consultations in April and May 2015, a draft discussion document for the iNDC was only released for public comment on the 1st of August 2015 (DEA, 2015a). Stakeholders were given a month to submit written submissions, and nine provincial consultations were held from early August to early September (DEA, 2015b). The DEA presented the draft iNDC at a two-day parliamentary hearing on the 22nd and 23rd of September 2015, and stakeholders presented their responses. The presentations were followed by a discussion about issues to address to finalise the iNDC. South Africa officially submitted its iNDC to the UNFCCC a few days later, on the 25th of September 2015.

The mitigation component of the iNDC drew on the LTMS, and used the PPD as the backbone of the mitigation target. But a slowdown in the economy, increase in electricity prices, and increase in renewable energy generation and energy efficiency had led to a reduction in electricity demand and a slowdown in emissions. It was therefore surprising that despite these changes between 2011 when the PPD was given absolute numbers in the NCCRP, and 2015 when the iNDC was submitted, the iNDC used an unchanged PPD. This illustrated the enduring legacy of both the knowledge base and the form of commitment, around which policy actors could organise, the PPD thereby exhibiting features of a boundary object as discussed by Latour (1987) and Lahn and Sundqvist (2017). Using a milestone in the international process, leveraging off a well-respected domestic knowledge base, and utilising key domestic policy windows, the PPD was able to shape policy progress at domestic (NCCRP and IRP) and international levels (iNDC).

5.2.2 Ghana – From discussion document to the iNDC

Ghana demonstrated their commitment to the global response to climate change by becoming a signatory to the UNFCCC in 1995 and Kyoto Protocol in 2003. Ghana's Ministry of Environment, Science, and Technology (MEST) developed the country's First National Communication in 2000. Like South Africa, Ghana made a pledge to the Copenhagen Accord in 2010, in the form of a list of 55 Nationally Appropriate Mitigation Actions (NAMAs), but not an emissions trajectory range (MEST, 2010b). The domestic climate policy conversation was initiated by the Ghana Goes for Green Growth (G4) discussion document, and the development of the National Climate Change Adaptation Strategy in 2009 (Lawson, 2016; MEST, 2010a). The G4 document drew on existing policy and knowledge, the recommendations from a national science-policy dialogue, and a broad stakeholder consultation process (Lawson, 2016). The evolution of the policy context and knowledge base in Ghana that

culminated in the submission of their iNDC, is illustrated in Figure 14 below, and discussed in the following paragraphs.

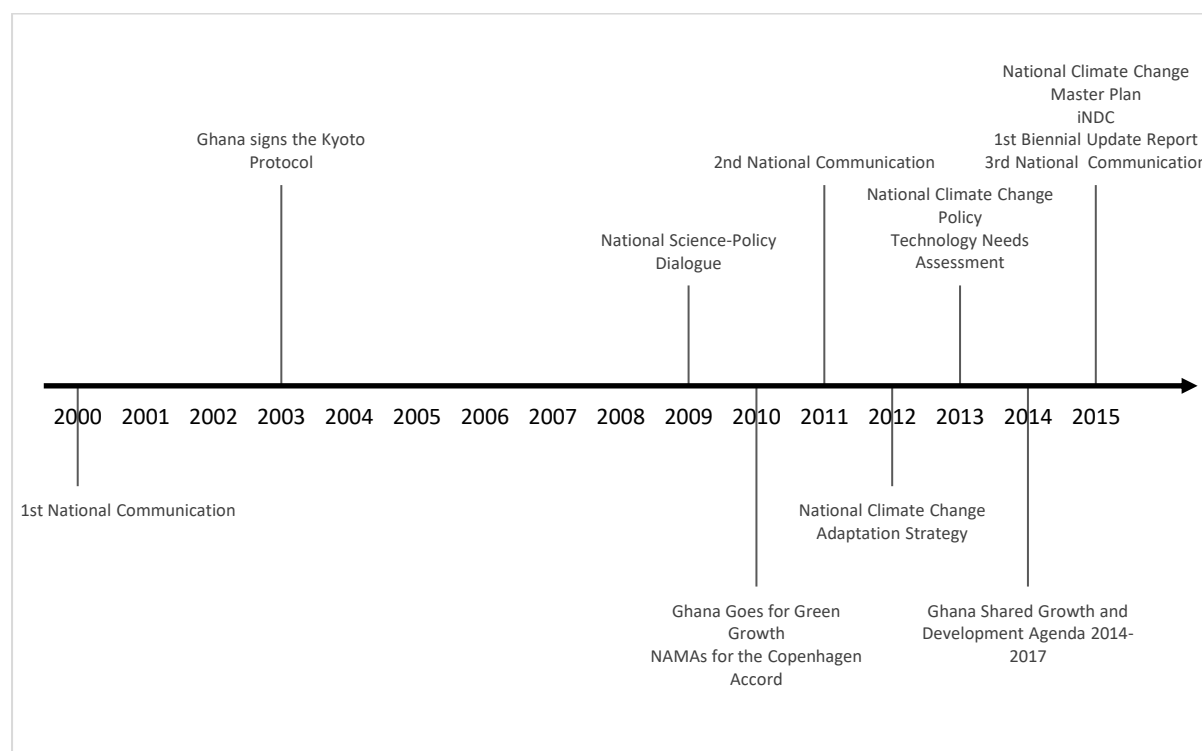


Figure 14: A timeline of the evolution of the policy context and knowledge base for climate change in Ghana from 2000 to 2015

Building on the work of the G4, MEST embarked on a process in 2011 to develop the National Climate Change Policy (NCCP). Policy actors participated in workshops, interviews, presentations, and peer review sessions, and were clustered into groups to gather a diversity of perspectives. Feedback loops and validation workshops were utilised to strengthen participation and transparency (Lawson, 2016). The final NCCP was released in 2013, by which time MEST had become the Ministry of Environment, Science, Technology and Innovation (MESTI) (MESTI, 2013). Notable features of the process were the use of the domestic knowledge base, the extensive consultation and facilitation to ensure diverse voices were recognised, and to build consensus. Two years after the release of the NCCP, a National Climate Change Master Plan (NCCMP) was developed to establish an implementation plan that included costing of activities. This included an even more extensive, bottom-up consultative process (MESTI, 2015).

Similar to South Africa, Ghana's iNDC had a solid domestic knowledge base and policy infrastructure to work from, and selected mitigation actions for the iNDC from the NAMAs (Republic of Ghana, 2015). Unlike in South Africa, Ghana's national climate policies and iNDC did not have a central boundary

object like the PPD, and which along with the lack of documentation, made it difficult to trace the evolution of targets and actions between the NCCP and iNDC.

A stakeholder and stocktaking process was held in the build up to Paris to develop the country's iNDC, which culminated in cabinet approval (Antwi-agyei et al., 2018; Codjoe & Dovie, 2020). Despite reference to this participatory process in the iNDC document, details about the process were limited (Climate Action Tracker, 2021a). Three options papers on adaptation, mitigation and engagements, awareness raising, and means of implementation were developed by technical working groups. These papers reviewed the existing climate policy actions, national and sectoral strategies, and international submissions, from which priority areas were identified. The working groups were made up of representatives from government, civil society, academia, and the private sector, and the three option papers were used as the basis of discussion for the iNDC consultations. Stakeholder workshops were held in the lead up to and after the Paris COP to validate and then refine the iNDC (Amoah, 2016).

As the option papers were not made publicly available, it was not possible to determine exactly how they informed the iNDC. The selection criteria for mitigation actions helped, however, to reveal how the iNDC drew on the existing knowledge base. Selection criteria included that mitigation actions selected needed to: come from the 55 NAMAs; be supported by government policy and have a financial commitment; have available baseline data to set targets; have GHG emissions abatement potential that could be modelled and co-benefits assessed; make possible estimation of investment requirements and identify funding sources; include assessment of sustainable developments benefits; requisite technology, and know-how were available for deployment; and have the underlying analytical tools that could be adapted to Ghana's context (Republic of Ghana, 2015). These criteria helped to communicate the rationale underlying the selection of mitigation actions in the iNDC, demonstrating how as Jasanoff (2010) and van Kerkhoff and Lebel (2006) identify, that criteria for justification differs according to the type of knowledge, thereby deeming which knowledge is valid, which knowledge counts. On the 23rd of September 2015, Ghana submitted its iNDC to the UNFCCC.

5.2.3 Kenya – From a national climate strategy to the iNDC

Kenya, like South Africa and Ghana, was active in international climate policy before having a national climate policy. Kenya submitted its first national communication to the UNFCCC in 2002 and signed the Kyoto Protocol in 2005. Figure 15 gives an overview of knowledge and policy that informed Kenya's iNDC.

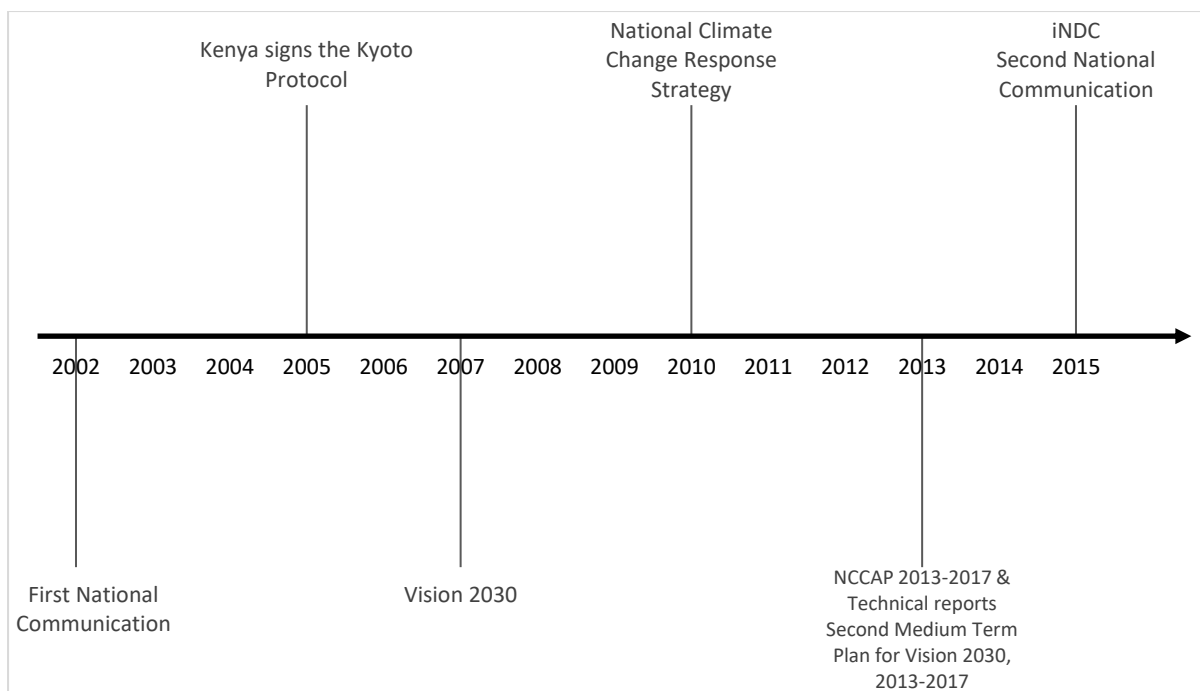


Figure 15: A timeline of the evolution of the policy context and knowledge base for climate change in Kenya from 2000 to 2015

The origin of the national climate policy discussion in Kenya was the development of the 2010 National Climate Change Response Strategy (NCCRS). After releasing the NCCRS, Kenya's Ministry of Environment and Mineral Resources (MEMR) identified the need to develop an action plan to drive implementation of the strategy. In 2012, Kenya began a technical and consultation process to develop the country's first National Climate Change Action Plan (NCCAP), which culminated in the development of reports covering eight sub-components. These documents were underpinned by comprehensive and detailed technical work, funded by DFID¹, DANIDA, JICA, CDKN. The sub-components included: the Long Term National Low Carbon Climate Resilient Development Pathway, developed by the IISD, ECN, and ClimateCare Kenya; the Enabling Policy and Regulatory Framework, developed by the IDLO; the Adaptation Analysis and Prioritisation, developed by LTS-Africa and Acclimatise UK; the Mitigation and Nationally Appropriate Mitigation Actions, developed by IISD, ECN, ClimateCare Kenya, and ICRAF; the National Performance and Benefit Measurement, developed by LTS-Africa, Ricardo-AEA UK & Baastel, PTC; the Knowledge Management and Capacity Development, developed by ALIN; Finance, developed by Adam Smith International and Vivid Economics; and Coordination and Management, developed by HTSPE and Matrix Development Consultants.

¹ Department for International Development (DFID); Danish International Development Agency (DANIDA); Japan International Cooperation Agency (JICA); Climate Development and Knowledge Network (CDKN); International Institute for Sustainable Development (IISD); Energy Research Centre of the Netherlands (ECN), International Development Law Organisation (IDLO); Land, Trees and Sustainability (LTS) Africa; World Agroforestry (ICRAF); Technology Action Plan (PTC); Arid Lands Information Network (ALIN)

Nine county consultations were conducted, followed by a joint consultation, and multi-stakeholder thematic working groups were established for each sub-component. The government-led NCCAP Task Force was responsible for coordination (Government of Kenya, 2013). 2013 saw the culmination of this extensive process and the official launch of the NCCAP. International research organisations played a central role in the knowledge creation, with limited representation of local researchers apart from ClimateCare Kenya.

The Ministry of Environment and Natural Resources (MENR, formerly the MEMR) kicked off Kenya's iNDC process with an inception meeting in February 2015 that brought together government and the relevant stakeholders. Technical support for the development of the iNDC was provided by international organisations Ricardo-AEA UK and Land, Trees and Sustainability (LTS) International, both of which were involved in the NCCAP, and Energia and the World Resources Institute (WRI). Funding was provided by the Climate and Development Knowledge Network (CDKN) and the stakeholder consultation process was conducted through the Low Emissions and Climate Resilient Development (LECRD) project, funded by United States Agency for International Development (USAID) and administered by the United Nations Development Programme (UNDP) (CDKN, 2015). Six multi-stakeholder consultation workshops were carried out to develop and validate Kenya's iNDC prior to COP 21 (MacOpiyo & Mamanji, 2020).

The iNDC used the NCCRS, NCCAP, National Adaptation Plan (NAP), and Second National Communication (SNC) as the primary sources of information (Government of Kenya, 2015a). An influential outcome of the NCCAP and SNC processes was the development of an emissions baseline and BAU scenario up to 2030. The scenario amounted to 143 MtCO₂e, with the SNC demonstrating a mitigation potential of a 60% reduction below BAU (Government of Kenya, 2015b). This then was used as the BAU scenario for the iNDC, along with a 30% emissions reduction target, as shown in Table 9 below (Government of Kenya, 2015a).

Table 9: Comparing the GHG emissions reduction potential and iNDC target in Kenya (Ministry of Environment and Forestry, 2021)

Sector	GHG emissions reduction potential (MtCO ₂ e)				iNDC target
	2015	2020	2025	2030	2030
Forestry	2.71	16.24	29.76	40.2	20.10
Electricity Generation	0.28	2.24	8.61	18.63	9.32
Energy Demand	2.74	5.16	7.92	12.17	6.09
Transportation	1.54	3.52	5.13	6.92	3.46
Agriculture	0.63	2.57	4.41	5.53	2.77
Industrial Processes	0.26	0.69	1.03	1.56	0.78
Waste	0.05	0.33	0.5	0.78	0.39
Total emissions reduction potential				85.79	42.90
Total Emissions				143	143
% of Total Emissions				60%	30%

The rationale or analytical basis for arriving at this target, by uniformly halving each sector, was not communicated. Instead, the country communicated an aggregated iNDC target, obscuring from view the technical work and sectoral details. This led to questions around the credibility of the target. One interviewee commented:

And then they went to Naivasha with the team, and they just slashed everything by 50%. So the 60% was reduced to 30%. And that is what they communicated. Because it was a politically decided figure. (34)

Numerous interviewees indicated that a few months into the process, the MENR was not satisfied with the mitigation component of the draft iNDC that was developed by Ricardo-AEA. They were concerned that the target was not a true reflection of Kenya's national circumstances, nor a reasonable international commitment. The Ministry opted to conduct an internal process to decide on a suitable iNDC. A closed workshop was held in Naivasha to develop the iNDC, bringing together ministries, departments and agencies, and some other trusted partners, to assess the evidence base and decide on a more politically acceptable mitigation target for the iNDC. Out of this workshop came the decision to adopt a 30% reduction target and the iNDC was finalised (29, 30, 32, 34).

Another factor that put pressure on the process was the arrival of US President Barack Obama in Kenya in July 2015. With the high-profile COP 21 approaching, Kenya saw this as an opportunity to showcase their leadership. The process needed to be fast-tracked to have something in time for President Obama's arrival, which led to the aforementioned Naivasha workshop. This seemed to have paid off with the US President commending Kenya on being "a leader in clean energy, and for announcing its

post-2020 target to limit carbon emissions as part of our fight against climate change” (CDKN, 2015). On the 23rd of July 2015, Kenya submitted its iNDC to the UNFCCC.

The findings presented above for South Africa, Ghana, and Kenya illustrated that understanding the origins of the iNDCs was important for understanding the final commitments. 2010 marked an important year for all three countries, in which national climate policy discussions started to gain real traction. New technical work was commissioned, and extensive consultation processes were run to develop the national climate change policies, which laid the foundations for the iNDCs. The countries were active in the international UNFCCC process before they had domestic climate policies. Once national climate policy and a supporting knowledge base was established, they drove the formulation of the iNDCs. This revealed the finding that back in 2015, iNDCs did not yet represent distinct policy instruments. Part of this was that most policy actors had little understanding of the iNDCs, which was caused by the lack of guidance provided by the international process, and the uncertainty surrounding what would be agreed upon in Paris. While South Africa and Ghana’s national climate policies and iNDCs were underpinned by technical work done by local academics, this strengthened local ownership, but in the case of South Africa mistrust was caused by the way in which the LTMS was developed and then used as the basis for national policy and an international commitment. Contrastingly, Kenya used international consultants for the technical work, which did not achieve the same levels of local ownership of the iNDC.

5.3 Knowledge bases for formulating the iNDCs

Knowledge is used by this conceptual framework and research design as one of the explanatory factors shaping the iNDC processes and their outcomes, and is the focus of this section. A knowledge base is made up of research-based knowledge and includes and interacts with other forms of knowledge held by policy actors (Cornell et al., 2013). Some of these forms of knowledge include the knowledge held by government bureaucrats who are skilled policy negotiators, the knowledge of civil society organisations (CSOs) that understand how to meet the needs of communities, or the knowledge of businesses with the resources and know-how to drive implementation. The challenge for a policy process is to recognise and include these diverse knowledges. But bringing together diverse forms of knowledge through knowledge processes, poses problems due to the cognitive, institutional and social differences between different knowledge types, illustrating the challenges inherent in combinatorial knowledge (Strambach & Klement, 2012) that is needed in cross-cutting policy processes for climate change. Commenting on the state of research-based knowledge for NDCs in South Africa, one researcher commented:

The technical stuff, we've done pretty good work in South Africa on this, that we know where all the mitigation opportunities are roughly what they would cost and who they will affect ...and now the DEA have their own in-house capacity. So I don't think there's no shortage of knowledge or information on the technical part of where the mitigation needs to happen. (2) It's also question about where the evidence base needs to go, when it's useful, when it's not useful...because you can't really tell. When you do this, you have this kind of naïve idea that someone will look at it and draw rational conclusions from it. But that's very seldom the way it works. In practice, people take certain things from it, and it gets used in certain contexts. (2)

The above excerpt highlights the importance of technical rigour and the contingent nature of knowledge in policy processes like the iNDC. Irrespective of its intended use, how policy actors draw on knowledge depends on their interests and their participation in the complex politics at play at the actor-knowledge-policy interface (2, 8). The use of the LTMS results for South Africa's Copenhagen Pledge, and its influence on the iNDC target, was an illustration of this finding.

One of the most notable gaps in South Africa's iNDC knowledge base was the longer-term, post-2030 action for which industry and transport are expected to play a bigger mitigation role. More research is needed if these difficult parts of decarbonisation are to be tackled (2, 3, 11, 17, 54). Part of the long-term also related to a just transition. South Africa was one of the few countries to mention the concept of a just transition in the iNDC (Republic of South Africa, 2015). At the time, however, there was no coherent vision for a just transition, nor how the country would get there (9, 11, 17).

Implementation knowledge was also an area of concern for the iNDC, which was raised by numerous interviewees. Sustained delays with implementation meant that the knowledge and capacity that is developed through implementation has failed to materialise in South Africa (2, 3, 11, 54). On the other hand, one researcher in South Africa highlighted the type of knowledge and capacity that was created by implementing renewable energy, demonstrating its role in garnering support for renewables:

From about 2010 when those companies started putting up their masts and measuring wind, we suddenly got lots of information about a huge resource. And this is key incontrovertible scientific data. Once people know if they put up a turbine, it's gonna turn and it's gonna make them a profit. It makes a very big difference. (3)

Another important feature of implementation knowledge is detailed and accurate costing. The technical work of the iNDC included an economy-wide analysis to determine socioeconomic impacts of mitigation. But the work did not include a detailed financial analysis, as the iNDC stated: “These costs are derived from energy systems and economic modelling. Further work is needed to prepare detailed business plans for finance and investment in mitigation” (Republic of South Africa, 2015, p. 9). This highlighted a key knowledge gap to be addressed by the technical work for future NDCs.

From an institutional perspective, apart from the NCCRP and PPD, no other components of the mitigation system had been finalised at the time the iNDC was being formulated. This posed challenges for generating the information required to design and trial the policy instruments needed to implement the iNDC, and hindered South Africa’s efforts to develop the governance and institutional capacity to design, administer, and monitor the iNDC (2, 3).

In Ghana, although there were few notable developments in climate policy between 2000 and 2008, 2009 saw a major increase in policy activity. Given the development in the knowledge base and evolution in circumstances between 2010 and 2015, it was surprising that the iNDC drew on the 2010 NAMAs (MEST, 2010b). The policy actions in the iNDC were more detailed, showing the work done by the iNDC process to enhance the granularity of the commitment.

Two knowledge gaps that were identified were the lack of data and Monitoring Reporting and Verification (MRV) systems for tracking progress, as well as detailed costing to enable investment and implementation (41, 43). Highlighting the need for financial analysis before the next NDC, Ghana’s iNDC stated: “revised cost from financial analysis will be presented before 2020” (Republic of Ghana, 2015, p. 8). Similar to South Africa, this represented a knowledge gap to be addressed by future work. Another challenge experienced was developing a long-term vision to remain relevant and robust, amidst changing political priorities, given the change in government shortly after the iNDC submission (41).

One reflection about the knowledge base that was unanimous across interviewees was that Ghana ran a locally-driven, consultative, robust processes for the development of the iNDC. The process was driven primarily by government and local academia, and sought to include representatives from traditional groups, civil society, and the private sector, . The way in which the process was carried out created ownership over the process and its outcomes (39, 41, 42, 43), as a researcher and civil society representative in Ghana remarked:

And I can also say for here that, especially for the past 10 years that we were doing all this preparation and knowledge, has basically been locally based. I can tell you that we did not use any external knowledge to develop all our climate policy actions and the iNDCs...everything came from within. (39)

Whatever you have seen in our iNDC is just a result of whatever that has happened from the GHG Inventory, the National Communication, the National Climate Change Policy, the National Adaptation Strategy, the Low Emission Carbon Development Strategy and Ghana's own development strategies. (43)

To meet the deadline of submitting an iNDC by COP 21, many African countries had to rely on international experts. In this context, Ghana's ability to run a locally-driven process was a noteworthy achievement. It also demonstrated how local knowledge creation and a process to bring together local researchers and policymakers, as well as other policy actors, played a role in building trust and ownership, and in enhancing the legitimacy of the iNDC and its process. These findings resonated with those of Ryan and Bustos (2019) and De Pinto et al. (2018) that the quality of the interaction between local researchers and policymakers is critical for building trust and legitimacy.

Kenya's iNDC had to deal with poor data quality and availability, which posed challenges for developing sound projections (20, 26) (Cunliffe et al., 2019). The tendency to rush processes and recycle existing data and analysis meant that weaknesses were often perpetuated rather than addressed, despite new information becoming available (21, 29, 34). These challenges were exacerbated by poor continuity in the knowledge base, and staff turnover within the MENR (29, 30, 32). Another knowledge gap identified was a long-term, Paris-compatible pathway or vision, with emissions targets only going up to 2030 (21) (Kurdziel et al., 2019; Mooldijk et al., 2020).

Kenya's approach to the iNDC was part of an approach to climate policy that has been fragmented and *ad hoc*, and which drew in international teams from time to time, under severe time constraints, to produce a new document. Such an approach has failed to institutionalise knowledge and learning in local organisations, key ingredients identified by Khan et al. (2018) for building long-term, impactful capacities. Kurdziel et al. (2019, p. 34) noted: "Due to the short timeframe in which Kenya's first iNDC had to be compiled in 2015, no provisions were made to institutionalise the process and ensure continuity for the enhancement and implementation of the iNDC in the future. While it seems that

the planned NDC update follows the same pattern, this new process offers the opportunity to establish critical institutions and permanent, well trained technical teams that allow for the iNDC update and other related processes to continue on an ongoing basis and beyond the delivery of the iNDC document". This statement highlights the important long-term work for the policy knowledge system that needs to happen in the five years between NDC submissions to institutionalise progress, build a critical mass of capacities, and establish a long-term research agenda.

Some features stand out about the roles of knowledge in the formulation of South Africa, Ghana, and Kenya's iNDCs. Firstly, limited new technical work was carried out. Instead, the existing knowledge base from existing climate reports and policy in the three countries was drawn on, consolidated, and repackaged in the form of iNDCs. However, it was unclear how the existing knowledge was translated for the iNDCs in Ghana and Kenya, and in South Africa, the commissioned technical work provided justification for targets instead of exploring what was possible with the iNDC. Even in cases where new information or data was available, this was not always utilised. Instead, countries sought to play it safe by remaining firmly within existing domestic policy. The detail of the iNDCs varied significantly, with Ghana providing the most detail with Annexes, South Africa providing some detail supported by technical reports, and Kenya providing a thin document with no supporting technical reports.

These three countries' iNDC processes showed that the form of a target and its supporting knowledge base influenced how policy actors organised around it. The form of targets also demonstrated what type of target could be justified by the available knowledge. For the last decade, the PPD has been a central boundary object around which policy actors could organise, to push for or resist greater ambition in South Africa. Ghana represented a more bottom-up approach, framing the discussion around policy actions, and making it easy for policy actors to position themselves in relation to a specific action. This also created a more fragmented discussion, however, which made it difficult to assess the coherence and adequacy of the discussion. Kenya on the other hand, presented an aggregated mitigation target, with limited details about its analytical basis, which made it difficult for policy actors to position themselves. The refusal to release the technical reports in Ghana and Kenya weakened the credibility of the processes and targets, by limiting their transparency. But this was a response to the pressure from international interests to increase ambition, which these two countries felt would only increase if they shared the details of the technical work.

Interrogating the knowledge bases of the iNDCs of South Africa, Ghana, and Kenya revealed that origins mattered but were obscured from view. Although economic conditions, emissions, and the

state of knowledge evolved considerably, boundary objects like targets and baselines have had long-lasting legacies in these countries, illustrative of the blackboxing that occurs as boundary objects become accepted (Lahn & Sundqvist, 2017; Latour, 1987). This was observable in the iNDCs using the PPD in South Africa, the NCCAP baseline in Kenya, and the NAMAs in Ghana. One of the risks of outdated baselines and targets was that they opened the door for contestation. In the case of South Africa, the outdated evidence base (specifically the use of the LTMS and MPA) was exploited by those resisting increased ambition in the iNDC, which constrained the level of ambition that could be committed to under South Africa's iNDC (1, 3).

Lastly, these trends indicated that the state of the knowledge base was a key determinant for what was possible with the iNDCs. Interrogating the knowledge base uncovered which areas were well covered, such as the electricity sector, and which were weaker areas, such as agriculture and land use, financial analysis, and costing of the iNDCs. These were highlighted as areas for research to prepare for the next NDCs. These processes mainly valued research-based knowledge, evident in the types of studies they drew on, whereas it was less evident how other forms of knowledge shaped the processes.

5.4 Participation of policy actors in iNDC processes

The roles of NDC processes and policy actors are two further explanatory factors used by this research, the influence of which are discussed in this section. In 2015, the iNDCs were still ambiguous policy objects, poorly understood by most stakeholders. They therefore inherited the actor dynamics of the existing climate policy landscape, which shaped the design and operation of the iNDC processes, and the participation of actors.

5.4.1 Policy access, knowledge, and capacities of policy actors

In South Africa, the DEA was the government department responsible for the iNDC, for which it commissioned research and ran stakeholder and intragovernmental consultations. The DEA set up the National Climate Change Committee (NCCC) to coordinate multi-stakeholder participation with climate change policy (DEA, 2011b). The Committee has been *ad hoc*, with its efficacy questioned and it failed to communicate how stakeholder inputs were used by processes (1). Communication is crucial for stakeholders to feel that their participation is taken seriously, and needs to be sustained over a period of time with regular opportunities to engage (Cash et al., 2003). However short-term, once off and poor communication weakened the legitimacy and ownership of the iNDC process in South Africa. Despite the laudable work the DEA has done, nearly all interviewees highlighted major limitations such

as their lack of political clout and authority, unclear policy direction, and inadequate capacity (1, 2, 3, 8, 11). Capacity constraints included limited budget and human resources, small technical teams, a wide range of policy development and implementation tasks, and high staff turnover (Averchenkova et al., 2019; Climate Action Tracker, 2020; Trollip & Boulle, 2017). As one interviewee remarked:

We don't have the people power in the Department [of Environmental Affairs] with the right skills. Teams are very small. People have grown into their positions very admirably...but you needed 10 high level seniors driving this with a lot of institutional knowledge that have been in government for the last 10 years. Instead, you have had one senior with a few juniors... You don't have a high-powered team doing this; it's been learning by doing. A lot of it has been reliant on consultants like me.

Leadership, skills, political clout, definite policy direction is what is missing. With that would have come an establishment of a knowledge base because it would have been clear which knowledge you are trying to generate. (1)

The above reflection demonstrated how the leadership, capacity, institutional memory, and political clout within government are fundamental for setting the goals for knowledge and using knowledge. A lack of these fundamentals has acted as constraints for the iNDC and climate policy more generally in South Africa (2, 54). Establishing a critical mass of in-house capacity in environmental ministries, instead of relying on consultants, is a part of running effective processes that enable other policy actors to bring their knowledge and capacities to the table.

Business in South Africa exerted influence in confidential bi-lateral meetings with the DEA, through consultations processes and key national decision-making platforms such as the National Economic Development and Labour Council (NEDLAC) (2, 54). The knowledge of business was detailed in terms of the impacts that climate policy would have on their sectors. This level of detail could not be matched by those outside industry, not least of all because much of the information was not in the public domain. This has resulted in an information asymmetry, which has been a major source of power for business, and has been used to good effect to influence national climate policy in South Africa over the last decade (Trollip & Boulle, 2017). Reflecting on how big emitters leveraged their knowledge to consolidate their power and resist change, one researcher in South Africa shared the following:

I think the knowledge will have been produced when, between government and the main players, they starting to implement the energy systems that are clearly least cost. But the

existing players have got most of the knowledge and most of the economic and financial resources. So, they're not going to produce that knowledge. The knowledge they are generating is the knowledge about how to stay in power. And they do that very well. (3)

The ability of big business and specifically big emitters to organise, supported by resources and real power in the economy, has given business their influence throughout the history of climate policy in South Africa; and so too in the iNDC. The result being that for the first half of the decade at least, business effectively slowed down and watered down climate policy in the country (2, 8, 9).

Civil society, communities, and organised labour had different levels of influence in South Africa. Advocacy and public campaigns have served as strategies for exerting pressure on the policy processes such as the iNDC. Civil society had fewer avenues of influence, which explains why they were so active in the written submissions and parliamentary hearings, which are discussed in the following section. Civil society used these avenues and public campaigns to good effect, to shape the discourse around the iNDC in the country. Organised labour used written submissions, stakeholder consultations, and bi-laterals with the DEA to participate in the iNDC, and also participate in NEDLAC. The representation of organised labour, through the Congress of South African Trade Unions (COSATU) and the tripartite alliance, which is an alliance between COSATU, the ruling party, the African National Congress (ANC), and the South African Communist Party, gives labour unique policy access and influence (9, 14). However, the influence of this alliance on the iNDC was not apparent.

The most direct access for the research community was through government-commissioned research. A small number of research organisations have played key roles for the DEA over the years, such as the Centre for Scientific and Industrial Research (CSIR) and the Energy Research Centre (ERC) at UCT. The CSIR was commissioned to do the technical report for the adaptation component of the iNDC, whilst the ERC were responsible for the mitigation component. Being commissioned for this technical work was based on a long history of these research centres being highly regarded in their respective areas. Both organisations have also had individuals on the South African delegation to the UNFCCC negotiations. These factors have established a high level of trust between the DEA and these organisations (5, 6, 11), and have contributed to the privileged role of experts in policy processes that Cozzens and Woodhouse (1995) discuss.

International donors participated in South Africa by providing funding for both the technical work for climate policy and the iNDCs, and for the operating budget of the DEA. Donor interests were not

always explicit, but they played a role in determining the type of knowledge that was produced and used, how processes were structured and run, and in strengthening the human capacity of the DEA (5, 6, 11).

Climate policy in South Africa has encountered resistance from the status quo and its constellation of actors, given the country's social and political history, and the structure of the economy (8, 9, 11) (Trollip & Boule, 2017). Big emitters in the period 2010 to 2015 effectively resisted climate policy, and line ministries prioritised their own agendas over climate policy. Organised labour, historically a progressive voice in South Africa, were cautiously supportive of the iNDC given that the constituencies' livelihoods were still largely located in big emitting sectors. Civil society have been a consistently progressive voice for climate action, but their limited political and economic power, and level of fragmentation has constrained their influence. While there was a sound knowledge base for the NCCRP and iNDC, this has been contested since entering the policymaking domain, as was evident in the pushback to the use of the results from the LTMS in the formation of South Africa's Copenhagen Pledge.

In Ghana, interviewees voiced concern that the iNDC process was rushed and did not allocate enough time to be truly consultative, which meant some actors were marginalised by the process (39, 42, 47). Unlike many other countries, Ghana went back to address issues of iNDC institutional arrangements (MESTI, 2017a) and iNDC mainstreaming (MESTI, 2017b), and to develop an iNDC implementation plan (MESTI, 2019), as evident in the documents cited here (39, 42). A researcher in Ghana noted:

...the biggest weakness of the iNDCs? The iNDCs were rushed without cognizance for the domestic policies existing policies? So very few countries, were able to go back and to see how [to] basically align their domestic policies to that of the iNDCs. But some of us had to go back and look at all our environment policies, development policies, and see how they lead to the iNDCs. And that's what we actually did. (39)

Some interviewees still felt that the lessons from the iNDCs were not properly captured, raising concerns that they would be replicated in the next round of NDCs (39). Some actor groups felt that they had been marginalised from the process, as a representative from civil society in Ghana reflected:

...over the years, there was some form of antagonism between the state agencies and the NGOs. So I suspect that was the reason why the state went ahead to develop the iNDCs without

actively involving CSOs. The second reason, I believe, is that CSOs are fragmented, you know, and it's a bit difficult to actually reach out to all CSOs. State agencies say that sometimes after a consultation process, then [we] have NGOs come to say that they were not involved in the process. But they have said that it is up to us as NGOs to come under common umbrella, so that it becomes very easy for them [the EPA] to reach out to us, (51)

This excerpt demonstrated the influence that existing relationships had on the iNDC process. The ability to organise and present a coherent voice was also a key determinant of influence, which is something that CSOs struggled to do effectively. This was highlighted here in Ghana (51) and was also a trend observable in all three countries.

In Kenya, the difference in the knowledge base and involvement of actors in the NCCAP and the iNDC was stark. The NCCAP was an extensive technical and consultative process to produce new knowledge for climate policy in the country. The iNDC reflected a much narrower process, predominantly drawing on existing knowledge and a small group of actors involved in a closed workshop, under severe time constraints. While the nature of the process was exclusionary for most local policy actors, notable was the dominant role of international experts, which suggested knowledge and capacity gaps domestically. This has thwarted efforts to institutionalise and establish continuity of the role of knowledge in climate policy in the country, and for the iNDC specifically (23, 30, 36).

5.4.2 Assessing written submissions as a form of participation in South Africa

Figure 16 below is a discourse network analysis (DNA) of the written submissions to the iNDC process in South Africa. This type of analysis was only possible for South Africa, as Ghana and Kenya's processes did not use written submissions as a mode of engagement. The analysis maps the policy actors that participated in this part of the iNDC process and some of their main concerns about the iNDC, thereby shaping the iNDC's priorities. The state of knowledge determined what positions could be justified, which areas of the knowledge base were well established, and which areas required more work. Lastly the analysis gathers reflections about how policy actors were allowed to participate, how they made use of written submissions. These features are represented in Figure 16 and unpacked by the discussion in the paragraphs that follow to illustrate the findings about the participation of policy actors revealed by the DNA.

powering a just transition in South Africa. The robust knowledge base that demonstrated the benefits of renewables was frequently mentioned to justify submissions' support for renewables. Contrastingly, CSOs were concerned that the just transition lacked a clear, detailed, and robust knowledge base.

Coal attracted divergent positions, with representatives from business indicating that South Africa would continue be reliant on coal, and that a longer time for a transition would be needed than was permitted by the iNDC. However, there was more widespread opposition to coal, particularly from community-based organisations and CSOs, as can be seen in Figure 16. Grounds for opposition to coal included its harmful impacts on the climate, water resources, air quality, and health of communities living on the coal belt. Stakeholders, particularly CSOs, proposed that the iNDC should accelerate the phase out of coal, and that domestic policy must align with the iNDC.

The PPD, as it has throughout its history, attracted contestation in the written submissions. Figure 16 shows that the PPD was opposed by all submissions that raised it, but the grounds for opposition differed. Business associations such as Business Unity South Africa (BUSA) and the Chemical & Allied Industries' Association (CAIA), two of the most influential business associations in the country, indicated that the PPD was too ambitious, and a slower transition was necessary to protect the economy, further evidence to the interviews of the resistance of big business to the iNDC (2, 8, 9). But a more widespread position, particularly of civil society and the research community, was that the PPD was not ambitious enough for South Africa's iNDC, and that the range should either be narrowed, or the lower end of the range should be committed to, to align with 2°C. A common reflection was that the knowledge base that underpinned the PPD was outdated and needed to be revised for the iNDC to be credible. This was corroborated by interviews (1, 3) and evidenced by Figure 16 as opposition to the knowledge base expressed by business and the research community, and opposition to the PPD from CSOs. These instances of contestation and opposition, illustrate the lasting legacy of mistrust around the PPD, and its origins, which was discussed in section 5.2.1.

From a development perspective, representatives from business contested that the iNDC would lead to costs that South Africa could not afford. But submissions in support from the research community and civil society cited studies that showed the positive socioeconomic impacts of the iNDC, which would contribute to transforming the South African economy to a lower carbon economy, and create jobs, food security, and manufacturing along the way.

The iNDC was criticised by civil society for not representing South Africa's fair share, with equity assessments used as the evidence for this claim. There was also concern about the negative impacts that climate change would have on livelihoods, particularly of poor communities, and therefore of the need for a more ambitious iNDC. There was a collection of issues that had been treated as peripheral issues, such as agriculture, transport, buildings, and the roles of cities. These were pinpointed as requiring more research to be better incorporated in the iNDC process.

The state of the knowledge base, which was seen as outdated, was most often mentioned in relation to the PPD. Other weaknesses in the knowledge base included the limited information on costing and implementation of the iNDC, and the need to strengthen the emissions inventory to track the iNDC. The knowledge base was also spoken about in a positive light, particularly for renewables, which suggested that it was a crucial ingredient for garnering the high levels of support for renewables, from civil society, organised labour, and the research community, as visible in Figure 16. It was also evident that knowledge was used to contest issues that did not have unanimous support.

Although there was recognition of the efforts of the DEA to run a robust consultation process for the iNDC, criticism of the policy access granted to stakeholders was widespread. Organised labour, civil society, traditional leaders, and local governments were critical of the inadequate time allocated for consultation and the incorporation of stakeholder comments. Another indication of the rush was that the final iNDC was submitted to the UNFCCC only a few days after the parliamentary hearings, which raised questions around whether the submissions were taken seriously. Some civil society organisations also cited a lack of funds as preventing them from participating in the parliamentary hearings in person, illustrating how resources determine policy access. The need for capacity building was also highlighted, which was seen as necessary to equip a broader spectrum of policy actors to meaningfully participate in the iNDC process.

In all, 31 submissions were made by actors in South Africa. As shown by Figure 17, over three quarters were made by civil society, including community-based organisations (Environmental Affairs Portfolio Committee, 2015), which indicates the importance of this forum for the goals of civil society. This was also representative of civil society representing diverse and fragmented interests that were difficult to organise. Typically, submissions were long but struggled to be packaged in a way that they could be used for the task of formulating the iNDC. In comparison, only two large business associations participated on the behalf of a large portion of big business in the country, representing a powerful

coalition in the process³. The participation of BUSA and CAIA demonstrated the well-organised and well-resourced ways in which business engaged with the process, and how they were well-accustomed to representing their interests in the terms of a policy process, exhibiting some of the features of successful discourse coalitions identified by Leifeld and Haunss (2012). These features, as well as their economic influence, gave business an advantage in the process. These trends with the written submissions also suggested the other forms of access enjoyed by other policy actors, such as bilaterals and NEDLAC for business and labour, and commissioned research for the research community. This meant that written submissions were not quite as important to these actors as they were for civil society. Lastly, the written submission revealed some implicit coalitions in South Africa, by the way in which civil society often drew on the work of the research community to substantiate their positions.

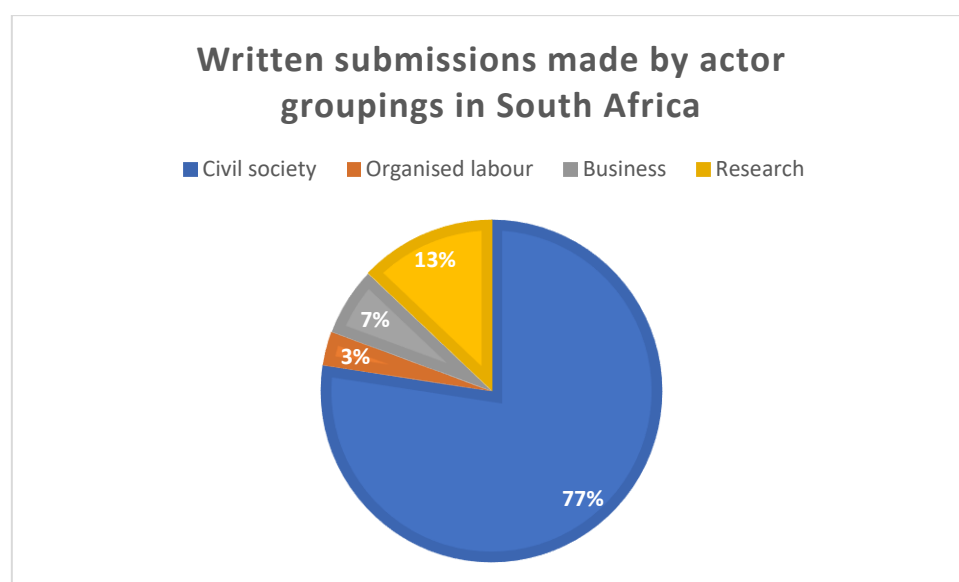


Figure 17: The breakdown of written submissions made by policy actor groupings to South Africa's iNDC process

Up to this point, this chapter has focused on assessing the NDC processes, the role of knowledge, and the participation of policy actors, which are seen as explanatory factors in this research. The following sections move on to discuss the implications of these factors on the knowledge system outcomes of the iNDC processes, such as their credibility, legitimacy and relevance, the consensus and contestation, and the representation and marginalisation of policy actors.

³ BUSA is the largest business association in South Africa in terms of the cumulative contribution of its members to GDP and employment. It represents a wide range of business including corporate representative organisations, chambers of commerce and industry, and professional organisations (BUSA, 2023). CAIA represents chemical manufacturers, industry service providers and traders from the chemical industry in South Africa, and is made up of 135 large and medium-sized companies (CAIA, 2023).

5.5 The credibility, legitimacy, and relevance of the iNDCs

Impactful knowledge systems effectively manage the interaction between knowledge and policy to build credibility, legitimacy and relevance (Cash et al., 2003; Cash & Belloy, 2020). Given that there was limited new technical work done for the iNDCs in all three countries, they were essentially a repackaging of existing information. This meant that the iNDCs inherited the existing knowledge bases and constellation of policy actors of the domestic policy processes. Where the knowledge came from, who it was produced by, and how it was produced emerged as key ingredients for building support (11), ingredients highlighted by the literature too (De Pinto et al., 2018; Jasanoff, 2010; Ryan & Bustos, 2019). Being locally produced by well-recognised, local universities and research organisations helped to develop the credibility, relevance, and support for the iNDCs in Ghana and South Africa. At the core of locally-driven approaches was the ability to build trust, based on the reputation of the knowledge producers, the relationships they held, and their histories of working in these countries with the Ministries of Environment. This was effectively done by local researchers at local universities in South Africa and Ghana (3, 28, 39). In contrast, the use of international consultants in Kenya led to technical work that was perceived not to be reflective of Kenya's national circumstances. The result was that technical work was shelved, and the process became one of political decision-making (29), as one researcher in Kenya explained:

It was political. So, they looked, they looked at looked at what Ricardo AEA [the international consultants] had done and then they looked at what other countries that are similar [did]. So, it was a sort of like, benchmarking against countries here. Where can Kenya sort of fit in? So, the 30% at the end did not have the calculations behind the data, but how it came you will not really get it. (29)

This led to questions over the credibility and legitimacy of Kenya's iNDC and its supporting knowledge base. The use of international consultants suggested that the local knowledge and capacities in Kenya at the time were inadequate for formulating an iNDC. But it is also reflective that the development of the NCCAP in 2013, relied heavily on international consultants. As the iNDC was predominantly a repackaging of the information from the NCCAP, international consultants that had been involved in the NCCAP, were best placed to play a leading role in the formulation of Kenya's iNDC. These trends highlight the need for the type of technical work required for NDC formulation to be institutionalised in local universities as Khan et al. (2018, 2019) suggest, to build the necessary local capacities, so that they are present and can be drawn on in the next round of NDCs.

As the impetus for the iNDCs came from the international process, they only really held relevance for those involved in the process. For others, they remained abstract processes with limited relevance. The struggles with relevance of the iNDCs, was not unique to these three countries, and is therefore not a criticism reserved for them. Rather it is a reflection of the challenges and work needed for an international process to gain traction within the specificities of a country context. The work of the international process is to support countries to do the work necessary in their contexts. The struggles of relevance were perpetuated by the lack of work that happened in South Africa, Ghana, and Kenya to translate the iNDCs for their societies, as well as the ambiguity that surrounded the iNDCs and the lack of time to build a broad-based understanding. The mismatch between the content of the written submissions and their suitability for being taken up by the iNDC was evidence of the lack of relevance of the iNDC in South Africa. A researcher in Ghana spoke about the work needed after the process, to build awareness about the iNDCs and their relevance, which demonstrates the importance of communication and using mainstream media to take the iNDCs out into the public:

I can tell you, even after the whole iNDC was done, we had to go back into our constituents to the provincial level also to do additional programs, awareness creation, and so forth. So various teams were tasked to do that work and give feedback to our constituents. So, two-way communication. That was the intention of the publicly done TV, radio station. (39)

Despite these efforts and the threat that climate change posed to livelihoods, interviewees mentioned how the iNDC process failed to effectively communicate these risks to the lived realities of communities in Ghana (39, 43). Translation of the relevance of the iNDC was critical for creating buy-in of policy actors. This was dependent, however, on the interpretation and communication skills of experts and policymakers. Small, overloaded teams, specifically in the Ministries of Environment responsible for the iNDC processes in these three countries, limited this type of work, which weakened the relevance of the processes. The technical support provided by the Environmental Protection Agency (EPA) in Ghana to MESTI, was critical for strengthening the capacities of government in the process; pointing to the benefit of pairing a Ministry with a technical state agency.

The qualities of the knowledge bases were shaped by how knowledge was produced and used in the iNDC processes. The communicative spaces conveyed the details of the knowledge bases and enabled policy actors to contribute to how knowledge informed the iNDCs. In all three countries, a criticism was that the underlying knowledge base was not clearly communicated. Policy actors were not able to see how their inputs were taken on board, giving the feeling that the consultation processes

resembled tick-box exercises. A contributing factor was that the processes were rushed to be ready for COP 21, which did not leave enough time for building understanding or robust engagement. This was most starkly visible in Kenya, who submitted their iNDC in July 2015, shortly before President Obama's visit; necessitating a closed workshop to conclude the process. Ghana and South Africa's processes were also rushed, although they made their submissions in September, with South Africa only holding their Parliamentary submission days before the submission. The ambiguity of the iNDCs at the time also made it difficult for policy actors to engage. All these factors reduced the legitimacy of the processes and the resultant iNDCs (1, 29, 36).

5.6 Knowledge, consensus, and contestation underlying the iNDCs

Knowledge and interests in policy processes are intertwined, which means that political contestations may present themselves as technical disputes (Cozzens & Woodhouse, 1995; Radaelli, 1995; Rafey, 2013). The iNDCs appeared to be reasonably successful at building consensus at a high level by including only those actions that were well supported. But uncovering contestation was more difficult and was dependent on unpacking the knowledge and policies underlying the iNDCs.

Since the dawn of climate policy in South Africa, the knowledge base used to inform policy formulation has been contested. This was evident with the LTMS, the results of which were well supported when it was regarded as a technical process. The decision to use these results to inform South Africa's Copenhagen Pledge and national climate policy, on the other hand, attracted criticism (Tyler & Torres Gunfaus, 2016), which showed that as soon as knowledge enters the realm of policy, it encounters politics and interests. Similar disputes over the use of knowledge in policy were evident in the processes to develop the policies and regulations for the carbon budgets, DEROs, and GHG emissions reporting in South Africa (Rennkamp, 2019; Trollip & Boule, 2017). Given that the implementation of the iNDC is dependent on domestic policy instruments, unpacking the contestation that played out at the domestic level provides insights into the contestation that underlies the iNDC but is not observable on the surface. The PPD, which was central to South Africa's Copenhagen Pledge in 2009, is an example here. It underwent a notable transformation from a deviation below the BAU scenario to an emissions trajectory range with absolute numbers for the national climate policy in 2011. This version was then used by the iNDC in 2015. Given the changes in the economics conditions of the country, and a slower than expected growth in emissions during this period, it was surprising that an unchanged version of the PPD in the NCCRP was used for the iNDC. The result of this lack of evolution was that the PPD was outdated by the time it was used in the iNDC. This was a source of contestation around the iNDC, with actors across the board calling for it to be updated. Critics of the process also used the fact that the

knowledge was outdated to oppose greater ambition. Instead of updating the PPD, the iNDC stuck with this wide, outdated emission trajectory range as its target. This created ambiguity that allowed competing interests to coexist and allowed the iNDC to be passed without resolving inherent contestation (2, 3, 54).

The point of contestation in Ghana lay primarily between the domestic and international actors. Commenting on the politicised nature of the role of knowledge in iNDC formulation, a researcher in Ghana remarked:

I can give an example that we had a lot of hassle with a couple of governments. It was like intelligence going after us, we only fund you if you do 1, 2, 3. And we said, no, we have our scientists, we have our resources. And of course, the UNDP provided sufficient funding to enable us to do our own iNDCs without any influence of any of those bilateral agreements...Ghana's iNDC was one of those that was not influenced by any external forces.
(39)

The statement illustrated the importance of local capacity and knowledge to set an agenda, as well as trusted funding partners to resist external pressure (39). Such knowledge and capacity cannot be built in the months leading up to an NDC submission, but was the result of years of sustained work by the knowledge system in Ghana.

The difficulty in uncovering domestic dynamics of contestation appeared to be a result of all the actions included in the iNDCs needing to enjoy high levels of support, which meant the more contested issues were left out. This approach raised two concerns. Firstly, if iNDCs were simply a repackaging of what existed that was well supported, it was unlikely that they were capable of driving an ambitious and transformative policy agenda. Limiting the iNDCs to consensus only ran the risk of near-term action being inadequate to put countries on long-term trajectories, necessary for the Paris Agreement. Secondly, if iNDC formulation processes remain as consensus-building exercises, with a reluctance to grapple with inevitable contestations, it is likely that the consensus will eventually start to fall apart further down the line. Experience over the last decade of the national climate policies in South Africa, Ghana, and Kenya showed that contestation was likely to arise during implementation. In the effort to avoid delays and be ready for submission deadlines, the iNDCs postponed these difficult conversations (54). To be ambitious target-setting policy instruments, capable of driving progressively more robust implementation, iNDCs will need to be willing to uncover and address contestation at

play. At the same time, consensus and contestation can shift, based on the evolution of the knowledge base, policy and technology, and the positions of policy actors. This demonstrates the need to look for opportunities for driving change with knowledge.

Examining consensus and contestation revealed the importance of a robust and regularly updated knowledge base and political processes to build consensus and address contestation. The more transparent, inclusive, and well communicated the knowledge base was, the greater the understanding of it, the consensus around it, and the support of its resultant iNDC.

5.7 Representation and marginalisation of policy actors in the iNDCs

The representation of policy actors in the iNDC processes depended on a collection of features. The design of the processes sets the terms of engagement, which consisted of structured engagements and an abstract iNDC document, around which there was ambiguity and uncertainty. Ambiguity in terms of information to include, forms of targets, timeframes, and level of detail of the iNDCs. The UNFCCC and IPCC played a key role in framing the problem of climate change and of the response. Although this has been crucial work to progress the conversation, it has meant privileging research-based knowledge and capacities by setting the goalposts for knowledge creation for the iNDCs in these terms.

Those actors who could adapt to these terms of engagement were best able to represent their interests in the process. This meant that policy actors with technical knowledge, resources, and good levels of organisation were disproportionately represented by the iNDC process (9, 25, 41). The exclusive use of English in these countries' NDC processes where the majority of the population do not speak English as their first language, was one example of the terms of engagement set. This along with the jargon that has filtered down from the UNFCCC process, posed real challenges for meaningful participation, particularly of grassroots community groups, rural and indigenous communities. One interviewee from Ghana highlighted that although the opportunity for all non-state actors to participate was the same, their levels of awareness of these opportunities and capacities differed, which resulted in differing levels of influence:

The degree to which these non-state actors are aware of the opportunities is a different matter. Right. And that definitely then leads to the fact that not all the actors have equal involvement in the process, even though the opportunities [to participate] are [equal] (41).

Secondly, are they [non-state actors] fully equipped to be confident to engage? I think that question is clear to everybody. Not all of them are fully engaged. Do they have the skills to be able to empower themselves to be able to engage effectively? Not all of them are not all of them are the same level, so those who have the edge in terms of the capacity in terms of the skills in terms of the knowledge, are the ones that are almost always seen to be fully engaged. And even when they engage, to what extent do they influence or shape the whole policy process and its outcomes, is another question. (41)

The barriers to participation also applied to different types of knowledge. Indigenous and traditional knowledge systems were most frequently cited as being marginalised from NDC processes, particularly in Ghana and Kenya (22, 25, 26, 51). These forms of knowledge systems are not well recognised at the international level under the UNFCCC, which trickles down to NDC processes in terms of dictating which forms of knowledge are deemed relevant for countries' NDCs (26). But as Nautiyal and Klinsky (2022) suggest, traditional and indigenous knowledge systems have important roles to play. Interviews revealed the importance attributed to these knowledge systems for forecasting local weather patterns (26), articulating local needs, and informing local mitigation and adaptation strategies particularly in agriculture (22). Although these knowledge systems and holders of these knowledges have historically not been directly consulted by NDC processes, doing so may enable these knowledge holders to become active agents in the formulation and implementation of NDC actions (51). Policy processes like the NDCs, are starting to directly engage with, and draw on these knowledge systems, but there is still a way to go both nationally and internationally (25).

In South Africa, the process seemed to be most influenced by the DEA, the commissioned researchers, and a well-organised, well-resourced business community. Civil society and labour also played key roles in shaping the discourse around the iNDC. In Ghana, MESTI and the EPA provided strong government leadership, with involvement by the research community to provide the necessary knowledge. In Kenya, the process was primarily driven by the MENR with international consultants as the primary knowledge providers. But when this research was not accepted, government agencies were brought in by the MENR to agree on a politically acceptable version of the iNDC.

Capacities were important determinants of representation in the iNDC processes but need to be thought of more broadly than technical capacities. Dimensions of capacity that were revealed, included the size of teams and level of turnover, political or economic clout, ability to understand and translate, and resources and ability to organise. Rather than pretend that equality of opportunity to

participate is the equivalent of equality of influence, the design and operation of processes could acknowledge these differences and employ strategies to address them. This will require that countries approach NDCs as long-term endeavours. As the iNDCs showed, the months leading up to a submission is a narrow window of opportunity that convenes national conversations and builds momentum. To make the most of such windows, countries need to have laid the necessary groundwork and knowledge. This takes years, not months, and speaks to the necessity to approach NDCs as five-year programmes of action, not six-month projects, reiterating the importance of institutionalising capacity building, in local organisations highlighted by Khan et al. (2018).

5.8 Concluding remarks

This chapter has analysed the iNDC formulation processes in South Africa, Ghana, and Kenya utilising a policy knowledge systems conceptual framework. Key explanatory factors identified by the application of this conceptual framework included the iNDC processes, the roles of knowledge, and the participation of policy actors. Knowledge system outcomes included: the iNDC documents, credibility, relevance and legitimacy of the knowledge and iNDCs, consensus and contestation, and the representation and marginalisation of policy actors. These findings have been discussed in relation to the empirical and theoretical literature presented in Chapters 2 and 3, to demonstrate how the findings of this research, revealed by the conceptual framework, build on and extend these bodies of knowledge. Five key findings are summarised below.

First, the iNDCs were strongly influenced, indeed conditioned upon, by previous research and policy development, rather than from a new and independent design process. Activities in climate policy at the national and international level, and the interaction between these levels, brought about the iNDCs. At the same time, the iNDCs helped to bring the domestic and international processes closer together and enable a new, more bottom-up policy regime for the global response to the climate crisis, showing that the iNDCs were in a sense a product of Putnam's (1988) two level game between international diplomacy and domestic politics.

Second, the task of the iNDC formulation process in each country could be described as figuring out what iNDCs meant for their countries, by drawing on their existing actors, knowledge base, and policy to develop iNDCs under serious time pressure, amidst uncertainty and ambiguity. The actor-knowledge-policy interface (Cornell et al., 2013; Jasanoff, 2006, 2010; Muñoz-Erickson, 2012; van Kerkhoff & Pilbeam, 2017) at work in the iNDC processes, shaped what was possible with the iNDCs.

Third, the participation of policy actors in iNDCs was enabled and constrained by the design and operation of the processes. Policy actors' influence was dependent on their ability to respond to the terms of the process through their policy access, the knowledge and capacities they held, and their ability to represent their interests in the politics of the moment, through an abstract and technical process. The terms of the process meant that those policy actors with technical knowledge, an ability to organise and communicate their position, along with resources, were well represented by the processes, demonstrating the differences in influence of policy actors as discussed by (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998; Pohl, 2008). Notable examples were local researchers in Ghana and South Africa, illustrating the privileged role of experts (Cozzens & Woodhouse, 1995; Jasanoff, 2006, 2010; Sundqvist et al., 2017), business in South Africa, and international consultants in Kenya. Others, such as civil society and communities, were more fragmented or not as well resourced, and as a result, were marginalised or struggled to exert influence in the processes.

Fourth, in addition to the iNDC documents, the iNDC processes resulted in a collection of knowledge system outcomes. This included knowledge bases that were adapted for the iNDCs and showed varying levels of development, with some features out of date. How the knowledge was created and used determined the credibility, legitimacy, and relevance of the resultant iNDC, important features of impactful knowledge systems as highlighted by Cash et al. (2003; 2020). This in turn shaped the consensus and contestation that emerged, showing the intertwined relationships between the technical and political features of policy processes (Cozzens & Woodhouse, 1995; Radaelli, 1995; Rafey, 2013), with consensus mainly high-level, and contestation beneath the surface, underacknowledged.

Fifth, a close studying of the processes highlighted the roles of the iNDC processes and their policy knowledge systems in determining their outcomes. Countries relied on years, not months of work, to prepare for and make the most out of the windows of opportunity and momentum that the iNDCs created, highlighting the need for capacity building to be approached as a long term endeavour as argued by Khan et al. (2018).

The iNDCs effectively created pressure points for knowledge synthesis and creation to convene evidence-based national conversations about how to respond to climate change, and the associated risks and opportunities. But a looming question is whether the iNDC processes, with all the challenges they faced, were catalysts of learning in policy knowledge systems, domestically and internationally. Another question is whether this learning informed more robust and transformative future NDC

processes and outcomes. To explore these questions, the next chapter shifts attention to what happened five years later, the NDC Updates.

CHAPTER 6: Five years later – Evolved processes and policy knowledge systems to update the iNDCs in South Africa, Ghana, and Kenya

2020 represented the start of arguably the most important decade for climate action in human history, and with it, the formulation of the NDC Updates. This chapter sets out to better understand these important processes at this critical time. The chapter begins by describing the NDC Update documents in South Africa, Ghana, and Kenya, and characterising the processes in these three countries that produced these commitments. This then lays the foundation for a policy knowledge systems analysis of the processes, utilising the conceptual framework presented in Chapter 3 (i.e., the portion illustrated in the blue square in Figure 18), and operationalises it through using the explanatory factors identified, namely the NDC Update processes, the roles of knowledge, and participation of policy actors. The findings revealed by the application of this conceptual framework are discussed in relation to the empirical and theoretical literature presented in Chapters 2 and 3.

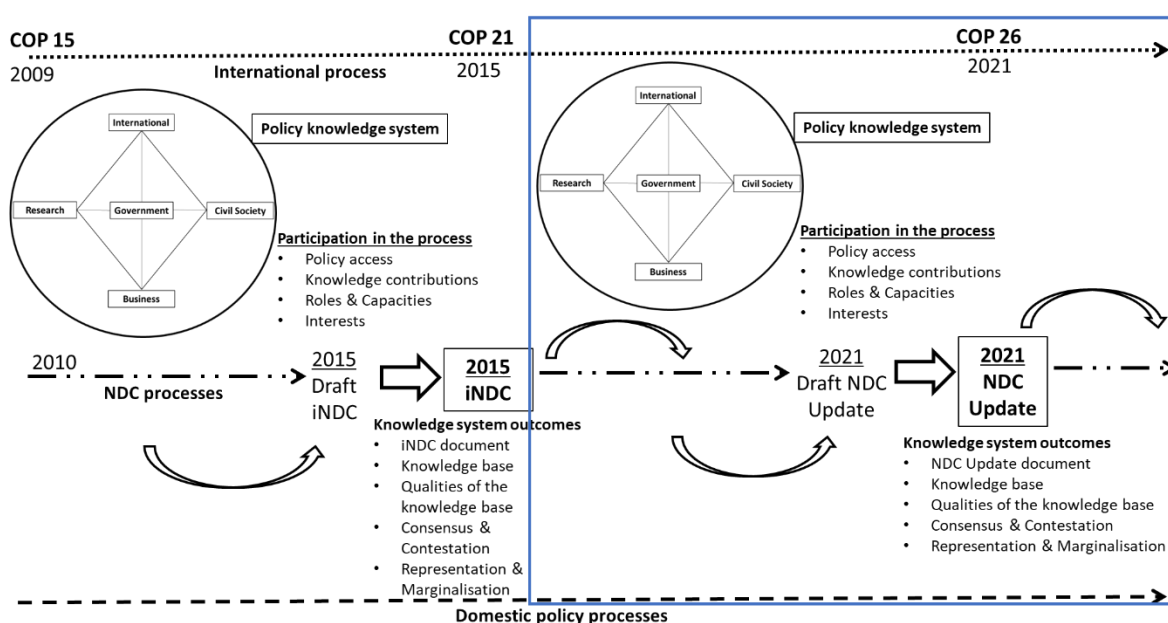


Figure 18: Situating the contribution of this chapter in relation to the conceptual framework - The part of the conceptual framework included in the blue square is discussed in this section: the NDC Update processes and the participation of policy actors through engaging with knowledge.

As mentioned in previous chapters, the intention with this conceptual approach is to move from describing “what” the NDC Update processes consisted of, to a characterisation of “how” and “why” they unfolded as they did, and how these features have changed between the iNDCs and NDC Updates. This chapter is different to Chapter 5 in that it does not discuss the outcomes of the Update processes apart from the NDC Update documents. A discussion about the knowledge system

outcomes is reserved for Chapter 7. The reason for splitting the content over two chapters is that observing the NDC Updates in real time meant that there was a much richer set of data to work with, than was the case for the iNDCs. This allowed for a more granular analysis. For this reason and because the Updates were compared to the iNDCs, two chapters were required to allocate enough space to present and discuss these rich findings.

6.1 The NDC Update documents

In the lead up to COP 26, 29 African countries submitted new or updated NDCs to the UNFCCC, out of a total of 143 countries, with another 49 countries not having yet updated their NDCs by COP 26. South Africa and Kenya were two of the African countries to meet this deadline, whereas Ghana submitted an interim letter on the 12th of October and their final NDC Update on the 4th of November 2021, after the COP had commenced (UNFCCC Secretariat, 2021).

The headline change in South Africa's NDC Update compared to the iNDC was in its mitigation target, with a narrowing of the emissions trajectory range. The updated target showed a 17% reduction to the upper end of the 2025 target, and a 32% and 12% reduction of the 2030 upper and lower bounds of the range respectively. In absolute terms, the new targets were as follows: 398-510 Mt CO₂e for 2021-2025, 350-420 Mt CO₂e for 2026-2030, compared to the iNDC's 398-614 Mt CO₂e (Republic of South Africa, 2015, 2021b). Crucially, this effectively brought the peaking year forward from 2035 in the iNDC to 2025, and did away with the decade-long plateau period that was contained in the iNDC (Republic of South Africa, 2021b). This meant that the Update finally did away with the PPD, more than a decade after it had entered the climate policy arena in the country. The mitigation component of the NDC Update was also more comprehensive than the iNDC, covering 14 pages compared to three pages.

The adaptation component served as South Africa's first adaptation communication. The National Climate Change Adaptation Strategy (NCCAS) was adopted in 2020, and is the country's NAP and implementation mechanism for adaptation in the Update. The climate impacts, risks and vulnerabilities of the country, and its likely costs and impacts on sectors and provinces were presented. The adaptation component, like that of the iNDC, was made up of five main goals, but was better defined with more details on the methodologies, actions, and investment requirements (Republic of South Africa, 2015, 2021b). The adaptation component of the Update at nine pages is roughly three times longer than that of the iNDC.

The support component communicated the financial needs for implementing the Update, with a goal to increase climate finance received from USD 2.4 billion in 2018 to a floor of USD 8 billion per year by 2030. Implementation was based on the assumption that there will be effective multilateral cooperation, as well as sufficient support in the form of finance, technology, and long-term institutional and human capacity-building (Republic of South Africa, 2021b). The revision of the NDC drew on more robust information on the impacts of climate change and the costs of responding than was available for the iNDC, and the Update contained substantially strengthened information necessary to facilitate clarity, transparency and understanding (ICTU) (Republic of South Africa, 2021b). On the whole, although South Africa's NDC Update followed the same structure as the iNDC, it was more detailed and comprehensive, with 33 pages compared to 11 pages (Republic of South Africa, 2015, 2021b).

Some of the expected headline achievements of Ghana's NDC Update by 2030 included emission reductions of 64 MtCO_{2e}, improved air quality to avoid 2900 premature deaths per year, creating at least one million decent and green jobs, and benefitting 38 million people, particularly for youth and women (MESTI, 2021a). As with South Africa, the mitigation target of Ghana's Update showed a major change from the iNDC. Unlike South Africa, Ghana decided to change the form of their target from a deviation below the BAU scenario, to a new single base year of 2019 of 58.8 MtCO_{2e}, and absolute emissions reduction target of 64 MtCO_{2e} by 2030. The Update was made up of 19 policy actions (compared to 16 in the iNDC) in 10 priority areas (compared to 7) to be implemented through 13 adaptation (compared to 11) and 34 mitigation programmes of action (compared to 20) to drive action and economic diversification (MESTI, 2021a).

Seven of the adaptation and nine of the mitigation programmes of actions were identified as unconditional, which together would achieve 8.5 MtCO_{2e} emissions reductions by 2025, and an additional 24.6 MtCO_{2e} reduction in emissions by 2030. Unconditional referred to measures for which financial resources had been secured to fund implementation. Other unconditional criteria were that an action needed to have high socioeconomic benefits, align with government priorities, and was cost-effective and not reliant on external support. Conditional commitments referred to measures that were unlikely to receive government support due market, regulatory, and technological barriers. Six adaptation and 25 mitigation programmes of action were identified as conditional, and could achieve additional emissions reductions of 16.7 MtCO_{2e} by 2025 and 39.4 MtCO_{2e} by 2030.

The financial needs communicated were between USD 9.3 billion and USD 15.5 billion, with an annex providing detail of how these figures were derived. This figure was substantially lower than the USD 22.6 billion estimated by the iNDC. The USD 9.3 billion was broken down into USD 3.9 billion for the unconditional programmes of actions (compared to USD 6.3 billion for the iNDC), and USD 5.4 billion for the conditional programmes of actions (compared to USD 16 billion for the iNDC). A smaller support request for USD 3 million on a biennial basis to support coordination of NDC actions and regular international reporting was also included. A footnote in the Update mentioned that detailed investment estimates were expected to be provided in Ghana's NDC investment strategy once it is available, and that a comprehensive analysis of job potentials and economic diversification opportunities will be developed. An annex provided further details on each policy action, such as their climate objective, expected socioeconomic outcomes, job creation potential, funding requirements, number of beneficiaries, level of gender responsiveness, and impact on short-lived climate pollutants (SLCP) (MESTI, 2021a).

Technology and capacity needs that were highlighted in Ghana's Update included staff training, strengthening the role of academia in training, and research and evidence gathering to update the NDC. Also highlighted was the need for stronger involvement of CSOs and traditional authorities to mobilise public support through information sharing. Ghana's NDC Update also provided a detailed table to cover ICTU, drawing on information from the 2019 GHG inventory. Exclusions communicated included future emissions from selected extractive and manufacturing industries (MESTI, 2021a). Ghana's NDC Update was 27 pages compared to the 16 page iNDC, with a foreword by the country's President demonstrating support from the highest political level (MESTI, 2021a).

Kenya's Update showed a more modest enhancement in the mitigation target than Ghana and South Africa. Kenya's Update committed to a 32% reduction below a BAU of 143 MtCO_{2e}, which is 2% more ambitious than the iNDC and stayed with the same BAU scenario that was used in the iNDC. A total of USD 62 billion was communicated as the investment requirement for implementation of the Update, which is a substantial increase from the USD 40 billion of the iNDC, and significantly higher than Ghana. 13% of finance is expected to come from domestic resources, and 87% from international support, whereas the iNDC was fully conditional, showing Kenya are more willing to allocate some domestic resources to the Update. 29% of the finance will be allocated to mitigation (Government of Kenya, 2015a, 2020).

The adaptation component of Kenya's Update was allocated 71% of the finance, demonstrating that building resilience is the major priority for Kenya. The cost of the adaptation component was estimated to be USD 43.9 billion, with 10% expected to come from domestic resources and 90% from international resources. The adaptation target was broken down into 50 adaptation programmes across 13 sectors, which provided a greater level of detail than was the case with the iNDC, and should aid tracking of progress. Any climate finance received as loans will be considered to be part of Kenya's domestic contribution (Government of Kenya, 2020). The document stated that international support will be required for Kenya to forego the benefits of exploiting domestic coal and oil reserves (Government of Kenya, 2020).

Improved information and data made it possible for more a robust assessment of options to be included in Kenya's NDC Update. The process drew on a document developed by UNDP and the WRI entitled, *Enhancing NDCs: A guide to strengthening national climate plans by 2020* (Fransen et al., 2019), which demonstrated the continued influence of international experts on NDC formulation in Kenya. Kenya's NDC Update represented a more comprehensive document, totalling 20 pages compared to the seven-page iNDC, and a well populated ICTU table that provided more granular information. Signatures from Kenya's Ministry of Environment and Forestry (MoEF), Ministry of Foreign Affairs (MoFA), Attorney General, and National Treasury and Planning demonstrated political commitment.

6.2 The process of updating the iNDCs

The following section analyses the processes that produced the NDC Updates in South Africa, Ghana, and Kenya. Both the iNDC and the Update processes have been poorly documented in all three countries. The benefit of the Update processes was I could observe them in real time, collect documentation that emerged during the processes, and document the different features of the processes and my impressions of it. Documenting these processes is a contribution of this thesis to make the study of the processes more possible, to deepen the understanding of these processes, and to ultimately uncover insights that can inform future processes.

6.2.1 South Africa

South Africa's NDC Update process, which was run by the DFFE (formerly the DEA), closely resembled that of the iNDC process, utilising national workshops, written submissions, bilaterals, and provincial consultations to structure the process, and to provide opportunities for all groups of policy actors to engage with the process, including other parts of government, civil society, business, research and

international organisations. On the 30th of March 2021, South Africa's Minister of Environment hosted an online session to launch the consultation process for South Africa's NDC Update. Stakeholders were invited to develop written submissions commenting on the draft NDC Update, from the 1st to the 30th of April 2021. A total of 33 submissions were made, and bilateral consultations were held with BUSA during a closed session on the 28th of April 2021, and with the youth constituency, the Youth Policy Committee (YPC), during an open session on the 29th of April 2021 (DFFE, 2021a).

Over the course of May 2021, the DFFE held consultations in each of South Africa's nine provinces. The workshops were similar to the ones held for the iNDC, but due to COVID-19, consultations were held in a hybrid format, which limited the number of in-person attendees but also allowed for virtual participation, thereby extending reach. The provincial consultations consisted of presentations from the respective provincial governments, followed by a presentation from the DFFE. The workshops were divided into breakaway groups on adaptation, mitigation, and means of support components of the Update. The main discussion points were presented back in plenary.

Virtual consultations were held with government departments through the Inter-Governmental Committee on Climate Change (IGCCC), as well as through a meeting for the Deputy Director Generals' (DDG) cluster on the environment. Once inputs from stakeholders had been integrated in a final draft of the NDC Update, the document was taken through the government cluster system to Cabinet (DFFE, 2021a). On the 22nd of September 2021, cabinet approved the Update (South African Government, 2021), and on the 27th of September 2021, South Africa officially submitted its NDC Update to the UNFCCC.

A notable innovation in the process to update South Africa's iNDC, which was not present at the time of the iNDC, was the establishment of the PCC. The PCC is chaired by President Ramaphosa and consists of 22 commissioners that represent civil society, organised labour, academia, and business, as well as 10 cabinet ministers (The Presidency, 2020). The PCC held two special sessions on the NDC Update in May and June 2021, which fed into the DFFE's process, and allowed social partners another avenue of engagement.

The first special session was held online on the 7th of May 2021 and included a recap on the draft Update from the Minister of Environment. Representatives of social partners then offered their perspectives on what should constitute a just NDC Update for South Africa. Representatives included the Chief Executive Officer (CEO) of BUSA representing business, the National Labour and Economic

Development Institute (NALEDI) representing organised labour, WWF-SA representing civil society, the Ayakha Melithafa Foundation representing the youth constituency, and the Chair of the South African C40 Cities Vertical Integration Working Group on Climate Change representing local governments. A question-and-answer session gave the opportunity for those attending to actively participate. Following the discussion, the DFFE made a second presentation, this time focusing on the technical work underpinning the draft. Three breakaway groups allowed for more in-depth engagement with the three main components of the draft Update. Key messages were consolidated and presented back in plenary (PCC, 2021a).

The second PCC special session was held online on the 4th of June 2021. Again, three sessions dedicated to each component were run. In each breakaway session, feedback from the prior PCC meeting were presented, along with the draft recommendations, followed by a discussion. The session on mitigation was unique, as it allowed the Energy Systems Research Group (ESRG, formerly the ERC) at UCT to present the modelling commissioned by the DFFE for the mitigation component. This presentation was followed by responses from Meridian Economics, CSIR, and the Pathways Project, which is a collaboration between the National Business Initiative (NBI), BUSA, and the Boston Consulting Group (BCG). The respondents shared insights from their respective modelling studies on mitigation pathways for South Africa. This allowed a discussion between the different studies about their results, areas of convergence and divergence, and the implications for the Update. The session concluded with a discussion and a summary of recommendations (PCC, 2021c). The PCC finalised the recommendations, which they submitted to President Ramaphosa as the Chair of the Commission on the 1st of July 2021 (PCC, 2021b). The recommendations formed one of the inputs for Cabinet's consideration and finalisation of the NDC Update (The Presidency, 2021).

6.2.2 Ghana

Ghana's NDC Update process was originally intended to be conducted from May 2020, with submission to the UNFCCC by October 2020. With the onset of COVID-19 in March 2020, Presidential elections in December 2020, and the one-year postponement of COP 26, the process was only launched in September 2020. Figure 19 below illustrates the amended timeline of activities for the Update process, which was shared by the EPA with stakeholders to inform them of the design of the process, the associated timelines, and their opportunities to engage with the process.

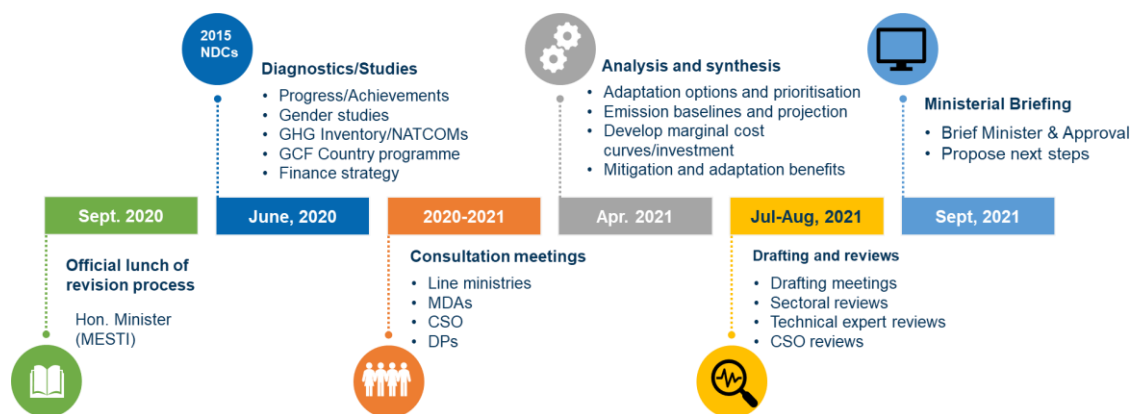


Figure 19: Updated timeline for Ghana's NDC Update process (EPA, 2021)

The process was initiated when an internal inception note was developed by the EPA and MESTI to inform the considerations for updating the country's NDC (52). One of the main political interests was to enhance alignment between the NDC Update and the government's policies and priorities, given that there was a change in government shortly after the iNDC was submitted (48, 51, 52). Cabinet approval for the process to commence was granted, and on the 1st of September 2020, MESTI's Minister held the official launch of Ghana's NDC Update process online (48, 50). The session included statements from the ministries, foreign governments, and multilateral agencies listed in Table 10 below.

Table 10: Statements made by representatives at Ghana's NDC Update launch

Ministries	Ministry of Local Government & Rural Development Ministry of Planning Ministry of Finance
Foreign governments	Government of Germany European Union Government of Switzerland Government of the United Kingdom
Multilaterals	UNDP World Bank Africa Development Bank United Nations Office for Project Services

The launch also included a presentation on the progress, achievements, and challenges of the iNDC presented by the EPA, and a presentation by MESTI on the Update process and next steps. The National Development Planning Commission (NDPC) presented on the alignment of NDCs with National Development Planning, and the Ministry of Finance presented on the status of finance for the implementation of the NDCs. Sectoral score cards were presented by various ministries, departments, and agencies. Presentations were followed by a discussion about the forthcoming NDC Update process.

The Update process consisted of four main phases: diagnostics; the Whole of Ghana Approach (WOGA); the analytical work; and the political process. The diagnostic phase was carried out shortly after the launch. The objective was to review the iNDC actions, the implementation progress of the last five years, and to identify challenges and lessons (MESTI, 2021a). Although the diagnostics report was an internal government document, it provided the basis for stakeholders to engage with during the consultation process, and informed a roadmap for the revision process (48, 52).

The WOGA aimed to conduct a broad stakeholder participation process to represent the diverse views in the process and its outcomes, by including ministries and CSOs, the private sector including banks, business associations, project developers, academia, and development partners (MESTI, 2021a). Table 11 gives an overview of the ministries and CSOs that participated; such detailed information was not available for the other actors.

Table 11: Ministries and CSOs that participated in Ghana's Update process

Ministries	Finance Energy Agriculture, Lands and Natural Resources Sanitation and Water Resources Transport Gender, Children and Social Protection; Local Government, Decentralisation and Rural Development, National Development Planning Commission.
CSOs	Kasa Initiative Nature Conservation and Research Centre Global Environment Facility (GEF) CSO Platform Ghana CSO Platform on the Sustainable Development Goals (SDGs)

As mentioned at the start of this section, the December 2020 presidential elections caused some delays to the process, but unlike in 2015, the incumbent president, President Nana Akufo-Addo, was re-elected (48, 52). COVID-19 also contributed to the delays by forcing the process to move to a hybrid model of in-person and virtual consultations (50). Following the election, the consultation process began in earnest in February 2021, with the initial sectoral consultations aimed at collecting data and status updates from the sectors. Ministries and state agencies acted as key data and sector status providers. Stakeholders were invited to communicate which actions should be added to the actions of the iNDC, which actions to keep, which to drop, and where new actions were necessary (48, 50, 52).

These initial meetings were used to gather stakeholder expectations, in terms of the appropriate design of the NDC Update process, how they would be allowed to participate in the process, and their priorities for inclusion in the NDC Update. After these initial meetings, stakeholders went back to their constituencies to gather relevant data, assess the data availability and new policy orientations, and

provide costing and plans to finance NDC Update actions (52). Stakeholders were provided with excel sheets containing the existing iNDC programmes of actions to structure their inputs. Based on the information provided, the lead consultants under the guidance of the EPA and MESTI led a consolidation exercise, out of which they developed the technical analysis reports for adaptation and mitigation (EPA, 2021). Once the tables had been through various iterations, they were consolidated in summary tables, which were then used by the EPA and lead consultants (both of which were academics from two Ghanaian universities) to develop the ICTU tables and the draft NDC Update. The Update was further refined by the EPA and MESTI before sharing for a final round of reviews by sectoral actors, technical experts, CSOs, and development partners (EPA, 2021) (48, 50, 52, 53).

Comments were then incorporated in a final draft of the NDC Update and submitted to cabinet for approval. The cabinet approval took longer than expected and the EPA was called to defend the NDC Update in front of a cabinet committee. Although the contestations were never aired publicly, the length of the process suggested its contested nature and resulted in Ghana missing the deadline of September 2021 for their NDC Update to be included in the UNFCCC's synthesis report (51). On the 11th of October 2021, MESTI submitted a transmittal letter communicating Ghana's intention to submit their NDC Update (MESTI, 2021d). The final NDC Update was submitted on the 4th of November 2021.

6.2.3 Kenya

Kenya's NDC Update process was initiated by the MoEF in February 2020 with the selection of local consultants to lead the technical work. An inception report was presented shortly thereafter, and the first round of sector consultations commenced in March 2020 (27, 34). Technical working groups consisting of representatives from government, civil society, academia, and the private sector were set up to enable their participation in the technical work to update the iNDC (27).

The initial consultations started as in-person workshops, but with onset of COVID-19 had to be transferred to a virtual format (27). This move took roughly two months before any more consultations were held, putting additional pressure on already tight timelines for the technical work to be conducted (28, 34). The primary objective of the initial round of sector consultations was for data and information gathering through the use of structured questions for the sectors (27). The lead consultants engaged with each sector, consolidated inputs, and then reflected these back to stakeholders for validation (27, 29, 32, 34). The data collection helped to assess performance of the iNDC from 2015-2020 (34), as one researcher in Kenya noted:

We went to into those meetings, when we had a very, very rough assessment of what had been achieved but by the time we left, we had some very concrete data and corrections of where we had gone wrong. And so, we came and finalized that. By the time we were now going for the online meetings, we now had a draft. (34)

The quote above showed a commitment from Kenya to run a more consultative process than had been the case for the iNDC. It also showed that a lot of work was left up to the process. Ideally, data collection and tracking progress would be happening on a continuous basis, with the Update process then only playing a consolidating exercise. But the reality is that these submissions are used to drive data collection and track progress, which otherwise is not done. After the data collection part of the consultations, the consultants and their teams, under the guidance of the Climate Change Directorate (CCD) within the Ministry of Environment and Forestry (formerly the MENR), developed a first draft of the NDC Update and presented this to stakeholders. For this validation phase, the consultants and CCD met with each stakeholder group separately (27, 32). The culmination of the consultation process was a national validation workshop that presented the final draft NDC Update to all stakeholders, and allowed the CCD and consultants to explain how comments were addressed (27).

The political process consisted of presenting the draft to the Parliamentary committee on the environment, and a meeting of the Cabinet Committee of Permanent Secretaries. The NDC Update was finalised in time for the 12th of December 2020 Ambition Summit, at which President Kenyatta was due to make a speech. Kenya's NDC Update was officially submitted to the UNFCCC on the 28th of December 2020.

6.3 Dynamics in the knowledge bases for updating the iNDCs

This section discusses the role of knowledge as one of the explanatory factors in the conceptual framework. There have been significant developments in the knowledge base and policy context for climate change over the last decade in these three countries, particularly between the iNDCs and Updates. Such dynamics have demonstrated the influence of the micro-dynamics of knowledge, such as the process character, context dependence and institutional dimensions of knowledge as identified by Strambach and Klement (2012). This included establishing a more diverse governance architecture of strategies, policies, regulations, and legislations. Developments in the knowledge base have been driven by the growing governance architecture, with technical work commissioned to inform the formulation of new policy, suggesting an important relationship between policy formulation and

knowledge creation. The technical reports for the iNDCs and Updates were key examples of policy formulation driving new technical work. The reporting requirements of the international process have also driven knowledge creation to prepare the BURs, National Communications, and National Inventory Reports (NIRs). Given these developments, the Updates had a more robust and diverse policy and knowledge infrastructure to work with, the implications of which are discussed in the following sections. Figure 20 is a timeline of the evolution of the policy context and knowledge base for the NDCs in South Africa over the last decade.

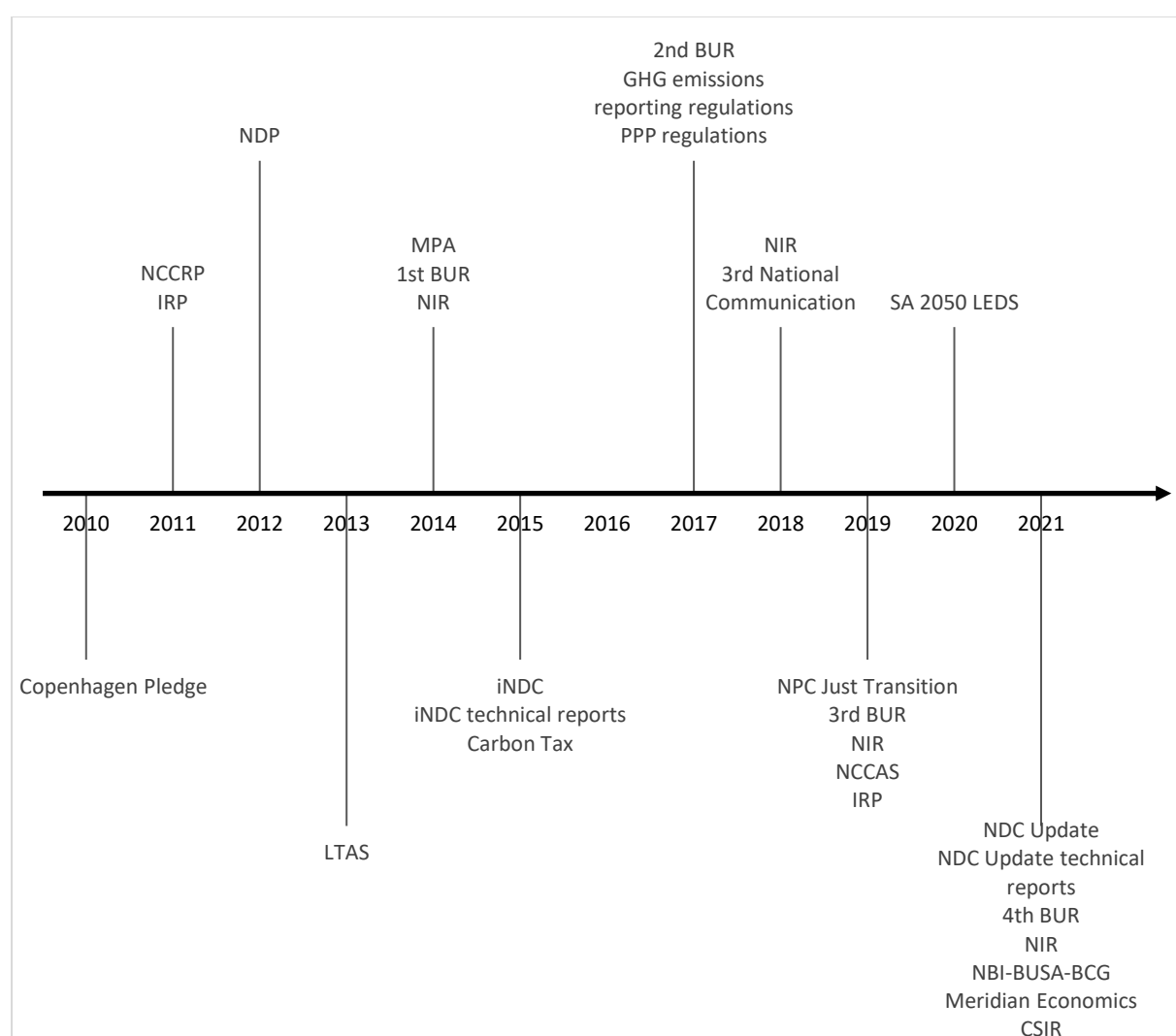


Figure 20: Timeline of the evolution of the policy context and knowledge base for climate change in South Africa

There were notable developments in the mitigation system in South Africa since the iNDC, with the introduction of the National Energy Efficiency Strategy, GHG Emissions Reporting Regulations, Pollution Prevention Plans (PPP), Green Transport Strategy 2018, IRP 2019, Carbon Tax 2019, NCCAS, the draft Climate Change Bill, and the establishment of the PCC. Aside from the 2011 IRP and a partially developed mitigation system, none of these existed when the iNDC was developed. This progress in

establishing a diverse governance architecture made up of strategies, regulations, taxes, legislation, and institutions, made for a more robust foundation for the NDC Update. The Update also discussed the approach to the long-term decarbonisation per decade until 2050, in line with the 2050 Low Emissions Development Strategy (LEDS), which had been published the year before. How the near and long-term aligned though, was unclear (Republic of South Africa, 2021b). Data was updated in line with the latest NIR 2000-2017, compared to the NIR 2000-2010 used in the iNDC, and it used the fourth BUR rather than the first BUR. Notably, land sector emissions from natural disturbances were excluded.

Since the iNDC, a key part of the knowledge base in South Africa has been the technical reports. These helped to unpack what lay behind the targets and provided justifications for the technical decisions. This made it possible to trace how technical work translated into a final NDC, and identify what the analysis did and did not do, illustrating the importance of the transparency of the creation and use of knowledge for building support, as highlighted by numerous authors (Cash et al., 2003; De Pinto et al., 2018; Haas, 2004). The reports also demonstrated progression in a granular way and identified gaps in the knowledge base.

The technical reports of the NDC Update in South Africa were only released after the Update was submitted to the UNFCCC, in spite of stakeholders repeatedly asking for the reports during the process, which attracted criticism (15, 17). The value in releasing the technical reports is not only about transparently communicating the technical details, but also about the conversation that they enable. The focus here is on the mitigation report, which was an assessment of the mitigation potential within, not beyond, the existing and planned policies (ESRG, 2021). This then raised questions for stakeholders about the constraints of existing policies, thereby taking the conversation beyond the NDC. This helped to identify other points of leverage in domestic policy, such as updating the IRP for the electricity sector.

The technical report for the mitigation component of the Update suggested that it was feasible to reduce the upper ranges of the 2025 and 2030 targets and that for 2030, and that reducing the lower range should also be considered. Lowering the upper range for 2030 was proposed with 450 MtCO₂e considered to have minimal risk of non-compliance, and 420 MtCO₂e having some risk (ESRG, 2021). This then allowed stakeholders to assess the credibility of the final targets, and whether they aligned with these technical recommendations.

The areas for future work identified by the report included a more economically optimal electricity plan than the IRP 2019, to explore the potential for further mitigation options by 2030, and a net zero emissions pathways for compatibility of the NDC Update with the LEDS. These areas then suggested some knowledge gaps. The knowledge needed to prepare detailed business plans for finance and investment in mitigation was identified as a knowledge gap from the iNDC, and so too again in the Update (Republic of South Africa, 2015, 2021b). This was concerning given that this is the type of knowledge needed to drive implementation, and yet was not addressed in the six years between the iNDC and Update.

Lastly, the report demonstrated the capabilities of the South Africa TIMES and Computable General Equilibrium (SATIMGE) model developed by the ESRG at UCT, by modelling all GHG emissions sources in the economy, although emissions from natural disturbances in the land sector were excluded due to their high variability and uncertainty (ESRG, 2021). This communicated the value of long-term model development in developing a robust knowledge base for NDC formulation, and also for identifying areas that require additional work.

The NDC Partnership through the Climate Action Enhancement Package funded a fair share analysis of the NDC Update, which was additional to the mitigation technical report commissioned by the DFFE. The analysis, also conducted by the ESRG, revealed that the draft Update did not align with a fair share and that lowering the bottom end of the range could achieve this alignment (ESRG, 2021). This was a key finding, utilised by those pushing for greater ambition in the process, such as civil society. Whereas the technical analysis for the iNDC sought to provide a justification for the target, the fair share analysis for the Update sought to go beyond the target and explore what a 1.5°C compatible commitment for South Africa might look like.

Not releasing the technical reports during the process was a missed opportunity, as discussions about them helped to unpack the substance of the Update. One business representative in South Africa summed up the importance of unpacking the technical work of the Update for building support:

But the modelling work itself, you know, the detail wasn't supplied at first [as part of the DFFE process]. So one of our [BUSA] comments at the time was, it's very difficult to say whether we can support the changes proposed, particularly around the mitigation targets. So initially, we simply supported the draft update, as it was.

So there was that whole process [referring to the process run by the PCC] and through that, a lot of that modelling that we didn't get to see upfront [during the DFFE process] was unpacked. So we could see the evidence that supported, really within our current policy framework, as a country, with very minimal refinements, it is actually possible for us to achieve, a much narrower and more ambitious range, even by 2030. So we again went back into our structures and to our members, and motivated that we support, an even more increased ambition. So I think around July [2021], we wrote again, to the minister and said, we can actually support the range of 350 to 420, which is it, which was the ultimate range that made it into the NDC.

(15)

This quote then illustrates how clearly communicating the technical work can build trust and shift the positions of policy actors, a theme also identified by the literature (Ryan & Bustos, 2019). In this case, shifting the position of big business represented by BUSA was a major breakthrough of the PCC process, which saw business make three separate submissions to the Update process, each time enhancing the level of ambition they supported. This was an unprecedented move from one of the most influential players in climate policy in South Africa, moving from being opponents of ambition in the South Africa's iNDC, to supporters of ambition in the Update. While it was not the only factor that drive South Africa to enhance ambition from the draft Update to the final Update, it was undoubtedly a significant, contributing factor.

A feature that stood out from the process in Ghana was the dedicated technical work that was commissioned between the iNDC and the Update, as illustrated by Figure 21. Most of this was funded by UNDP, the NDC Partnership, and UNEP. These reports included iNDC institutional arrangements (MESTI, 2017a), mainstreaming (MESTI, 2017b), implementation plan (MESTI, 2019), sector analysis (MESTI, 2020), and gender analysis (MESTI, 2021c). Regular international submissions also formed a critical part of the knowledge base. This knowledge base provided sound analytical work as the basis of Ghana's NDC Update and informed the consultation process. Technical reports for the adaptation and mitigation components of the Update were commissioned by the EPA and MESTI, and led by representatives from the Kwame Nkrumah University of Science and Technology (KNUST) and the University of Ghana.

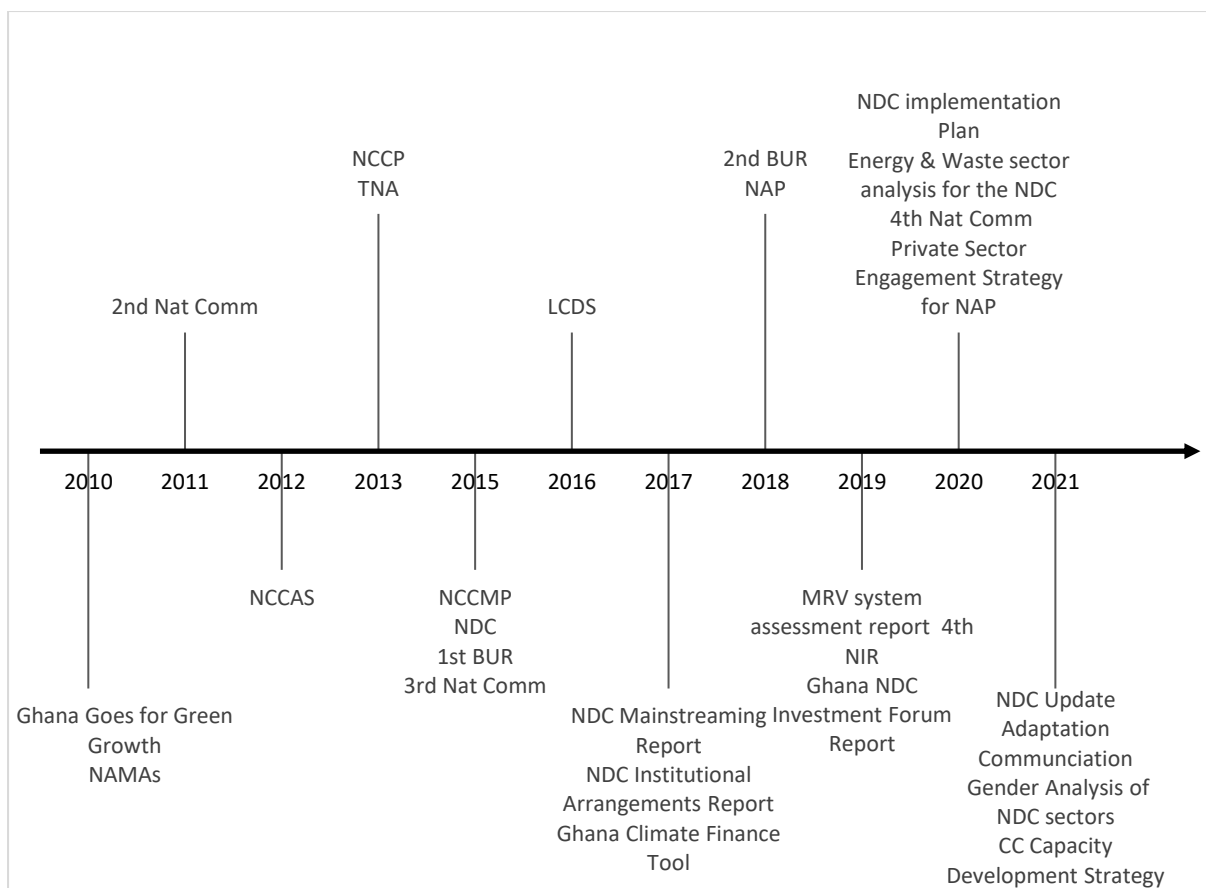


Figure 21: Timeline of the evolution of the policy context and knowledge base for climate change in Ghana

Although presentations were made, and the excel sheets of programmes of actions shared, the technical reports were not released. It emerged that MESTI and the EPA were concerned that by sharing the technical work, they would be put under even more pressure by donors to enhance mitigation ambition (48, 49, 52), as two interviewees in Ghana explained:

So I mean, even before Ghana started to work on this revision, some development partners were very interested to be part of the process, but really actively part of the process, or, in some cases it even looked as if they want to drive the process. And I can only speak here about Ghana...this was irritating for the country, for the EPA, and for other key technical policy, government representatives, and they really did not, they wanted this to be a national process. They really very carefully kept it as a national process not dictated by any other interests and development partners. (49)

The key question was this, to what extent can you design the NDCs to the extent that it reflects your national circumstances and what is practical as against putting in the NDCs things that

are talking to the donors, so they can invest in it... but they also coming in with a certain agenda of, of making sure that the NDC is more ambitious than it should. (52)

The sentiment expressed above illustrated that the process needed to walk a fine line between developing a revised NDC that could attract donor support and that reflected national priorities (49, 52). Government representatives in Ghana and Kenya felt strongly that these external pressures should be resisted (27, 39, 52). The response, as a form of defence against this pressure, was to limit rather than enhance transparency. The irony was that the decision not to release the technical reports in Ghana and Kenya was the source of critique of these commitments.

In the efforts to enhance future NDCs in South Africa, Ghana, and Kenya, technical reports represent valuable sources of knowledge to equip stakeholders to meaningfully participate in the formulation of their NDCs. At the same time, a tendency has been for this complex conversation to be oversimplified by the donor community, to being about solely mitigation ambition. Expectedly, this has resulted in strong pushback from developing countries, like Ghana, because it fails to recognise the extensive work behind the NDCs (48, 49, 52). To strengthen transparency, there would need to be a commitment by all parties to a granular and nuanced conversation about the NDCs.

Like Ghana and South Africa, Kenya has also taken strides to diversify and strengthen the policy and knowledge infrastructure for NDCs since submitting its iNDC, and as illustrated by Figure 22. The Update built on the NAP, NCCAP 2018 – 2022, the Third NIR (although this is yet to be released), as well a robust national policy framework developed over the last decade. Notable aspects included the NCCAP identified as the implementation mechanism for the NDC, to be financed through the Medium Term Development Plans, as stipulated by the Climate Change Act. The formulation of the second NCCAP and supporting technical work, as well as other frameworks and reports, are once again evidence that the formulation of new policies drives the creation of new knowledge, thereby driving the evolution of knowledge system and policy context simultaneously. The National Climate Change Council (NCCC) was established for coordination and the CCD is to serve as the Secretariat to the NCCC, responsible for analytical support, technical assistance, capacity building, and implementation. Climate Change Units in sectors and counties are tasked with implementation responsibilities. The promulgation of the Climate Change Act in 2016 and the array of climate-related legislation give Kenya's Update perhaps the strongest legislative basis out of all three countries.

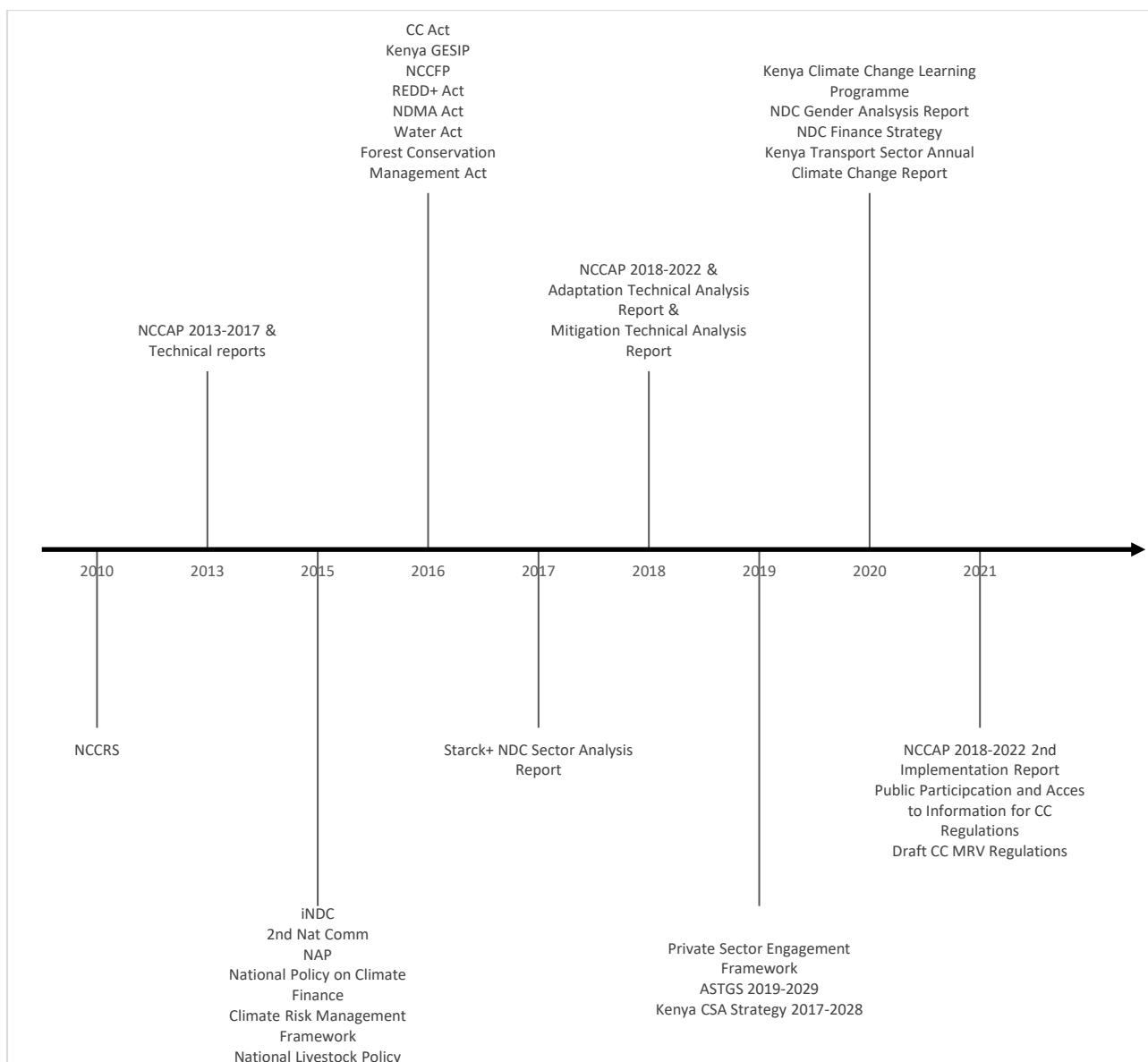


Figure 22: Timeline of the evolution of the policy context and knowledge base for climate change in Kenya

Despite the general sentiment in Kenya that the NDC Update process was an improvement on the iNDC, a concern raised by local researchers was that some of the shortfalls of the iNDC were replicated in the Update (29, 36). The virtual NDC Update consultations were not recorded (26), nor was the draft Update meeting minutes, technical reports, or stakeholders submissions made available despite the CCD holding this documentation (27, 28, 31). As with Ghana and South Africa's processes, the reluctance to make the detailed work available constrained the ability of actors to interrogate the detail of the technical work, and to deeply participate in the process. The lack of documentation meant that it was not clear how the stakeholders' inputs were incorporated into the final document (35). This lack of transparency and the low level of detail in the Update obscured from view the detailed analytical work that was done by local consultants, and which represented a significant improvement on the iNDC. This raised questions about the legitimacy of the final commitment, illustrative of the

insights of Cash & Belloy (2020), around how the creation and use of knowledge, in terms of their inclusivity and transparency shapes, the legitimacy of a process. Figure 23 from a MoEF's presentation in February 2021 (two months after the Update had been submitted) illustrated the overall and sectoral mitigation potential, and the sectoral and overall targets of the iNDC and Update.

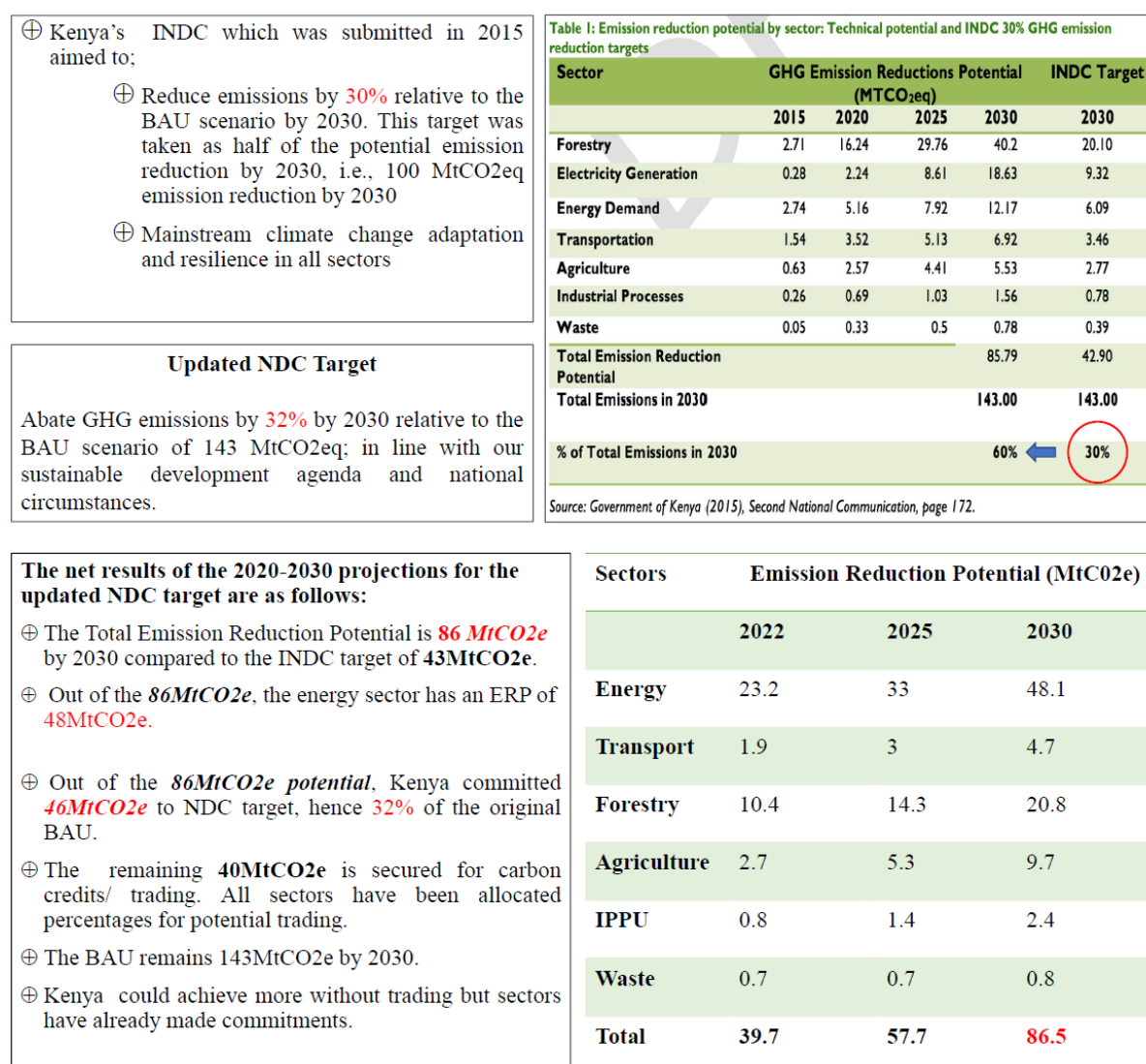


Figure 23: A comparison of the overall and sectoral abatement potential behind Kenya's iNDC and Update's targets (Source: Ministry of Environment and Forestry (2021))

The sectoral abatement potential for the iNDC added up to 60%. Figure 23 demonstrates that half the abatement potential of each sector was taken and summed up, to get to the overall 30% emissions reduction target of the iNDC. The figure shows some major changes in the abatement potential of sectors between the iNDC and Update, such as forestry reducing from 40.2 to 20.8 MtCO₂e, and energy increasing from 30.8 to 48.1 MtCO₂e. Kenya's iNDC identified the need to address the uncertainty in LULUCF, stating: "There is significant uncertainty in the BAU emission and mitigation potential

estimates for this sector [LULUCF] and work is underway to update and improve these estimates” (Government of Kenya, 2015a, p. 3). It was therefore surprising that the target and BAU scenario of the NDC Update did not reflect these changes, and that little substantiation was offered for the 32% emissions reduction target and the 40 MtCO₂e allocation for carbon credits and trading (Ministry of Environment and Forestry, 2021). The investments in new policy formulation and knowledge creation have yielded improvements in data and knowledge. So too have these surfaced challenging conversations that need to be dealt with by the MoEF, even if they reflect badly on the progress since the iNDC. Policy actors, particularly from the local research community have raised concerns that despite the improvements in data showing inaccuracies in previous projections and targets, that the NDC Update failed to utilise this improved information to address the issues identified, thereby perpetuating some of the pitfalls of the iNDC. A concrete example was in the AFOLU sector, in which new data showed how emissions have increased in the sector since the iNDC, instead of decreasing, a finding that was not addressed in the formulation of the Update (29, 34). Such conversations can ultimately strengthen the credibility of a commitment. Conversely, the decision by the Ministry not to address these issues raised questions around credibility, the Update’s ability to deliver change, and the impact of advances in knowledge.

A last feature of the evolving knowledge in these countries was the reporting requirements of the international process. These have been part of driving knowledge creation and synthesis in these three countries to prepare their submission at regular intervals, and relies on well-established monitoring and reporting systems. At the time of the Update, Kenya’s latest available international report was their Second National Communication in 2015; although the Update indicates it made use of the 3rd NIR (30, 36). In comparison, Ghana and South Africa have over the last decade regularly submitted reports. Ghana submitted their Fourth National Communication in 2020, third BUR in 2021, and NIR in 2022, and South Africa submitted their fourth BUR and NIR in 2021, and third National Communication in 2018. This suggested that the data and information and monitoring systems were less developed in Kenya, which has implications for the quality of the targets and in tracking progress.

In all three countries, the transparency was strengthened from the iNDCs to the Updates, through more consultative processes and through sharing more information. These improvements were in response to a decision on ICTU. Still, many documents supporting the Updates were not made public during the processes, and even when they were technically available publicly, sourcing them was often difficult. Typically, accessing such documents relied on personal knowledge of the policy ecosystem. This is a major barrier to transparency and, if rectified, could help to enhance the support for work of

the NDC processes. In terms of areas for future work, detailed investment requirements, implementation plans, and socioeconomic impact assessments, including job potentials, were earmarked for future analysis in all three countries, which suggests that they are currently knowledge gaps.

6.4 The roles of policy actors in the NDC Update processes

Elzinga & Jamison (1995) draw attention to how the four main groups of policy actors, namely government, civil society, research, and business, compete for influence in a policy process to represent their interests. Given the heterogeneous groups of actors, social and environmental problems bring together, conflict and contestation is inevitable and need to be managed by including these competing actors to find compromises that hold legitimacy (Strambach & Surmeier, 2013). The findings about the roles of policy actors in NDC processes revealed by this research support similar findings, as illustrated by the quotation below and the discussion of the following paragraphs.

Domestic actors are starting to understand what you can do with the NDC [Update], what it's for, domestically... What South Africa does is the outcome of an extremely complex contestation. NDCs are actually negotiated domestically now that enough actors understand the implications for them... (54)

The six years that elapsed between the iNDCs and Updates has seen major changes in how climate change is perceived globally and by countries, companies, and society at large. These shifts have contributed to the evolution of the domestic conversation around NDCs in all three countries, making for a very different basis from which the Updates could be negotiated.

The governments in all three countries were central to framing the Updates, acknowledging the requirements of the Paris Agreement, and stressing the need for the Updates to speak to the development imperatives of their countries. They did so by using a collection of communicative spaces, and by setting the terms of participation, specifically through the draft NDC Update documents, the presentations made, the public fora, and the technical work commissioned. One of the most contested features of the Updates processes was the selection and prioritisation of actions for the NDCs and determining conditionality, which governments typically decided on in closed processes; although Ghana showed greater transparency than did South Africa and Kenya (29). A feature of the Ministries of Environment leading the Update processes in these three countries, as is the case in many other countries, were the small teams and high staff turnover (1, 6, 34). An example

of this in Kenya was that the longest serving members of staff of the CCD were not around when the iNDC was developed (29, 34). As identified by researchers in Kenya, this has eroded institutional continuity, which has resulted in poor knowledge management and made the technical support to policy formulation *ad hoc*. The limited evidence of structures to store, organise, and institutionalise knowledge was reflected by the trend that when new knowledge was available, it was not always utilised to the extent it could have been (3, 29, 46). This challenge has been most acutely experienced in Kenya, as one researcher explained:

The interesting thing that happens in the CCD, everybody has their laptops. They receive these things in emails...they are in their laptops, then laptops will crash, or he will move with his laptop, to a different unit, or he will retire, and it goes with it. But there is nowhere in the CCD like a server or somewhere...There is nothing like that in the CCD. Why? Because they are waiting for a donor to finance the process...I think now they have the portal, but nobody who is responsible for putting information in. (34)

Civil society, the private sector, and line ministries played similar roles by acting as data providers, contestants, and translators of knowledge required for the Update. Validation of knowledge and identifying gaps in knowledge were other ways in which these actors held the process to account. The differences in forms of knowledge, capacities, ability to organise, resources, and policy access determined levels of influence.

Donors have influenced domestic climate change policy in Ghana, Kenya, and South Africa, and in the iNDCs from the outset, in a variety of ways, depending on the roles they have played. Kenya's technical process for the iNDC used international consultants and the NDC Update guidance document developed by the WRI and UNDP for the Update, showing that international actors influenced the technical work in Kenya, more so than was the case in South Africa and Ghana. In Ghana, the process was funded by the UNDP (48, 49, 52). In South Africa, it was funded by the NDC partnership, and in Kenya it was funded through NDC Assist, primarily through the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) for the technical work and UNDP for the stakeholder process (27, 32). The presence of donors went well beyond the NDC processes and included funding numerous NDC-relevant projects, technical support, and international technical analysis. Thus, the influence of donors was determined by providing funding in all three countries and expertise in the case of Kenya. In Ghana the involvement of local researchers was important for pushing back against the attempts

of external interests to influence the technical work in the process, and in South Africa local researchers have been central to the technical work behind the NDCs.

Reflecting on the roles of policy actors revealed that for some actors, such as diverse and fragmented civil society, it was simply more difficult to map their knowledge and interests on the NDCs in ways that could be feasibly addressed. This was a trend that was observable across the three countries. Civil society sought to represent societal interests, and their ability to translate knowledge and their advocacy and media work gave them influence in shaping the discourse around NDCs. Organised labour, only really visible in South Africa, represented worker interests; their ability to mass-mobilise and the policy access they enjoyed granted them influence to ensure their workers were not excluded by the NDCs. Well organised and resourced business associations, most visible in South Africa (15, 52), drew influence from their knowledge and data, their financial resources and economic power, ability to coordinate and organise around a common agenda, and their implementation capabilities. The research community used knowledge creation as the primary avenue for influence, particularly through government-commissioned studies, to ensure NDCs drew on the best available research-based knowledge. The roles and capacities of policy actors are elaborated on in the following sections.

6.4.1 Policy actors' use of written submissions and provincial consultations in South Africa

Figure 24 is a discourse network analysis (DNA) of the written submissions to South Africa's draft NDC Update. As with the iNDCs, written submissions were only available in South Africa, not in Ghana and Kenya. The intention of this analysis is to represent which policy actors made written submissions, the main issues they raised, and whether these were used in support or opposition of the Update. DNA is an approach to reveal the relationships between actors and concepts, the narratives and coalitions that emerge (Leifeld & Haunss, 2012). As interests are central to the motivation of actors, discursive analysis is a way to uncover interests, to explain how actors participate in policy processes (Laudari et al., 2021). The paragraphs that follow Figure 24 discuss the findings about the participation of policy actors, through this mode of engagement that are revealed by this type of analysis.

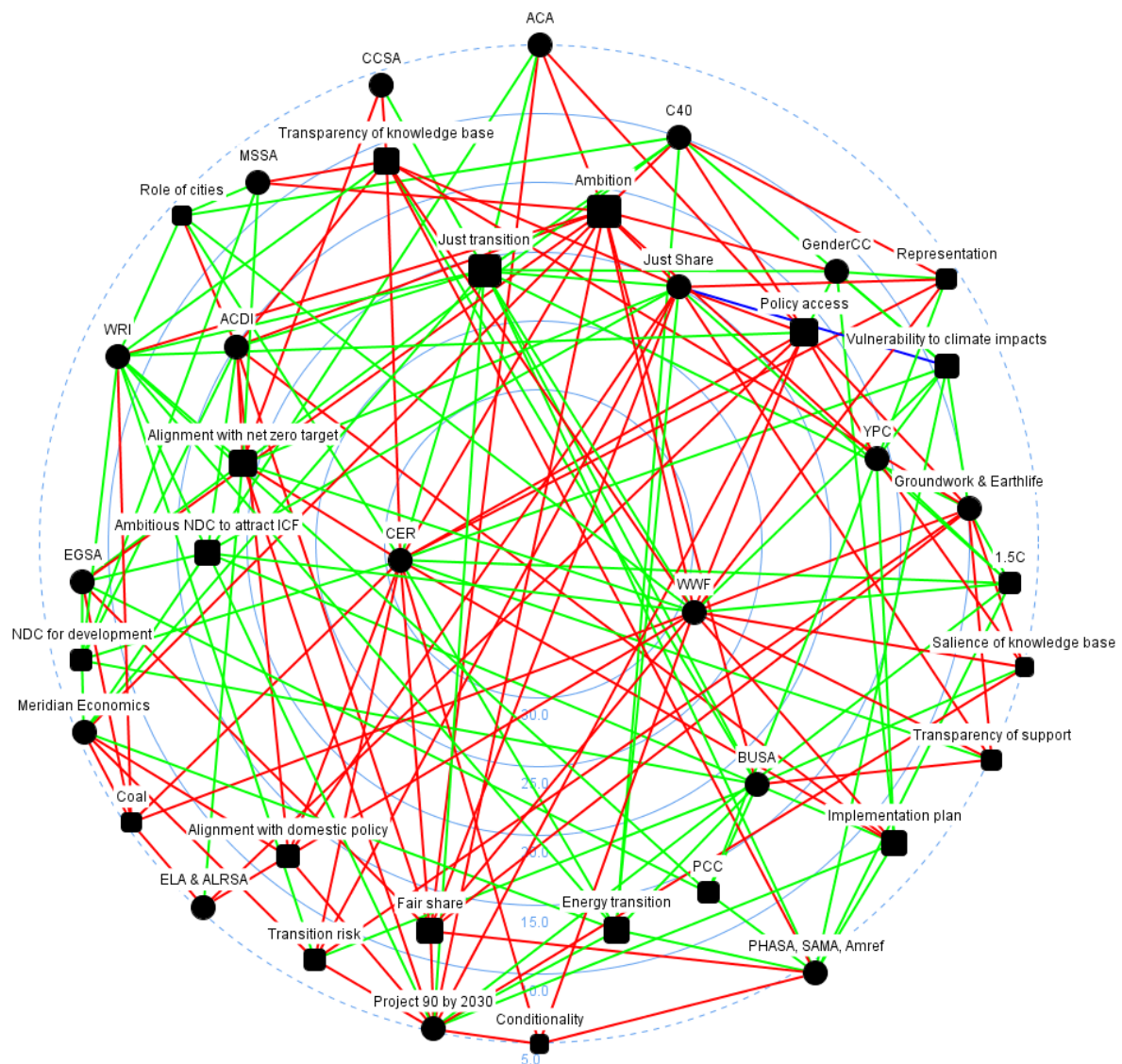


Figure 24: Discourse analysis of stakeholder written comments on South Africa's draft NDC Update. The figure represents policy actors (black circles), issues (black squares) for which they criticised the draft NDC Update (red lines), and areas of support (green lines). The size of the square indicates the number of actors that raised the issue (Key: African Climate Alliance (ACA); African Climate & Development Initiative (ACDI); Business Unity South Africa (BUSA); C40 Cities (C40); Cement and Concrete South Africa (CCSA); Centre for Environmental Rights (CER); Environmental Law Association & Animal Law Reform South Africa (ELA & ALRSA); Gender Climate Change (GenderCC); Marc Sherratt Sustainability Architects (MSSA); Presidential Climate Commission (PCC); Public Health Association of South Africa, South African Medical Association, Amref Health Africa (PHASA, SAMA, Amref); World Resources Institute (WRI), World Wide Fund for Nature South Africa (WWF); Youth Policy Committee (YPC)).

Like the iNDC the level of ambition of the Update was a prominent issue raised by stakeholders, represented by the issues 'Ambition', '1.5°C' and 'Fair Share'. Stakeholders criticised the Update for not aligning with 1.5°C, and for aligning with outdated domestic policy. Nearly all submissions were critical that the target did not reflect the highest possible ambition based on national circumstances, and that the evidence base showed that more ambition would have positive development impacts. What was noticeable, is that the support for greater ambition, was evident across the board, including big business, a major development since the iNDC. Civil society in particular were critical of the fact

that the upper bound of the range had been enhanced but not the lower bound, and felt that a single emissions trajectory would be more appropriate.

Alignment with domestic policy, was another prominent issue in Figure 24. Specifically, submissions from academia and civil society voiced the concern that the IRP 2019, was neither least cost nor highest ambition, and that aligning the Update with it, would put a Paris Compatible trajectory out of reach. Stakeholders expressed support for the idea that the NDC should go beyond existing policy, and that the IRP 2019 needed to be updated. The Green Transport Strategy (GTS), National Energy Efficiency Strategy (NEES), and Carbon Tax were also judged to be inadequate for delivering the scale and speed of change required, and that these should be addressed by the relevant line departments. Stakeholders cited various pieces of research to substantiate their criticisms of the domestic policies mentioned and of the Update. This discussion also demonstrated how the conversation of the Update overflowed into discussions about domestic policy, and therefore was able to exert pressure on the need for revisions of these policies, a notable evolution in influence from the iNDC.

Perhaps one of the most significant shifts in the discourse around NDCs, that occurred with the Updates, was the perception of risk, of unabated climate change, and an unambitious national policy response to the climate crisis. Submissions from across the board including business, civil society, academia, and international organisations, stressed that with the draft Update that South Africa continued to be vulnerable to transition risks, and without enhanced ambition in the draft Update, these risks would remain unaddressed. The risks highlighted included, trade risks and stranded asset risk of high carbon infrastructure. There was concern that lock in risks would lead to South Africa being left behind by global transitions and their accompanying opportunities, a major concern for big business in South Africa. Due to these concerns, there was widespread support for the notion that South Africa will need to the most ambitious version of the Update possible to attract adequate international climate finance. With the severely constrained national fiscus, accessing international climate finance, was seen as critical for the implementation of South Africa's NDC Update and the country's just transition, more broadly.

One of the perceived weaknesses of the NDC Update, was the lack of detail about how exactly it would be implemented, captured as 'implementation plan' in Figure 24. Stakeholders from civil society, business and academia voiced the need for an implementation plan to articulate goals, actions, timelines and responsibilities, and enable the monitoring, and reporting of, implementation. This

greater focus on implementation, was another shift between the iNDCs and the Updates, with a serious realisation of the need for implementation of ambitious action in this decade.

There was unanimous support for a 'just transition', and an 'energy transition' away from fossil fuels to renewable energy, visible in the high levels of support for these concepts in Figure 24. The just transition was an issue that has evolved significantly. South Africa was one of the few countries to include the concept of a just transition in their iNDC. Since then, it is a concept that has gained traction globally, evident in the number of countries that included a just transition in their NDC Updates. Domestically in South Africa, there have been robust processes and technical work to develop a vision for the just transition and build consensus around it, evident in the NPC's Just Transition process, the PCC's Just Transition Framework, as well as the Just Energy Transition Investment Plan. All this work, contributed to the just transition gaining traction, with all actors agreeing it should be central to South Africa's NDC Update. Part of this has been the growing knowledge base, developed by an array of local research organisations, that makes a compelling case for the benefits of a just transition, which has been central to garnering the support of policy actors.

Process reflections were predominantly captured by three interrelated issues: policy access; transparency of the knowledge base, and representation. While a few actors commended the DFFE on their consultation process to update the NDC, the majority felt that the 30-day window period was too short, a concern particularly for civil society. Given that the deadline for the NDC Updates was delayed by more than a year, stakeholders felt that more time should have been allocated for consultation. Concerns were also raised that the document was too technical and therefore inaccessible, especially for grassroots groups and communities. These were similar issues to those raised during the iNDC process, showing work still needs to be done to address these issues.

CSOs also criticised the DFFE for not holding a bilateral with civil society. The DFFE held bilaterals with the youth and business, while civil society had an informal bilateral with the ESRG. All these engagements were held only days before the written submissions were due, leaving little time to incorporate their insights. Another criticism was that the DFFE did not communicate to stakeholders how their inputs were taken up in the final NDC Update, leaving stakeholders questioning how seriously their submissions were taken. Furthermore, a lack of transparency of the analytical work underpinning the draft Update made it difficult for stakeholders to assess its robustness.

These written submissions revealed the strategies adopted by actors to exert influence on the process. The relevance for policy knowledge systems was that the submissions demonstrated which were the most pressing issues, and how actors were able to draw on knowledge, where it was compelling to substantiate their support for issues. Similarly, the submissions showed that for the more under developed knowledge areas, this was used to contest issues. On the whole, the written submissions for the Update, were evidence of a more sophisticated discussion between policy actors, drawing on a more established knowledge base, than was the case for the iNDC. Figure 25 provides a breakdown of written submissions according to policy actors.

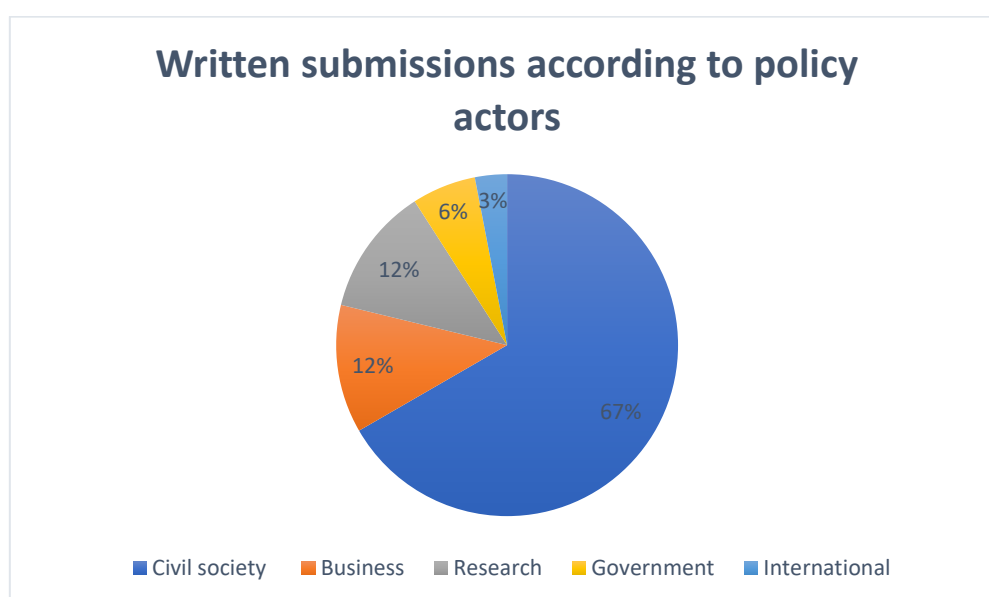


Figure 25: Breakdown of written submissions according to policy actors in South Africa's NDC Update process

The trends were similar to those of the iNDC's written submissions, with civil society making two thirds of submissions, followed by business and research organisation. CSOs typically made long submissions of roughly 20 to 30 pages in which they, voiced their criticisms and made suggestions for improvements. Noticeably, many of their comments were too broad to be integrated in an updated NDC by the DFFE (15). Business and industry associations on the other hand, provided shorter and more targeted inputs that addressed the most important aspects of the NDC Update for their interests. As with the iNDC, a few business associations were able to organise well to represent a large portion of business, compared to the fragmented approach of civil society, thereby displaying some of the characteristics of successful coalitions as identified by Leifeld & Haunss (2012). Research organisations typically spoke to the details of the analytical work underpinning the Update, raised questions about it and its transparency, and compared it to their own or other relevant technical work.

In addition to written submissions, nine provincial consultations were held in May 2021 to capture the concerns and priorities in South Africa's provinces. Despite the genuine commitment from all participating parties, the provincial consultations struggled with what appeared to be a crisis of relevance. The DFFE presented an abstract and technical policy document and requested feedback on this basis. In response, provincial governments, and the participants in these workshops saw this as an opportunity to raise their most pressing issues. While many of the issues raised were legitimate, in some cases they were not directly relevant for the purpose of updating an NDC. This led to a situation where stakeholders were unable to pinpoint the relevance of the NDC Update for their lives, and the DFFE were unable to incorporate many of the stakeholders' comments (13, 15, 16). This suggested the need for translation work to enable a more meaningful conversation and to acknowledge the diverse forms of knowledge and concerns that policy actors bring to the table.

6.4.2 Participation through structured templates in Ghana

Haas (2004) highlights the importance of a substantive core and procedural dimension for making knowledge usable for policymakers. Ghana's approach to gathering stakeholder inputs for the Update showed a more concrete and structured approach to making knowledge usable than South Africa. Stakeholders were able to indicate which policy actions from the iNDC should remain, which should be changed, which should fall away, and where new targets were required for the NDC Update. Excel sheets were provided to structure submissions (51, 52). As one civil society representative explained:

The government also developed a template that was shared among the CSOs fraternity to populate, so that whatever information we will present to them, that information will be used in developing the NDCs. So to that extent, I will say that during the second process, it was very, very consultative. (51)

Structuring the process as such made the makeup of the Update's targets transparent, and communicated to stakeholders what types of inputs were relevant. This enabled stakeholders to clearly communicate their knowledge and interests in these terms and allowed them to trace how their inputs were taken up (44, 46, 49, 51, 52). Given that NDCs can often struggle with a lack of relevance, this was an important achievement of the process. The inclusion of Annex 2 was evidence of the structured, bottom-up process. The annex provided a disaggregated view of the policy actions that constituted the Update and showed how the mitigation target of 64 Mt by 2030 was arrived at. This is a level of detail uncommon in NDCs and lent greater credibility to the commitment; also making it easier for actors to concretely contribute to updating the NDC.

Contrastingly, stakeholder inputs were unstructured in South Africa, which made it difficult for actors to map their interests on the Update and tailor their inputs into something usable for the process (15). This resulted in submissions that were heterogenous in scope and in their relevance to the Update, with the DFFE and stakeholders often speaking past each other.

6.4.3 The roles of research communities

Experts based on their expertise and authority in a domain are granted privileged roles in policy processes and manage their integration for impact and their independence for credibility (Cozzens & Woodhouse, 1995; Jasanoff, 2006, 2010; Sundqvist et al., 2017). The research communities responsible for the technical work for formulating the NDCs in South Africa, Ghana, and Kenya were competent groups of experts, stakeholders, and policymakers who have achieved commendable progress over the last decade. In South Africa and Ghana, universities and government research institutes were central to producing the knowledge for the iNDCs and Updates, and in drafting the documents (2, 3, 52, 53). In South Africa, a small, university-based team was at the core of the research community's contribution to the mitigation components of the NDCs. This team has been doing modelling work over the last 15 years, and was responsible for the technical work of the iNDC and Update (2, 3, 12, 17). Although the long-term involvement of local universities was also a feature of the process in Ghana, this work was conducted in an *ad hoc* manner and done by individuals, with model development done every time the NDC came around instead of leveraging off years of sustained modelling work (48, 50, 53). This is not to say that it would be optimal for Ghana to allocate resources to follow a path of model development like South Africa, given the very different emissions profile of the country and abatement potential of sectors. Ghana may well be better off developing tools that move away from the modelling, emissions-centric approaches in the energy sector, to ones that are tailored to their context. The AFOLU sector may be a more appropriate focus for model and tool development given that it is the major emitter in the country. This would include addressing issues such as data availability and quality. This is a totally different data challenge to the energy sector, as AFOLU is highly fragmented, with thousands of small scale farmers. This means that the sector is in many cases not formalised creating challenges with data and reporting. Therefore a key part of the work that lies ahead in the sector is how to work with this diverse set of actors to develop appropriate solutions for improving data, reporting and action in the sector. This can then lay the basis for sustained technical work, that seeks to develop and enhance models and tools that are appropriate for the context. One of the challenges up to now, has been that the local technical experts in Ghana and Kenya, have not had the luxury of working in a sustained manner on the tools and methodologies

they employ. This has forced them to use off-the-shelf tools, and apply them every time an NDC submission comes around, limiting the extent to which these tools are tailored to the country contexts, and their ability to drive the development of local solutions in these sectors. Whatever the focus, long-term research is an important ingredient for a robust foundation for policy formulation. Contrastingly, in Kenya there was limited involvement of local academia, with international consultants leading the technical work for the iNDC, and local consultants for the Update. The big drawback of this approach was that it failed to institutionalise the role of knowledge in consecutive NDCs (27, 29, 30, 37). Long-term research, institutionalised in government departments or universities, was more capable of building the capacities needed for NDC formulation (3).

Researchers also brought preferences and biases. In Kenya, analytical attention was prioritised for those sectors associated with the best data, tools and expertise, such as in the energy sector. While this was also the case in South Africa, unlike in South Africa, the energy sector is not the main emitter in Kenya, and therefore placing disproportionate emphasis on the sector seemed to be misplaced (30), as one researcher in Kenya explained:

...when you look at the sources of emissions for Kenya, where are they from? AFOLU. So by us investing in energy, how does that help Kenya to address the sources of emissions? And therefore, as much as you like energy, you must align your NDC with the sources of emissions. That is why the national greenhouse inventory becomes important, because it tells you where you need to focus.

Some consultants are not willing to push the envelope, not willing to read beyond their area of comfort zone, energy. And therefore, if you look at it, there's more heavy discussions on energy. (30)

Given the dependence on the same small group of researchers, this has had a lock-in effect in Kenya, and it has hindered efforts to push the envelope in other sectors in the country. This limited what was possible in the NDC Update, which was observable in the minor enhancement in ambition and lack of sectoral detail (30).

Another feature of the local group of researchers working on NDCs in these three countries was that they held long-standing relationships with governments. Consequently, they were commissioned to do the technical work for the iNDCs and Updates. This relationship has developed trust between the experts and policymakers, and ensured that research is well-integrated into the development of NDCs.

Other stakeholders have questioned the independence of the technical work, however (11, 5, 14, 36, 53, 54). One international researcher commented on the significance of building trust.

So I think this whole building trust and building effective collaborative relationships within those structures or even outside them, I think this is an important lever (5)

Sundqvist et al. (2017) highlight the tension between integration for influence, and independence for objectivity, that researchers working at the knowledge-policy interface need to manage. Approaches to building trust played out differently in the three countries but a common theme that emerged was that enhancing the transparency of the data, assumptions and methodologies underpinning the technical work of the NDCs, helped to build trust. In none of the countries were the detailed technical reports released during the processes, and only in South Africa, were the reports released after the iNDC and Update processes were completed. The failure to release the technical reports was criticised by civil society and business in all three countries, and releasing these reports during future processes could help to build trust (15, 17, 27, 39, 48, 49, 52).

Another trend that emerged was that once researchers were commissioned by government, it was difficult for them to be critical of the process, or its use of knowledge. This has created a vacuum in these three countries, with little critical policy analysis of the NDC processes (5, 30, 51, 53). This seems reflective of the concentrated nature of the skills and knowledge base. Building a critical mass of experts is part of improving the robustness and effectiveness of the policy knowledge systems for NDCs (29, 30, 34).

6.5 Time as a crucial ingredient for robust participation

Time is an essential ingredient for inclusive knowledge creation and robust participation (De Pinto et al., 2018; Ryan & Bustos, 2019). The time allocated to NDC formulation emerged as an important theme in the three country processes. Across the diverse groups of policy actors in Ghana, there was consensus that the Update process was enhanced significantly in terms of transparency, consultation, and inclusivity when compared to the iNDC process (47, 51), all of which were a product of the greater time invested into consultation by the Update process. As an interviewee in Ghana explained:

I can see that the level of transparency between 2015 and 2021 has been largely improved...there's quite a lot of respect. There was some good level of transparency in the NDC update report. There was extensive consultation with the actors that were involved in sectors;

I can say better than it was done in 2015. There was quite a lot of engagement and publicity and visibility around the NDC update report than was done in 2015. I can say that the 2015 one was basically drafted by a few individuals, you know, which constituted a technical committee. But I think that this process was much enhanced, and more collaborative and consultative than the previous one. (47)

This was an encouraging sign of progress in Ghana, which allowed for deeper engagement with a diversity of voices. Through establishing a roadmap at the beginning of the process, EPA and MESTI clearly communicated the structure of the process, the timelines, and the different ways that stakeholders could participate (50, 51). All these features laid the basis for more meaningful engagement from policy actors across the board, which ultimately strengthened ownership.

Most interviewees in Kenya were also of the opinion that the NDC Update process was a vast improvement on the iNDC process, in terms of its inclusivity. One civil society representative remarked:

So when it was championed through the Climate Change Directorate, I loved the way the process was going on, because this time around as much as still there was a consultant, but the consultant for once was local yeah...I want to say that I love that process because it was inclusive. And it felt like this time round, we wanted to get it right. (28)

This was a notable improvement from the comparatively closed iNDC process, and it was well supported by stakeholders. Researchers and civil society representatives were frustrated, however, that the process in Kenya started late, which meant that the timeframes were tight from the beginning. These were further compounded by the delays of moving to virtual consultations, which was a trend also observable in Ghana (28, 29, 34, 50). Even so, virtual consultations made the consultation process cheaper for the government and expanded their reach (27). The short timeframes in Kenya put pressure on the technical work and made this technical process more inaccessible for certain stakeholder groups, particularly civil society and communities (28, 33, 35). Another consequence of the rushed timeframes was that it closed down the space to really grapple with and address unresolved challenges of the iNDC process, such as the underlying knowledge, baseline data, and sectoral mitigation targets (36). This raised questions as to why Kenya did not postpone its submission to 2021, as many countries had decided to, to give more time to the Update

process. The Leaders Ambition Summit in December 2020 offered one explanation for the rushed completion, as explained below:

What helped us also was the fact that there is a date 12 December 2020 when there was a virtual forum for heads of state, that ambition meeting. The fact that there was that pressure to have the document ready by that time so that the President could make an announcement really helped us go through certain processes faster...Then having announced it, the rest was just now history, just the other cabinet secretaries appending their signatures, because it has been, like already announced by the President. And then he finally submitted it. (27)

The interaction between international diplomacy and domestic politics can be understood as a two level game, with international commitments made by countries the product of this two level game (Putnam, 1988). The pressure caused by the milestone of the Leaders Ambition Summit, and by Kenya wanting to be perceived as a champion of climate change was similar to the iNDC process when President Obama visited Kenya in 2015, which led to a rush to complete the iNDC so that the Kenyan President Kenyatta could announce the commitment (19, 28, 33). Despite these short-term gains, NDCs, their targets, knowledge bases, and formulation processes have lasting legacies. Rushing the processes in Kenya to a premature conclusion in 2015 and again in 2020, and the close resemblance of the mitigation target in the Update to that of the iNDC, left unresolved questions. Questions around the data, analytical work, baselines, and proposed targets, which by remaining unresolved, papered over inherent contestations (28, 33).

In South Africa, the government process run by the DFFE to update the NDC allowed for broader participation than for the iNDC. Stakeholders were frustrated, however, that the consultation process was still rushed, with the draft being shared at the end of March 2021 and the DFFE's public consultation processes concluding at the end of May 2021. This gave only a month each for written submissions and provincial consultations. Considering that the process had an extra year given the delay to COP 26, the general sentiment was that this extension was not well utilised to give more time and space for consultation (13, 15, 16). Other stakeholders felt that the COVID-19 pandemic imposed another dimension on consultation, that despite the accessibility of virtual consultations, they were challenging to access for marginalised groups, like communities, and sacrificed depth of conversations (13, 16). The process run by the PCC was a key innovation in the Update process that sought to address some of the issues raised (14, 15, 54).

Time then, remained a constraint in South Africa, Ghana, and Kenya's Update processes, despite the improvements on the iNDCs. While it was unsurprising that the iNDC processes were rushed along to be ready for Paris, six years later with the Updates, this was a more concerning trend. Time was fundamental for developing robust evidence to enhance credibility, conducting transparent and accessible processes, and forming relationships. Time was needed to build trust in and legitimise the Update and its knowledge base, and in communicating its relevance. It follows that time is a crucial ingredient for establishing impactful policy knowledge systems and robust commitments, and should be a key consideration in the preparation of future NDCs. To take time and change seriously, more attention could be placed on what happens in the five years that elapse between NDC submissions, rather than focusing solely on the months before a new submission.

6.6 Concluding remarks

The NDC Updates failed to put the world on a 1.5°C trajectory, which rightly has caused serious concern. Urgent change is required at a scale and speed never been done before. But simply focusing on the end of pipe, the targets, is likely to lead to the same underwhelming outcomes. Opening up the NDC Update processes through utilising a policy knowledge systems conceptual framework, and comparing them to the iNDCs, has been an attempt to reveal how and why these processes unfolded as they did, and how they have evolved between the iNDCs and Updates. Key explanatory factors operationalised by the conceptual framework, included the NDC Update processes, dynamics in the knowledge base, and the participation of policy actors. These findings have been discussed in relation to the literature presented in Chapters 2 and 3, to demonstrate how these research findings, revealed by the conceptual framework, contribute to extending these bodies of literature. How these explanatory factors influenced the knowledge system outcomes of the NDC Update processes in South Africa, Ghana and Kenya are discussed in Chapter 7. Six main findings of this chapter are summarised here.

First, this analysis shows that the Updates have become more distinct policy objects, with which policy actors have become more familiar. This has made for a more sophisticated policy conversation, with policy actors having a better understanding about what was possible with the Updates, and organising accordingly. The Updates were also more detailed, with more robust commitments than the iNDCs, enhanced targets and more granular information guided by the decision on ICTU.

Second, the Updates had a more established policy infrastructure to work with, as well as improved knowledge bases. While the knowledge was more tailored and comprehensive, new knowledge was

not always used; hinting at the politics of knowledge (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). Some of the same knowledge gaps from the iNDCs persisted in the Updates, particularly around costing and implementation. The Updates also illustrated that for knowledge to drive change, it needs to be accompanied by skilled communication, and compelling narratives.

Third, the Update processes of these three countries were more consultative, offering a wider range of ways in which policy actors could participate, showing the importance of investing in enhanced processes to establish more robust knowledge creation and participation (Laudari et al., 2021; Röser et al., 2020). Importantly, as identified by Haas (2004), creating usable knowledge requires both a substantive core and a procedural dimension. In this respect there were some innovations in consultation, most notably through the PCC process in South Africa. Although differentiated and structured modes of engagement in Ghana and Kenya helped to strengthen the participation of policy actors, the relevance of the Updates continues to be a concern. The holding of technical knowledge, ability to organise, stability of core frames, and resources, features of successful coalitions identified by Leifeld and Haunss (2012), were found to be instrumental in the Update processes too.

Fourth, the Updates revealed that there is a small group of committed policy actors, between which experience, and long-standing relationships have built trust. Part of building trust is about improving the quality of the spaces that facilitates the relationships between policymakers, researchers and other policy actors working at the knowledge-policy interface (De Pinto et al., 2018; Ryan & Bustos, 2019). At the same time, this group of usual suspects brought their analytical biases and preferences, which has at times limited the capabilities of the technical work by playing it safe and by sticking to their analytical comfort zones. Broadening and diversifying this community of practice is imperative for pushing the envelope with research and crowding in other forms of knowledge, to recognise the different kinds of knowledge held by different policy actors, and to drive the kind of radical change needed (Keeley & Scoones, 2003; Muñoz-Erickson, 2014; van Kerkhoff & Lebel, 2006; van Kerkhoff & Pilbeam, 2017; Ziervogel et al., 2016).

Fifth, transparency is political, and all Parties will need to play a part in creating the conditions and incentives for enhancing transparency. Local capacity and knowledge were crucial for pushing back against external pressures, and limiting transparency reduced the trust in processes and their outcomes. These findings demonstrate the necessity of approaching capacity building as a long term

endeavour to equip countries with the skills and agency to determine their own agendas (Khan et al., 2018, 2019; Sokona, 2021).

Sixth and finally, while the five-yearly requirements to submit an NDC have caused a flurry of activity, domestically, both the iNDCs and Updates in these three countries exhibited the constraints of rushed processes carried out over the months leading up to a submission. There was less evidence of sustained work to enhance the NDCs, their knowledge bases, institutional foundations, and implementation in the six years between the iNDCs and Updates. With two NDC formulation experiences to learn from, moving ahead, countries and the international community would do well to expand the conversation to what happens between the NDC submissions. This would help to prepare countries to make the most of the windows of opportunity that open with new NDC submissions.

The following chapter builds on the analysis of the NDC processes, the role of knowledge, and the participation of policy actors presented in this chapter, to assess the implications of these drivers in terms of the knowledge systems outcomes of the NDC Update processes in South Africa, Ghana, and Kenya.

CHAPTER 7: Assessing the knowledge system outcomes of the NDC Update processes in South Africa, Ghana, and Kenya

Chapter 6 analysed the NDC Update processes in South Africa, Ghana, and Kenya, focusing on how the processes enabled and constrained policy actors, and how knowledge and the participation of policy actors shaped the processes. The implications of these explanatory factors on the knowledge system outcomes of the NDC Update processes, and how these compare to those of the iNDCs, are the subject of this chapter. While the NDC targets have been central to the assessments about the iNDCs (Pauw et al., 2018; Pauw & Klein, 2020; Röser et al., 2020) and Updates, other outcomes are deserving of attention. In line with the conceptual framework of this thesis, and as illustrated in Figure 26 below, this chapter assesses a broader set of knowledge system outcomes of the NDC Update processes (i.e., the sections of Figure 26 in blue boxes and a comparison between them). This chapter, Chapter 7, therefore builds on Chapter 6 to assess the NDC Updates in South Africa, Ghana, and Kenya, and their knowledge system outcomes in terms of their: i) knowledge bases, and how these were created to shape their credibility, legitimacy, and relevance; ii) how consensus was built and how contestation played out; and iii) the ways in which policy actors were represented and marginalised from the Update processes, and how this has changed between the iNDCs and Updates. The endeavour with this approach is to, as Pauw et al. (2018) suggest needs to be done, go beyond the headline mitigation numbers to understand how and why these processes unfolded to lead to these knowledge system outcomes. The findings revealed by the application of this conceptual framework are discussed in relation to the literature presented in Chapters 2 and 3.

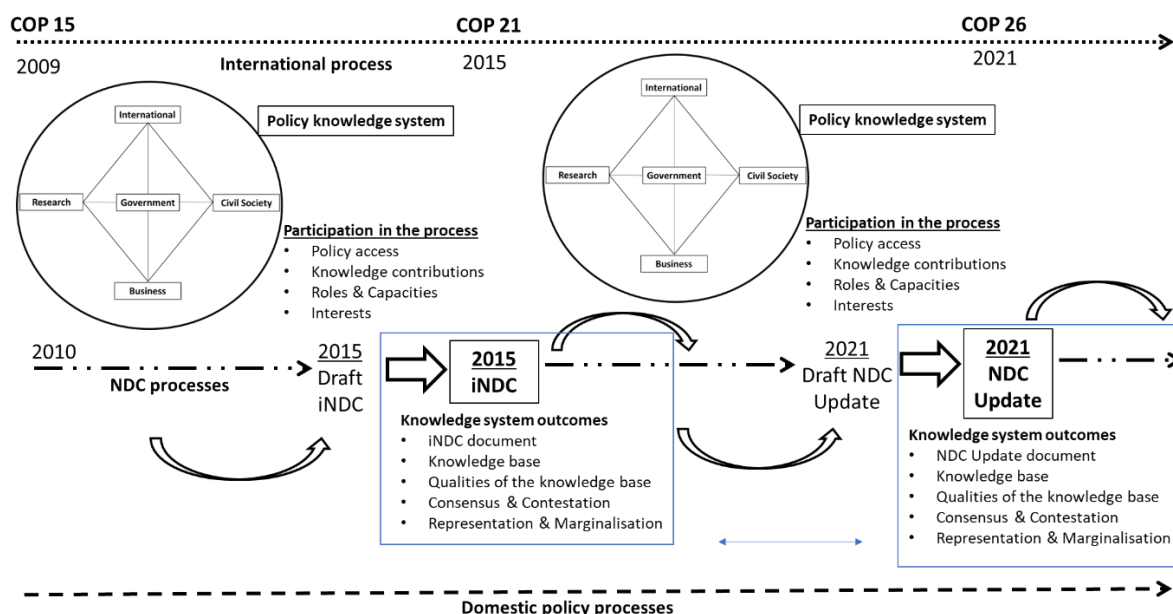


Figure 26: Situating findings in relation to the conceptual framework - The part of the conceptual framework included in the blue square is covered by the findings discussed in this section: the knowledge system outcomes of the NDC Update formulation processes such as the NDC Update documents, knowledge bases and their qualities, consensus and contestation, and representation and marginalisation.

Figure 27 summarises and situates the findings of this thesis in relation to the conceptual framework by representing knowledge system and process changes that were revealed and the knowledge system outcomes they contributed to. These are discussed in detail throughout this chapter.

Knowledge systems changes	Outcomes		Process changes
Improved knowledge bases	Baselines & targets that reveal & obscure	Credibility, legitimacy, and relevance	Enhanced processes
State of the knowledge base	Determined the location of consensus & contestation	Represents & marginalises in different ways	Design & operation of processes
NDCs have become more distinct & mainstreamed	Stakeholders more familiar with what is possible with the NDCs	National & international processes brought closer together	International process created pressure & resources for knowledge creation & processes
Changing interests & roles of actors	Built more ownership & support	Insights for implementation	Formulation processes signpost support and opposition, knowledge gaps
Who does the work and how they do it	Trust & credibility		

Figure 27: Knowledge system and process changes contributing to the knowledge system outcomes of the NDC processes

7.1 The baselines and targets of the Updates

Chapter 6 presented the content of the NDC Updates and how they changed from the iNDCs. This section builds on that analysis to reveal what these new documents amounted to in terms of ambition, and to understand some of the reasons that explain these changes. Table 12 gives an overview of how the targets and baselines evolved between the iNDCs and Updates and how they compared between South Africa, Ghana, and Kenya.

Table 12: Comparing the mitigation targets and baselines of the iNDCs and Updates

		iNDC	NDC Update
Progression of NDC targets & baselines	Overall	Consolidation of existing policy documents and knowledge base.	Dedicated technical work and more consultative processes.
	South Africa	PPD taken from Copenhagen Pledge and NCCRP “takes the form of a peak plateau and decline GHG emissions trajectory range. South Africa’s emissions by 2025 and 2030 will be in a range between 398 and 614 Mt CO ₂ eq, as defined in national policy” (Republic of South Africa, 2015, p. 6).	Significant reduction in the targets and narrowing of the range – 17% reduction to the upper end of the 2025 target and a 32% and 12% of the 2030 upper and lower bounds. PPD removed and peaking year pushed forward. More ambitious adaptation. 2050 LEDS and alignment. Use of NIR 2000-2017.
	Ghana	15 and 45% reduction below BAU. Programme of actions communicated but not clear how they added up to the overall target. Decisions around conditional versus unconditional split. “BAU is subject to revision before 2020” (Republic of Ghana, 2015, p. 4). Breakdown of policy actions and programmes of action.	Did away with a deviation below BAU target due to uncertainties. Changed from a 2010 to a 2019 base year. Communicated an absolute emissions reduction target of 64 MT CO ₂ e by 2030, based on the summing up of the abatement potential of the policy actions committed to.
	Kenya	BAU scenario of 143 MtCO ₂ e by 2030 from NCCAP and SNC. 30% reduction target in iNDC allocated based on uniform 50% of identified mitigation potential for each sector.	Baseline of 143 MtCO ₂ e by 2030 remained the same despite being outdated. Marginal enhancement to 32% emissions reduction target. Rest allocated for carbon markets.

Assessments of ambition and fair share contributions aim to reduce high degrees of uncertainty and complexity, to develop standardised assessments that consider historical contributions, current emissions, capabilities, and equity, and to enable comparison between countries and the assessment of progress on the global goals. They are therefore highly contested with differed tools using different criteria and methodologies, and the ratings for each country produced by each tool differing substantially. It is not the work of this thesis to compare and critique these different tools; indeed, there is a well-established body of literature on this (Climate Action Tracker, 2021b, 2022; Climate Analytics, 2021; Fransen et al., 2022; UNEP, 2022). This thesis has intentionally reduced the importance attached to ambition assessments of the targets, and has instead emphasised the importance of process and knowledge systems in driving these outcomes. Still, drawing on these types

of assessments to assess the progress in ambition from iNDCs to NDC Updates, and to compare across the three countries, is useful for understanding how they relate to the knowledge systems.

Despite South Africa's iNDC stating that it represents the country's fair share contribution to the global temperature goal, various analyses have demonstrated the inadequacy of the iNDC to make its fair share contribution to the 1.5°C or 2°C temperature goals (Altieri et al., 2016; Climate Action Tracker, 2019b; Cunliffe et al., 2019; den Elzen et al., 2019). Some assessments suggest that the commitment is more in line with a 3°C or 4°C world, and therefore rated it to be highly insufficient (Climate Action Tracker, 2017). Reiterating the need for greater ambition in the NDC Update, more recent domestic analysis also found the iNDC not to be Paris-compatible, with the need for the level of ambition to be enhanced by the NDC Update (Marquard, 2020).

As has been discussed, South Africa's NDC Update showed a marked enhancement of ambition, and demonstrated progression between the country's iNDC and Update, with the removal of the PPD, the peaking year brought forward, and a significant narrowing of the range with a reduction in the targets with a 17% reduction to the upper end of the 2025 target and a 32% and 12% of the 2030 upper and lower bounds of the target (Republic of South Africa, 2021a). Assessments suggest that the Update is an improvement but still rated 'insufficient', compatible with a 3°C world, while the 'internationally supported target' was rated as almost sufficient, compatible with 2°C, showing the differences in levels of ambition of the upper and lower bound of the target range (Climate Action Tracker, 2021b). The 1.5°C national pathway explorer finds that a 1.5°C pathway would require an emissions range of 249-325 MtCO₂e/yr by 2030 (excluding LULUCF). With the Updated range being 350-420 MtCO₂e by 2030, the lower bound of the target nearly falls within this range but would need to be strengthened to reach compatibility, whereas the upper bound of the range is a long way off. Furthermore, an emissions trajectory range creates ambiguity that can be, and has been, exploited in the past. While the bottom end of the range may represent an ambitious target, the upper bound is the commitment that the country is ultimately responsible for. At some point in its future evolution, the presence of a range at all and its role will need to be addressed.

South Africa is different to Ghana and Kenya in that it is in the top 20 emitters in the world and is responsible for roughly 1% of global emissions (DFFE, 2021b). International assessments account for this historical responsibility and the need for the country to decarbonise, which reflected in their critical assessments. Ghana and Kenya, on the other hand, are minor emitters, responsible for only 0.1% of emissions, with low per capita emissions (Government of Kenya, 2020; MESTI, 2021a; Republic

of Ghana, 2015). This then is factored into the more favourable international assessments of their ambition levels, demonstrating that the challenge is one of avoided future emissions, as opposed to decarbonising the existing economies of Ghana and Kenya. Put another way, little responsibility to attain the global 1.5°C target lies with Ghana and Kenya; this is primarily the responsibility of large emitters. Still all countries have the responsibility to respond to the problem, and with the adequate international support, pursuing climate action can bring development benefits to countries like Ghana and Kenya.

Ghana assessed its iNDC and NDC Update to be fair share contributions to the global effort, based on their very low historical responsibility, having emitted only 0.1% of global emissions in 2012, low per capita emissions of 1.3tCO₂e, and the constrained fiscal space of the country (MESTI, 2021a; Republic of Ghana, 2015). The Update further justified this assessment due to the enhanced target, new programmes of action, and prioritising development recovery in the wake of the COVID-19 pandemic (MESTI, 2021a). There is little independent analysis to assess what would constitute a Paris-compatible commitment for Ghana, which is partly to do with Ghana being a minor emitter.

The 1.5°C national pathway explorer conducted an ambition assessment of Ghana's NDC Update and its 1.5°C compatibility, and claims that "the conditional target translates to 2030 emissions levels of around 42 MtCO₂e/yr or an increase in emissions of 32% above 2015 levels, less ambitious than its previous NDC" (Climate Analytics, 2021). But given the change in base year and a shift to an absolute reduction, comparison between Ghana's iNDC and Update is not straight-forward, and the assessment of the Update as less ambitious than the iNDC warrants closer examination. Assessing the level of ambition is dependent on a complex set of factors, not least of all the accuracy of the baseline and its underlying data, and the methodology adopted for making a fair share assessment. Still, some simple observations can be made here when comparing the ambition of Ghana's iNDC and Update. According to the iNDC, from a 2010 base year of 19.53 MtCO₂e, emissions were expected to rise under a BAU scenario to 37.81 MtCO₂e in 2020 and 73.95 MtCO₂e in 2030 (Republic of Ghana, 2015). A conditional commitment of 45% reduction by 2030 then translates to a 33.28 MtCO₂e absolute reduction. With an absolute emissions reduction target of 64 MtCO₂e by 2030 (MESTI, 2021a), Ghana's NDC Update appears to be more ambitious than the iNDC, and therefore closer to 1.5°C compatibility. However, it is also necessary to note that the NDC Update has an updated base year of 2019 with a value of 58.8 MtCO₂e (MESTI, 2021a). Due to concerns over uncertainties around data and policy, the EPA and MESTI decided to move the target from a deviation below BAU to an absolute reduction below a base year. One government representative from Ghana explained the rationale for this decision:

In a typical business as usual mitigation goal type, three things must happen. First one is that you must have a solid historical emission inventory, which we have. We have up to 2019... And another thing that you need in the BAU is a very good high quality policy-related data to drive the projections right. And in this country, we have a lot of policy risk...So it is difficult to reflect those policy targets in the BAU predictions...The third one is also about the reliability of the data that we use to drive the projections. So we did the projections ourselves... And four questions had to be answered. The first one was that, does the projection that we have done for 2030 reflect the most optimal emission scenario for Ghana, if all the policies are implemented? And the answer was no. Why was that? Because of the very reason of what I said. That lack of data behind policy announcement, policy inconsistencies, and unreliability of the data that is used to drive the projections.

The alternative was, instead of comparing the effects of these measures on a baseline that you're not sure about, we have the option of comparing it to the one... a single year, base year. So the best alternative, in this round of the NDC updates, is to do is to compute the emissions for individual actions and put them together...we will do 34 measures. We will compute the effect of these measures, put together and communicate the impact of those measures without comparing it to any baseline. (52)

This was a genuine endeavour by the EPA and MESTI in Ghana to develop a target that was in line with policy developments, changes in emissions, and availability of data. It also demonstrated the fundamental importance of the state of the policy knowledge system and its implications for determining what was possible with the Update. While the approach described was a robust option, it showed that the actual growth in emissions contained in the new 2019 base year of 58.8 MtCO₂e far exceeded that of the BAU projection for 2020 of 37.81 MtCO₂e. This suggests a problematic feature in changing the form of commitment, in that although absolute emissions committed to have increased, this is on the back of more than double the growth in emissions than was forecast by the iNDC. While there are compelling reasons for moving from a deviation below BAU target to an absolute reduction, changing the form of the target makes tracking of progress more challenging.

Kenya's iNDC, using the same BAU scenario as the 2015 Second National Communication, opted for half of the 60% mitigation potential identified (Government of Kenya, 2015b), with a 30% reduction target (Government of Kenya, 2015a). This indicates what is feasible given the country's circumstances, and remains fair and ambitious given the historical responsibility and capability of

Kenya (Cunliffe et al., 2019; Kurdziel et al., 2019; Luna et al., 2018). The CAT rated Kenya's iNDC as 2°C compatible (Climate Action Tracker, 2019a).

Kenya assessed its NDC Update to be fair and ambitious based on low historical responsibility (0.1% of global emissions), low per capita emissions of 2.06 MtCO₂e compared to global average of 4.92 MtCO₂e, domestic budget constraints, and development imperatives of the country (Government of Kenya, 2020). Kenya's NDC Update was rated by the same methodology, namely the CAT, as 'almost sufficient' for 1.5°C. Interestingly though, the internationally supported target of Kenya is rated as 'critically insufficient' for communicating 4°C compatibility. The rationale for this difference was presented as follows: "The strong difference in the two ratings reflects Kenya's situation as a country with strong development needs and a small historical responsibility, but with relevant mitigation potential in its own territory, which could be exploited to a large extent with international support" (Climate Action Tracker, 2022). This statement highlights the potential for Kenya to go beyond its responsibility, with international support to enhance ambition. Kenya decided to remain with the same BAU scenario as the iNDC, and communicate a 32% reduction by 2030, compared to 30% in the iNDC. While this updated target fulfils the condition of progression, more could have been done by the country by utilising international support, particularly given the changes in emissions between 2015 and 2020 that have been discussed. One interviewee in Kenya explained that a decision about the BAU scenario was not even up for discussion:

What we agreed is that you are not going to revise our baseline. So we started from that point. Okay. The baseline remains the original baseline, as in the second national communication. It was not even subject to debate. That is something that all stakeholders agreed on to simplify the process. (27)

This decision disregarded the changes in emissions and improvement in data availability in Kenya in the five years between the iNDC and Update, and the minor enhancement in ambition failed to communicate the detailed technical work done for the Update. This example showed how targets and baselines, once agreed on, can be resistant to change, despite the necessary evidence (29, 34).

The experiences of these three countries have shown that beneath the conversations about baselines and targets were issues such as the accessibility and integrity of the data, the accuracy of baselines, and the transparency of policy decisions. Focusing attention here can help to reveal that inflated baselines and projections are often driven by political agendas and legacies. Improvements in data

and technical work are not always used to update targets when politically inconvenient, as this would have reflected badly on previous political promises that had not been met (29, 33). The forestry sector in Kenya was an example of this, as one researcher explained:

Now, what happened was, we had some estimates. We had some maps that had been done, and some estimates, but they were very inaccurate. And that was the basis of the projected emissions from the forest sector [for the iNDC]. So, now, recently when we did a similar exercise for the update using the latest data, we realised that the emissions are actually higher than what was projected then back in 2015...To what extent the initial NDC targets have been met, and to what extent the actions that have been proposed in the NDC were carried out. And in the forestry sector, what it shows is that we have actually become worse than we were. (34)

7.2 Credibility, legitimacy, and relevance as the fruits of enhanced processes

Cash et al. (2003; 2020) posit that for knowledge systems to be impactful they need to work in such a way as to increase the credibility, legitimacy and relevance of the knowledge they produce. The investments in strengthening the Update processes in South Africa, Ghana, and Kenya that have been discussed, helped to strengthen the credibility, legitimacy, and relevance of the Updates and their supporting knowledge. This was evidenced primarily in how stakeholder perceptions of these features evolved from the iNDCs to the Updates, and was observable in the workshop participation, written submissions, and interviews.

The greater time allocation and more consultative processes helped to improve the perceived legitimacy of the Update processes, by giving voice to policy actors in all three countries. At the same time, the failure to use new data and knowledge to update targets raised questions about the legitimacy of the process in Kenya (36). Knowledge management and documentation also proved to be important ingredients for building legitimacy, which was missing or partial in all three cases, despite improving between the iNDCs and Updates.

Credibility of the Updates and their knowledge bases was enhanced by reducing the ambiguity and uncertainty through the introduction of guidelines for transparency. Commissioning new technical work and the development of the knowledge bases in South Africa, Ghana, and Kenya were also contributing factors to the credibility of the Updates (17, 29, 52). Enhancing transparency made clear justifications for analytical decisions, which could then be discussed. This stood in contrast to the

iNDCs, which were mainly a product of synthesising existing knowledge through relatively opaque processes.

The position of the climate crisis on the global agenda has undergone a fundamental transformation since the time of the iNDCs. This has been driven by the risks of not acting becoming clearer, and the opportunities of transitioning becoming better understood. Thus, it has moved from an issue on the periphery to a key issue for governments, businesses, and societies. These larger shifts have radically altered the conversation around NDCs. The Updates leveraged these changes and became more relevant to a wider group of actors, beyond the small community of practice that worked on the iNDCs; thereby building a broader base of support (17, 54).

The degree to which the knowledge base is tailored towards the development imperatives, emissions profile, and abatement potential of countries is an important determinant of relevance (Kurdziel et al., 2016; Makomere & Mbeva, 2018; Röser et al., 2016, 2020). In all three countries, there was a reluctance to go beyond “comfort zones” of analytical work, with technical teams sticking to what they knew best. In South Africa, this was the energy sector, which was appropriate given that it is the main emitter, and it has led to well over a decade of model development (2, 3). AFOLU was a more challenging sector in all three countries, although it contributes to a relatively small share of South Africa’s emissions. In Ghana and Kenya, AFOLU was the biggest emitting sector with the greatest abatement potential, but it had serious knowledge gaps (30, 46). A researcher in Ghana explained the differences in the state of the underlying data for energy and AFOLU, which explained some of the challenges for analytical work in the AFOLU sector:

The one area that I think would be quite good in terms of data coming out might be the energy sector, because the energy sector is quite formalised. And there’s a lot of records to guide the kind of calculation. But when we take agricultural sector, because agriculture is very big in Ghana, data is basically non-existent. Most of the projections that come out of the agriculture sector are mainly based on assumptions based on crude estimates. (46)

The data and knowledge challenges were highly country-specific. Therefore, it may not be appropriate for Ghana and Kenya to replicate the 15 years of model development on energy and economic modelling that has been so central in South Africa. Focusing on the data and analytical challenges in the AFOLU sector may be a more appropriate approach to the technical work that needs to happen.

7.3 Building consensus and (un)covering contestation – The roles of knowledge

7.3.1 The NDC Updates' potential for consensus building

The nature of contestation, particularly around essentially contested concepts is that it plays out at multiple interconnected points, and is thus systemic, meaning more technical knowledge is unlikely to resolve contestation (Cozzens & Woodhouse, 1995; Lahn, 2018; Radaelli, 1995; Rafey, 2013). 'Cooling down' controversial issues in policymaking can be a strategy for building consensus and support (Lahn, 2018; Sundqvist, 2014). Building consensus with knowledge is also about paying attention to the flow of knowledge through learning processes. Here tacit knowledge is important to consider as it deeply influences the decisions and sense-making of actors, but is bound to actors as their skills and experience, and difficult to transfer as it does not constitute explicit knowledge, which is codified and more easily transferred (Polanyi, 1966; Strambach & Klement, 2012). These tacit dimensions have implications for the feasibility of building consensus with knowledge.

A sound knowledge base tailored for the Updates, which was well communicated, enabled more granular and robust conversations important for developing legitimacy and support for the Updates and their knowledge. All these elements were marked improvements on the iNDCs (15, 32, 48). The Update processes in South Africa, Ghana, and Kenya showed that the best chance of establishing an evidence-based discussion that could build consensus and address contestation was through local, ongoing knowledge work beyond the NDC processes. On the other hand, *ad hoc* work every time the NDCs came around was not as effective at building the same level of trust and consensus in Ghana and Kenya (36, 53). Importantly, such technical work needed to be accompanied by process work, as knowledge alone was inadequate for building consensus and resolving differences, despite it being an important ingredient. Echoing some of the ingredients highlighted by Ryan and Bustos (2019) and De Pinto et al. (2018), the more transparent, inclusive, and well-communicated the technical work was, the stronger the understanding, consensus, and trust, established by the marked improvements in the Updates compared to the iNDCs.

Both the iNDCs and Updates in these three countries foregrounded consensus-building, so much so that contestation was difficult to unearth. Everything in the Updates had to achieve a certain level of consensus to be included (14, 48, 42, 51). Those that were not well supported were left out, as a government representative from Ghana explained:

As much as possible, we try to reach consensus. Most of the interventions or priorities that we put in our climate policies are out of consensus. Usually where we have very serious disagreement, we tend to feel that that's not a priority. Yes, because if it's really a priority, then there must not be that serious disagreement amongst the parties, and we look at it from a national perspective. If you look at most of the interventions that you find in our climate policies and the NDC, they are as a result of consensus. (42)

While consensus-building is no doubt critical, if the Updates are to be transformative in their work and contribute to just transitions, they will have to go beyond simply what is agreed upon. Limiting the NDC Updates to consensus only ran the risk of near-term action being incompatible with the long-term pathways that are necessary to drive just transitions to net zero emissions. The inadequacy of the sum of the NDCs globally to meet the long term goals of the Paris Agreement are evidence of this misalignment (UNEP, 2022; UNFCCC, 2022) as is the lack of clear alignment between South Africa's Update and 2050 LEDS, and Ghana and Kenya not yet having long-term strategies with which to align their Updates.

7.3.2 The role of the PCC in brokering consensus in South Africa

The PCC in South Africa was an example of the level of consensus that could be built through knowledge and process work. The PCC ran a dedicated process to engage with the draft NDC Update, and illustrated what was possible outside the constraints of a formal government process but connected to it. The process represented the type of innovation possible in a policy knowledge system to convene a national knowledge-based policy discussion, build consensus, and drive change.

Discourse coalitions organise around storylines to attempt to exert influence in policy processes (Hajer, 2002; Leifeld & Haunss, 2012). The PCC framed the conversation around updating South Africa's NDC as a window of opportunity to transform the economy to remain competitive in a changing global economy. At the heart of the Commission's effort were tenets of procedural and substantive justice, evidence, ambition, and transparency. The PCC leveraged off its particular origin and composition. In terms of its origin, the PCC is an outcome of the 2018 Jobs Summit⁴, where there was broad stakeholder support for the formation of the PCC to convene the conversation about a just transition in the country (12, 14, 15). The PCC's composition of a collection of representatives from all

⁴ The 2018 Jobs Summit brought together government, business, organised labour, and community organisations to discuss the unemployment crisis in South Africa, and to establish solutions for job creation in the country. The formation of the PCC was one of the resolutions that came out of the Summit.

social partners and 10 cabinet ministers gave voice to a broad spectrum of interests, working towards the types of all-of-society approaches needed, as identified by the UNFCCC (2022). The transparency and inclusivity of the process, as well as its documentation that was shared publicly, was a part of building trust (12), as was the brokering role played by the PCC Secretariat outside the special meetings to engage with stakeholder groups in bilaterals. As one interviewee explained:

In the bilateral setting, it was easier to find each other. Firstly, from understanding what are some of the assumptions that they had used for their models, or for bringing forward their position. And also helping to shape our understanding of why their position is that way. But also best responding, of course, through, I would say, a co-created understanding of how to move forward based on the science that is presented in front of us based on the information they hold of their position. How do you best arrive at a common position? (12)

Using different modes of engagement and playing a brokering role meant that areas of discomfort could be discussed in a safe space, and not only in public where people are often vilified for their positions (12). Part of this was providing a platform to unpack the ESRG's technical work underpinning the mitigation component of the Update, by bringing it into conversation with related studies by the BUSA-NBI-BCG Pathways Project, Meridian Economics, and the CSIR. This conversation opened the Update's technical work to reveal a robust, independent knowledge base, which established high levels of trust and support across the social partners (12, 14, 15, 17, 54).

The interaction between closed and public meetings proved to be an important feature of the process. Finding common ground behind the scenes made it possible for the PCC to reach consensus in the public meetings, and ultimately in their recommendations. Public meetings could be used to legitimise the evolving conversation that was then used as leverage in the closed meetings. This helped to shift the positions of actors, rather than leaving the contestation behind closed doors where positions tend to become more entrenched (54). Organising around specific recommendations provided a concrete basis of discussion around which consensus could be built. Part of this was providing space for feedback and uptake of feedback in the recommendations, which was well communicated to participants so that they saw how their inputs were used (12, 14). A last non-trivial factor had to do with the unique positioning of the PCC. The PCC had the freedom of sitting outside of government but to also still be plugged into government; enjoying the political clout of having South Africa's head of state, President Cyril Ramaphosa as the Commission's Chair and the participation of cabinet Ministers (15).

The PCC's recommendations were organised according to the three components of the draft NDC Update: adaptation; mitigation; and means of support. The PCC's submission was different to others, in that it sought to represent the views of all social partners and to develop consensus around a set of recommendations. The recommendations were supported by a compelling evidence base, along with the work to organise these into specific recommendations. Not only were the recommendations specific and clear, but they could feasibly be addressed by the DFFE (PCC, 2021b).

What became apparent was that it was the interaction between the PCC and DFFE processes that shaped what was possible in updating the NDC. While the DFFE was able to run a government-mandated process, consult inside and outside government, and hold the mandate to development and enforce policy, it was also constrained by the process (15, 54). The PCC on the other hand, sat outside of government and was able to push the envelope more, for example on the ambition of the mitigation component. In both processes, a sound knowledge base played a central role, which was granted greater credibility when it was corroborated by other independent studies; illustrating that who knowledge is produced by has implications for how it is received. The robust knowledge base, the convening platforms, and transparency enabled the process to transgress divides and break familiar deadlocks through building consensus. This was observable in the increased level of trust in the knowledge, which facilitated the shifting of mindsets and changing of public positions of policy actors (12, 15, 17, 18, 54). Perhaps the starkest example of this was that BUSA updated their original written submission two times to voice their support for increased ambition. The initial position communicated by BUSA's written submission on the 30th of April 2021 was to support the range proposed by the draft NDC Update 398 – 440 MtCO₂e by 2030. As the process demonstrated the knowledge and growing support for enhancing the ambition, BUSA updated their submission citing their support for a range of 350-370 – 440 MtCO₂e on the 25th of June 2021. Finally, on the 10th of September 2021 BUSA communicated their support for the range proposed by the PCC recommendations 350 – 420 MtCO₂e, which was the range that was used in South Africa's final NDC Update. This was unprecedented, and showed that business themselves were convinced by the evolving conversation and its supporting knowledge, and did not want to get left behind by the shifting landscape or to be seen as outliers resistant to change.

These processes demonstrated that outcomes were not predetermined but rather developed by virtue of the work done by the processes. In other words, what was possible at the start of the process was not what was possible at the end of the process. An example of the work done by the process

was, by convincing policy actors what was possible, providing an evidence base, and having social partners participating in the process, consensus and support was established for a more ambitious target, by the end of the Update process (15, 17, 54). Consequently, the push for greater ambition came from multiple voices outside of government, which then allowed the DFFE to enhance ambition; thereby going beyond existing policy. It is unlikely that the DFFE alone would have been able to make the case for enhancing ambition to this extent, instead it had to come from the process (54). As one representative from business put it:

How is this process different to the first [iNDC] process? ...I think government ran a similar consultative process. I think the maturity of the society and participants were different. So I think COSATU in particular, in the labour union space, were much more sophisticated in the consideration of these things. Business, obviously, were a lot more. The fact base was more known. So it was easier. And then I think the role of the PCC was quite unique. We didn't have that in the first NDC; that group that was independently pulling together voices to feed into the cabinet and into DFFE. I think was also a significant change. (17)

The PCC leveraged off a more mature policy discussion and convened a group of well-capacitated, representative voices that were able to represent their constituencies in this technical and abstract process (15, 17). While the PCC by no means excluded grassroots participation, the space given to commissioners, ministers, and technical experts did foreground these actors. The interaction between the DFFE and PCC processes represented a step change in how to do NDC consultations, which set it apart from the iNDC in South Africa and the iNDCs and Updates in Ghana and Kenya, which exhibited more incremental improvements in the process. This is a model which could be tested by future NDC processes.

7.3.3 Development of the knowledge base influenced where consensus and contestation were located

In the attempt to maintain progress, contestation in the NDCs was typically side-lined, making it difficult to uncover and address. Researchers and business representatives in South Africa expressed their concern that the really contested issues, for which the knowledge base is less developed, have not yet been properly addressed, and that difficult conversations lie ahead (11, 17, 54). There was also the sense that although the Update process built more robust consensus than the iNDC, consensus was still at a fairly high level, which created ambiguity (54). Commenting on the implications of the

ambiguity caused by the emissions trajectory range of South Africa's NDC Update, one researcher remarked:

I would say that there was still enough constructive ambiguity in the process to accommodate different interests and the DMRE (Department of Mineral Resources and Energy) could continue to believe that their policies, specifically the IRP 2019, were compatible with the NDC Update range. We are now getting to a point, which is, I think, being pushed by the JET-P⁵ particularly... Now, there's a process where you get closer to implementation where the consensus that you built around the policy outcome starts to shatter because you can't have your cake and eat it. Because you can't have emissions at the level that the DMRE want and the DFFE want... the JET-P is the thing that's really causing this to happen because it's forcing us to resolve that ambiguity in a way that we do not want to. (54)

The ambiguity created by the emissions trajectory range has made possible some of the progress achieved up to this point in South Africa, particularly with agenda setting. It has also created vulnerabilities by allowing competing interests to coexist without finding a resolution, at the cost of ambitious action. Trollip and Boule (2017) highlight evidence of a similar trend that surfaced in the attempts of the DFFE to implement the national climate policy in South Africa, which should act as a warning for the implementation of the NDC Update. While the work of the Update narrowed the range and sought to address some of the ambiguities, it failed to go all the way and commit to a single trajectory. The JET-P will be a space to watch to see whether cracks in consensus start to show up during implementation (54).

Researchers in South Africa, Ghana, and Kenya highlighted that now is a critical time to translate targets into implementation and to develop the knowledge to do this. But the most contested elements of the Updates, such as costing, prioritisation, and financing, which are crucial for implementation, were also the least developed components of the knowledge base (29, 48, 54), as they were in numerous countries' NDCs (Levin et al., 2015; NDC Partnership, 2022; WWF, 2021). As Table 13 shows, while the iNDCs highlighted the need for more detailed costing and financial analysis, the Updates failed to address these knowledge gaps.

⁵ The Just Energy Transition Partnership (JET-P) is a partnership between South Africa, Germany, France, the EU, UK, and USA, which has mobilised USD 8.5 billion to support the implementation of the most ambitious version of South Africa's NDC Update in the next five years, through three focus areas. This will be discussed in more detail in Section 7.6.

Table 13: Gaps in the knowledge bases persist and reveal weaknesses that need to be addressed

Support request & Financial analysis		iNDCs	NDC Updates
	South Africa	“These costs are derived from energy systems and economic modelling. Further work is needed to prepare detailed business plans for finance and investment in mitigation” (Republic of South Africa, 2015, p. 9).	“The projected costs of adaptation over the 2021-2030 period are detailed in the adaptation communication above, and include the costs of adaptation measures themselves, as well as the costs of building the relevant human and institutional capacity... further work is underway to accurately quantify the costs” (Republic of South Africa, 2021b, p. 28). “These costs might be termed ‘economic costs’, or in the case of economy-wide models socio-economic costs and benefits. These costs are one form of information to consider the socio-economic implications of mitigation. Economic costs should be understood with these purposes and methodologies in mind. They should not be confused with financial analysis. Financial analysts would use entirely different methodologies to support decisions related to investment decisions. The economic costs reported here are not considered an appropriate basis for any ‘bankable project’. Further work is needed to prepare detailed business plans for finance and investment in mitigation” (ESRG, 2021, p. 14).
	Ghana	“The cost of adaptation is indicative. Revised cost from financial analysis will be presented before 2020” (Republic of Ghana, 2015, p. 8).	“Detailed investment estimate will be provided in the NDC investment strategy” (MESTI, 2021a, p. 10).
	Kenya	“Further analysis will be necessary to refine the required investment cost and determine the domestic support” (Government of Kenya, 2015a, p. 7).	

The progress in the knowledge base and capacity of all three countries between the iNDCs and Updates has enabled progress, in terms of ambition, credibility, support, and awareness. Progress was most evident in the areas where the knowledge base was most developed; for example, in the power sector in South Africa, in which stakeholders used the compelling evidence base to push for a more ambitious target. Conversely, in parts of the conversation where the knowledge base was less established, the conversations tended to get stuck in ideological differences rather than disputes about the technoeconomic details (14, 15, 17). The financial analysis of the Updates is critical for garnering support and for attracting investment (Levin et al., 2015; NDC Partnership, 2022; WWF, 2021). The failure of the Updates to address the gap highlighted by the iNDCs, as shown in Table 13, suggests that there has not been a sustained endeavour over the last six years to conduct the types of

financial analysis needed in these three countries. When the time for the Updates came around, there was either not enough time, or the requisite skills to conduct these types of financial analysis.

The last decade, and particularly the last six years, has shown evolution and increased activity in the knowledge base and policy contexts in South Africa, Ghana, and Kenya, and that the knowledge and capacity challenge is a shifting frontier. Much of the focus for mitigation in these three countries over the last decade has been on demonstrating the technoeconomic case for decarbonising the power sector, for which strong consensus has been built. The challenge of this decade is to implement at scale and speed. Contestation is shifting to some of the harder-to-model areas. It is therefore also the work of this decade to tackle some of these longer-term questions that relate to just transitions to net zero GHG emissions, socio-economic impacts, skills disaggregation, and trade-offs of these transitions. There is also a need to decarbonise the harder-to-abate sectors such as transport and heavy industry, as well as AFOLU, which continues to be poorly understood despite its importance. These knowledge areas are not as well developed and the capacity is even thinner; this will require long-term research agendas to drive progress in these areas, as focusing on the power sector alone will not deliver the scale of action required (17, 30, 54).

While the Updates have exhibited their success as consensus-building instruments, the same cannot be said for how they have handled contestation. They have displayed an inherent bias for shying away from contestation. Rather than ignore the contestation, the NDC processes could use their convening powers, knowledge bases, and translation capabilities to address contestation. Although this was a stronger feature of the Updates, both the NDC and Update processes failed to take contestation seriously, with the exception of the PCC process in South Africa. Areas of contestation often reveal issues that require attention in the formulation of the next round of NDCs, which are important for delivering on progression. Uncovering contestation should then be seen as an achievement of a process and not a criticism of it.

Unpacking knowledge, consensus, and contestation revealed insights about how to build trust with knowledge in policy processes through participation, features identified by the literature too (De Pinto et al., 2018; Ryan & Bustos, 2019; Sundqvist, 2014). As the last decade has unfolded, it has illustrated how knowledge can be the subject of mistrust and can play a key role in building trust. Some ingredients that emerged as crucial for building trust included how the knowledge was produced, how it included or excluded policy actors in the creation and use of knowledge in the process, how it was communicated to illustrate its relevance, and how comprehensive and robust it was. The Update

processes have demonstrated that the role of knowledge has been enhanced in these three countries when compared with the iNDCs. As a result, the Updates have been more capable of building trust in the policy knowledge system, making possible what was not possible before. Despite this, work remains, and some of the most difficult conversations may still lie ahead (17).

7.4 Representation and marginalisation of policy actors

The Update processes offered a more diverse range of opportunities for policy actors to participate than was possible with the iNDCs. A test for these processes was their ability to fairly represent the heterogeneous interests, knowledge, and positions of policy actors. This has to do with the relationships between the government, as the gatekeeper to a policy process, and the different groups of policy actors which is not uniform and has implications for representation and marginalisation of actors, their knowledge and interests (Jasanoff, 2006, 2010; Keeley & Scoones, 2003; Torgerson, 1986; van Kerkhoff & Lebel, 2006). Important here are also the challenges with combinatorial knowledge, that is, bringing together very different forms of knowledge, held by different actors, and the need to overcome such challenges to achieve fair representation (Klement & Strambach, 2019; Strambach & Klement, 2012). Some of the dynamics influencing representation and marginalisation are summarised in Table 14 below, and are elaborated on in the following paragraphs.

Table 14: Dynamics influencing the representation and marginalisation of policy actors in the iNDCs and Updates

	iNDCs	NDC Updates
Overall	NDC and international process set terms of engagement amidst ambiguity and uncertainty. Processes were rushed and remained abstract to most policy actors, and they privileged more technical forms of knowledge. Representation was dependent on technical knowledge, resources, and ability to organise, as well as capacities to translate interests in the technical terms of the NDC process. Most policy actors were constrained by their capacities.	Enhancements in the process and communication of the knowledge base made it possible for a wider group of policy actors to participate. A differentiated and structured approach to involving stakeholders appeared to be one strategy for addressing a crisis of relevance. Still, processes over-represented those with technical expertise and under-represented those that struggled to communicate their interests in the technical terms of the Updates. Changes in the macro environment impacted on the actor dynamics.
South Africa	National workshops, provincial consultations, written submissions, Parliamentary Hearings, bilaterals with the DEA	National workshops, provincial consultations, written submissions, bilaterals, PCC process
Ghana	Technical and national consultations, technical working groups, actor group specific workshops	National workshops, templates for written submissions & data collection, actor-specific workshops, review process, validation workshop
Kenya	Six multi-stakeholder consultations, closed technical workshop, national validation workshop	National, sectoral & actor-specific workshops, structured written submissions & data collection, national validation workshop

The Updates demonstrated that inclusive participation needs to go beyond simply bringing a diverse collection of policy actors into the room. Rather, participation needs to recognise that participants enter the room with vastly different sets of knowledge, capacities, and resources that determine their ability to participate, represent their interests in the terms of the process, and be heard (15, 52). It follows that consultation processes need to acknowledge these differences and be designed in such a way as to create a more level playing field. One strategy for enhancing participation was offering a diverse collection of ways in which policy actors could participate, which was one of the ways that all three countries strengthened representation in the Updates compared to the iNDCs. A differentiated and structured approach, as was the case in Ghana and Kenya, improved the relevance of the stakeholder inputs and engagements, which enhanced the uptake of stakeholder contributions and therefore improved their representation (27, 28, 51). The more open-ended written submissions and provincial consultations in South Africa struggled at times with a lack of relevance, which could be observed by the tendency for the DFFE and stakeholders to talk past each other. Such an approach did little to strengthen participation and representation of more marginalised groups like communities and grassroots organisations (15).

In Ghana, representatives from civil society highlighted how although youth participation has improved, the direct participation of communities was still limited and mainly consisted of representative voices of communities rather than the actual community members (43, 51). The abstract and technical nature of NDCs made it difficult for those unfamiliar with them to engage. In addition, all three countries also struggled to include subnational actors in the process, despite them being important actors for implementation (16, 33, 43).

The PCC in South Africa was able to better represent a diversity of actors because it was comprised of well-capacitated voices that represented all social partners. The PCC played a strong facilitation and brokering role to open up technical work to scrutiny, using public and private fora, and doing important boundary work to organise policy actors and build consensus around a concrete set of co-created recommendations (12, 15). This took astute political acumen to leverage opportunities and break familiar deadlocks, in a way that has been rare in the history of climate policy in South Africa (54). As a result of this unique set of characteristics, the PCC was, more than any other part of South Africa's Update process, able to represent a diverse range of actors in a balanced way. The uptake of the PCC's recommendations in the final Update was evidence of its impact and support (12, 14, 15, 17, 54). The PCC experience therefore presented an alternative to the usual consultation model. It acknowledged the differences of stakeholders, and sought to address these imbalances in its design and operation.

The impact of the COVID-19 pandemic on the representation of policy actors for the Updates was paradoxical. It was paradoxical because by moving to virtual conversations, it extended the reach but sacrificed a depth of participation and created new barriers that some stakeholders were unfamiliar with overcoming. Communities and grassroots organisations in all three countries struggled particularly with this shift (15, 27, 51).

Notwithstanding the progress made since the iNDCs, the Update processes of South Africa, Ghana, and Kenya represented those with technical expertise and under-represented those that struggled to communicate their interests in the terms of the process. This came back to the capacities, knowledge, and resources of policy actors and their ability to organise around a common position, which differed markedly across groups (15, 33, 52). More fragmented groups, such as grassroots and community-based organisations, struggled most in this regard. It appeared though, to enhance representation, differentiated approaches to stakeholder participation at different parts in the process that acknowledge differences in stakeholders' knowledge, interests, and capacities are needed. Future

NDC processes could serve as valuable testing grounds for experimenting with new modes of participation to enhance representation.

Enhancing representation also includes how future NDC processes could seek to incorporate forms of knowledge that have been largely excluded. These could include local knowledge that can help to identify local issues, understanding risks and impacts (Khan et al., 2018; van Kerkhoff & Lebel, 2006), and practical knowledge which is needed for practice and implementation, and political knowledge needed to navigate policy processes (van Kerkhoff & Lebel, 2006). Gibbons et al. (1994) refer to these as Mode 2 knowledge, as they are created through application within a specific context, and are held by a broad range of actors. Cultural and traditional forms of knowledge are also important within certain contexts and most often marginalised from formal policy processes (Nautiyal & Klinsky, 2022; SBI, 2020, 2021). There is also a pressing need to move beyond the focus on techno-managerial forms of knowledge, to include a much broader suite of expertise contained in the social sciences and humanities, that acknowledge plural ways of knowing, values and the contested politics of climate change (Leyshon, 2014; Nautiyal & Klinsky, 2022; Nightingale et al., 2019). All these types of knowledge are needed to move beyond the technocratic dominance currently observable in NDC processes to understand how to bring about change and the systemic features that resist change. But as has been discussed, given the small communities of practice working on climate change in these three countries, technical knowledge has been prioritised with limited resources dedicated to critical, social science approaches. A shift to supporting more critical social science analysis should be treated as a priority by future processes, to enhance the likelihood of knowledge driving change.

Lastly, as with the iNDC processes, English was used exclusively in these NDC processes. This was not even raised as an issue during the processes, which illustrates the assumption that all should be able to participate in English, but fails to recognise, the imbalances this causes between policy actors. Those comfortable representing their views in English, were then favoured by the processes, compared to those that were not. Whilst a difficult issue to address within the NDC processes, it points to the awareness raising and capacity building work that needs to happen in the five years between NDC submissions, to assist with addressing such imbalances.

7.5 The Updates brought together the national and international

A policy knowledge systems approach revealed that the iNDCs, and even more so the Updates, brought together the national and international that was influential in a number of ways, and has evolved considerably over the last six years. This ability of the NDCs to bring together the national and

international, showed how the NDCs can be thought of as a product of the two level game between international diplomacy and domestic politics (Putnam, 1988). Specifically, through the requirements of NDC submissions, the international process has created pressure points to create knowledge, and has opened up spaces to convene domestic, evidence-based discussions. The process made resources available for the stakeholder processes and knowledge creation, which was most effective when provided by trusted development partners with a long track record; UNDP in Ghana was a prime example of this (39, 48).

So, in some sense, the international determined the purpose of knowledge creation for the NDCs and its goalposts, which influenced what was communicated in the iNDCs and Updates, and the orientation of the technical work through the requirements of the ICTU guidelines and UNFCCC Synthesis Reports (UNFCCC, 2022; UNFCCC Secretariat, 2015). Such spaces are hard to imagine without the influence of the international process, and highlights the potential of multilateralism. There have been drawbacks too, as one researcher in Kenya remarked:

We didn't get it right from the very beginning... When the decision was made in 2013, 2014, for countries to prepare and make their pledges, there was no framework. So, what happened... WRI was quick to try and construct some framing. What an iNDC was before there was any guidance from the COP. (30)

Similar guidance, specifically Fransen et al. (2019) was prepared by the WRI and UNDP in 2019 in the lead up to the Updates, which the Kenyan NDC Update explicitly cited as guidance for its process to update their commitment (Government of Kenya, 2020). This demonstrated that like with Kenya's iNDC, international framing and guidance continued to play a role for the Update. The international process seems to have been most successful at driving *ad hoc* progress by driving a flurry of activity every time an NDC submission comes around. There was less evidence, however, of supporting sustained, long-term work in these three countries (52, 54). One of the areas in which the international process has been more successful is in its capacity-building role through the preparation and peer review of GHG emissions inventories, BURs, and National Communications, which has been core to improving underlying data and building the requisite capacities (2). This set of data, capacities, and knowledge types are foundational for robust NDCs, and therefore building these has been an important achievement of the processes. Ghana and South Africa exhibited the capacities they have developed by remaining up-to-date with their submissions of BURs and National Communications, which bodes well for the data available for NDC formulation. Kenya, on the other hand, last submitted

a National Communication in 2015, showing that the data, systems, and infrastructure to prepare these reports is not as up-to-date as in Ghana and South Africa.

The interplay between the national and international processes, and its implications over the last decade, was visible from the early days of South Africa's climate policy and has continued to evolve. As has been discussed, the Copenhagen COP drove the announcement of South Africa's PPD, which was taken forward by the national climate policy and the iNDC, and influenced domestic policy like the electricity sector plan and the IRP 2011. Six years later, the NDC Update process shone a light on how domestic policy such as the IRP 2019 was out of date and did not represent least cost, and was acting as a constraint to the ambition that could be realised in the Update. Consequently, the Update process exerted pressure on electricity policy along with other sectoral policies to be updated, illustrating the leverage provided by NDCs in domestic policy processes (2, 14). This is also an example of the implications of Putnam's (1988) two-level game.

The Paris Agreement and its rulebook, the introduction of guidelines for ICTU and the dedicated technical work, gave the Updates a more robust foundation to work with than the iNDCs had. The nature of the NDCs Updates were also better understood than were the iNDCs. All these factors together meant that there was less uncertainty and ambiguity around the role of the Updates. This made the Update processes more accessible to a wider group of policy actors, around which they could better organise and participate more meaningfully (15, 28, 51). This translated into more detailed and robust Updates, with greater levels of transparency and ownership. But whilst progress in ambition was also present, it fell short of what was required. Urgent attention is needed here, particularly as the efficacy of the COP is increasingly being questioned, with more emphasis being given to country-level action (Dubash, 2022).

Lastly, something that has become increasingly apparent over the last six years, as the Updates became more established policy objects and the international conversation about the climate crisis has evolved, was that the international influence goes much wider than what happens under the UNFCCC. As a representative from business in South Africa reflected:

I think we've seen more change in the last year or two than we've seen in the last 10. And because the reality of the global transition is starting to hit home, in South Africa, and for Kenya and for Ghana, these are exogenous risks. These things are happening to you, whether you like it or not. Coal will be out of the economy by 2050. You know, because of the decisions [that] places like India and Europe and the US are making. And so the argument that we need

to protect coal to protect jobs actually becomes defunct because you can't protect coal and therefore, you can't protect the jobs... And so, I think the conversation is moving, not entirely but a big chunk of the conversation is moving away from, What do we have to do, to how are we going to do it?

So I actually think that the international policy work that has led to large-scale, industry change in energy and in the automotive sector, for example; those things are unstoppable. (11)

Features such as the drop in the price of renewables, future of carbon pricing and border adjustment taxes, the reduced appetite of lenders for investing in coal, and the general elevated recognition of the risk that the climate crisis represents for businesses, economies, and societies, are all examples of the shifting terrain globally. These shifts changed the equation for countries and their Updates. This was most visible in South Africa, where decarbonisation and resuscitation of the ailing, emissions-intensive economy is an imperative, as is the need to address transition risks. So too have they forced certain international corporates to move away from being opponents to climate policy, as was the case for the iNDCs, to becoming active participants in unlocking and capitalising on the opportunities associated with the implementation of the Updates (2, 3, 9, 10, 11). This has shifted the focus of the NDC Updates to being one about harnessing the power of these broader shifts that are underway; a shift towards implementation (17, 54), which is discussed in the following section.

7.6 Moving from agenda setting to implementation with the Updates

The focus of this research has been on the formulation processes of the iNDCs and Updates. But the research has also revealed, as did Laudari et al. (2021) and Röser et al. (2020), how insights from these formulation processes offer valuable insights for implementation of the Updates. The recent shift in focus to implementation also requires a change in focus of the policy knowledge systems, as one researcher from South Africa explained:

Everything that's been done up to now and the whole knowledge base of what we've done has been based on modelling and projections. But we're getting to the point where we need to go into a different phase where there are a whole bunch of different factors we need to take into account.

I think it's only when we really started getting into the detail of the implementation process that we really understand what the implementation challenges are and if you're able to really quantify the effort that will be required and ongoing. And I think this is very poorly understood. (54)

This statement identified the challenge confronting knowledge work for future NDCs. The knowledge for implementation of the iNDCs and Updates has been a weakness, inadequate for driving the implementation that is now so urgent. South Africa offers an intriguing example about the linkage between NDC formulation and NDC implementation, and how this relationship is evolving. The 350 MtCO₂e target that was finally agreed on as the more ambitious, lower bound of South Africa's NDC Update target range has already proved instrumental in framing its implementation. This was evidenced through the JET-P that was announced at COP 26, shortly after the Update was submitted. The political declaration states that the finance provided is aimed at supporting the implementation of the most ambitious version of South Africa's NDC Update, in other words the 350 MtCO₂e target. So, it was important that this target was perceived to be robust and ambitious, and its knowledge base credible and legitimate. If this target was not regarded as such, it is unlikely that the International Partners Group (IPG) would have agreed to this partnership. This was a strong line of argument raised by policy actors in the Update consultations and written submissions in South Africa, which stated that greater ambition would attract higher levels of international climate finance. Reflecting on the role of the evidence base to communicate ambition, address risk, and access finance through the work of the Update, a business representative from South Africa remarked:

So that was key, was the kind of fact base... and we translated that fact base into a presentation that we did on the NDC Update: What it is, why it's important, and what can be achieved with the new knowledge. And [we] had this argument that if we got it right, and if we got our ambition right, we would be able to attract significant funding at COP. So the 8.5 billion deal (referring to the JET-P) was rather a relief. And also made the point that if we don't get it right, we would suffer these sort of serious trade risks. And so that ambition was important for both protecting us from those risks, but also access to finance. (17)

This statement shows the necessary evolution in the knowledge base to make the case for ambition, to unlock opportunities, and protect South Africa against the risks of not transitioning. But again, this comes down to skills and knowledge to prepare a vision, an investment and implementation plan, and to communicate this in the terms of the interested parties. It is unlikely that this target would have been regarded as robust, ambitious, and transparent, without the underlying technical work and the work done by the Update process to build consensus around a more ambitious target. So, in a sense, the 350 MtCO₂e acted as a boundary object around which actors interested in implementing and

funding South Africa's NDC Update could organise, which has led to the provision of some of the international climate finance needed to implement the Update.

But for all the agenda-setting progress of the Updates, their capabilities in terms of driving implementation remains questionable. One of the most frequently cited critiques of the NDCs was that they lacked details about implementation; who does what, by when, and how. In addition, investment plans that allocated roles and resources were lacking from the NDCs. Although this may not have been the role of iNDCs and the Updates up to now, an imperative now is the work that will need to be done to translate goals and targets into tangible implementation. Therefore, it is necessary to reflect on what might be the roles of NDCs in relation to implementation. Here the literature may be instructive, in terms of the view of knowledge and its role in implementation. For this purpose of contributing to implementation, knowledge is more suitably seen as the competencies for action, rather than an object to be acquired (Ibert, 2007; Strambach & Klement, 2013). This then shifts attention to the competencies that need to be built to support the implementation of NDCs, not just the knowledge that needs to be created or obtained. From the experience of the two rounds of NDCs in these three countries, and the findings discussed in these chapters, perhaps NDC processes and their supporting knowledge systems need to ensure and demonstrate implementability; but not drive implementation itself. The appropriate roles of NDCs for supporting implementation is an important part of the puzzle that requires attention.

7.7 Concluding remarks

This chapter has demonstrated that assessing the outcomes of the Updates is about more than evaluating their targets. Opening up their processes through a policy knowledge systems conceptual framework revealed a broader set of knowledge system outcomes, as well as the drivers of these, and the evolution between the iNDCs and Updates. Reflecting on the journey of the iNDCs to the NDC Updates, what has changed? South Africa, Ghana, and Kenya have run more consultative processes, used more accurate data, conducted more rigorous technical work, and enhanced the transparency of the processes to update their iNDCs. At the same time, the position of NDCs and the global discourse on climate change has changed markedly in the last six years. Still, processes remained rushed, data continues to be a problem, capacity remains competent but concentrated, participation is improving but unequal, continuity is a challenge, progress is hindered by legacies and lock-ins, and question marks remain about the roles of NDCs and knowledge for supporting implementation. A summary of the seven main findings of this chapter revealed by the conceptual framework and that build on the literature follows.

First, unpacking the baselines and targets of the Updates and comparing them to those of the iNDCs showed how they had lock-in effects, with the legacies of the iNDCs still present in the Updates (despite their improvements in ambition), resistant to new information and change. Critical work for future NDC processes will be to relook at these baselines and targets, to establish whether these countries need to break away from them completely, to allow for more radical action and close the ambition gap (UNEP, 2022; UNFCCC, 2022).

Second, characteristics of the Update processes set the terms of participation for policy actors, and were more consultative, robust, and included more diverse forms of engagement than did the iNDCs. This meant that the processes and their outcomes represented a broader range of interests than was possible during the rush of the iNDCs. Still, the technical and abstract nature of the Updates processes privileged those policy actors with technical knowledge, resources, and an ability to organise, even in virtual platforms made necessary by the COVID-19 pandemic, showing that representation of policy actors was uneven (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998; Pohl, 2008)..

Third, commissioning dedicated technical work and opening this up for conversation during the Update processes enhanced credibility, participation in the process, and opportunities to engage with the technical basis of the Updates. Communication of knowledge strengthened the legitimacy and relevance of the knowledge base and Updates, representing areas of improvement on the iNDCs. Strengthening relevance, credibility and legitimacy were the fruits of the enhanced processes, exhibiting the roles knowledge systems can play to support action as highlighted by Cash et al. (2003; 2020).

Fourth, part of the significance of the Updates was their ability to build high-level consensus. The ability to build consensus had to do with building trust. Trust was most effectively built when knowledge was locally produced, well-communicated, and showed convergence across different studies, echoing the findings of Ryan and Bestos (2019) on how to build trust in policy processes through knowledge and participation. This made it possible to garner support around those elements best supported by the knowledge base; although consensus was high level and not deep. Furthermore, limiting the Updates to consensus building ran the risk of driving near-term action that was incompatible with the types of long-term trajectories necessary for the Paris Agreement, and revealed the types of ‘cooling down’ strategies for building support discussed by Sundqvist (2014).

Fifth, the flipside of consensus was the contestation that the processes uncovered, or rather covered. Where there was contestation in these three countries, these difficult conversations were, for the most part, left for another time in the future. This has been a weakness and a bias of the NDC cycles, with a preference to look ahead, focusing on the need for more ambition, instead of critically reflecting on progress and lack thereof. Not addressing contestation created risks that look set to emerge as the Updates enter the territory of implementation. Where consensus was superficial, or ambiguities allowed for conflicting interests to coexist, implementation is starting to shine a light on these tensions. Contestation has shown itself to be a shifting frontier to where knowledge gaps exist, with debate then getting trapped at the level of competing ideologies. This highlighted how the state of the knowledge base influences where consensus and contestation are located, and the technical work that needs to be done to address these under-developed knowledge areas. At the same time simply more technical knowledge is unlikely to resolve contestation and needs to be accompanied by process and political work, as discussed by the literature too (Cozzens & Woodhouse, 1995; Gallie, 1956; Rafey, 2013; Wijsman & Feagan, 2019).

Sixth, iNDCs, and even more so the Updates, demonstrated their ability to connect the international and the national, resembling a two level game (Putnam, 1988). The international provided the space and resources for the creation of the relevant knowledge and evidence-based national processes in these three countries. While the domestic policy processes imposed constraints and opened opportunities for the iNDCs and Updates, the Updates in particular showed that they were able to push in the opposite direction and put pressure on the domestic processes. Part of the success of the Updates lay in them becoming more distinct policy instruments. This enabled a more diverse group of policy actors to organise around them than was possible with the iNDCs, given the uncertainty and ambiguity of the time. It was also evident that the Updates leveraged the broader shifts in technology, finance, and trade. The shifts over the last few years have been dramatic, and have reshaped the conversation around the NDCs and their relevance.

Seventh and lastly, the Update processes showed that the outcomes of the processes were not predetermined. By virtue of their design, operation, and knowledge, these processes shifted the needle and create unexpected outcomes. Reflecting on two rounds of formulation of the NDCs has revealed rich learnings that could inform the preparations for the implementation of the NDCs (Laudari et al., 2021; Röser et al., 2020). So too has it revealed a forward-looking bias of the NDC experience, which resulted in the lessons from the iNDCs not being fully utilised in the Updates. As a result, some of same weaknesses of the iNDCs persisted in the Updates of South Africa, Ghana, and

Kenya. For real change, critical reflection is needed to harvest learnings and apply them to build capacities. This reiterates the conclusion that shifting attention to the five years between NDC submissions, instead of the preceding months, would give countries the space to approach NDCs as sustained, long-term work. This would mean that countries are better prepared to make the most out of the windows of opportunity that open when a new NDC submission comes around. This would require, however, a total reorientation of the ecosystem of actors working on and supporting NDCs, both nationally and internationally.

CHAPTER 8: Synthesis and Conclusions

This, the final chapter of this thesis aims to situate the findings of this research in relation to the state of the literature and theory on climate policy and NDCs, and on knowledge systems in policy processes. To do so, the chapter revisits the conceptual framework and then structures a discussion around the research questions to show how this thesis answered each research question through the conceptual framework and empirical work. In so doing, the chapter demonstrates how this thesis builds on and makes an original contribution to extend the body of knowledge on NDCs and knowledge systems. The chapter then moves on to discuss limitations of this research and recommendations for future research. Lastly, the overall conclusions of the thesis are presented.

8.1 Conceptual approach

Figure 28 represents the conceptual framework from which the empirical research was approached, analysed, and interpreted. As illustrated in Chapters 5 to 7, the units of analysis were the policy knowledge systems for the iNDC and Update processes in the cases of South Africa, Ghana, and Kenya. The approach demonstrated how the processes set the terms of engagement for policy actors, and how policy actors and knowledge shaped the processes, resulting in their knowledge system outcomes and the evolution between the iNDCs and Updates. Knowledge system outcomes included the NDC documents, the levels of development, credibility, legitimacy, and relevance of the knowledge base, areas of consensus and contestation, and the representation and marginalisation of policy actors. Figure 28 also illustrates the temporal dimension of this conceptual framework, which aims to capture the evolution of the policy knowledge systems for the iNDCs and Updates. The temporal aspect is important to represent the dynamic nature of policy knowledge systems and policy processes.

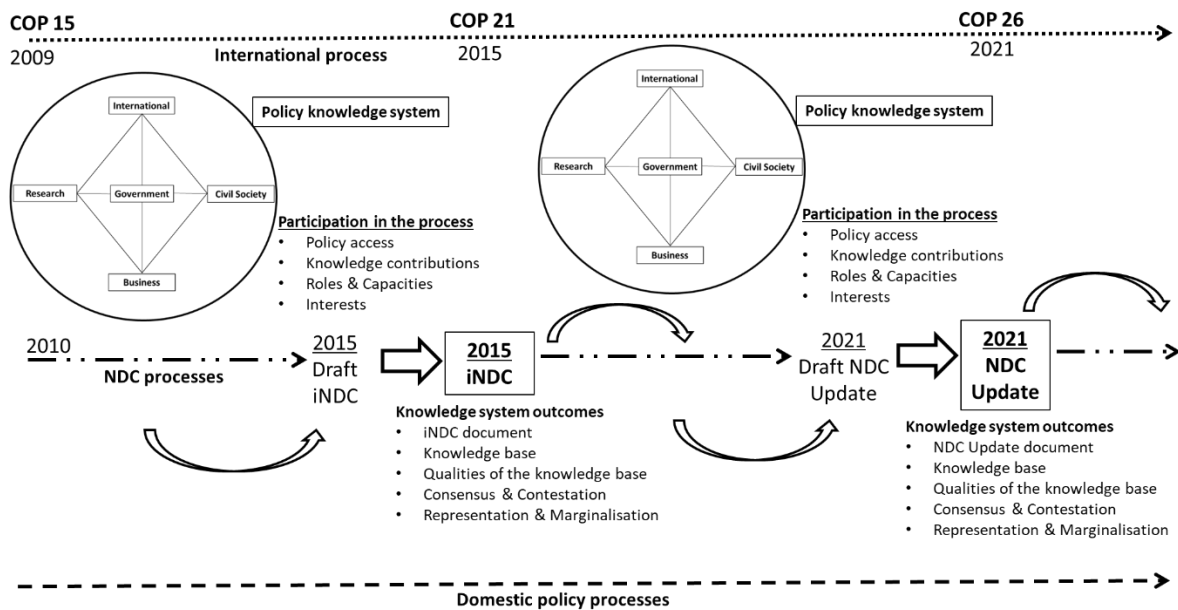


Figure 28: The conceptual framework of this thesis illustrates the components of a policy knowledge systems analysis, which consists of policy actors and their participation in NDC processes, through their policy access, knowledge, roles and capacities, and interests. The process and participation of actors influenced the knowledge base, its credibility, legitimacy, and relevance, the areas of consensus and contestation, and ultimately who was represented and marginalised by the resultant NDCs.

8.2 Reflecting on the research questions

This section is structured according to the respective research questions to illustrate how the findings of this research revealed by the application of the conceptual framework, build on the state of the empirical and theoretical literature discussed in Chapters 2 and 3, and how the thesis answers the research questions.

8.2.1 How have policy knowledge systems evolved over time and shaped the Nationally Determined Contributions (NDC), their processes, outcomes, and implementation prospects in South Africa, Ghana, and Kenya?

This is the primary research question for this thesis and therefore the five research questions that follow also contribute to answering this question. A policy knowledge system is defined by this thesis as a system of interconnected policy actors that, based on their roles and capacities, the knowledge they hold, and the access they are permitted to a policy process, attempt to influence a policy process and its outcomes in ways that represent their interests (Cornell et al., 2013; Muñoz-Erickson, 2014; Never, 2012a; Oliver et al., 2021; Pohl, 2008). As van Kerkhoff and Lebel (2006, p. 473) suggest, “the relationships between research-based knowledge and action can be better understood as arenas of shared responsibility, embedded within larger systems of power and knowledge that evolve and change over time”. Such a view draws attention to the need for exploring the role of knowledge to

include this more systemic perspective to understand how it can contribute to change. This research has shown that research-based knowledge is still given preference by NDC processes, evident in the central role that commissioned technical work plays in the formulation of NDCs. Civil society in these three countries often drew on the research to substantiate their positions, but struggled to communicate a coordinated position due to high levels of fragmentation. Business in South Africa brought extensive knowledge about the working of the economy and implementation, which they organised and communicated in terms directly relevant to the NDCs. Other forms of knowledge held by grassroots organisation and communities, traditional or indigenous knowledge, and even the knowledge of subnational governments, struggled to gain traction. This illustrates the need for future processes to establish ways to better recognise broader forms of knowledge to become more inclusive. Broader inclusivity might be a way to ensure that NDCs are based on different forms of knowledge, build support from a wider group of actors, and enhance the likelihood of implementation.

Latour (1987) and Lahn and Sundqvist (2017) noted that what tends to happen with boundary objects is that as they become accepted, they get black-boxed, which means that their origins and the importance of their origins get obscured from view. This effect was visible in the iNDCs in South Africa, Ghana, and Kenya, the legacies of which led to the original work used for the iNDCs persisting and constraining what was perceived to be possible with the Updates. Excavating these black boxes through in-depth country-specific findings enabled a level of granularity of analysis, to move from describing “what” to explaining “how” and “why” these processes unfolded as they did, and how they can change.

Putnam (1988) identifies the interaction between international diplomacy and domestic politics as a two-level game. This research has shown how the NDCs can be thought of as a product of this two-level game. Although NDC processes operated under numerous constraints, they created pressure points for knowledge synthesis and creation to inform national conversations established in the space that was created by the demands of the international process. The Updates in particular showed progress in loosening the familiar deadlocks of national policymaking, such as the conflict that often arises between line ministries and Ministries of Environment. Clearly, these different interests still come into contact and are constrained by each other, but the iNDCs initiated national conversations that are hard to imagine without them. The Updates have taken forward this work, demonstrating that they were more capable than the iNDCs of delivering progress. This had to do with the Updates becoming more distinct policy instruments and with the evolution of the global conversation about the climate crisis. While the national settings constrained what was possible with the iNDCs, they have

loosened their grip on the Updates, which have managed to push in the other direction and shine a light on elements of the national processes that require change. Similarly, the knowledge work done for the Updates has not stayed confined to the processes themselves, but has overflowed into other policy areas and the national discourse more generally; thereby making the case for change in sectors in a way that line ministries were unwilling to do. Examples of this were visible in South Africa's Update process, with stakeholders using the state of the research to make the case for updating electricity and transport policies. In Ghana and Kenya, improvements in data showed the need to strengthen efforts in the AFOLU sector.

8.2.2 How has the policy access, roles, capacities, knowledge, and interests of policy actors shaped their participation in the NDC processes?

Despite the now well-established body of literature on NDCs, Laudari et al. (2021) and Röser (2020) identify the shortage of literature analysing NDC formulation processes, and the pressing need for such analysis, so as to learn from previous NDC experience and enhance future ones. Pauw et al. (2018) also highlight the disproportionate attention paid to the headline mitigation numbers of NDCs and the need to go beyond an assessment of these targets. Going beyond the targets implies assessment of a broader set of outcomes and the drivers of these, and importantly how the evolution between the iNDCs and Updates contributed to this change. The UNFCCC Synthesis Reports found that 40-70% of Parties' iNDCs held stakeholder consultation processes, with this figure rising to more than 90% of Parties for the Updates (UNFCCC Secretariat, 2016, 2021). Purposes of stakeholder participation included data collection, capacity building (Dash & Gim, 2019), awareness raising to communicate the relevance of NDCs (Nautiyal & Klinsky, 2022; Röser et al., 2020), and creating buy-in through demonstrating the socioeconomic benefits of NDCs (Atteridge et al., 2019).

This research has shown how the design and operation of these process determined the ways in which different policy actors could utilise their access, knowledge and capacities, and interests to participate in, and shape these processes and their knowledge system outcomes. The findings of this research have contributed by offering in-depth, country-specific insights on the consultation processes that took place during the development of the iNDCs and NDC Updates in South Africa, Ghana, and Kenya. While the iNDC processes were typically closed and rushed, all three countries went to efforts to make the Update processes more inclusive. They did this by offering different ways in which policy actors could participate, commissioning dedicated technical work for formulating the Updates, and setting aside more time. They also showed how external pressures on the processes rushed processes to completion in time for global milestones, with the impact of the Ambition Summit on Kenya's Update

process an example of this. Ghana used the Updates process to enhance alignment with government policy, given that the iNDC was formulated by the previous government. Differentiating the phases of the process to include diagnostics, a whole-of-society approach, and phases for the analytical work and political approval, helped to differentiate the objectives for each phase of the Update process in Ghana, and the participation of different policy actors therein. The use of templates in Ghana and Kenya helped to structure the inputs of policy actors in the process, thereby improving their relevance for the Ministries of Environment (and the EPA in Ghana) that were tasked with incorporating stakeholder comments.

What was possible during the NDC processes rested on capacities. A survey found that over 50% of respondents indicated that the formulation of iNDCs experienced serious capacity challenges (Röser et al., 2020), with 113 developing country iNDCs including capacity-building support as a condition for implementing their iNDCs (Pauw et al., 2019). Capacities consist of skills, thematic or domain expertise, types of capacities such as understanding the nature of the policy problem and its causes and impacts, and the ability to develop, implement, and assess policy actions (Khan et al., 2019; Levin et al., 2015; Röser et al., 2020). The location of capacities, the size of teams, and whether these capacities are sustained or *ad hoc* in nature are also important features of capacities (Nautiyal & Klinsky, 2022; Sokona, 2021).

Rafey (2013) differentiates between producers, users, and contestants of knowledge. Other authors highlight the need to manage the boundary between knowledge and policy through communication, translation, and mediation (Cash et al., 2003; Cash & Belloy, 2020; Lahn & Sundqvist, 2017). Elzinga and Jamison (1995) view science policy as an outcome of the dynamic interplay between actors in the policy arena, which Pohl (2008) builds on in their conceptualisation of knowledge systems.

This research has built on, adapted, and applied these concepts to explain how the iNDCs and Updates are also outcomes of the interplay between policy actors and their knowledge and capacities. The findings revealed that capacities were a challenge for the iNDCs in these three countries; although this improved across the board between the iNDCs and Updates. The iNDCs were characterised by poor communication between experts, policymakers, and the broader group of involved actors, particularly in the closed iNDC process in Kenya. In all three countries, communication was typically one-way from government to policy actors, was irregular, and mostly happened when a new submission was due. A lack of translation was evident in the seeming crisis of relevance in some of the discussions, which

characterised the iNDCs, and was still present in some fora for the Updates, such as the provincial consultations in South Africa.

Government teams in the Ministries of Environment, acting as users of knowledge, led the processes in South Africa, Ghana, and Kenya. Although they were shown to be competent, they were typically small teams that lacked political clout, had only a few key technical people, apart from which technical capacity was thin, and were without clear policy direction. This constrained how well they could use knowledge in policy formulation. Their ability to play effective communication and brokering roles was also limited. While Ministries of Environment have limited political clout within government, they do hold power as gate keepers to the NDC processes, and need to exercise this power in ways that open up not close down access.

Authors have long identified that it is common for certain experts to be granted privileged access to the policy process (Cozzens & Woodhouse, 1995; Jasanoff, 2006, 2010; Nautiyal & Klinsky, 2022). Experts exert influence from this point of privileged access, by managing integration in the process for impact, and maintaining their independence for credibility (Sundqvist et al., 2017). The research communities directly involved in the iNDCs and Updates in South Africa, Ghana, and Kenya were competent but small, and acted as the central knowledge producers for the NDC processes. In Ghana and South Africa, local universities occupied these central roles and held longstanding relationships, particularly with their Ministries of Environment (and EPA in Ghana), alongside who they have worked for the last decade, which has developed trust. Consequently, their positionality and independence have at times been questioned by other policy actors, and by association their research too. This was most effectively addressed when the analytical work underpinning NDCs was compared to and corroborated by other studies, as was the case in the process run by the PCC for South Africa's Update. The role of researchers in Kenya was different to Ghana and South Africa, in that local universities seemed to be marginal to the processes, with international consultants leading the technical work for the iNDC and local consultants for the Update.

Business as contestants and producers of knowledge exerted influence by drawing on their economic importance, their financial resources, ability to organise, and implementation capabilities, which gave them bargaining power. They also benefitted from detailed understandings of their operations, which provided them with an information asymmetry that they leveraged for influence to frame what was and what was not possible. The ability of a few big business associations to organise a large portion of big business around a common position also helped to elevate the voice and influence of business,

particularly in South Africa, and less visibly in Ghana and Kenya. Business in South Africa therefore exhibited some of the characteristics of successful coalitions identified by Leifeld and Haunss (2012), such as: large, well organised constituencies, the use of core frames or issues that are stable over time, which are effectively integrated into coherent positions or narratives to shape the discourse in line with their interests.

Civil society and organised labour typically used public fora and advocacy campaigns to shape the discourse around the NDCs, playing important translation roles for their constituencies, which was important for building public pressure for more progressive NDCs. Civil society, in particular, struggled to present a unified, coherent voice, which weakened their bargaining power and influence. The fragmentation, limited organisation, and diversity of issues and narratives across civil society, were examples of some of the barriers to becoming successful coalitions, as characterised by Leifeld and Haunss (2012). Organised labour in South Africa used their favourable policy access, by virtue of being part of a political alliance with the ruling party. Offering a diversity of forms of engagement for civil society has been shown to enhance their participation. Structured templates in Ghana and Kenya, helped to guide the inputs of civil society to increase the likelihood of uptake of their inputs. Enhancing the levels of organisation across different parts of civil society under umbrella groups, and making more targeted inputs may also help to increase their influence. As NDCs progress towards implementation, the importance of context-specific knowledge and the roles of communities in implementation, is becoming increasingly apparent. The involvement of CSOs has become a necessity for NDC implementation to contribute to just transitions. Long term work and relationship building between communities and CSOs, will be needed for CSOs to properly represent the communities that will be directly impacted by the implementation of the NDCs.

International actors shaped the NDC processes by providing funding and technical support for the technical work and consultation processes. Furthermore, donors played a key role by signalling their intention to finance the conditional components of the NDCs. This meant that countries were under pressure to develop NDCs that reflected national circumstances, and were able to attract international support. Concerns over international actors exerting undue influence, particularly around ambition, in what were meant to be nationally driven processes, were voiced strongly by government representatives in Kenya and Ghana. The NDC processes so far have demonstrated that new ways of working between Global North and Global South are needed to drive the level of progress required. This could include locating just transitions, that are defined by countries and to which support should be tailored as the priority for NDCs in developing countries. This support should focus on building on and broadening existing local capacities through long term research projects, that enable the

development of context-specific data, tools, and models. Support for long term work by African universities and guarding against conditionalities for providing support for the formulation of NDCs, could be another focus for NDC support. Organising Northern support around these features could help to radically alter the progress possible through the NDCs.

A key finding was the increasing maturity of the ways in which policy actors interacted with the Updates compared to the iNDCs. This was due to the Updates becoming better defined, supported by more detailed knowledge, and a better understanding from policy actors about what was and what was not possible with the Updates. Policy actors were therefore better equipped to organise around and participate in the Update processes, which was visible in the more robust and nuanced conversations around the Updates, than was the case with the iNDCs.

8.2.3 How have the processes to develop and use knowledge for the NDCs determined the credibility, legitimacy, and relevance of the NDCs and their knowledge?

Cash et al. (2003) highlight that to have impact in connecting knowledge to action for sustainability, knowledge systems need to manage the boundary between knowledge and action, and the involved actors, to enhance the credibility, legitimacy, and salience of the knowledge produced. Impact includes linking knowledge to action, as well as influencing how issues are defined and framed, and which options are considered for responding to a problem (Cash et al., 2003). Working towards co-production of knowledge has demonstrated itself to be an effective way of including the needs and perspectives of a multiplicity of actors, which is important for including marginalised communities (Cash et al., 2003; Cash & Belloy, 2020). Haas (2004) identifies that the effective use of knowledge in policy processes depends on whether there are procedural mechanisms in place to store, organise, and institutionalise knowledge.

Credibility, legitimacy, and relevance provided criteria with which to assess the effectiveness of the policy knowledge systems for the NDCs in these three countries. The iNDCs were essentially a repackaging of the national climate policies, and were therefore outdated and experienced challenges with data quality, accessibility, and poor transparency. This led to policy actors questioning the credibility of the iNDCs. The Updates showed marked improvements with dedicated technical work and greater transparency, which strengthened their perceived credibility. Baselines and targets caused lock-ins and legacies, however, that resisted change that was necessitated by new knowledge. Evidence of this trend was visible with South Africa using an outdated emissions trajectory range for the iNDC, which was done away with by the enhanced targets of the Update; although a range

persisted. Ghana decided to change the form of their commitment by moving from a deviation below BAU in the iNDC to absolute emissions reduction off a new base year for the Update, but did not acknowledge the notable increase in emissions between the iNDC and Update. Whereas Kenya's Update made a minor improvement, and based itself on an outdated BAU scenario and problematic target from the iNDC.

Enhancing the transparency about data and decisions that were made, helped to unpack the knowledge of the Updates in a way that was not done for the iNDCs. The release of the technical reports for the iNDC and Updates in South Africa were important steps towards improving transparency, albeit after the completion of the processes. However, releasing these reports during the process would have enabled more granular conversations and shone a light on the constraints of existing policy, thereby putting pressure on domestic policy to change. These conversations illustrated what was possible with the Updates and allowed actors to push for more ambition and identify gaps, and it shifted the positions of actors. One of the most prominent examples of this was the shifting position of big business in the PCC process in South Africa. In Kenya, on the other hand, aggregation obscured from view the technical work done by local consultants and developments in data, and therefore replicated some of the shortcomings of the iNDC.

From the perspective of legitimacy, iNDCs were rushed and somewhat opaque and ambiguous, which excluded most, apart from those familiar with the international process or directly involved in the iNDC processes. Even in instances where consultations were held, such as the Parliamentary Hearings for South Africa's iNDC, these were only held days before the official iNDC submission, which raised questions about whether the inputs made by stakeholders during the hearings had any influence at all. The Updates were a marked improvement with more time allocated, dedicated technical work was made more transparent, and there were more diverse sets of opportunities for a wider group of policy actors to participate in the processes. This all helped to strengthen legitimacy and ownership of the processes and their outcomes.

The iNDCs were abstract, ambiguous policy instruments; coupled with poor communication, this made their relevance limited for most people in the three countries. The Updates, on the other hand, benefitted from the NDCs becoming more established globally and in these countries' domestic discourses. Locally generated knowledge was able to develop ownership, support, and trust, in a way that the work conducted by international experts was not. The MoEF in Kenya moved away from using international consultants for their iNDC to using local consultants for the Update, whereas the DFFE

in South Africa and MESTI and EPA in Ghana used the same core group of local academics for both the iNDCs and Updates. Furthermore, there were more concerted efforts with the Updates to communicate their relevance, but could be strengthened further.

8.2.4 How have NDC processes and their policy knowledge systems built consensus and uncovered contestation?

Radaelli (1995) draws attention to how knowledge used in the formulation of the policy problem determines the knowledge required by the policy response. This trend was observable in all three countries' NDC processes. The types of technical knowledge, such as drivers of emissions, options for abatement potential, and socioeconomics impacts thereof, which was used in framing the problem the Updates sought to solve, were the same types of knowledge that held currency in the formulation of the Updates. This had implications for who could participate and how consensus and contestation played out.

Systems, target, and transformation knowledge are identified by numerous authors as three types of knowledge produced by effective knowledge systems working towards sustainability (Kueffer et al., 2019; Pohl et al., 2017; ProClim, 1997; Schneider et al., 2019). Most evident in South Africa, Ghana, and Kenya was the sectoral differences in knowledge, with notable progress in the power sector; whereas sectors like AFOLU and IPPU still require major work. Systems knowledge was the most developed in terms of understanding the drivers of emissions and their impacts. Although target knowledge has become more robust, transformation knowledge, in other words how targets will be implemented, continues to be an underdeveloped area that persisted between the iNDCs and the Updates. An example of this were the gaps in implementation knowledge identified, which included detailed costing of the NDCs and developing detailed investment plans, as well as knowledge gaps on just transitions, socio-economic impacts of NDCs, long-term net zero emissions, and hard-to-abate sectors. The research showed that knowledge gaps were typically the source of disagreement and contestation between actors, without the necessary knowledge to provide the substance for the political work to address these differences.

Rafey (2013) highlights that the technical and political elements of a policy process are inseparable and co-create one another. This trend was visible in the development of the iNDCs and Updates in South Africa, Ghana, and Kenya, where the technical made its way into the political and the political made its way into the technical; an interplay that shaped what was possible in the iNDCs and Updates. Specifically, a robust knowledge base and an inclusive process to establish and communicate the

knowledge contributed to shifting the mindsets and positions of policy actors. Similarly, the state of the global conversation about responding to the climate crisis, the temperature of political negotiations, and the evolution of the position of actors influenced how the knowledge landed, and the level of support that could be garnered for the knowledge base and the resultant NDC. The Updates advanced from the iNDCs with progress observable in these features. Looking ahead, approaching NDCs from this perspective could help to reveal where the possibilities and barriers for change may lie.

Gallie's (1956) use of 'essentially contested concepts' refers to concepts that are subject to multiple interpretations and substantiated by seemingly credible evidence, but represent divergent valuations of the concept. This makes it difficult to resolve such contestations, with more technical knowledge alone unlikely to resolve the contestations at play (Gallie, 1956; Rafey, 2013). The experience of the iNDCs and the Updates in these three countries illustrated how consensus and contestation had histories, but these were not set in stone. Consensus and contestation could therefore be thought of as a shifting frontier, which policy knowledge systems can influence. The evolution between the iNDCs and Updates showed that the most developed parts of the knowledge base, garnered support to drive progress. The Updates in particular were utilised as consensus-building instruments by leveraging evidence-based discussions to cultivate trust. While the principle of transparency was an important part of this, government representatives in Ghana and Kenya specifically, voiced their concerns that full transparency would subject their commitments to international scrutiny and pressure, which caused these countries to limit transparency. These NDC experiences illustrated that simply more knowledge alone is inadequate for resolving contestation, although a crucial ingredient. To build consensus and address contestation, knowledge needs to be locally produced by inclusive processes that promote transparency, and be accompanied by the necessary process and political work to address the concerns of policy actors, as has been shown by the literature too (De Pinto et al., 2018; Ryan & Bustos, 2019).

Importantly, the knowledge work done for the Updates did not stay confined to the processes themselves, but overflowed into other policy areas and the national discourses. This overflow helped to make the case for change in sectors, in a way that line ministries were unwilling to do, and environment ministries were unable to do. This trend was most visible in South Africa, with the Update process highlighting the need for an update in electricity sector planning.

The process run by the PCC in South Africa emphasised consensus-building. It did so by framing the Update conversation as being a window of opportunity for the country to transition to a more competitive and just society and economy, thereby demonstrating how the NDC Update to contribute to a vision for the country rather than focussing only on setting new targets. The PCC played a vital brokering role to build support for the NDC by leveraging its composition and origin; it did important boundary work and allowed policy actors to engage with the Update in a variety of ways. Convening different technical work strengthened credibility, while legitimisation of the recommendations for the Update in public fora was used as leverage behind the scenes, organising around multi-actor recommendations and offering space for feedback and iteration. The PCC sitting outside government, with the President Cyril Ramaphosa as chair, made for a unique position from which to act as a boundary organisation. The role of the PCC revealed some useful ingredients for impactful policy knowledge systems that could be replicated in future NDCs.

Both the iNDCs and Updates foregrounded consensus, and for the most part side-lined contestation. Avoiding contestation ran the risk of near-term action driven by NDCs being inadequate for the long-term trajectories required by the Paris Agreement. Furthermore, the consensus built was high level, with unresolved ambiguities that were papered over in the rush to be submit the iNDCs and Updates. A big outstanding question is how this consensus will endure when it reaches implementation; these ambiguities and associated competing interests of actors need to be resolved. There is a pressing need, given the urgency of the problem of climate change, for future NDCs to go beyond simply what is agreed upon, to grapple with the thornier issues. It was noticeable that the contested issues in these three countries were located at the less developed, or outdated parts of the knowledge base; trapping conversations at ideological differences and obstructing progress. Of particular concern was that the knowledge base in these three countries was poorly equipped to deal with implementation and the knowledge gaps in AFOLU (particularly in Ghana and Kenya), hard-to-abate sectors (mainly a concern in South Africa), and socioeconomic impacts. This should be treated as a priority, given the imperative of this decade to implement at scale and speed. The knowledge-policy interface for these thornier issues needs to be proactively managed, as knowledge alone cannot resolve inherently contested issues.

Consensus and contestation have themselves proved to be frontiers that have shifted markedly since the iNDCs, with the associated policy knowledge systems playing pivotal roles. So too can knowledge systems continue to drive change.

8.2.5 Whose interests are represented and marginalised by the NDC processes and final NDCs?

A key purpose in utilising a policy knowledge systems conceptual framework was to uncover interests, influence, marginalisation, and contestation that defined the intersections between actors, knowledge, and policy. This then illustrated how and why these intersections shaped the NDC processes, their knowledge system outcomes, and implementation prospects. Numerous authors have identified these features and interactions as instrumental in driving and resisting change in policy processes (Cornell et al., 2013; Muñoz-Erickson, 2012; Muñoz-Erickson & Cutts, 2016; Nightingale et al., 2019; Zervogel et al., 2016).

All knowledge does not hold the same currency in a process and is determined by the broader socio-political context and who is perceived to hold authority, credibility, and legitimacy, which gives them their influence (Jasanoff, 2006, 2010). An over-emphasis on technical knowledge that is so often central to policy processes marginalises contextual, plural forms of knowledge held by a wider group of policy actors than just experts (Nautiyal & Klinsky, 2022; Sokona, 2021). Acknowledging diverse forms of knowledge aims to recognise the knowledge brought to a process by a diversity of actors (de Jong & Ferguson-Hessler, 1996; Jasanoff, 2006, 2010). Process character, institutional dimensions and context dependence enable and constrain the flow of knowledge between actors, thereby shaping representation and marginalisation (Strambach & Klement, 2012; Strambach & Surmeier, 2013).

The iNDCs of South Africa, Ghana, and Kenya inherited entrenched actor dynamics and constellations that favoured the status quo and resisted the type of transitions that NDCs seek to unlock. But the Updates, by virtue of their strengthened processes, were more effective at shifting the constellation of actors, and illustrated that having everyone in the same room is not enough for meaningful participation and representation. Processes need to do the work to enable a more level playing field in which a diversity of actors can participate and be heard. Uniform participation that ignores the differences between policy actors perpetuates power imbalances, as was the case with the provincial consultations in South Africa. Disaggregating the roles and capacities of policy actors in the policy process, and allowing for different modes of engagement with the Updates, helped to in part overcome the unequal distribution of knowledge and resources between policy actors. The virtual participation enforced by COVID-19 expanded the reach of participation but sacrificed depth and created new barriers to entry. Structured participation, on the other hand, enhanced relevance and transparency, as Ghana and Kenya showed. The representation of policy actors also came down to a growing maturity of how they could participate in the process, based on an evolution in their

understanding of the Updates. The PCC, through its ingredients discussed, was perhaps the single most concerted effort to improve representation of a wider range of policy actors by convening a representative set of voices. The PCC's process represents a valuable process innovation that could inform future NDC processes.

Ultimately, representation is intertwined with the politics of knowledge, which is concerned with how and why knowledge is produced and utilised by different actors vying for influence at the knowledge-policy interface, and the uneven distribution of power across actors (Cozzens & Woodhouse, 1995; Lahn, 2018; Nautiyal & Klinsky, 2022; Radaelli, 1995). While progress was evident in the Updates, those groups of actors with the most technical knowledge and resource, ability to translate their interests in these terms, and ability to organise, were over-represented by the processes; those lacking these characteristics were more marginalised. There is some way to go still to establish NDC processes that are inclusive and transformative enough for the development aspirations of their respective countries and the long-term goals outlined in the Paris Agreement.

8.2.6 What insights does a policy knowledge systems perspective of the formulation of the NDCs reveal about their implementation prospects?

Assessing the NDC processes should, hopefully, uncover lessons to inform the design of future processes to deliver on the Paris Agreement (Dash & Gim, 2019; Kurdziel et al., 2016; Laudari et al., 2021; Zheng et al., 2021). As Laudari et al. (2021) and Röser et al. (2020) suggest, reflecting on processes is necessary, as they are likely to hinder or enable implementation.

This research revealed that the lessons from the iNDCs were not adequately reflected in the Updates, resulting in the Updates not fully delivering on what was expected of them in terms of their processes, knowledge and level of detail, ambition, and communicating their implementability. This resulted in the Updates replicating some of the same pitfalls as the iNDCs. This was perhaps partly down to the fact that there was no formal process of learning from the iNDCs. Such critical reflective spaces are needed to generate and capture the lessons from the NDCs, but are typically not available, with the small, overloaded, local teams, needing to move onto the next process. Much of the reflective work that does happen, is done by those sitting in the global North. Although it has not been engaged with deeply by this thesis, the literature on double and triple loop learning, which refers to the importance of learning to address assumptions, values and world views and target structural change, provides lessons for how to facilitate learning in future NDC processes (Ely et al., 2020; Pahl-Wostl et al., 2013). This would serve as a valuable area for future research.

Despite their agenda setting successes, the implementation abilities of NDCs are still in question. Part of this has had to do with the fact that the policy knowledge systems for the iNDCs and Updates in South Africa, Ghana, and Kenya have not been geared towards producing the knowledge needed to support implementation, or demonstrate implementability. This was apparent in two respects. First, knowledge areas that were under-developed, such as in AFOLU, harder-to-abate sectors, or the long-term transitions, were more difficult to build support for implementation. Second, the knowledge necessary for driving implementation such as costing, developing investment plans, and articulating finance needs, were weaknesses in these countries' NDCs. This gap was identified by all three countries' iNDCs but was not sufficiently addressed by the Updates. A major shift in the focus of the policy knowledge systems supporting NDCs in these three countries is imperative in the coming years to make the case for and support implementation at the scale and speed necessary. Part of this will be the need to define exactly what the role of NDCs in implementation is. From the two rounds of NDCs, it seems that these processes may be better equipped at determining implementability and barriers to implementation, but not necessarily for driving implementation.

A last way in which the formulation of NDCs offered insights for implementation was that they identified which elements of the NDCs enjoyed support, such as accelerating the decarbonisation of the power sector in South Africa, and which encountered resistance from which policy actors. These dynamics evolved markedly between the iNDCs and Update, and suggested which areas during implementation can be expected to enjoy support or encounter opposition. These insights offer signposts for the political work that lies ahead for policy knowledge systems supporting the implementation of NDCs. Importantly, knowledge alone is not enough, and this work to drive implementation will also need to address the lack of continuity, the size of responsible teams, and challenges with institutionalisation and knowledge management that is needed for ambitious implementation.

8.3 Recommendations for future NDC processes

This section reflects on the findings of the thesis to offer some recommendations for those working on NDCs, with the hope that these reflections can inform efforts to deliver a step change in NDC processes and outcomes. Such sections are often coined 'best practice guidelines'. But this thesis resists this term, as it does not claim best practice in these three countries or any countries. Rather the intention is to share hard won insights from granular and in-depth assessments of these three

countries, and offer these insights for others to continue the learning journey this thesis has embarked on. A summary of these recommendations is provided in Table 15 and discussed in more detail below.

Table 15: Features to establish well-functioning NDC formulation processes supported by robust and inclusive policy knowledge systems

A summary of key findings to inform future NDC processes
1. Invest in communication, transparency and the necessary time to establish NDC processes that build trust and support
2. Open up baselines and targets to enable honest conversations, break lock-ins, and enable a step change
3. Develop context specific NDCs along with a critical mass of local capacities supported by the requisite resources
4. Offer diverse forms of participation tailored towards the diverse knowledge and capacities of different policy actors to enable robust participation
5. Invest in communication, translation and mediation to build credibility, legitimacy and relevance of NDCs
6. Enhance transparency and pioneer new ways of working between the Global North and South
7. Address contestation through technical and process work in the most underdeveloped areas of the knowledge base
8. Align ambitious near term action of the NDCs with ambitious long term action of the LT LEDS
9. Take the politics of knowledge seriously, address power imbalances in whose knowledge is recognised and marginalised
10. Strengthen implementation knowledge to support action at scale and speed
11. Make use of the five years between NDC submissions not just the months leading up to a new submission
12. Work towards moving from incremental progress to a step change

1. Invest in communication, transparency and the necessary time to establish NDC processes that build trust and support.

For this to be achieved, the quality of the spaces between government, researchers and other policy actors working together needs to be improved, in terms of its transparency, communication, and the time given to these, to establish long term collaborative processes (De Pinto et al., 2018; Ryan & Bustos, 2019).

2. Open up baselines and targets to enable honest conversations, break lock-ins, and enable a step change

The experiences of the iNDCs and Updates in South Africa, Ghana, and Kenya revealed that baselines and targets have lasting legacies that lock in a trajectory rather than enable change. This is a critical area to address, so that future NDCs avoid such lock-ins and are more capable of delivering the type of transformative change envisaged by the Paris Agreement. The challenge for future NDCs is to move

from incremental change to step change, without which the global goals will be unattainable. The work of policy knowledge systems supporting NDCs between now and then, is to make this possible.

3. Develop context specific NDCs along with a critical mass of local capacities supported by the requisite resources

Context specificity is key, resources and capacities are needed to build a critical mass of policy actors, working within a country to design and run NDC processes, and develop NDCs, that are equipped to meet the realities they seek to change. The NDC experiences in these three countries have revealed rich learnings about how the NDCs have gained traction and struggled to gain traction, within the particularities of a country context. Importantly, changes between the iNDCs and Updates illustrated how this picture has evolved over time. For example, Kenya's decision to go from using international consultants in the iNDC, to using local consultants for the NDC Update represents important progress to ensure NDC formulation is reliant on local rather than foreign expertise. A serious shift in resources to support local researchers in African countries to do critical reflective work to assess their NDCs, and build the knowledge base for NDCs is needed to improve the understanding of these processes, and how to bring about change.

4. Offer diverse forms of participation tailored towards the diverse knowledge and capacities of different policy actors to enable robust participation

Although progress was visible with the Updates, the technical and abstract nature of NDCs continues to overrepresent those with technical knowledge, an ability to organise and translate their interests in the terms of the process, and resources to support this work. Ministries heading up the NDC processes will need to continue to push the envelope with new models of participation. Disaggregating participation of policy actors based on the stage of the policy process and the capacities, roles, and interests, is part of making processes more inclusive, particularly for more marginalised groups. Offering guidance and structure as was the case in Ghana and Kenya has shown itself to be an effective strategy for strengthening participation across the board, and evening out some of the power imbalances between policy actors. If such power imbalances are left unaddressed, they are typically perpetuated (Jasanoff, 2006, 2010; van Kerkhoff & Lebel, 2006). The PCC in South Africa provides useful lessons for participation that could be used in other countries too, in the efforts to involve more of society in NDC processes.

5. Invest in communication, translation and mediation to build credibility, legitimacy and relevance of NDCs

This research has shown the importance of boundary work as identified by Cash et al. (2003; 2020), such as communication, translation, and mediation to communicate the credibility of NDCs, to build legitimacy of a process, and to demonstrate relevance. However, the boundary work performed by policy knowledge systems supporting NDCs in South Africa, Ghana, and Kenya, has not been a strong feature. Investing in this type of boundary work, and establishing structures to perform this work, should be treated as a priority for future NDCs.

6. Enhance transparency and pioneer new ways of working between the Global North and South

Transparency is a fundamental ingredient for enhancing the credibility of policy, their formulation processes, and supporting evidence (De Pinto et al., 2018; Ryan & Bustos, 2019). For example, releasing the technical reports behind all three of these countries' NDCs during the process would have enhanced transparency and legitimacy and should be considered in the next round of NDCs. However, concerns about exposing themselves to international pressure has caused countries to limit transparency of their NDC processes. If developing countries are to enhance transparency, there will need to be a commitment from the international community, funders in particular, to support the efforts to strengthen NDCs processes so that they can deliver better outcomes instead of using transparency as leverage to push for greater ambition as a condition for providing support. This speaks to moving away from the paradigm associated with traditional official development assistance (ODA), to more collaborative forms of cooperation. The magnitude of the challenges at hand speak to the need for a radical re-imagining of how countries work together towards common global goals.

7. Address contestation through technical and process work in the most underdeveloped areas of the knowledge base

Future NDC processes will need to produce the knowledge and the process work to address contestation, as contestation around the NDCs moves to harder-to-model, less-developed areas of the knowledge base. This will need to include enabling the difficult conversations and doing the technical and political work to address these contestations. Researchers have shown a reluctance to move beyond their analytical comfort zones, such as the AFOLU sector in Ghana and Kenya, leaving key areas of the knowledge base underdeveloped, and most vulnerable to contestation. If left unresolved, such contestations are likely to emerge further down the line (Gallie, 1956; Rafey, 2013), particularly during implementation.

8. Align ambitious near term action of the NDCs with ambitious long term action of the LT LEDS

While the elevation of the importance of the long-term such as reaching net zero emissions by 2050 is necessary, it cannot come at the cost of near-term action. The poor performance to deliver the extent of near-term action needed, suggests a worrying preference for the abstract long-term over the concrete near-term. The disconnect between the NDCs and Long Term Low Emissions Development Strategies (LT LEDS) has also painted a worrying picture. A priority for future research, and for the NDCs and the LT LEDS, will be to explore ways to enhance the alignment between the near-term action and long-term pathways, so that they complement rather than compete with one another.

9. Take the politics of knowledge seriously, address power imbalances in whose knowledge is recognised and marginalised

This research has shown the importance of taking the politics of knowledge seriously. Failing to do so allows power imbalances to persist, perpetuating patterns of inclusion and exclusion (Borland et al., 2018; Corbera et al., 2016; Nightingale et al., 2019). As has been discussed, this is an area that requires more attention to work towards more inclusive processes.

10. Strengthen implementation knowledge to support action at scale and speed

The implementation abilities of NDCs remains questionable, and the elements of the knowledge base that relate to driving implementation are the least developed. Implementation is the imperative of this decade to keep 1.5°C alive, and therefore also needs to be a priority for the work happening around NDCs. A focus of this decade will need to be to address outstanding questions around the implementation of the NDCs and their implications. This research has demonstrated that this will require a major shift in focus in the policy knowledge systems, to build on the lessons learnt from formulation and to support implementation.

11. Make use of the five years between NDC submissions not just the months leading up to a new submission

While the five yearly NDC cycle has been successful in generating momentum around the NDC submissions, the focus of research and practice needs to shift to using the five years between the NDCs. The real value of policy knowledge systems has been demonstrated when they have built the knowledge base over an extended period of time, independent of a particular policy milestone, but equipped to respond when a policy window opens. Typically, the policy window itself is too short for detailed technical work to be conducted from scratch and to do the necessary political work to build support, as the rushed NDC processes illustrated. This then stresses the need for long-term, sustained

research that is conducted by local researchers, from which policy windows can draw. The sustained technical work to support NDC formulation done by local researchers in South Africa over the last decade, has been an important enabler, that was not present in Ghana and Kenya, and that these countries would benefit from.

12. Work towards moving from incremental progress to a step change

Lastly, it is clear that there has been notable progress between the iNDCs and the Updates. At the same time, it is true that emissions continue to rise, development challenges remain unaddressed, and the Updates are inadequate for delivering on 1.5°C. A step change in the next round of NDCs is critical. This research has sought to provide insights into how to do things differently, and how to drive change through policy knowledge systems. Much work remains. **Error! Reference source not found.** i s a summary of key features to consider in the efforts to establish more robust, inclusive, and transformative NDCs and policy knowledge systems in the future.

8.4 Limitations of this research and areas for future research

The onset of the COVID-19 pandemic, not even a year into this research, shaped the rest of the process profoundly by forcing me to move interviews online, follow processes virtually, and postpone or cancel country visits. The details of these impacts were discussed in the methodology chapter, so will not be repeated here. It is important to simply note here that the research had to adapt in many ways to the reality of the pandemic.

Given the challenges with access to the processes, documentation, and interviews, it is unsurprising that the Updates only partially incorporated the lessons from the iNDCs. As time passes, we forget. This stresses the need to document and critically reflect, to harvest the learnings and act on them in future rounds of NDCs. This research has been an effort to stimulate documentation and critical reflection that can drive learning and inform future NDC processes and future research. The way in which the data could be collected, differed significantly between the iNDC and the NDC Updates in these three countries. Because the iNDCs processes happened in 2015, they could not be observed directly. Instead, I was reliant on documentation from the processes and interviews. Documentation was limited and the detail and comprehensiveness with which interviewees remembered the processes differed, which limited the depth of research that was possible, and made triangulation of findings important to ensure consistency and reliability.

The Updates were different in this regard but still differed between the three countries. In South Africa, because the process was run online, I was able to participate in the process and collect data first-hand through direct observation. I was also able to harvest documentation as it became available. For Ghana and Kenya, it was only possible for me to attend a few sessions online. I was able to go on a two week research visit to Kenya, but unable to travel to Ghana due to the constraints of the pandemic. I was therefore dependent on interviews and the documentation coming out of the processes. Despite my efforts to have as representative a group of interviewees as possible, out of 98 interviews requested, 54 agreed to participate in an interview, who were predominantly comfortable with participating in online interviews. This biased the sample, which could only be rectified with in-person interviews in Kenya. This meant that I had a much richer data set from South Africa to work with, than I did for Ghana and Kenya. As a result, I decided to allocate more space to the South African Update process. To enable more equal comparison, future research could aim to conduct in-person direct observation, documentation and interviews for the next round of NDCs in real time in all three countries. This would enable more in-depth comparative work, which could also be extended to other African countries.

Another influential factor was that little work like this has been conducted in these three countries, which meant that there was little to work with. While this provided room to make an original contribution, it posed challenges to the depth that the research could reach. The endeavour of this research was to contribute to establishing a long-term research agenda on knowledge systems and NDC processes in these three countries, for which teams of African researchers can collaborate moving forward.

Another area of research for the NDCs, is policy analysis and model comparison work. Projects such as the [Climate Futures Project](#) run by the Centre for Policy Research in India, is the type of research that is needed to compare the methodologies and results of different modelling studies. This can help to build the credibility of the technical work underlying NDCs, and convince policy actors to support a more ambitious version of an NDC when supported by evidence. Given the relatively small ecosystem of actors, such work is only happening to a limited extent in South Africa, Ghana, and Kenya. Future research could focus on this type of model comparison within and between countries, as a way to assess the rigour and appropriateness of different modelling approaches.

The analysis has shown that the design of NDCs and their knowledge requirements, still reflects biases from the global North, with African countries needing to respond to these requirements, even if they may not always be suitable in their contexts. What might be more appropriate approaches to the

creation and use of knowledge for formulating and implementing NDCs in these three countries? Limited time and capacity are available for critical reflective work, of these countries' experiences of the requirements of the international process. Such reflective work is typically done by researchers in the global North. This stresses the need to build a critical mass of local individuals and organisations in African countries, that can do this type of reflective work to make sense of the international regime and how best their countries, can respond and create knowledge that represents their interests and contexts. While in South Africa this might consist of the energy and economic modelling approaches they have adopted, in countries like Ghana and Kenya, other locally driven approaches might be more appropriate. African universities have a key role to play as nodes of capacity and knowledge and could help to centre African knowledges, methodologies, epistemologies, and solutions to the problem of climate change. Support from the international process is needed for long term work, that allows building capacities, crowding in different types of knowledge, and establishing African agendas with the NDCs.

8.5 Conclusions

With the aim of building on the questions posed by the Talanoa Dialogue, "Where are we?", "Where do we want to go?", and "How do we get there?", this research sought to explore the questions "Why are we where we are?", and "How did we get here?".

The starting point for the research was defining climate change as a complex and urgent policy problem, for which the international and national policy responses in the form of the Paris Agreement and NDCs, have been inadequate for driving commensurate action. Understanding the drivers and actors behind the inadequate progress in action, is therefore imperative. NDC formulation processes and their supporting knowledge systems, have received relatively limited attention in the literature, particularly in African countries. This under-researched area is where this thesis seeks to make its contribution. The thesis contributes to the important body of work to develop context-specific NDCs in African countries that are based on local knowledge and expertise and integrate international knowledge discourses and requirements simultaneously. A conceptual framework applied the lens of policy knowledge systems to the iNDC and NDC Update processes in South Africa, Ghana and Kenya. The intention of this framework was to achieve a more granular understanding of the roles of NDC processes, the participation of policy actors, and the use of knowledge, in shaping the processes, their knowledge system outcomes and implementation prospects. The concepts upon which the conceptual framework rests, aim to provide criteria with which to assess the knowledge aspects of NDC processes. Ultimately the research aimed to move from describing "what" these processes consisted of, to

characterising “how” and “why” these processes unfolded as they did according to the specificities of these three country contexts. Given these aims a qualitative comparative case study analysis between few countries was utilised. This was deemed an appropriate research design due to the nature of the research questions, the conceptual framework, and the necessary data required to answer the research questions.

The findings of this research presented and discussed in Chapters 5 to 7 found that the iNDCs were heavily influenced by what existed, in terms of policy and knowledge at the national and international levels. At the same time the iNDCs brought the national and international closer together, to establish a more bottom up global response to climate change. Given the uncertainty, ambiguity, and time pressures leading up to Paris, the iNDC processes were essentially an exercise in figuring out what they could mean for these three countries, based on existing policy, actors and knowledge. The iNDC experiences in South Africa, Ghana and Kenya illustrated that the design and operation of the processes constrained and enabled policy actors’ participation in different ways. Those with technical knowledge, resources and organising abilities were well represented by these processes, whereas for a broader group of people, the relevance of the iNDCs was limited, as was their influence. The iNDCs created pressure points for knowledge synthesis and creation, and convened evidence-based national conversations, connecting them with the international process in a way that had not been done before. But a question for the iNDCs, was whether their processes had stimulated learning, knowledge creation and capacity building that would inform the Updates.

The NDC Updates showed improvements, benefitting from being more distinct policy objects than was the case at the time of the iNDCs. This meant that a broader group of actors were more familiar with what could, and could not be achieved with the Updates, which enabled more nuanced and sophisticated conversations, supported by the more granular information made available with the Updates. The Updates in all three countries had more established policy infrastructures and knowledge bases and better data to work with than was the case for the iNDCs, as evidenced by the country timelines. But the Updates also showed that new knowledge and data was not always used, suggesting the politics of knowledge, and illustrating the legacies and lock-ins that persisted from the iNDCs, with some of the same pitfalls perpetuated by the Updates. And despite the improvements in the knowledge base, some familiar gaps from the iNDCs remained, particularly around costing, finance and implementation, and for sectors such as AFOLU, and hard to abate sectors.

The Update processes themselves were enhanced by being more consultative and inclusive, through offering a more diverse set of options for policy actors to engage with the processes. Improvements in transparency of the processes and of the technical work underpinning the Updates, contributed to enhancing their credibility and legitimacy, when compared to the iNDCs. In addition to overall improvements in the processes, there were some innovations, such as the PCC's process in South Africa. This approach catered for the different knowledge, capacities and needs of policy actors, and is perhaps more likely to be effective, than simply aiming to get everyone in the same room.

The research found that committed and capable groups of policy actors were central to the progress achieved. Despite broadened participation for the Updating processes, these groups were small, typically overloaded and under immense pressure. This points to the necessity to broaden this community, to establish a larger critical mass of local policy actors working on NDCs in South Africa, Ghana and Kenya, to crowd in different types of knowledge and capacities, needed to drive radical change, and to broaden their relevance.

Consensus and contestation emerged as important themes for the NDCs. At the centre of building consensus or support, was trust, which relied on knowledge that was locally produced, well-communicated, and showed convergence across independent studies. Foregrounding consensus was a part of the strategy for building support around the NDCs. On the other hand, contestation was mainly side-lined, delayed for another time in the future, which created risks for implementation. Knowledge played a specific role in determining the location of consensus and contestation, based on the levels of development of the knowledge base. In other words, those elements best supported by the knowledge base, were more able to garner support, whereas under developed areas of the knowledge base, encountered contestation and ideological differences. Importantly, the experience of the iNDCs and Updates has shown how advances in knowledge, when supported by the necessary process work and compelling narratives, can shift the positions of actors. So too, then can future NDC processes aim to continue to shift these actor dynamics in the direction of more radical change. On this note, the Updates utilised the developments in the international climate policy regime, and the shifts around climate change that have happened globally over the last five years, far beyond the UNFCCC process. These shifts in technology, politics, and the perceived risks of climate change for societies, businesses, and economies, have helped to mainstream the relevance of NDCs around the world, beyond the small communities of practice that were responsible for developing the iNDCs. These major shifts in the position of climate change on the global agenda, allowed the Updates to put more pressure on domestic policy processes to align with more ambitious action.

Perhaps one of the most important findings was that the Updates, in particular, demonstrated how, when processes were allowed to do their work, outcomes were not predetermined. The Update processes created and used new knowledge, established new spaces for conversation, and communicated common interests of policy actors, that were able to shift the positions of actors and create unexpected outcomes. This trend has also shown that an option for driving progress with the NDCs, lies with focusing on designing and conducting better processes, knowledge creation, and policy actor participation over the five years that elapse between NDC submissions. This may then allow countries to critically reflect, harvest learnings and use these, to prepare for the next NDC submission. By doing so countries may be better placed to make the most out of the windows of opportunity that open with a new NDC submission, than they would be, by only focusing on the work in the months leading up to a new submission. Long term, peer-to-peer learning between African countries can contribute here, and is work that is already underway that can be built on.

At the core of all these considerations, needs to be an acute awareness of differences in country responsibilities and the different forms of knowledge in African countries. Ghana and Kenya are simply not as responsible for the climate problem as South Africa, and even less so than major emitters like the United States and China. Similarly, they are not able to influence to the same extent whether the world stays on a trajectory to achieve the 1.5°C target. That responsibility still lies primarily with bigger emitters, acknowledging every Party needs to play their part. At the core of the work to support African NDCs, should be a real recognition of these differences. At the same time, there are major opportunities to combine development and mitigation in countries like Ghana and Kenya. Such opportunities should be capitalised on, even if they do not fall directly within these countries' fair share. If going beyond a fair share, to greater ambition, with the commensurate international support, brings benefits to a country, this should be an aspiration of multilateralism for climate change, rather than bean counting, which will not add up to enough.

Did policy knowledge systems drive change in the iNDCs and NDC Updates? In short, they did in a variety of ways, but not sufficiently. This is a shifting frontier, as was evident over the last six years, which is likely to continue to shift in the years to come. These three countries have demonstrated their efforts to shift this frontier by running more participative processes, strengthening and tailoring their knowledge bases, enhancing transparency and communication, and building consensus. Knowledge has led to change but has, at the same time, been hamstrung by past legacies and entrenched constellations of policy actors and interests. The experience of these three African

countries has shown that the value of national and local knowledge in African countries, produced by African researchers and other policy actors, need to be better recognised by, and central to future NDCs, if they are to be relevant and contribute to driving change on the African continent. South Africa, Ghana, and Kenya, along with all Parties of the Convention, will need to find ways to deliver a step change. A step change that transitions away from past trajectories at scale and speed, to deliver radically different processes and outcomes. In this critical decade, no less is required.

"...we've been infected with this kind of pathological impatience that makes us want to have the knowledge but not do the work of claiming it. The true material of knowledge is meaning. The meaningful is the opposite of the trivial, and the only thing that we should have gleaned by skimming and skipping forward is really trivial. The only way to glean knowledge is contemplation, and the road to that is time. There's nothing else. It's just time. There is no shortcut for the conquest of meaning. And ultimately, it is meaning that we seek to give to our lives."

--Maria Popova, Transcript of "Cartographer of Meaning in a Digital Age", OnBeing.org

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Appendices

10.1 Appendix 1

Glossary of key definitions

Below are the definitions of the key concepts that underpin this research, which were developed as part of this research.

Boundary work – Knowledge systems play a role in terms of managing the boundary between knowledge and policy, through boundary work such as communication, translation, and mediation, which in turn influences the credibility, salience, and legitimacy of the knowledge produced and used (Cash et al., 2003; Cash & Belloy, 2020; Lahn & Sundqvist, 2017). **Communication** refers to the communication between experts, decision makers, and other actor groups, and how this communication is characterised in terms of its inclusivity, its regularity, and whether it allows for multi-directional flows of communication instead of being one-way communication (Cash et al., 2003). **Translation** is required to traverse the different backgrounds and views of different actors, to establish a mutual understanding of the knowledge base and communicate the relevance of the knowledge base for different actors and the policy itself. **Mediation** is necessary given the conflict that arises between the different interests of actors and how these are represented by the knowledge base. It follows that mediation is required to navigate areas of consensus and contestation (Cash et al., 2003).

Knowledge qualities – Credibility, salience, and legitimacy represent the qualities of the information that knowledge systems produce for sustainable development (Cash et al., 2003; Cash & Belloy, 2020; Haas, 2004). **Credibility** refers to the adequacy of the technical evidence; whether it is regarded as scientifically adequate by the standards of its field of study. **Salience** refers to the degree to which the information or knowledge produced is relevant in terms of meeting the needs of decision makers or other knowledge users. **Legitimacy** points at the process through which the knowledge was developed and whether it was unbiased in including and representing opposing views and interests of different actor groups (Cash et al., 2003; Cash & Belloy, 2020).

Knowledge types – Sustainability science identifies the role of science in making a contribution to sustainability, and in this case climate action, through providing systems, target, and transformation knowledge (Pohl et al., 2017; ProClim, 1997). **Systems knowledge** includes concepts that allow us to

understand the status quo, or the existing system. In the case of climate change, this includes knowledge about the status, causes, and impacts of climate change (Kueffer et al., 2019; Pohl et al., 2017; ProClim, 1997; Schneider et al., 2019). **Target knowledge** describes the need for change and the desired goals or vision that society should be aiming for. This includes scenarios and indicators to represent these visions and goals (Pohl et al., 2017; Pohl & Hirsch Hadorn, 2008; ProClim, 1997). **Transformation knowledge** deals with how to transform technical, political, institutional, and socioeconomic dimensions of the current system to the target system, which include developing scenarios and measures to enact this transformation (Hubeau et al., 2017; Kueffer et al., 2019; ProClim, 1997).

Policy actors – The main groups of actors in a society and relates to how they mobilise their knowledge, leveraging their roles as producers, users, or contestants of knowledge, and utilising their access to the policy process to represent their interests and those of their political constituencies (Elzinga & Jamison, 1995; Jasanoff & Wynne, 1998; Muñoz-Erickson, 2012; Pohl, 2008). Four policy actor groupings that represent the majority of social actors in policy processes include government, civil society, research, business, and international.

Policy knowledge systems – A system of interconnected actor groups that, based on their roles as producers, users, or contestants of knowledge in a policy process, together with the knowledge they hold and the access they are permitted to the policy process, attempt to influence the interactions between knowledge and policy and their outcomes in ways that align with and represent their interests (Cornell et al., 2013; Muñoz-Erickson, 2014; Never, 2012a; Pohl, 2008; Rafey, 2013).

Policy process – The policy process consists of four interrelated functions: problem framing; policy development; policy implementation; and policy evaluation (Pohl et al., 2017). These functions are carried out by the policy process, in relation to one another, in a way that is non-linear and often non-sequential and contingent.

10.2 Appendix 2

List of interviewees

Table 16: List of interviewees for South Africa

Individual	Organisation
Alina Averchenkova	Grantham Institute, London School of Economics and Political Science
Andrew Marquard	Energy Systems Research Group, University of Cape Town
Brett Cohen	The Green House
Dirk de Vos	QED solutions
Ditebogo Lebea	Youth Policy Committee
Dumisani Nxumalo	Presidential Climate Commission
Frederic Hans	NewClimate Institute
Hilton Trollip	Independent
Jarredine Morris	Business Unity South Africa
Katie Ross	World Resources Institute
Kent Buchanan	Department of Forestry, Fisheries & the Environment
Lebogang Mulaisi	Congress of South African Trade Unions
Louise Naude	World Wide Fund for Nature (WWF) South Africa
Mike Levington	Navitas Holdings
Nicole Loser	Centre for Environmental Rights
Rabelani Tshikalanke	Chair of the Vertical Integration Working Group / City of Joburg
Shailendra Rajkumar	Presidential Climate Commission
Steve Nicholls	National Business Initiative
Tyler Booth	Youth Policy Committee

Table 17: List of interviewees for Ghana

Interviewee	Organisation
Alexandra Soezer	United Nations Development Programme
Benji Gyampoh	Kwame Nkrumah University of Science and Technology
Chibeze Ezekiel	Strategic Youth Network for Development
Chris Gordon	Institute for Environment and Sanitation Studies, University of Ghana
Daniel Twerefou	Department of Economics, University of Ghana
Daniel Benefor	Environmental Protection Agency
Delali Benjamin K. Dovie	Regional Institute for Population Studies, University of Ghana
Faustina Boakye	Independent civil society representative
Obed Asamoah	Research and Grant Institute of Ghana
Peter Dery	Ministry of Environment, Science, Technology & Innovation
Philip Antwi-Agyei	Kwame Nkrumah University of Science and Technology
Samuel Doste	HATOF Foundation
Stephen Kansuk	United Nations Development Programme
Thomas Kankam	United Nations Environment Programme
Winfred Nelson	National Development Planning Commission

Table 18: List of interviewees for Kenya

Interviewee	Organisation
Charles Tonui	African Centre for Technology Studies and African Research & Impact Network
Emily Massawa	United Nations Environment Programme
Frank Msafiri	Kenya Climate Change Working Group
Fredrick Ouma	Transparency International
George Outa	Institute for Climate Change and Adaptation, University of Nairobi
George Wamukoya	African Group of Negotiators Expert Support
Irene Karani	Children's Investment Fund Foundation
Joanes Atela	African Centre for Technology Studies and African Research & Impact Network
Kennedy Mbeva	African Research & Impact Network and University of Melbourne
Lukas Kahlen	NewClimate Institute
Meryne Warah	Pan African Climate Justice Alliance and Kenya Platform for Climate Governance
Michael Khaduyu	African Group of Negotiators Expert Support
Michael Okumu	Ministry of Environment and Forestry
Reuben Makomere	University of Tasmania
Sharon Chelangat	University of Nairobi and Ministry of Environment and Forestry
Stephen Cheboi	National Council of NGOs
Tom Owino	Climate Care
Yvonne Nyakobi	United Nations Development Programme

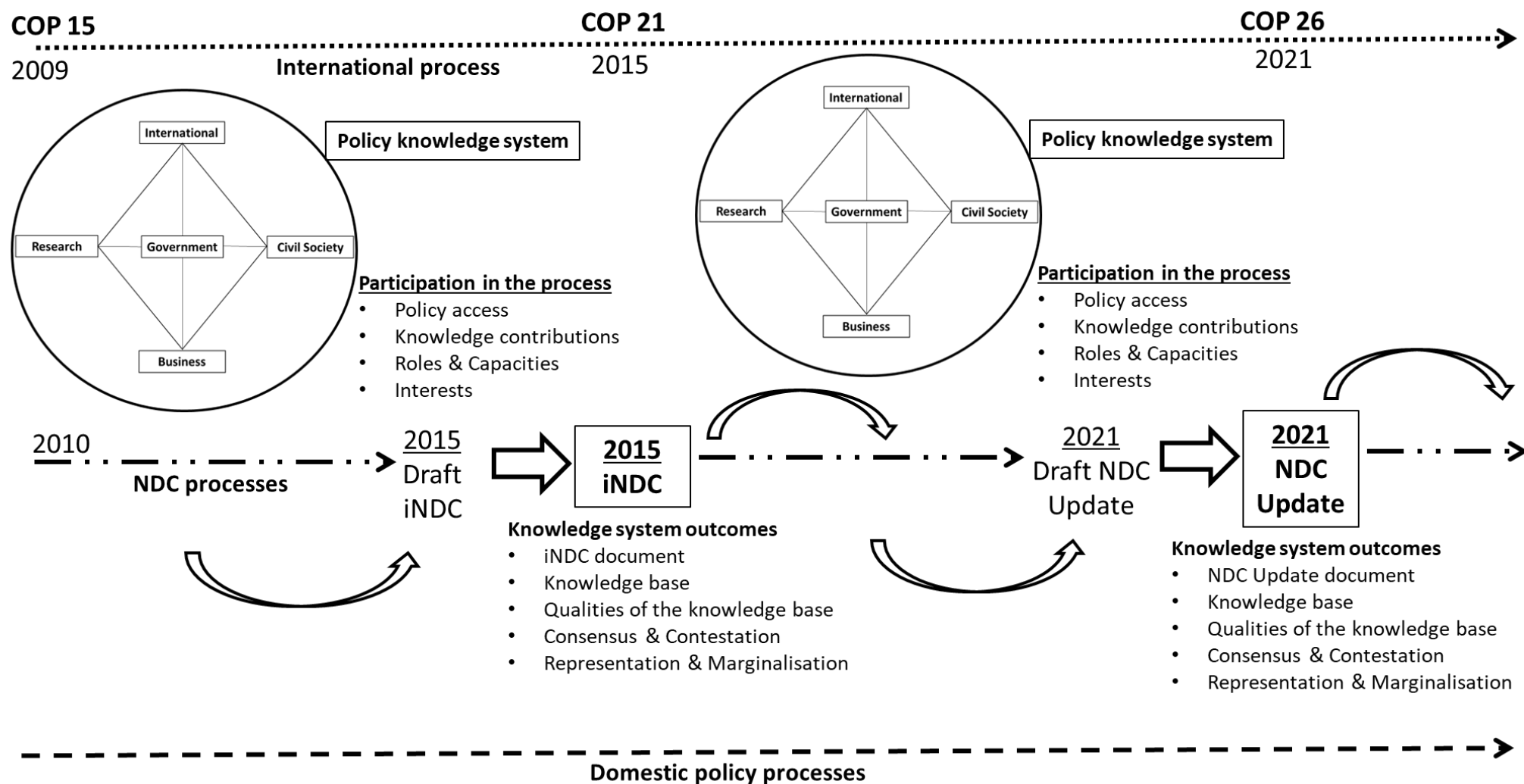
10.3 Appendix 3

Interview schedule

1. Could you explain your involvement in the NDC (2015) and NDC Revision (2021) process? And describe the processes themselves? How were these similar and different?
2. What was the role of knowledge/evidence base in the NDC and NDC Update? What are some of the strengths and weaknesses of the knowledge base and what are some of the gaps? How transparent was this knowledge base?
3. Which actors participated in the NDC processes and how were they given access to these processes? Which actors influenced how knowledge informed the NDC and NDC Update processes and their outcomes by producing, using or contesting knowledge?
4. What are from your perspective some of the key features of the NDC and NDC Update?
5. What are the main sites of contestation or consensus in the NDC processes and how have these evolved?
6. How is implementation included in the NDC and NDC Updates? How can insights from the NDC formulation processes inform implementation in the coming decade?

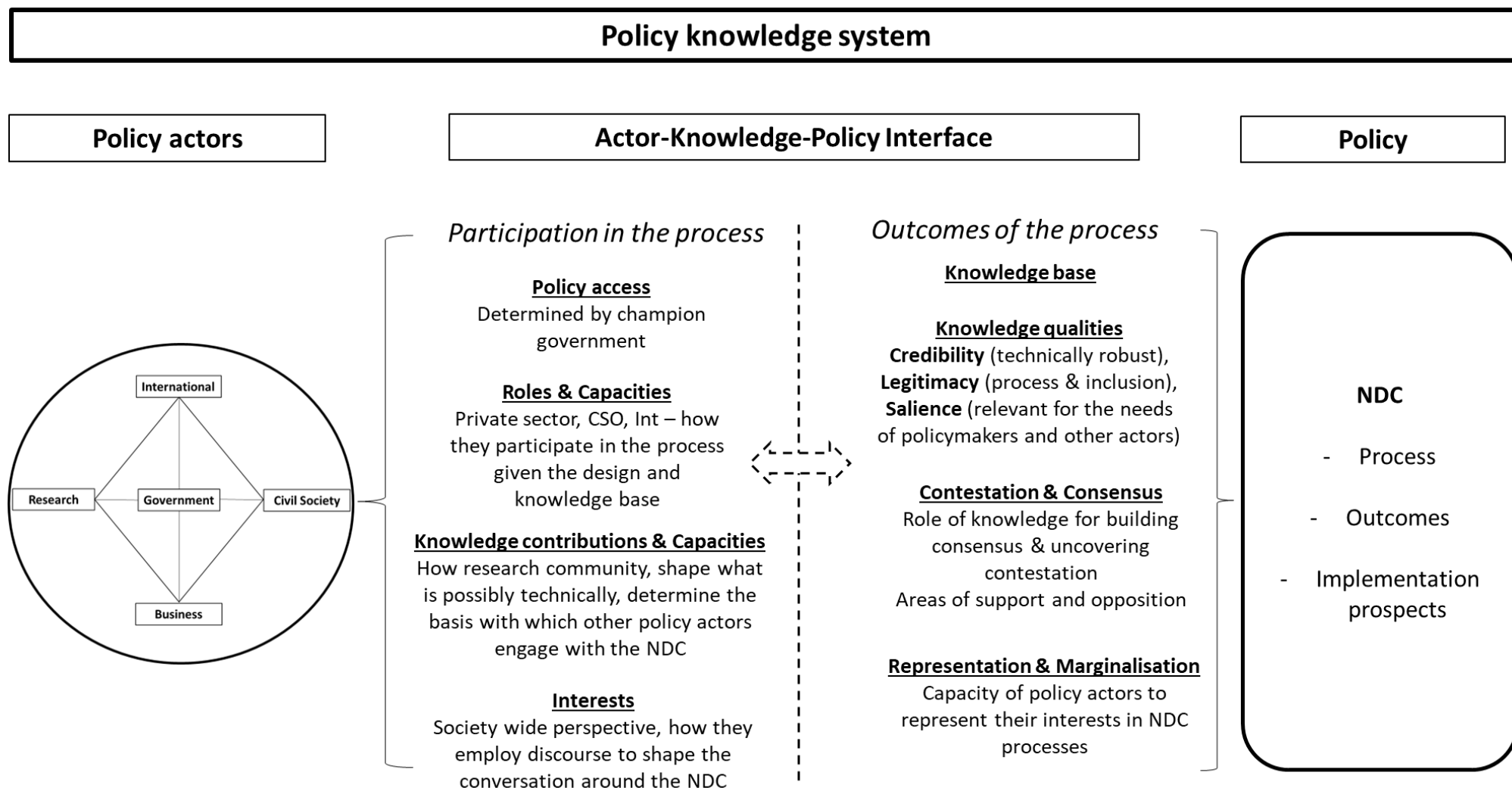
10.4 Appendix 4

Final version of conceptual framework



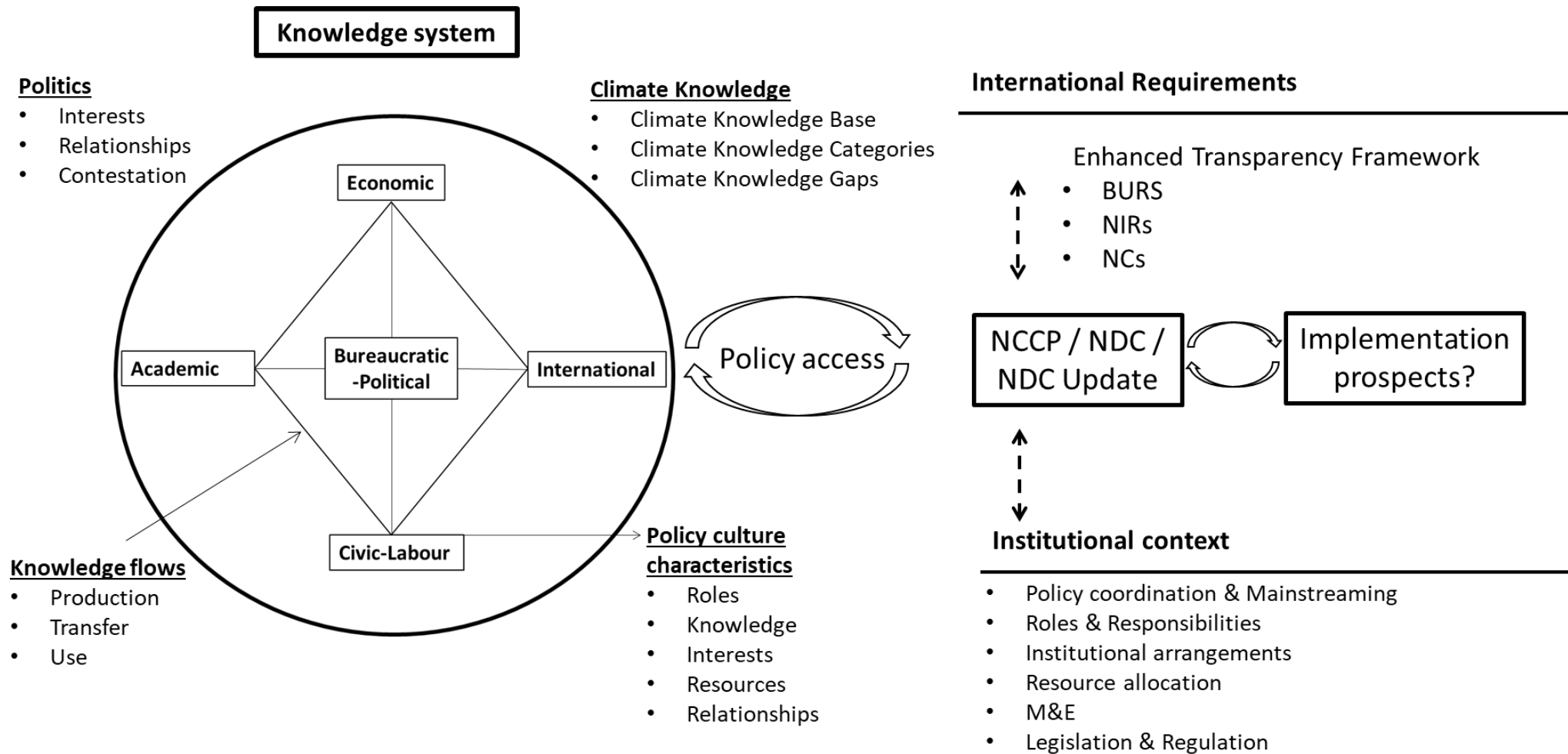
10.5 Appendix 5

Second version of conceptual framework



10.6 Appendix 6

Initial conceptual framework



10.7 Appendix 7

Codebook for second round of interviews

Concepts	Concepts	Codes	Description	Coded text
Policy Knowledge System (Made up of actors, and how they participate in policy processes based on their policy access, roles in the policy process, knowledge and interests they hold, which they draw on in their attempts to influence the process in ways that align with their interests.)	1. Participation of policy actors	Government, Research, Civil Society, Business, International	Groups of policy actors that participate in policy processes and are representative voices of society including government, civil society and labour, academia, the private sector and international community.	
		1.1. Interests & Position	The positions actors adopt in policy processes that structure their engagement with the processes and represent their interests to influence the processes	
		1.2. Knowledge	The different types of knowledge policy actors hold, create, or use in the policy process	
		1.3. Policy access	The different ways in which policy actors are granted access or marginalised from policy processes e.g. public consultations, bilaterals, written submissions, commissioned research, workshops	
		1.4. Roles & Capacities	Policy actors play different roles in policy processes such as being producers, users, and contestants of knowledge, and carrying out boundary work such as communication, translation or mediation of knowledge, which typically determines the impact or usefulness of knowledge in policy processes	
	2.1. Knowledge system outcomes		Outcomes of the policy process including the policy document and accompanying characteristics unpacked below	
		2.1.1. Knowledge base	The knowledge base including the different levels of development of different types of knowledge and gaps in the knowledge base which inform the formulation of the policy	
		2.1.2. Qualities of the knowledge base	The qualities exhibited by the knowledge base in terms of its credibility (technical rigour), legitimacy (inclusiveness of process to develop the knowledge) and salience (usefulness) of the knowledge	

Concepts	Concepts	Codes	Description	Coded text
		2.1.3. Consensus & Contestation	The supported and opposed elements of the policy and its supporting knowledge base	
		2.1.4. Representation & Marginalisation	Ways in which the knowledge and interests of policy actors were represented by the policy process, its use of knowledge, and its outcomes	
	3. Policy		Characteristics of the final policy document, the NDC	
		3.1. Process	Features of the policy process to develop the knowledge base and involve policy actors in the formulation of the policy document	
		3.2. Outcomes	The policy document, its knowledge base, its levels of support, and whose interests it represents	
		3.3. Implementation prospects	The implementation prospects of policy established by the policy formulation process, its knowledge base and involvement of the policy actors	

10.8 Appendix 8

Codebook for first round of interviews

Concepts	Concepts	Codes	Description	Coded text
1. Knowledge systems			Knowledge systems describe the interaction between knowledge, actors, and politics and how this interaction shapes the production, transfer and use of knowledge in policy processes and brings about contestation.	
	1.1 Knowledge			
		1.1.1 Knowledge base	Knowledge base refers to the studies that were commissioned to develop the evidence base for policy development, as well as other sources of knowledge relevant for the policy formulation.	
		1.1.2 Climate knowledge categories	Knowledge types are the main groups of knowledge that frame and inform climate policy development and implementation in a country context.	
		1.1.3 Knowledge gaps	Knowledge gaps refer to the major inadequacies in the existing knowledge base that underpins climate policy development and implementation and require further work.	
		1.1.4 Knowledge flows	Knowledge flows refers to production, transfer, use and contestation of knowledge	
	1.2 Actors - Policy cultures		Policy cultures refer to the groups of actors that represent different political and social interests, and the ways in which these groups interact and compete for resources and influence within the interactions between policy and knowledge	
		1.2.1 Capacity & Skills	The capacity and skills policy actors draw on to participate in and represent their interests in climate policy processes	

Concepts	Concepts	Codes	Description	Coded text
		1.2.2 Interests	The interests actors seek to represent in climate policy processes	
		1.2.3 Key players	Key individuals or organisations that are most influential in terms of representing the interests of a group of actors in climate policy processes	
		1.2.4 Resources	The financial, material and organisational resources that policy actors deploy in their attempts to influence a policy process	
		1.2.5 Roles	The roles actors play in climate policy processes such as being producers, users, and contestants of knowledge, and performing boundary work such as communication, translation and mediation	
	1.3 Politics of knowledge		Politics refers to the competition between interest groups that mobilise their resources, expertise, and relationships to have influence in the policy process	
		1.3.1 Interests & Contestation	Areas of contestation in climate policy processes between different interest groups	
		1.3.2 Relationships & Coalitions	The relationships between actors and the coalitions they form to represent their interests and exert influence in climate policy processes	
		1.3.3 Funding	Funding provided for the technical work for climate policies, or the consultation processes themselves	
2. Policy development-implementation process			The policy development-implementation process refers to the process of issue definition and agenda setting, policy formulation, selection and legitimation of policy and implementation and evaluation of policy. These processes evolve in parallel and interact with one another, thereby shaping the trajectory of these distinct processes and the trajectory of the policy development-implementation process in general.	

Concepts	Concepts	Codes	Description	Coded text
	2.1 Policy context		Policy context refers to the overall political and social context of a country	
	2.2 Policy development		Policy development includes issue definition and agenda setting as well as the formulation and adoption of policy. Importantly, policy development occurs throughout the lifespan of a policy including during implementation which often helps to refine and adapt policy.	
		2.2.1 NCCP	The national climate change policy of a country	
		2.2.2 NDC	The Nationally Determined Contribution of a country	
		2.2.3 Other	Other relevant policies	
	2.3 Policy implementation		Policy implementation starts during the stage of policy development, as policy formulation determines what will need to be implemented. Therefore, actors engage with policy development inline with their interests that would be influenced by policy implementation. Policy implementation also refers to the development and enforcement of the supporting institutions.	
		2.3.1 NCCP	The national climate change policy of a country	
		2.3.3 NDC	The Nationally Determined Contribution of a country	
		2.3.3 Other	Other relevant policies	
	2.4 Institutions for climate policy		Institutions determine the operationalisation of policy through legislation, regulation, M&E systems and institutional arrangements and capacities. Institutions ultimately mandate the division of resources and responsibilities which have an important baring on policy development and implementation.	

Concepts	Concepts	Codes	Description	Coded text
		2.4.1 Domestic	The domestic institutional infrastructure for climate policy	
		2.4.2 International - Domestic	The link between international and domestic institutional arrangements for climate policy	
	2.5 Policy engagement mechanisms		Policy engagement mechanisms are the ways in which different actors are allowed to engage with the policy development-implementation process. Engagement is typically unevenly distributed and as a result so is the influence of different actors and the knowledge they hold in policy development-implementation processes.	
	2.6 Future outlook		Future outlook refers to the future possibilities and risks that lie ahead in a policy development-implementation process in a country. For climate policy the long-term perspective is particularly important for policy goals such as net zero emissions and poverty reduction.	