

A Roadmap to Nowhere?

A Critical Discourse Analysis of Australia's 'Technology-Led' Emissions Reduction Strategy

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Declaration

This thesis has been submitted in partial fulfilment of the degree Bachelor of Advanced Studies (Honours) in Politics and International Relations. This work is substantially my own, and where any part of this work is not my own, it has been indicated by acknowledging the source of that part of those parts of the work.

Abstract

In response to mounting international pressure, the Australian Federal Government has recently announced a ‘Technology Investment Roadmap’ as its national climate strategy. This new policy seeks to enable the deployment of emerging “low emissions technologies” to spearhead the decarbonisation of Australia’s economy. Nevertheless, policies which promise future technical solutions to intractable global problems risk delaying effective action by obscuring the scope for other non-technical changes. Drawing primarily on the approach to Critical Discourse Analysis (CDA) developed by Fairclough, this research project aims to examine how dominant representations of technology in Australia’s ‘technology-led’ emissions reduction strategy are discursively constructed, and to what extent they influence the policy’s mitigation potential. The analysis identified three dominant socio-technical storylines within the examined texts, each linked by their optimistic representations of low emissions technologies. These storylines were constructed from a set of technological discourses which, when situated in a wider social context, were found to reproduce Australia’s political (and emissions) status quo. Since these dominant representations of technology are incompatible with the systemic changes required for substantial emissions reductions, this research project concludes that the Technology Investment Roadmap delays, rather than enhances, meaningful climate action in Australia.

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Abbreviations

API	American Petroleum Institute
BECCS	Bioenergy with Carbon Capture and Storage
CCS	Carbon Capture and Storage
CDA	Critical Discourse Analysis
CLA	Critical Language Awareness
CO₂	Carbon Dioxide
COP	Conference of the Parties
DISER	Department of Industry, Science, Energy and Resources
ERF	Emissions Reduction Fund
GHG	Greenhouse Gas
IEA	International Energy Agency
IPCC	Intergovernmental Panel on Climate Change
NDT	Nationally Determined Contribution
NET	Negative Emissions Technology
SCOT	Social Construction of Technology
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change

Chapter 1: Introduction

1.1 Research Context

On the 31st of December 2020, Australia formally updated its emissions reduction commitments, or Nationally Determined Contribution (NDC), to meet its obligations to the 2015 Paris Climate Agreement. Under the agreement, countries are expected to submit increasingly ambitious emissions reduction commitments on a five-year cycle, establishing a series of key stepping-stones on the journey to limit global temperatures to “well below” 2°C above pre-industrial levels by 2100 (UNFCCC 2020). While Australia’s recommunicated NDC claims that it will now “overachieve” its climate goals without using carry-over credits from the previous accord, it fails to raise its previous 2030 emissions reduction target which is widely regarded as “insufficient” (Australian Government 2020; Melville-Rea & Armistead 2021). Nevertheless, the updated document does feature a ‘technology-led’ emissions reduction strategy, articulated via the government’s ‘Technology Investment Roadmap’. This new policy aims to enable the deployment of new and emerging technologies as a primary mechanism to “drive emission reductions and support economic growth” (Australian Government 2020, p. 1). It maps out a series “low emissions technologies” such as carbon capture and storage, electricity storage systems, and clean hydrogen fuels, which are expected to spearhead the decarbonisation of Australia’s economy.¹

Now, in the lead-up to the 26th United Nations Climate Change Conference (COP26), Australia’s Federal Government has chosen to double down on its technology-led climate strategy. This is significant as COP26 will test whether the framework for co-operative emissions reductions set out in the Paris Agreement can, in fact, curb rising global

¹ Low, clean, zero, and negative emissions technologies are together referred to as ‘low emissions technologies’ in the Technology Investment Roadmap. For the sake of coherence, this research project uses the same term.

temperatures. Without an updated 2030 emissions reductions target, Australia's contribution to the global climate effort will now hinge entirely on the mitigation potential of the Technology Investment Roadmap. This has caused concern among environmental watchdogs and advocacy groups; however, representatives of Australia's Liberal-National government continue to express high expectations for the new policy. Whether it will actually be able to deliver on its promise to bring about meaningful emissions reductions through the development and deployment of low emissions technologies will indicate whether Australia has sufficiently raised its climate ambitions.

1.2 Problem Formulation

It is often taken for granted that a new climate policy has an immutable commitment to mitigating greenhouse gas emissions; however, it is important to consider that mitigation practices may also be expected to deliver against specific political or economic objectives, not just environmental ones. For example, most modern capitalist societies hold the expectation that the government should provide continually increasing standards of living, resulting in the inevitable prioritisation of economic policy goals. In this context, it seems important to ask of any new climate policy whether implementing or promoting it would help *sustain or enhance* or may for any reason *delay or deter* meaningful climate action.

This concern is particularly true for policies which seek to operationalise novel technologies as a mechanism for accomplishing emissions reductions. As technical expectations have become increasingly hyperbolic in late industrial modernity, it is necessary to closely examine how visions of new technologies are constructed. It is not surprising that expectations for Australia's future are predominantly technological; we envision expansive green metropolises, filled with cyclists and electric cars who move between buildings crowned with solar panels. At the heart of this vision lies the notion that technological solutions will arrive just in time to solve the seemingly intractable ecological problems that

society has produced. However, this assumption can be dangerous, as it diminishes the perceived importance and urgency of alternative forms of climate action. Moreover, the idea that a technological ‘fix’ is just around the corner allows politicians to justify gradualist climate policies that are not properly equipped to secure significant emissions reductions.

In the case of the Technology Investment Roadmap, the focus on finding technological solutions to rising greenhouse gas emissions may have the potential to enhance Australia’s climate mitigation effort; however, this is dependent on whether its environmental objectives really do supersede all other conflicting social, political, or economic interests. On the other hand, promises of future technologies may also delay effective climate action by preserving a specific social and economic status quo. Since the Technology Investment Roadmap is Australia’s most recent climate strategy, little research has yet been done on the nature of its construction. A close analysis of the policy and its associated texts would help fill this gap in the literature by providing a deeper understanding of which assumptions are embedded in its representation of low emissions technologies, and whether they serve to enhance or delay meaningful climate action.

1.3 Research Aim, Question, and Objectives

The aim of this research project is to critically analyse the construction of the technological discourses which shape Australia’s ‘technology-led’ emissions reduction strategy. This analysis hopes to give readers a deeper understanding of what normative assumptions and value orientations are embedded in dominant representations of technology, and to what extent they influence climate mitigation practices in Australia.

To guide the analysis, the research question that this project seeks to answer is:

How is technology represented in Australia’s ‘technology-led’ emissions reduction strategy, and with what implications?

Building upon this research question, the primary research objectives are:

To reveal which normative assumptions and value orientations have been embedded in dominant representations of low emissions technologies.

To understand the broader effects that the Technology Investment Roadmap has on Australia's political landscape.

To determine whether the discursive construction of the Technology Investment Roadmap enhances or delays meaningful climate action.

1.4 Approach and Outcomes

To answer the research question and achieve the research objectives, this study draws on the qualitative methodology of Critical Discourse Analysis (CDA). Unlike other forms of linguistic analysis, CDA investigates how societal power relations are established or reinforced through language use. For this reason, this research project adheres to the social constructionist tradition, which assumes that representations of reality gain their meaning through constructions of language. This means the investigated material is exclusively *semiotic*, consisting of official government publications (policy papers, media releases, and transcripts) which detail and promote Australia's 'technology-led' emissions reduction strategy.

The analytical structure of this research project is primarily informed by Fairclough's (1992) three-dimensional CDA framework, which combines the examination of textual features, discursive processes, and social practices. Hajer's (1997) storyline concept is also applied to the identified technological discourses, to reveal how they combine to construct several dominant socio-technical storylines. To supplement the macro level of analysis, Bourdieu's (1992) field theory is then incorporated into the examination of social practices, allowing the

study to identify whether the roadmap serves to either transform or reproduce Australia's political status quo.

The outcomes of the analysis reveal that the technological discourses which constitute Australia's 'technology-led' emissions reduction strategy consistently prioritises policy pathways which do not pose a threat to the dominant neoliberal political status quo.

Moreover, by concealing more transformative policy pathways, the examined technological discourses were found to reproduce the same norms and practices which perpetuate climate inaction. Taking these results into account, this research project argues that the dominant technological discourses which combine to shape the Technology Investment Roadmap delay meaningful climate action, as they obscure the scope for more effective systemic change, and diminish the potential for non-technical solutions.

1.5 Chapter Overview

To present this argument, this research project is organised into five chapters. Following the introduction, Chapter 2 provides a comprehensive literature review which examines a variety of key perspectives, trends, and debates in the literature surrounding technology and its role in climate policy. It also identifies the current gap in the literature which this research aims to address. Chapter 3 provides an overview of the research design and methods that guide the analysis, and explores the project's ontological and epistemological foundations. This is also where the chosen data is introduced, and where the coding frame is established. Chapter 4 presents the findings of the CDA. These results are organised around three dominant socio-technical storylines which are examined in relation to broader social practices, followed by a discussion of the political implications of these results. Chapter 5 serves as the conclusion of the study, linking the results on the ongoing academic debates identified in the literature review and exploring recommendations, limitations, and avenues for further research.

Chapter 2: Literature Review

This chapter critically reviews a cross-section of literature on technology and its function in climate policy. Since anthropogenic climate change is a widely recognised ‘wicked’ policy problem that requires urgent political action, there has been a significant amount of interest in novel technologies which promise to arrest climbing global temperatures by mitigating greenhouse gas (GHG) emissions.² Nevertheless, the role of technology in climate policy continues to be a contentious topic among researchers as there is little consensus on how it should be understood, in which ways it ought to be used, and what broader political implications it may have.

The purpose of this review is to examine a variety of key perspectives, trends, and debates in the literature surrounding technology and climate policy in order to contextualise the field of research and identify the current gaps in knowledge. To provide a concise outline of each area of review, this chapter is organised into three aggregated sections followed by a discussion. The first section identifies the major theoretical positions on how technology ought to be understood, critically examining the key contributions of each school of thought. The second section examines how technologies have been featured in climate research and policy, looking specifically at which discursive practices have been attributed to different representations of technology. The third section explores discussions of low emissions technologies in an Australian context, reviewing research and media publications on past, present, and proposed climate policies. At the conclusion of this chapter, each section is brought together in the discussion, where key gaps in the literature are emphasised and the research aims are reiterated.

² In their typology of social planning and policy dilemmas, Rittel and Webber (1973, p. 160-161) define ‘wicked’ problems as highly complex, intractable policy issues with no definitive formulation or solution.

2.1 Competing Theories of Technology

2.1.1 Determinism, Substantivism, and Critical Theory

For most of the twentieth century a critical attitude has predominated normative reflections on the nature of technology. Numerous schools of thought emerged during this period, each differing in respect to the perceived neutrality of technical means and the role of human action in the technical sphere. Feenberg (1999, p. 9) identifies three major theoretical positions which underlie these perspectives; determinism, substantivism, and critical theory. Each of these positions challenge the “common sense” instrumentalist understanding of technical activity, which entails the assumption that all technologies are passive tools (or instruments) which are deployed and controlled by humans to serve various ends (Feenberg 1999, pp. 1-6). This perspective (akin to positivism, functionalism, essentialism, or representationalism) raises no normative questions about the inherent ideologies that are embedded within technology and thus sees technical activity as value neutral. The following paragraphs examine and contrast the three major theoretical understandings of technology which counter the common instrumentalist position (represented below in Figure 1).

TECHNOLOGY IS UNDERSTOOD AS:	AUTONOMOUS	HUMAN CONTROLLED
<p>NEUTRAL</p> <p>Technology is a neutral means to an end</p>	<p>DETERMINISM</p> <p>Theorists: Marx, Schumpeter</p>	<p>INSTRUMENTALISM</p> <p>Classical understanding of technology</p>
<p>VALUE-LADEN</p> <p>Technology forms a way of life that includes ends</p>	<p>SUBSTANTIVISM</p> <p>Theorists: Heidegger, Ellul</p>	<p>CRITICAL THEORY</p> <p>Theorists: Marcus, Foucault</p>

Figure 1. The major theoretical understandings of technology, adapted from Feenberg (1999, p. 9)

Technological determinists consider technology not just as a harbinger of progress but as the primary driver of social change. Deterministic theories, such as traditional Marxism, understand technical means to be neutral insofar as they only meet natural needs, but differ from instrumentalism in that they see technologies to have an autonomous functional logic that can be explained without reference to society (Bimber 1990, p. 334; Marx & Smith 1994, pp. 67-71). This position follows a comparable logic to that of economic determinism, which similarly sees the market as a force impervious to political control (Kellner 2017, p. 272). In both cases, any attempt by humans to manage or reconstruct this force is seen as a hopeless enterprise. This similarity has led some economic theorists to subsume all technical activity under the economy. Schumpeter (1976, pp. 81-84) notably identifies technological innovation as a critical dimension of economic progress in his book *Capitalism, Socialism and Democracy*, arguing that innovations in technology are necessary to upset the established order and create dynamic social change. However, treating technology as a neutral means requires no particular philosophical explanation or justification for its use, since it understands technical activity as a natural rather than political process. As such, deterministic understandings of technology tend to abstract technical activities from their political contexts.

Responding to the pervasion of technology in the first half of the twentieth century, a new wave of “substantive” scholarship emerged to challenge the dominant neutral understanding of technology. Substantive theorists accept the premise that technology is an autonomous force but argue that technical activity embodies specific social values and can therefore not be considered neutral (Feenberg 1999, pp. 2-3). Heidegger is a prominent advocate of this perspective, arguing that technology has become the dominant ontology of the modern age, forming a culture of universal control (Sikka 2011, p. 95). In his view, this process of domination occurs autonomously from the moment technology enters society, directly

influencing how humans interact with the world. This substantive perspective is often applied as a method to uncover how certain technologies affect dominant ways of thinking in a society (Brady 2020). As such, it can be set apart from deterministic theories which are unable to explain the underlying influences of technology on social and political thought. Jacques Ellul (1967, p. 159) is another significant substantive theorist who builds upon Heidegger's theory, arguing that technology has become the defining characteristic of every modern society regardless of political ideology. He similarly shares Heidegger's prediction that technological developments will autonomously lead to the total domination of technology over society (Ellul 1967, pp. 430-436). This pessimistic perspective further distinguishes substantive theorists from their deterministic counterparts, as they do not share the optimistic assumption that technology is capable of bringing about societal progress.

Critical theory, emerging in the 1960s, shares substantivism's scepticism regarding the neutrality of technology but denies its autonomy thesis. It's central claim, that social problems are influenced more by societal structures and cultural assumptions than by individual factors, provides an understanding of technology which sees all technical activity as humanly controlled (Finn 2012, p. 10). Marcuse and Foucault stand out as influential contributors to the critical understanding of technology, as they both reject the idea of an autonomous path of progress based on technological rationality. Marcuse (2002), a former student of Heidegger, shows a strong influence of substantivism in his examination of technology in *One-Dimensional Man*. He supports Heidegger's claim that technology is inherently value-laden, but posits that technical development is linked to systems subject to our ultimate control (Marcuse 2002, pp. 147-151). Similarly, in *Discipline and Punish* Foucault agrees that technologies should not be understood as neutral in nature as they are designed to reproduce certain values which form a specific environment and way of life (Dreyfus 1990, pp. 83-90). He contends that regardless of whether technology takes the form

of a panoptic prison or an assembly line, it always embodies a form of power (Dreyfus 1990, p. 85). This critical understanding is the position which this research project defends, as it sees technical activity as socially contingent; making it compatible with the social constructionist epistemology of this study.

2.1.2 The Social Construction of Technology

Social constructionism accepts critical theory's position that technology is value-laden in nature, and provides further insight into the active human agents which determine how technology is used and developed.³ Constructionists theorise that all of social reality is socially constructed and that those who construct reality are subsequently influenced by it (Burr 1995, p. 2). As such, social forces (such as cultural norms, economic pressures, and government regulations) are understood as mutually influential with technology as it both shapes and is shaped by it. Croteau and Hoynes (2003, p. 69) simplify this process of reality production into three steps:

1. People create constructions of society through a continuous process of mental and physical activity.
2. Over time, these constructions come to seem objectively real, separate from human activity, and begin to be taken for granted.
3. The norms and practices of these constructions are internalised by people of that society, thereby being influenced by their own creation.

They argue that this process is what makes things we create seem normal or even inevitable; however, because we collectively construct social reality, we always have the power to

³ While Pinch and Bijker (1984) opt for the term "constructivism" in their theory, this research uses the term "constructionism" here to avoid confusion with Piaget's constructivist theory (see Burr (1995) *An introduction to social constructionism*).

change it (Croteau & Hoynes 2003, pp. 69-70). This is one of the fundamental differences between social constructionism and deterministic theory. Unlike determinism, constructionists propose that there are many different pathways that the first form of a new technology can take, some of which are well-trodden and others which are quickly deserted. Pinch and Bijker (1984, pp. 75-76) call this the “symmetry principle”, which holds that for a given technology, there are always viable technical alternatives which may instead have been developed. This idea derives from the Duhem-Quine thesis on the philosophy of science, which proposes that there is inevitably a lack of a logically compelling argument for preferring one competing scientific theory to another (Feenberg 1999, p. 78). As such, the final design of a new technology depends not on factors such as technical and economic efficiency, but on how its “fits” with the interests and beliefs of all involved social groups.

In their theory on the Social Construction of Technology (SCOT), Pinch and Bijker (1984) focus on the process of negotiation between social groups who have competing interests in the design and deployment of the technology. They argue that at this stage of development, all technologies exhibit “interpretive flexibility” as their meanings vary depending on whose perspective we adopt (Markusson, Shackley & Evar 2012, pp. 5-6; Pinch & Bijker 1984, p. 421). Using the early evolution of the bicycle as an example, they show how its design was pulled in several different directions before reaching its present form. At the time, groups interested in using bicycles for sport preferred designs emphasising speed, while others were more concerned about their safety. These two designs met vastly different needs and could be considered two different technologies with many shared elements. When the “safety” design eventually won out, the period of interpretive flexibility was replaced by a period Pinch and Bijker (1984, p. 424) call “closure”, in which a technology becomes fixed in definition and is no longer called into question. This phenomenon fits into the second step of Croteau and

Hoynes' process of reality production, as the technology's origin is quickly forgotten, seemingly separate from human activity.

While the development of the bicycle is a reassuringly innocent example, some social constructionists argue that the various technical solutions to a problem can have profound effects on the distribution of wealth and power. In response to his research question "Do Artifacts Have Politics?", Winner (1980, p. 125) identifies two ways in which technology can become dangerously politicised. The first shows how the development of a technology can become biased in a particular direction which serves specific social groups. This occurs when new technologies are heralded as "wonderful breakthroughs by some social interests and crushing setbacks by others" (Winner 1980, p. 125). Winner examines how plans for an early New York highway included overpasses which were too low for city buses. This design intentionally discouraged poorer people from Manhattan (who relied on public transportation) from visiting the beaches on Long Island. This case study exhibits how a one-sided design process contained an inherent class bias. The second way in which technologies become politicised occurs when certain technical activities correlate with particular types of political relationships (Winner 1980, p. 123). The design of an assembly line, for example, embodies specific capitalist notions of control over the working population. It must be noted that these power inequalities cannot simply reverse the biases inherent to the technology. Under the doctrine of social constructionism, technology is unable to exist in a neutral state and any attempt to alter its valuative content in accordance with our own preferences will only make it less viable to us. For this reason, it is important to consider the interests and beliefs of all involved stakeholders when developing or deploying a new technology.

2.2 Climate Change and the Politics of Technology

2.2.1 Technology in Climate Research and Policy

Since anthropogenic climate change was first identified as an intractable policy problem, proposals for technological solutions have dominated political discourse. Basiago (1994, pp. 17-22) attributes this appeal of technology to the societal doctrine of “technological optimism”, which describes the assumption that future developments in technology will always continue to sustain and perpetuate human society. Hansson (2012, pp. 78-79) argues that this assumption has been pervasive in research which attempts to predict the development trajectories of novel technologies. To demonstrate his point, he examines modelling by the European Union which suggests that by 2050, fifty percent of electricity production will be provided by Carbon Capture and Storage (CCS) equipped power plants. He finds that the researchers assume that current barriers to the implementation of CCS would be solved with time, and points out that future uncertainties of the technology are not considered. This type of technological optimism is also often coloured by elements of technological determinism, as researchers often assume that technology will act as a guiding force behind societal progress. This can result in the dangerous assumption that technology will ensure decarbonisation even in the absence of effective government action.

There is some debate among researchers over why technologies are frequently misrepresented in research and policy. Markusson, Shackley and Evar (2012, pp. 36-37) theorise that prolific models and studies which underplay the risk and problems of certain technologies may be the source of the problem. They argue that a systematic bias exists among scientific researchers who wish to promote certain technological innovations (Markusson, Shackley & Evar 2012, pp. 26-37). These discourses are not always intentionally propagated and are often unknowingly caused by the aforementioned technological optimism of the researcher. Nonetheless, Gardiner (2011, p. 46) contends that it

is not uncommon for technological promises to be the product of systemic “moral corruption” by actors who have an interest in preserving a certain status quo. In these cases, promises of future technologies serve an ideological purpose, such as justifying the continued extraction of fossil resources. In an examination of discourses on aviation climate policy, Peeters et al. (2016, pp. 6-10) refer to these discourses as “technology myths”. They found that stakeholders who embraced technology myths overstated the realistic potential offered by future technologies to justify non-action in the short-term.

2.2.2 Technology as a Discourse of Climate Delay

There are several discursive strategies which discount or downplay the need for immediate climate action. Historically, the dominant method has been the outright rejection of climate science; yet the literature indicates that there is a global trend away from these denialistic discourses (Farrell, McConnell & Brulle 2019, p. 191; Schiffman 2021). Two alternative strategies which are commonly used by politicians and policymakers to cast doubt over the need for climate action include *ad hominem* attacks on the scientific community and climate-impact scepticism. These strategies are ubiquitous in today’s political discourse and have therefore been subject to substantial academic inquiry (Harvey et al. 2018, p. 282; Oreskes & Conway 2011). A fourth strategy, however, has received far less attention by researchers; the use of discourses which manipulate discussions on what sort of action should be taken. Lamb et al. (2020, pp. 1-3) call these “climate delay” discourses, as they lead to political deadlocks which prevent necessary action from being taken. They argue these discourses take place across various sources, actors, and contexts and can influence where costs and benefits are allocated, how fast measures are implemented, and who bears responsibility. Importantly, they point out that these discourses of climate delay feature frequently in discussions of future technologies, calling for further critical research to be done in this area.

There are two prominent pieces of literature which demonstrate in what ways discourses of climate delay have been used in climate policy. The first is a study by Asayama and Ishii (2017, pp. 50-59) on the discursive construction of CCS in Japan. Using a content analysis, they identify how narratives of technological optimism have been used to draw attention away from more proven policy options (such as taxing carbon emissions) which would likely provide higher emissions reductions in the short-term. These optimistic narratives were propagated by policymakers, who used the promise of imminent developments in CSS technology as the “political glue” to align emissions reductions with the continued use of fossil fuels (Asayama & Ishii 2017, p. 56). The promise of a technological solution, in this case, was an effective discourse of climate delay as it proved more popular with the public than its disruptive alternatives. The second example of climate delay is evident in Sheehan’s (2018, pp. 201-318) examination of how the American Petroleum Institute (API) exerts its influence on US energy policy. She outlines how the API funnels tens of millions of dollars into promoting the development of “cleaner” fossil fuels as an alternative to more stringent industry regulation. By establishing a narrative of “fossil fuel solutionism” (which stands in stark contrast to established evidence), the API is able to obscure more effective approaches to reducing carbon emissions, thus delaying effective climate policy.

2.3 Climate Policy in Australia

2.3.1 A History of Inaction

There is extensive scholarship on Australia's failure to mitigate climate change (Christoff 2005; Crowley 2021; Pearse 2007; Taylor 2014). Since signing the Paris Agreement at the 21st conference of the parties to the United Nations Framework Convention on Climate Change (UNFCCC), Australia has pledged to reduce its net emissions by 26–28 percent by 2030 from 2005 levels. Crowley (2021, pp. 1-2) highlights several issues with this commitment. She argues that Australia’s chosen target is grossly inconsistent with the

advised reductions of 45–65 percent and points out the lack of an explicit commitment to the Paris target of net zero by 2050. Furthermore, Fernyhough (2020) demonstrates that emission reductions under Australia’s current policies are not projected to achieve even the low-end of the 2030 target, with the current intention being to use carry over credits from the now concluded UNFCCC Kyoto Protocol. This strategy of “reducing” emissions by carrying over credits from outdated international agreements reflects the concerning lack of effective climate policy in Australia. Lowe (2020, pp. 3-4) attributes this political failure to decades of federal policy gridlock caused by a stance of deliberate inaction by the Liberal-National Coalition. It is therefore unsurprising that climate advocacy has had a longstanding history in Australia, with continued calls for more ambitious climate targets, improved policy, and divestment from fossil fuels (Pearse 2016, pp. 1084-1096).

Australia's history of climate policy recalcitrance is typically explained as a struggle between those proposing a lower carbon future and advocates of the status quo (Chubb 2014; Head et al. 2014). The status quo in this case refers to Australia’s structural reliance upon fossil fuels, coal in particular, and the ongoing lobbying efforts of the coal mining industry. Baer (2016, p. 197) details this nexus between the coal mining industry and the federal and various state governments, arguing that lobbying efforts have weakened legislation on native title and land rights and have deliberately stoked polarisation in debates over climate action. He observes a persistent belief (in both the Liberal-National government and the Labor opposition) that halting fossil fuel extraction will damage the nation’s prosperity. Furthermore, with the price of renewables falling faster than expected, the emphasis of lobby groups has begun shifting from coal to natural gas (Brett 2020, pp. 72-73). While marketed as a “transition fuel”, the extraction of natural gas is argued to be merely another means of protecting the hegemony of fossil fuel. Nevertheless, the nexus between the government and fossil fuel industries is currently under pressure from community activism. Colvin and Jotzo (2021, pp. 1-18) predict

that as the Australian population ages, a growing majority of voters will accept the need for climate action. As such, efforts to promote climate delay may have a limited shelf life as they are increasingly rejected by the public.

2.3.2 Technology in Australian Climate Policy

The prospect of using “clean coal” and “negative emissions” technologies to mitigate emissions has been a major component of the climate policy debate in Australia (Tyfield 2014, p. 60). Not only are these future technologies viewed as an undisruptive way of reducing emissions within Australia (circumventing the costly process of closing and replacing fossil energy infrastructure), but as a means of ensuring the long-term viability of Australia’s coal and natural gas exports (Meadowcroft & Langhelle 2009, pp. 50-51). While highly optimistic, it is not surprising that the development of non-transformative technologies such as clean hydrogen and CCS has received widespread support from both sides of the political spectrum. Evar, Armeni and Scott (2012, pp. 27-29) regard Australia as a pioneer in the area of both CCS and BECCS development due to a series of investments made by the Liberal-National government in the early 2000s. These technological promises never resulted in meaningful climate action and have since been criticised as merely being a strategy to fend off criticism for inaction (Parkinson 2020). Nevertheless, these accusations have not been restricted to the Liberal-National government. In 2007, after proposing a plan to put \$500 million into clean fossil fuel research, the Labor government was accused of “following John Howard into [the] supposition that there is a technology called clean coal” (ABC Online 2007). It can thus be said that technology has had a bi-partisan history in Australian climate politics, despite the fact that there has been no progress towards its deployment.

More recently, the announcement of the Technology Investment Roadmap has once again made discussions on the role of technology in Australian climate policy salient. Described as a “technology not taxes” approach, the proposed strategy seeks to allocate \$18 billion AUD

in Commonwealth investments to finance selected low emissions technologies over a ten-year period (DISER 2020b, pp. 1-2). While there has been little research on this new policy direction, it generated significant attention in the Australian media. Many of the examined articles criticise the vague objective of the climate strategy, which seeks to meet net zero emissions “as quickly as possible and preferably by 2050” through commercialisation of low emissions technologies (Climate Council 2020; Joshi 2020; Karp & Morton 2020). Similarly, businesses and environmental groups alike have stated that the strategy is effectively meaningless to them without mentioning long-term emissions targets or how to achieve them (Mazengarb 2020). Nevertheless, others welcome the potential for increased investment in domestic technological innovation, arguing that Australia has recently shown to be lagging in public investment in low-carbon technologies (Global Energy Innovation Index 2019). From this perspective, incentivising technological innovation is seen as a way of ensuring that Australia does not become “a technological island” (Hughes & Gosens 2020).

Australia’s singular focus on its technology-led climate strategy has also been the subject of international criticisms, particularly in light of the ongoing COVID-19 pandemic. Lahcen et al. (2020, pp. 731-750) highlight the mounting international pressure for governments to adopt a comprehensive green recovery policy framework containing environmental, regulatory, and fiscal reforms. The assumption is that if countries strengthen their climate change mitigation efforts, they should also see a rise in socio-economic and health related “co-benefits” (Lahcen et al. 2020, p. 747). While Australia has invested a considerable amount into recovery spending, only a small fraction has been used to fund environmental initiatives (Murphy 2021). In fact, in a recent study conducted by the United Nations Environment Programme (UNEP), Australia ranks among the poorest performing countries in directing economic stimulus towards clean, rather than polluting, policy options

(O’Callaghan & Murdock 2021).⁴ This has, in part, been attributed to the piecemeal pace of Australia’s current set of climate policies, which only see gradual investment over long timeframes. Nevertheless, in the leadup to this year’s COP26 climate summit, the Morrison government has indicated that it intends to present the Technology Investment Roadmap as the centrepiece of its climate change mitigation strategy (Climate Action Tracker 2020).

2.4 Discussion

The literature reviewed in this chapter indicates that the function of technology in climate policy remains an ongoing topic of debate among theorists, researchers, and policymakers. On the one hand, there exists an unyielding faith in technology as a means of arresting the rising GHG emissions responsible for climate change. While these deterministic notions of technological progress have had a long history in academia (beginning with the Marxian assumption that fast-changing technologies drive social change), they are still pervasive in contemporary literature. This is made apparent in Section 2.2, which examines how discourses of technological determinism and technological optimism have manifested themselves in discussions of low emissions technologies. On the other hand, there exists a deeply rooted scepticism in the literature over novel technologies which promise to bring about future emissions reductions, based in the fear that technology is increasingly used as a tool to dominate social and political life. This pessimistic hypothesis is shared by researchers who take their understanding of technology from critical theory. From this perspective, technology is understood as neither neutral nor autonomous; rather, it forms a site of struggle, or a “parliament of things”, upon which political alternatives contend (Feenberg 1999, p. 83). Constructionists further expand on this understanding, suggesting that technologies are a social construction much in the same way that institutions are. This latter position is defended

⁴ Plans by the Australian Federal Government for a “gas-led recovery” were excluded from this calculation as UNEP considers natural gas energy as having a net negative impact on environment and human health.

in this research project, as it allows prevailing representations of technology in climate policy to be critically investigated.

While optimistic and pessimistic discourses were found to exist simultaneously within reflections on the nature of technology, the literature shows that optimistic discourses reign dominant within the field of climate policy. These positive representations can be demonstrably linked to the technological optimism of the researcher or policymaker, who is able to make claims to objectivity that should otherwise be open to debate. Since these optimistic discourses assume that low emissions technologies will eventually be able to mitigate climate change *while* preserving the current economic (and emissions) status quo, they risk drawing attention and investment away from more effective non-technical mitigation strategies. Moreover, Lamb et al. (2020, p. 5) suggest that these technical discourses may be intentionally operationalised as a form of climate delay by policymakers, arguing that more research needs to be done in this area. This constitutes the primary gap in the literature which this research project seeks to address. By bringing the notion of climate delay into an Australian political context, this research project is able to critically examine how dominant representations of technology in the Technology Investment Roadmap are discursively constructed, and to what extent they influence the policy's mitigation potential.

Chapter 3: Research Design and Methods

This chapter focuses on the research design and methods used to critically analyse the technical discourses surrounding the Technology Investment Roadmap. It first introduces the ontological and epistemological assumptions which guide the research process, before providing an overview of the research design which details how this study will answer its research question. It then introduces and justifies the selected research methods and explores their theoretical underpinnings. This involves a close discussion of Fairclough's Critical Discourse Analysis (CDA) framework in conjunction with Hajer's storyline concept and Bourdieu's field theory. A discussion of challenges and contingencies is also included in this section. The final section then presents the texts which have been chosen for analysis, detailing the data sampling and collection process and the subsequent coding procedure. Together, these sections map out how this study will approach its research question and fill the gap in the literature that was identified in the preceding chapter.

3.1 Ontology and Epistemology

Since the aim of this research project is to examine particular representations of technology in Australia's recent emissions reduction strategy, it must challenge prevailing systems of meaning which have become *naturalised*; that is, taking representations of ideas and artifacts that are treated as common sense and transforming them into objects for discussion and criticism (Jørgensen & Phillips 2002, p. 21). This process of unmasking taken-for-granted, common-sense knowledge is one of the fundamental aims of social constructionism; the epistemological approach which informs this study (Brown 1994, p. 24). This perspective starts with the assumption that all representations of the world are contingent, meaning that our knowledge of the world cannot be treated as an objective truth. As such, our views of and knowledge about the world are produced by "historically situated interchanges among

people”, and our ways of understanding the world are created and maintained through various social processes (Gergen 1985, p. 267). This chosen ontological perspective, which sees systems of meaning as contingent, is positionally anti-foundationalist as it opposes the idea that knowledge transcends human actions.

In addition to its social constructionist premise, this research project accepts that our reality is accessible through ‘discourse’. In this context, the term discourse is borrowed from the school of post-structuralist linguistic philosophy, which defines it as “a particular way of talking about and understanding the world” (Jørgensen & Phillips 2002, p. 9). This can include all symbolic human interaction, whether directly written or spoken language or via gesture, diagrams, pictures, music, or film. Moreover, it understands discourse as not only constituted but also as *constitutive*, as it contributes to the construction of our prevailing understandings of the social world; “without understanding discourse we cannot understand our reality, our experience or ourselves” (Phillips & Hardy 2002, p. 2). This doesn’t mean that reality itself does not exist; rather, representations of reality gain their meaning through language. That being said, in order to avoid the reductionist tendencies that are inherent to his view (where discourse is seen as the ‘ultimate’ dimension of reality), this research project takes an interdisciplinary approach that also recognises the causal importance of broader non-discursive dimensions (Alvesson & Karreman 2000; Fairclough 2005).

3.2 Research Design

This research project employs qualitative methods to collect and analyse the chosen texts as it is theoretically underpinned by a social constructionist framework. The research design is therefore guided by the broad aims of interpretivism, which shares an ontological understanding of reality as the contingent perspective of different actors and entities (Clark, Foster & Bryman 2019, p. 107). The project also takes an inductive research approach, meaning that the data is collected and then interpreted using methods which allow insight into

the social and cultural conditions which have helped shape the prevailing technical discourses. Using this ‘bottom-up’ research approach, this project is able to first identify and describe the discourses and social practices it seeks to address before providing an explanatory critique which aims to give insight into any underlying injustices or inequalities. To ensure this process is suitably comprehensive, discursive (and social) processes are examined on a micro, meso, and macro level of analysis (Clark, Foster & Bryman 2019, pp. 107-108).

For its primary method for interpreting social reality, this research project employs Norman Fairclough’s Critical Discourse Analysis (CDA) to capture and unpack the meanings that are embedded in the language of political actors who advocate for technical solutions to climate change. CDA can be understood as the critical study of how discourse can perpetuate or disrupt unequal relations of power. As both a theory and a method, this analytical approach is wedded to the principle of examining empirical examples of language use with the aim of “exposing strategies that appear neutral on the surface, but which may in fact seek to shape the representation of events and persons for particular ends” (Machin & Mayr 2012, p. 5). As such, the discursive focus of this method is well suited to scrutinise the ways in which prevailing representations of technology are strategically shaped by a variety of linguistic objects. Moreover, CDA has a flexible structure which allows it to benefit from the integration of additional analytical tools. This research project adopts Hajer’s (1997) storyline concept to guide the micro and meso level analysis of the selected policy texts. The storyline concept is featured in many examples of environmental communication research to date, providing insight into how separate textual and discursive features can combine to form an overarching narrative (Fischer 2003; Stibbe 2021). Thus, by integrating this analytical tool into Fairclough’s CDA framework, a more comprehensive analysis is possible.

To examine the broader social processes which influence the policy, this research project also supplements Fairclough's analytical framework with Pierre Bourdieu's (1992, pp. 94-98) concept of social 'field'. This theory is further explained in Section 3.3.4, but put briefly, a field can be understood as a social domain which obeys a specific social logic. Actors within a specified field will struggle to attain the same goal and are therefore linked to each other in a conflictual way (Bourdieu & Wacquant 1992; Jørgensen & Phillips 2002, p. 72). This study is primarily concerned with Australia's 'political field', in which different actors and institutions struggle among one another to gain and maintain political power. Bourdieu's field theory therefore informs the macro level analysis of the study as it serves to examine the broader socio-political conditions which constitute (and are constituted by) the storylines identified earlier on in the analysis.⁵ This reveals the ideological, political, and social consequences of the policy, giving insight into how certain technical discourses contribute to the maintenance or transformation of the status quo. In drawing such conclusions, the research project is rendered both political and critical.

3.3 Research Methods

3.3.1 Discourse Analysis

It is now widely recognised that language is intrinsically linked to cultural and social processes. As such, researchers from a variety of disciplines emphasise the importance of using language analysis as a method for studying social change. This 'linguistic turn' in social theory has led to the weakening of boundaries between social sciences, resulting in the development of more diverse theories and practices within disciplines (Jørgensen & Phillips 2002, p. 5). Importantly, there has since been significant research into new ways to link

⁵ By integrating Bourdieu's field theory into CDA, this research project is also equipped to reveal how representations of technology are shaped by non-discursive conditions (i.e., institutional influences).

language to the political notions of *ideology* and *power*.⁶ These theories and methodologies all offer their own unique perspectives on research in communication, culture, and society; however, they share a common understanding that discourse plays a fundamental role in creating and changing the way we understand the world (Jørgensen & Phillips 2002, pp. 12-3). Discourse in this context refers to a post-structuralist linguistic concept informed by the works of Michel Foucault, who played a central role in the development of discourse analysis through his empirical and theoretical research. He argued that discourses do not just reflect or represent social relations and entities, but they play a role in constituting them too (Foucault 2013, pp. 117-118).

While most contemporary discourse-analytical approaches follow Foucault's (2013, p. 117) conception of discourse as a relatively rule-bound set of statements "for which a group of conditions of existence can be defined", they all diverge from his tendency to identify only one dominant discursive regime per historical period. This allows discourse to be broken down into different 'communicative events'; that is, instances of observable language use (referred to as 'texts') from which a system of meaning is constructed or maintained (Fairclough 1992, p. 4; van Dijk 1993). O'Halloran (2003, pp. 10-11) argues that by confining the term discourse to refer to specific occurrences of semiotic activity, researchers are better able to examine particular social practices. For this reason, discourse analysis can be used to reveal how systems of meaning are constructed through the combination of various discourses. Different trends for the study of political discourses include Wodak et al.'s (2009) Discourse-Historical Approach, van Dijk's (1993) Socio-Cognitive Approach, Laclau and Mouffe's (Laclau & Mouffe 1985) Discourse Theory, and Fairclough's (1992) Critical Discourse Analysis. While each of these approaches draw from one another in a variety of

⁶ Notable examples of the 'linguistic turn' in the study of ideology and power can be seen in early works of Pêcheux (1982), Laclau & Mouffe (1985), and Fairclough (1989).

different ways, they are each distinguished by how they interpret the mediating force between language and politics. Acknowledging how this relationship can be differently mediated is of key significance in choosing a method to interpret and explain the use and effect of discourse and in political contexts (Filardo-Llamas & Boyd 2017).

3.3.2 Fairclough's Critical Discourse Analysis

Since this research project has critical ambitions, it is best suited to Fairclough's (1992) Critical Discourse Analysis. Jørgensen & Phillips (2002, p. 60) promote this method for the analysis of political discourses as the "most developed tool for political research within the critical discourse analytical movement". This approach, referred to more generally as CDA by Fairclough, is unique in that it examines how 'discursive practices' (the production and consumption of a text) mediate between texts and wider social practices (Fairclough 1992, pp. 70-71). For this reason, CDA can be distinguished from van Dijk's socio-cognitive approach which carries out rhetorical but not linguistic studies of language use as well as Laclau and Mouffe's discourse theory which does not carry out systematic, empirical studies of language use (Bloor & Bloor 2013; Jørgensen & Phillips 2002, pp. 60-62). CDA is also appropriately critical in the sense that it seeks to *unmask* the role of discursive practices in the maintenance of the social world, including social relations which involve unequal relations of power. It aims to contribute to social change by revealing pathways for more equal power relations in both communication processes and society in general (Jørgensen & Phillips 2002, p. 64). CDA cannot, therefore, be understood as politically neutral in nature (in the way that objectivist social science claims to be) as it is a critical approach which is politically committed to social change.

Fairclough's analytical framework informs both the method and structure of this research project. His three-dimensional analytical model for CDA incorporates micro, meso and macro levels of analysis by bringing together the three key dimensions of every

communicative event (represented in Figure 2) (Fairclough 1992, pp. 72-73). These dimensions are presented as three frames: *text*, *discursive practice*, and *social practice*. Text analysis focuses on the linguistic features from which discourses are realised linguistically. By descriptively examining the texts' formal characteristics such vocabulary, syntax, and metaphors, it is possible to reveal how discourses are activated textually in a way that provides backing for a particular interpretation (Fairclough 1992, pp. 234-236). Analysis of the discursive practice is concerned with interpreting how text is produced, distributed, and consumed. This involves examining 'interdiscursivity'; how text producers draw on already existing discourses, and on how readers apply available discourses in the consumption and interpretation of the texts (Fairclough 2017, p. 232). The final frame of analysis, social practice, focuses on the broader context of which the previous two dimensions are part. Here Bourdieu's field theory is applied to situate the communicative event into the broader social practices which influence, and are influenced by, the Australian political field (Bourdieu & Wacquant 1992, pp. 94-98).

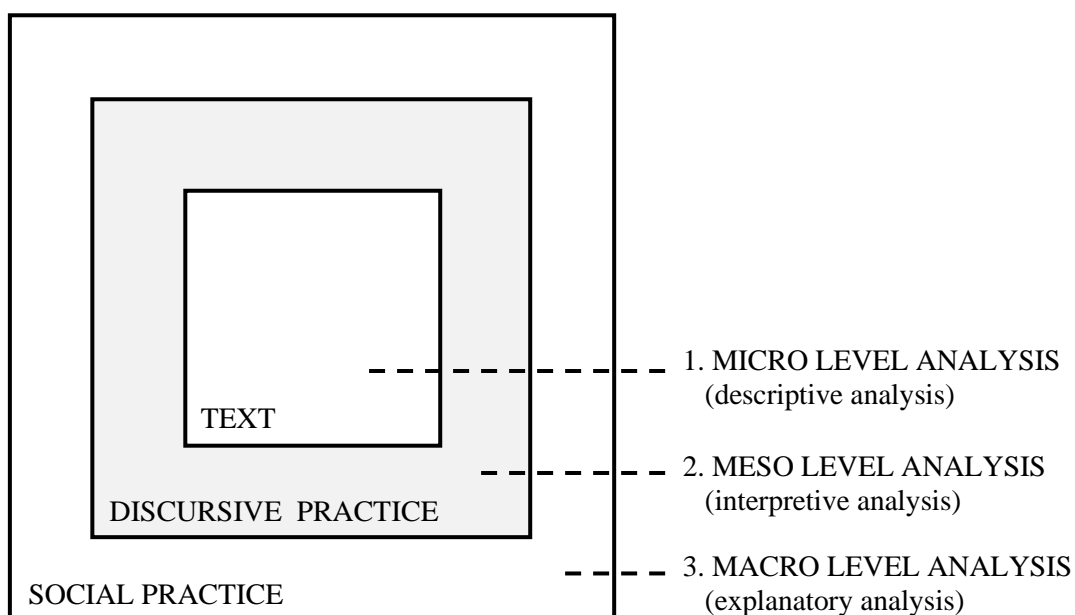


Figure 2. Fairclough's (1992, p. 73) three-dimensional analytical model for CDA

3.3.3 Hajer's Storyline Concept

To effectively operationalise the CDA framework, Fairclough (1992, p. 225) recommends that researchers analytically combine the micro and meso level of analysis due to the inevitable cross over between textual features and discursive practices. Hajer's storyline concept is therefore employed as an aggregated frame of analysis for this research project (represented in Figure 3). A storyline, according to Hajer (1997, p. 56), "is a generative sort of narrative that allows actors to draw upon various discursive categories to give meaning to specific physical or social phenomena". Its primary function is to combine a variety of separate discursive components in a way that creates a persuasive narrative on the nature of social reality. In other words, the power of storylines is primarily based on the idea that they appear believable. To achieve this, storylines unite several established linguistic and discursive concerns from the constructionist tradition. The discursive practice of the metaphor, for instance, may play a role in constituting a storyline, as can analogies, nominalisations, word connotations, appeals to collective fears or senses of national pride (to name a few). By analysing these micro and macro level features together, this research project is able to identify which narratives which underlie the examined policy texts.

Since most people do not draw on comprehensive discursive systems to understand the world around them, they turn to storylines as short-hand constructions of reality. For example, a reader of a policy discussion paper will not typically appeal to well-developed political philosophies or ecological theories for cognitive assistance. Instead, it is quite likely that they will take the dominant construction of reality (articulated through storylines) for granted (Fischer 2003, pp. 86-89). In this way, storylines function to reduce the discursive complexity of a text by condensing large amounts of factual information. Nevertheless, this reductive process leaves room for the text producer to intermix certain value orientations and normative assumptions into the storylines they create. Thus, by incorporating a storyline analysis into its

CDA framework, this study is able to find out which taken-for-granted meanings are embedded within the examined texts by analysing the construction of discursive components within each storyline. Not only does this reveal which aspects of the policy are intentionally emphasised or concealed, but it also provides insight into how the policy positions certain actors and structures in Australian society. As such, this research project begins its analysis with a close examination of the identified storylines before exploring their influence, and are influenced by, broader social practices.

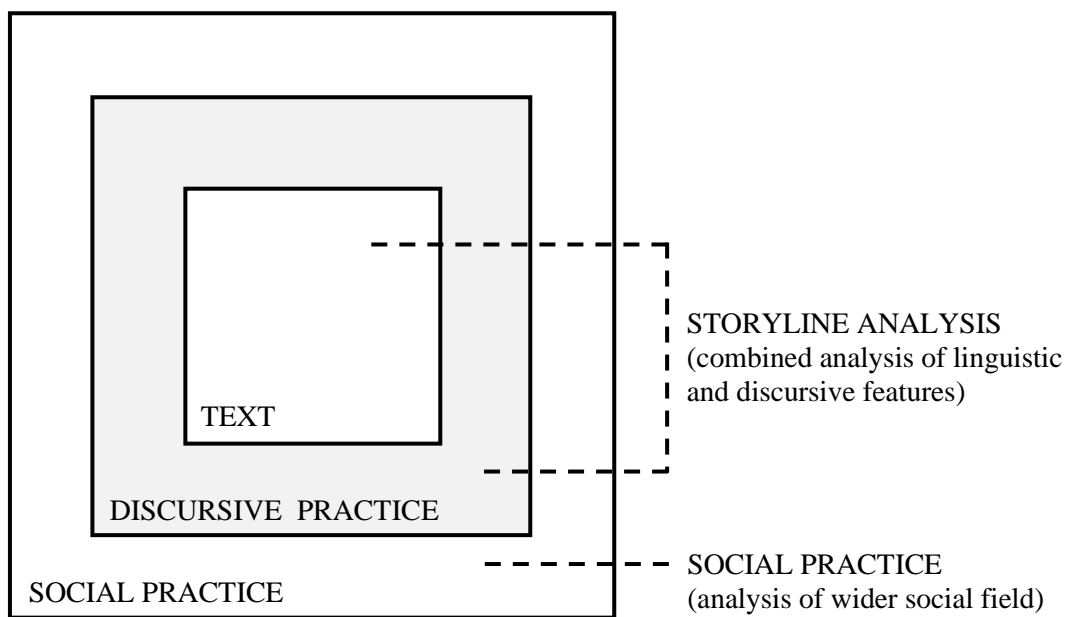


Figure 3. Hajer's (1997) storyline concept applied to Fairclough's (1992, p. 73) three-dimensional analytical model for CDA

3.3.4 Bourdieu's Field Theory

To supplement the macro level of Fairclough's analytical framework, this research project draws on Bourdieu's field theory. According to Bourdieu, a field is a social domain made up of a series of interrelated institutions, rules, conventions, and appointments (Bourdieu & Wacquant 1992, pp. 94-98). Together, these structures constitute a dominant system of meaning which delimits what kind of discourse can be produced. Fields also feature social actors who occupy varying positions of power. Dominant social actors, which Bourdieu calls

incumbents, are invested in maintaining the field in its current form, as changes to the status quo risk destabilising their position of power (Bourdieu & Wacquant 1992, p. 83). Fields may also feature actors who aim to transform the status quo, thereby challenging the existent distribution of power. As such, fields are often understood to be in a *dialectical* relationship with the actors who inhabit them, as new discourses can alter the field's constitutive structures (Webb, Schirato & Danaher 2002, p. 21). By integrating Bourdieu's field theory into CDA, this research project is able to explain how the discourses examined on the micro and meso level of analysis influence, and are influenced by, the power dynamics of the Australian political field. Not only does this provide an additional level of mediation between discursive and social practices, but it also contextualises the findings in an Australian political context.

3.3.5 Challenges and Contingencies

Due to the highly interpretive nature of qualitative discourse analysis, this research project remained aware of its own analytical role throughout the study. This is an important contingency as the research process is itself constitutive; it both represents and creates reality in the same way that other discourses do (Jørgensen & Phillips 2002, p. 175). For this reason, it is necessary that an attitude of reflexivity was adopted and adhered to throughout every phase of the research process, including the formulation of the research question, the collection and analysis of the data, and the conclusion which are drawn. This ensured that any influence on the process of knowledge production was acknowledged and reduced in an effort to enhance the rigour and accuracy of the study (Berger 2015, p. 220).

Furthermore, to effectively harness CDA to expose potentially problematic discourses within Australian society, it is important that both the analysis and the results of this research project are presented in a way that is clear and accessible to all readers (Fairclough 1992, p. 238; Fairclough 2014, pp. 7-12). Fairclough (1992, pp. 238-240) calls this process Critical

Language Awareness (CLA), which seeks to redefine the classical relationship between the researcher and the reader, where the researcher is positioned as a sovereign authority with privileged access to truth of authority. CLA involves drawing upon the readers' own discursive practices to help them become more conscious of the wider processes which they are involved in as consumers of the examined texts (Fairclough 2014, pp. 7-12). By paying close attention to the discursive and social processes which may play a role in shaping the readers understanding of the world, it became easier to expose which discourses are complicit in maintaining the status quo (Fairclough 1992, p. 238; Fairclough 2014, pp. 7-12). This research project therefore makes sure to articulate its results in a way that allows readers to become more aware of the constraints upon their own social practices, and of the possibilities, risks, and costs of challenging these constraints.

3.4 Data Collection and Coding Procedure

Due to its focus on technical discourse, this research project exclusively investigates sources of semiotic data. While data collection and sampling procedures are often not well defined in critical discourse studies, there are some general principles that this project considered when conducting its research (Wodak & Meyer 2001, p. 27). The data was kept relevant to the study by employing a purposive sampling technique, where the texts were intentionally selected "according to the interest of the analyst, where perhaps they have observed ideology in operation" (Machin & Mayr 2012, p. 206). Furthermore, a variety of discursive genres (policy papers, media releases, and transcripts of speeches) were sampled to allow for the analysis of different linguistic styles. To keep the scope of the research project achievable, however, only a small number of these texts were selected for analysis.⁷

⁷ Sample size is not typically a point of concern in discourse analysis as the primary interest is in how language is constructed. Large variations in linguistic patterning can emerge from a small number of texts (Potter & Wetherell 1987).

The texts that constitute this data set were selected on the basis of three criteria. Firstly, all texts had to be produced by official representatives of the Australia’s Liberal-National government (the primary actor investigated by this research project). Secondly, the texts had to explicitly promote or discuss the Technology Investment Roadmap. And thirdly, the texts had to be published in and after the year of the policy’s announcement (2020 onwards) to reflect Australia’s current political landscape more accurately. An effort was also made to select texts that exhibited a diverse conditions of production, varying by their author, genre, and style. Importantly, spoken sources were only sampled when transcriptions were provided. The five chosen texts that fulfill all the aforementioned criteria are shown in Figure 4 below.

TEXT	AUTHOR(S)	GENRE	STYLE	PUBLICATION
Technology Investment Roadmap: Discussion Paper	Department of Industry, Science, Energy and Resources	Policy Paper	Formal Third-person	21 May 2020
First Low Emissions Technology Statement				22 September 2020
Harnessing new technology to grow jobs and the economy and lower emissions	Angus Taylor Minister for Industry, Energy and Emissions Reduction	Media Release	Formal First and Third-Person	21 May 2020
Australia’s Energy Future				29 October 2020
Transcript: Achieving the ‘Electric Planet’	Dr. Alan Finkel Special Adviser to the Australian Government on Low Emissions Technologies	Speech (transcript)	Informal First-Person	23 April 2021

Figure 4. Characteristics of the selected government publications

The five selected texts were sourced from official government web pages and downloaded into NVivo 11 qualitative data analysis software, where a set of codes were methodically applied. These codes were either thematic or linguistic, and focused on textual features and the discursive practices. Thematic codes were assembled and defined around the secondary literature reviewed in chapter 2, while linguistic codes were informed by the works of Fairclough (1992), Bloor and Bloor (2013), Machin and Mayr (2012), and Jørgensen and Phillips (2002). The coding procedure involved an iterative process of assigning and refining specific codes to relevant sections of the selected texts throughout a process of several reviews. The coded sections were then grouped according to which worldviews they formulate, allowing the analysis to identify and critically examine the overarching storylines which exist within the texts. The results of this analytical process are presented in the following chapter.

Chapter 4: Results and Discussion

The purpose of this chapter is to present the main findings from the Critical Discourse Analysis (CDA) to show how different representations of technology combine to shape the Liberal-National government's recently introduced 'technology-led' climate strategy. In doing so, this chapter tests the principal contention of this research project, which argues that dominant technological discourses serve primarily to obscure alternative policy pathways towards social and institutional change, thereby delaying meaningful climate action.

The results of the analysis are presented in the following five sections, and were attained through the application of Fairclough's CDA framework in conjunction with Hajer's storyline concept and Bourdieu's field theory, as previously discussed in Chapter 3. The first part of the chapter (Section 4.1 to Section 4.4) is organised around the emergent themes provided by the storyline analysis, where the textual and discursive features of three dominant storylines are examined in detail (forming the micro and meso level analysis). Section 4.5 then details the results from the macro level analysis to show how the identified storylines fit into the wider social practices of the Australian political field. Lastly, Section 4.6 consists of a discussion which consolidates the results of each preceding section and explores how the discursive construction of the policy influences its ability to effectively decarbonise the Australian economy.

4.1 Three Dominant Socio-Technical Storylines

The analysis identified three dominant storylines that each played a functional role in constructing a political pathway towards reducing Australia's emissions output, thereby creating the possibility for problem closure. All three storylines were found to hold a high discursive affinity as they each presuppose the need for a *socio-technical* approach to the policy problem. This means that they all advocate for the integration of low emissions

technologies into Australian society, with each storyline centring on a different dimension of the technological solutions they propose. With respect to the order of their examination, these three dimensions and their associated storyline are:

- the *promise* of a carbon constrained future ('climate action storyline');
- the *assurance* of economic growth ('prosperity storyline');
- the *compatibility* with the fossil industry ('business-as-usual storyline').

Hence, the analysis of each storyline is organised according to what socio-technical features of the proposed technologies were highlighted (or neglected) and how they were represented in the examined texts. To reveal which normative assumptions and value orientations were intermixed within these dominant representations, the analysis examined the construction of the key discursive components upon which each storyline is built. These discourses were not objectively 'discovered' during the analysis; rather, they were constructed in the critical-analytical process (as intersubjective objects between the text producer and the analyst) as a way to reveal how the text producers embedded naturalised meanings into their texts. This approach combines the analysis of each storyline's *textual* features (the linguistic choice of words, metaphors, or rhetoric) and the *discursive practices* (the production and consumption of the text as well as interdiscursive relations between existing discourses). Thus, the results of following three sections constitute both the micro and meso levels of Fairclough's critical analytical framework.

4.2 The Promise of a Carbon Constrained Future

The 'climate action storyline' centres on the *promise* of a low-carbon future which it argues can be attained through the development and deployment of low emissions technologies. The basic assumption of this storyline is that stringent emissions reductions are required to stabilise the concentration of GHGs in the atmosphere in order to avoid the increasingly

harmful impacts of climate change. However, to achieve these significant emissions reductions, the development and deployment of low emissions technologies is presented as the only reasonable policy response. Accordingly, highly deterministic visions of new and emerging technologies, such as CCS and BECCS, are foregrounded by the text producer to justify and inspire confidence in the choice of a technology-led climate strategy. The key discursive components behind this storyline were found to downplay risks and uncertainties, establish narrow definitions of success, and advocate for policy perfectionism.

4.2.1 Downplaying Risks and Uncertainties

The analysis reveals that all of the texts associated with the Technology Investment Roadmap typically downplayed or disregarded the risks and uncertainties associated with low emissions technologies. By obscuring the scope for legitimate social, political, or environmental concerns, this discursive practice assuages valid concerns for the safety and efficacy of the proposed technologies. For instance, in the discussion of the long-term implications of CSS in the *Technology Investment Roadmap: Discussion Paper*, the uncertainties surrounding the practice of geological sequestration are not addressed:

“Australia has a comparative advantage in CO₂ transport and storage, with a number of sources of CO₂ located close to suitable geological storage basins and with established pipeline easements between the two. Australian CCS projects could also play an important long-term role in storing CO₂ drawn down from the atmosphere, likely to be crucial in global efforts to meet the Paris Agreement’s temperature goals” (DISER 2020b, p. 21).⁸

The primary intention of this section is to emphasise Australia’s “comparative advantage” in its potential to transport and store CO₂ captured by CCS technologies. The text producer chooses not to address the legitimate concerns for the long-term safety of CO₂ storage. The

⁸ The extracts shown in this chapter have been underlined at points to emphasise relevant linguistic elements in the analysis.

possibility of CO₂ leakage from geological formations is currently considered to be one of the main risks associated with long-term CSS use. Some researchers have even raised concerns over the heightened probability that earthquakes could be triggered by the injection of large volumes of CO₂ into geological formations (Zoback & Gorelick 2012). Not only would this undermine the effectiveness of CCS for climate mitigation, but it also poses a threat to the communities and ecosystems in the vicinity of the technology. By disregarding these risks, the text producer is able to reify an optimistic vision of future emissions reductions through CSS, but fails to reflect the uncertain reality of the technology.

The examined government publications also frequently downplay the economic risks associated with the proposed low emissions technologies. For example, in the *First Low Emissions Technology Statement*, the application of CSS technology is optimistically projected to become cheaper over time through schemes which incentivise its adoption:

“Achieving a stretch goal of under \$20 per tonne for CO₂ compression, hub transport (in the vicinity of 100 km) and storage would position CCS to be competitive over the long term with other forms of abatement supported by the ERF” (DISER 2020a, p. 21).

While it is reasonable for policymakers to set ambitious stretch goals, the optimism for CCS in this example is currently at odds with the piecemeal progress of CCS innovation.

Developments in CSS technology have stagnated over the last decade, with numerous demonstration projects being suspended or cancelled due to a lack of financial viability (Reiner 2016). The ambition to bring the costs of CSS technology down to a competitive level can be attributed to what Markusson et al. (2012, p. 910) call the ‘appraisal optimism’ of the policymaker. This refers to a generic phenomenon where advocates of a technology produce unrealistically low cost estimates, often to secure support from governments or industry groups. The discourses which shape the Technology Investment Roadmap construct a deterministic vision of CSS innovation which assumes that technological progress is an

inevitable product of scientific and economic forces. By presupposing the autonomy of technological progress, the underlying societal factors which shape the development of CSS technologies inevitably become obscured. This has larger political implications, as increased investments in CCS technologies may incur sunk costs which exacerbate ‘fossil fuel lock-in’ by perpetuating the status quo of the current fossil energy regime. Nevertheless, this optimistic representation of technology serves as an effective persuasive device as it reinforces the *promise* of future emissions reductions.

4.2.2 Establishing a Narrow Definition of Success

Each of the examined texts share a vision of success which is articulated through a narrow set of goals and targets. A narrow definition of success can be beneficial to policies which seek to address specific issues in a localised context; however, when dealing with wicked policy problems like climate change, a narrow frame may mean that broader social and political considerations become obfuscated. For instance, by presenting technology as the *only* reasonable strategy for achieving emissions reductions in Australia, successful climate mitigation is exclusively framed in techno-economic terms. This discourse can be observed in the *Technology Investment Roadmap: Discussion Paper* under the section titled “STAGE 1: SETTING A CLEAR VISION”, where the text producer primarily emphasises the economic outcomes of the proposed low emissions technologies:

“The Government will set measurable economic goals for specific priority technologies and track our progress towards them.”

“Cost-competitiveness of new technologies is what will ultimately unlock deployment and displace more emissions-intensive alternatives, not just in Australia but globally. Technology goals will provide a measurable pathway towards our vision and will be the basis for evaluating the impact of our investments” (DISER 2020b, p. 13).

In this example, policy success is defined in “measurable economic” terms without any consideration of wider social or environmental impacts. The “cost competitiveness” of the proposed technologies is presented as the primary indicator of progress while emissions reductions are presented as a secondary outcome. Moreover, by emphasising measurable policy goals, a quantitative definition of progress is evidently favoured by the text producer. These factors point to the existence of a rather narrow techno-economic frame which omits important cultural and political dimensions from the roadmaps objectives (i.e., ensuring an energy transition which does not generate new forms of poverty or inequality). It should also be noted that there is no mention of a long-term emissions reduction target in any of the examined texts. This means the policy lacks a clear destination, and downplays the urgency with which the proposed low emissions technologies would need to be scaled up.

The examined policy papers also take the mitigation potential of currently hypothetical technologies for granted when modelling future emissions reductions in Australia. This concerning assumption is evident in the *First Low Emissions Technology Statement*, under the section “The Role of Negative Emissions Technologies”:

“The Intergovernmental Panel on Climate Change (IPCC) and the International Energy Agency (IEA) have concluded the Paris goals cannot be achieved without carbon sequestration deployed at scale.”

“Over 90% of the IPCC’s scenarios consistent with a 66% chance of avoiding a 2°C temperature rise rely on negative emissions technologies, including bioenergy coupled with carbon capture and storage (BECCS) and afforestation and reforestation. All scenarios consistent with a 50% chance of keeping temperatures within 1.5°C require negative emissions in addition to deep emission reductions” (DISER 2020a, p. 23).

This extract reveals high levels of intertextuality, borrowing heavily from existing texts produced by the IPCC and the IEA. The choice to draw on specific emissions scenarios

establishes a persuasive techno-scientific presentation of negative emissions technologies as a necessary step towards decarbonising Australia. Insofar as the policy's objective is narrowly described as a purely economic or scientific matter of reducing global GHG concentrations, negative emissions technologies will appear to the reader as the most suitable policy pathway. This embeds the idea that successful decarbonisation can be achieved entirely through the development of new technologies, without any disruptive transformations in energy and economic systems. Furthermore, the text producer fails to acknowledge any wider social or political implications that may come with these hypothetical technologies. Proposals for negative emissions technologies range from large-scale soil carbon restoration to more controversial forms of solar geoengineering such as stratospheric aerosol injection.⁹ If policy outcomes are not properly evaluated, chosen interventions may end up creating a more regressive distribution of costs and benefits with the risk of global and intergenerational consequences.

4.2.3 Emphasising Policy Perfectionism

The analysis found that text producers frequently dismissed more ambitious climate action strategies in favour of a perfectionist policy approach. This conservative approach to climate policy design emphasises disproportional caution in order to reduce the risk of losing public support. While it can be sensible to pursue cautious policies, this political rhetoric can quickly become a discourse of delay when text producers forgo the need for public deliberation and outreach work that could build support and reach consensus for more ambitious solutions. For instance, in the *First Low Emissions Technology Statement*, the text

⁹ The IPCC concluded that stratospheric aerosol injection is “the most-researched [solar geoengineering] method, with high agreement that it could limit warming to below 1.5°C.”; however, they warn it carries the risk of causing other unintended effects (IPCC 2018, p. 350).

producer emphasises policy perfectionism when stressing the importance of allowing time for the proposed technologies to develop:

“As new and emerging technologies develop and become more competitive, households and businesses will adopt them. This process will take time and depend on the continued operation of mature technologies” (DISER 2020a, p. 16).

The implicature of this example is that low emissions technologies will not be ready for deployment in Australia until they reach economic parity with current means of energy production. The “mature” technologies in this case include thermal energy generators which derive their fuel from fossil resources, evidenced by the footnote: “mature technologies include coal and gas, as well as renewable technologies like hydro, solar and wind that are already enjoying widespread commercialisation” (DISER 2020a, p. 16). By foregrounding the importance of an extensive development process, the text producer obfuscates the government’s preference for a *slow* transition away from fossil energy where coal and gas energy are used until they are no longer considered economically viable.

The perceived urgency of climate action was also often minimised to justify the slow pace and high cost of the policy. An apparent example of this discursive practice can be observed in the transcript of Alan Finkel’s speech promoting the Technology Investment Roadmap, where he claims clean hydrogen technology will be a success despite its slow uptake:

“For the anxious, progress is too slow, but look back a few decades from now and history will record the hydrogen industry as an overnight success” (Finkel 2021).

Not only does Finkel equate legitimate concerns for urgent policy action as a symptom of climate anxiety, but he also insists that hydrogen’s mitigation potential should only be evaluated in the far future. This points to an underlying assumption that future technologies will be capable of rapidly decarbonising Australia’s economy before the effects of climate

change begin to have a significant impact. By presenting future emissions reductions as a highly certain policy outcome, Finkel establishes an atmosphere of complacency about the growing dangers of sustained fossil fuel dependence. This form of technological optimism contributes to the prevailing representation of technology as a ‘silver-bullet’ fix to the climate crisis by obscuring the scope for other, non-technical policy pathways

4.3 The Assurance of Economic Growth

The ‘prosperity storyline’ centres on the need for Australian society to achieve a balance between sustainable practices and economic growth. Its underlying narrative argues that environmental protection is a “positive-sum game” in which climate change *is* recognised as a symptom of modern society, yet is thought only to exist because of poor management practices. The prosperity storyline therefore takes for granted the idea that climate action must take a techno-managerial approach to help decouple rising emissions from continued economic growth. Moreover, it sees technology-led climate policy as an opportunity for enhanced economic prosperity as it has the potential to position Australia as a global leader in low emission technologies. Hence, this storyline relies heavily on the deterministic assumption that future technologies will soon be able to reconcile the conflictual processes of emissions reductions and economic growth. In order to articulate this optimistic idea, the key constitutive discourses of this storyline prioritise economic development, oppose regulatory measures, and ensure job security and wellbeing.

4.3.1 Prioritising the Economic development

The necessity of economic development is articulated in all of the examined government publications, and constitutes the central goal of the prosperity storyline. This discourse can be seen in the foreword of the *First Low Emissions Technology Statement*, when the overarching ambition of the Technology Investment Roadmap is first established:

“The Technology Investment Roadmap addresses the biggest global challenge of our era – to rapidly reduce emissions in a way that supports economic growth” (DISER 2020a, p. 3).

By explicitly pairing the challenge of global emissions reductions with the goal of continued economic development, the reader is introduced to the notion of “green growth” (Hickel & Kallis 2020, p. 469). This economic idea has an origin in the discourse of sustainable development; promising a path of economic progress which is decoupled from resource use and other adverse environmental impacts. In this case, the text producer implicitly pontificates that green growth is a viable policy pathway which can be realised through the development of and deployment of low emissions technologies. Nevertheless, the promise of decoupling emissions from growth is based largely on optimistic assumptions of the capabilities of future technologies, and therefore remains highly contentious (Hickel & Kallis 2020).¹⁰

The need for Australia to advance its capacity for technological innovation is also heavily underscored by the notion of economic prosperity. In the *Technology Investment Roadmap: Discussion Paper*, plans for the subsidising the development of low emissions technologies are articulated as a business opportunity, particularly when outlining the importance of advancing CSS technologies:

“Australia’s potential for large-scale CCS is already of interest to some potential overseas markets looking to produce low emissions hydrogen from coal and gas” (DISER 2020b, p. 20).

Here, the text producer intends to frame the development of CCS technology as an opportunity for Australian industry to expand its overseas exports. CSS is presented as a

¹⁰ In their research paper on the possibility of green growth, Hickel & Kallis (2020) contend that “there is no empirical evidence that absolute decoupling from resource use can be achieved on a global scale against a background of continued economic growth”.

product which facilitates the production of hydrogen from fossil fuel energy, rather than a means of climate mitigation. By overstating the economic potential of the policy, its environmental impact becomes obscured, and attention is drawn away from the objective of sustainability. Furthermore, by focusing on Australia's capacity to develop CSS technologies for other countries, the text producer capitalises on the lurking sentiment of Australia's pride in itself as a 'high-tech' nation. This notion is reinforced throughout the text in descriptions of Australia as a "world leader" and "pioneer" in the field of technological development (DISER 2020b, pp. 16, 25).

4.3.2 Opposing Regulatory Measures

The examined texts were often found to oppose or shy away from the prospect of restrictive policies. In both policy papers, for example, the text producers emphasise the need for Australian businesses to pursue the proposed policies on a voluntary, rather than mandatory, basis. In the *First Low Emissions Technology Statement*, regulatory measures are dismissed when setting out the "Guiding Principles for Government Support of Low Emissions Technology":

"The Government sees enhanced economic outcomes in expanding rather than limiting the choices of consumers and businesses."

"The Government will respect consumer choice and trust households and businesses to adopt new technologies as they approach parity."

"The Government will not seek to regulate these outcomes through mandated deployment targets or taxation mechanisms" (DISER 2020a, p. 29).

Here, the text producer uses a third-person point of view along with high dynamic modality to create distance between the reader and the "The Government". This positions the government as an authority over the conditions of the policy, constructing a power

asymmetry between the text producer and the reader. While these linguistic features are not atypical in a policy paper, their use in discussions of regulations highlight which areas of the text are presented as “ideologically fixed” and not subject to further negotiation (Machin & Mayr 2012, p. 79). In this case, an economic discourse of ‘free-market environmentalism’ can be observed in the principles which advocate incentivisation, rather than regulation (Anderson & Leal 2001). This discourse helps constitute a dominant ideology which sees market tools such as individual choice and entrepreneurship as the primary drivers of climate action (the social and political implications of this ideological position are further discussed in section 4.3). Thus, by emphasising the voluntary nature of the policy, the text producer reveals the free-market prerogative which is embedded within the prosperity storyline.

Not only do the examined texts stress the importance of an incentive driven policy programme, but they also actively discredit more stringent regulatory measures as too “overburdening” and “paternalistic”. This discourse is evident in both of the examined media releases from the office of Angus Taylor, which promote the ‘technology-led’ emissions reduction strategy to the public:

“At its core, this is about technology not taxes. It means reducing emissions, not reducing jobs and the economy” (Minister for Energy and Emissions Reduction 2020b).

“That would be a sledgehammer to industry and growth not seen since the carbon tax” (Minister for Energy and Emissions Reduction 2020a).

The intention of this discourse is to cultivate a negative attitude towards alternate policy pathways which seek to regulate Australian industry. In the first example, the text producer presents taxation as the structural opposition to the technology-led strategy, presupposing that it would harm the economy more than it would help the environment. In this way, the reader is positioned to see taxation as a threat to Australia’s future prosperity. The second example

provides a more histrionic vision of Australia's economic future, metaphorizing regulative policy measures as a destructive force similar to that of a "sledgehammer". When used in this way, metaphors are deliberately persuasive as they obscure or simplify complex processes in a way that can connote certain emotions. By evoking the image of a sledgehammer, the economic ramifications of new regulatory measures appear far more harmful than they would actually be. As such, the prospect of an alternate policy pathway becomes significantly less desirable to the reader. It is important to note that when metaphors become the dominant way of thinking about a phenomenon (such as taxation) it becomes increasingly difficult to challenge the metaphors that are used to describe it (Semino 2008, pp. 33-34). This is because these metaphors become the 'common-sense' or naturalised way of understanding the world and become embedded within the dominant order of discourse.

4.3.3 Ensuring Job Security and Wellbeing

The importance of job security and wellbeing was a recurring theme within the examined policy texts. It was frequently articulated through discourses which emphasised the potential social effects of the Technology Investment Roadmap in discussions of employment, consumption, and quality of life. This type of problem framing can be particularly persuasive and is often designed to resonate with marginalised communities and low-income members of society. Considering the effects on employment and community wellbeing is a legitimate and necessary aspect of climate policy deliberation and therefore requires careful assessment (Lamb et al. 2020, p. 4). In some cases, text producers were found to focus their attention primarily on the social injustices which the policy sought to rectify. For instance, in the *Technology Investment Roadmap: Discussion Paper*, a case study is used to demonstrate how a government scheme to increase rural development through the deployment of renewable technologies had already given 26 remote communities across the Northern Territory access to more reliable and affordable power (DISER 2020b, p. 21). This discourse frames the

benefits of the policy in a way that does not appear to be linked to a prerogative of economic growth, nor does it serve to push a non-transformative solution. As such, while belonging to the prosperity storyline, this type of rhetoric does not play a role in supporting an agenda of climate delay.

Nevertheless, discourses which promote job security and wellbeing were also frequently found to be hyperbolically framed to portray alternative policy options as regressive. In these instances, the text producer overstated the costs and downsides of more disruptive forms of climate action to demonstrate the ways in which they would burden society. In his media release titled *Australia's Energy Future*, Taylor operationalises this discursive practice in his claim that a transition away from coal energy would threaten fundamental livelihoods and living standards in Australia:

“[Coal] has provided generations of Australian workers with a good income and a comfortable home. To this day, it is the lifeblood of towns throughout rural and regional Australia. It has powered our industries and given rise to others overseas, lifting millions of men, women and children out of absolute poverty” (Minister for Energy and Emissions Reduction 2020a).

The primary intention of this type of rhetoric is to arouse a sense of ‘moral panic’ from the reader. A concept borrowed from media discourse, moral panic causes readers to fear that their way of life is in jeopardy as a way to engender a more persuasive emotional response. At the discursive level, moral panic can be intentionally set in motion by a condition which becomes defined as a threat to the values, interests or well-being of a hegemonic community or society (Machin & Mayr 2012, p. 221). In the example above, Taylor presents the fossil fuel industry as the “lifeblood” of rural and regional communities in Australia, providing stable employment and a high quality of life. The implicature is that this prevailing way of life would be jeopardised by efforts which seek to drastically reduce Australian coal

production. This deters readers from alternative policy pathways which would regulate the extraction of fossil fuels such as coal, as they appear to disproportionately undermine fundamental aspects of the Australian way of life .

4.4 The Compatibility with the Fossil Fuel Industry

The ‘business-as-usual storyline’ underscores the compatibility of low emissions technologies with the fossil fuel industry, and is built around a present-day account of the political economy of fossil energy. Its central narrative is that modern capitalist economies are fundamentally reliant on fossil energy, and cannot be radically transformed or replaced by low-carbon energy alternatives. It also presupposes that fossil fuels such as natural gas will play a crucial role in securing Australia’s low-carbon future, and advocates for their continued use. The business-as-usual storyline therefore promotes a less disruptive technological approach to reducing greenhouse gas emissions, emphasising “end-of-the-pipe” technologies such as carbon dioxide scrubbers and CCS. By obscuring the scope for more effective and transformative solutions which would threaten the fossil fuel industry, this storyline serves to delay meaningful climate action through discourses which promote increased energy efficiency, fossil fuel solutionism¹¹, and the infeasibility of transformative change.

4.4.1 Increasing Energy Efficiency

The first discursive practice which presumes the possibility of effective climate action *within* the continued fossil energy regime is the promise of increased energy efficiency. Central to this discourse is the assumption that gains in energy efficiency are key to reducing the environmental harms caused by fossil fuel energy. In both of the examined policy papers it is taken for granted that energy efficiency cannot be achieved through a single new technology;

¹¹ “Fossil Fuel Solutionism” is a term used by Sheehan (2018) and Lamb et al. (2020) to describe the promotion of fossil fuels by corporate or government actors as a method of climate mitigation.

rather, that it should become “a characteristic of every technology and process”. This puts the emphasis on how fossil energy is consumed, rather than how it is produced. For instance, in the *First Low Emissions Technology Statement*, household energy solutions are listed first among Australia’s priority low emissions technologies:

“Smart meters, smart appliances, energy management systems and better sensors that allow consumers to make wiser choices about how they use energy and other carbon-intensive products” (DISER 2020a, p. 26).

Here, “consumers” are represented as the passivated recipients of the proposed low emissions technologies. When social actors are represented as being at the receiving end of an action, either positively or negatively, they are “beneficialised” by the text producer (Roderick 2016, pp. 77-78). In this case, the beneficialisation of the consumers narrows the solution space to individual consumption choices. Rather than supporting regulations and structural shifts to high emitting actors like the fossil fuel industry, the widespread deployment of more efficient “smart” technologies is presented as the best pathway to lower energy usage. This obscures the role that powerful actors can play in driving down fossil fuel emissions.¹²

In some instances, text producers were found to promote technologies targeted at increasing the efficiency of existing fossil fuel investments. In the *Technology Investment Roadmap: Discussion Paper*, improvements to existing fossil energy systems were discussed and recommended:

“Technologies that increase the efficiency of existing thermal generators and reduce emissions also merit consideration, especially given the high utilisation and long lifespans of

¹² That is not to say that individual choices are ineffective. Rather, a more meaningful discourse of responsibility would recognize that structural changes are complementary to individual action.

these types of facilities; a small increase in efficiency can result in a substantial reduction in emissions over many years” (DISER 2020a, p. 29).

It is important to note the description of fossil fuels such as coal or gas as “thermal generators”. This lexical choice obfuscates the negative connotations associated with fossil resources like coal or gas and helps to draw the reader’s attention towards the positive elements of the statement. Additionally, the presupposition that increased efficiency can reduce emissions reveals an embedded bias towards technologies which promise to modify the processes of exiting fossil energy systems. This strategy is contentious in the field of climate policy as it is challenged by the environmental economists who argue that the rate of resource consumption inevitably rises with increased in efficiency due to a resulting increase in demand (known as the “rebound effect” or “Jevons paradox”)(Polimeni et al. 2015). Nevertheless, by presenting “cleaner” and more efficient fossil fuel energy as a plausible policy outcome, the text producer reifies the overarching business-as-usual storyline.

4.4.2 Presenting Fossil Energy as a Solution

Fossil fuel ‘solutionism’ is another discursive practice which casts fossil fuel energy as a necessary component of climate action. Both of the examined policy papers presuppose that the fossil industry will continue to operate as a primary provider of energy with the help of new low emissions technologies. This assumption can be observed in the foreword of the *First Low Emissions Technology Statement*, which makes the claim that:

“Existing, proven technologies like coal, gas, solar and wind will play important roles in Australia’s energy future” (DISER 2020a, p. 2).

By listing coal and gas energy together with solar and wind energy, the text producer conflates fossil resources with renewable forms of energy. This suggests that the government is not willing to commit to an energy transition that moves away from energy derived from

the burning of fossil fuels. Moreover, a high level of epistemic modality treats the continued use of fossil energy as a certainty rather than an assumption. This lexical choice gives the text producer the power to state what “will” happen, closing down alternative outcomes such as a future where coal or gas are replaced by their renewable alternatives. It is also coloured by elements of technological determinism, as it conceives of technological development as a linear pathway which can be predicted with a high degree of certainty.

The examined texts also share the assumption that technological innovation will make Australia’s energy future *compatible* with the continued use of fossil fuel energy. In the *Technology Investment Roadmap: Discussion Paper*, proposed technologies such as battery storage and CCS are listed as complementary to existing fossil fuel investments:

“PV and battery storage technology are bolt on and complementary to existing diesel generation investments”

“Deploying CCS for hydrogen production from fossil fuels could help generate economies of scale in carbon sequestration projects and support its use for other applications” (DISER 2020b, p. 32).

The metaphoric expression “bolt on” used in the first extract illustrates the ease of upgrading existing energy systems with low emissions technologies. The capabilities of the technologies, however, are not further discussed nor is any information provided on how they would actually reduce emissions. This suggests that the text producer intends to emphasise how the proposed technologies can preserve investments in diesel generation, rather than how they will reduce emissions. Similarly, the second extract assumes that fossil fuels are necessary in the production of hydrogen, while details on the actual sequestration potential of the proposed CSS systems are left absent. In both cases, the text producer does not elaborate on their claims; reducing the ambiguity on whether low emissions technologies are actually able to achieve the promised levels of decarbonisation. As a form of lexical suppression, this

rhetorical strategy obscures alternative policy options from the reader, reinforcing the notion that technology-led climate policy is the only reasonable pathway towards decarbonisation.

4.4.3 Avoiding Transformative Change

The idea that fossil fuels will, in some capacity, help secure Australia's carbon-constrained future is closely related to the reoccurring notion that transformative change is undesirable or even unfeasible. This discursive component maintains that strong climate policies will impinge on politics and society to the extent that its final implementation would inevitably fail. For this reason, this discourse primarily manifests itself in representations of technologies which help reify the current state of society. For instance, in the *First Low Emissions Technology Statement*, existing fossil fuel resources are represented as necessary to the continued affordability and reliability of Australia electricity grid even after technological intervention:

“The existing coal fleet provides critical system stability as well as the bulk of the low-cost power consumed by Australia's energy-intensive industries, while gas generators provide the stability and services needed to enable the integration of rapidly increasing solar and wind energy capacity” (DISER 2020a, p. 16).

The condition of stability is given salience in reference to energy produced by existing fossil fuels (emphasised as “critical system stability”). While not overtly stated, this lexical choice produces a structural opposition which sees system instability as the implicit alternative to coal or gas energy. This discursive practice can be understood as a form of ‘ideological squaring’ (van Dijk 1998), in which the text producer either accentuates the positives of their own view or accentuates the negatives of an opposing view to create an implicit evaluation through opposition. For this reason, a ‘business-as-usual’ objective is presented as the more desirable option, where low emissions technologies serve only to compliment Australia's existing energy systems.

A further aspect of this discourse is the persistent representation of human behaviour as something that is fixed or highly resistant to change. This can be observed in the transcription of Finkel's speech, *Achieving the 'Electric Planet'*, where he claims that developments in low emissions technologies will enable decarbonisation in a way that would require no dramatic change to the Australian way of life:

“I don't think that the alternatives to changing our lifestyles, such as global population control or behavioural change so that we all ride bicycles instead of cars are likely....people expect to see every year or certainly cumulatively over a decade-by-decade improvements in their cost of living and their lifestyles and with technology, we can deliver it” (Finkel 2021).

Finkel treats “behavioural change” as a pejorative term, listing it together with a far more controversial notion of depopulation. Since discourses which advocate for population control are commonly associated with the ecofascist movement, the implication is that both of the listed policy options are dangerous and thus unacceptable (Alberro 2020). More explicitly, Finkel attempts to demonstrate the futility of behavioural change by making the generalised claim that, at an effective scale, it would require that “we” would all need to change “our lifestyles”. By using collective plural pronouns, the listener is addressed as being on the same side as the author, establishing a broader ‘we-community’ concerned about the implausibility behavioural change as a political strategy (Schutz 1967). He then offers a more desirable policy alternative in which new technologies allow the continuation of “decade-by-decade” improvements to our lifestyle in a way that does not involve transformative change. The underlying sentiment here is that climate action can be almost undetectable and can be attributed to the false assumption that technological innovation will inevitably facilitate nation-wide decarbonisation without any significant change to energy habits. Hence, this optimistic representation of technology does not pose a threat to the fossil fuel industry, as it envisions a ‘business-as-usual’ future where urgent climate action is not a priority.

4.5 Social Practice: (Re-)producing a Neoliberal Status Quo

The analysis of social practice considers the wider social forces that constitute, and are constituted by, the three identified socio-technical storylines. Where the preceding section details the textual and discursive features of each storyline (through a combination of descriptive and interpretive analysis), this section explores the wider social practices which influence and are reflected by the examined texts through an explanatory analysis. This forms the macro frame of Fairclough's critical-analytical framework, and gives some insight into how the examined discourses change or reproduce power relations in a broader Australian context.

To supplement the storyline analysis, the wider social practices which influence the examined texts can be mapped out in semi-autonomous social 'fields' to reveal how interconnected actors struggle to gain or maintain power (Bourdieu & Wacquant 1992). Since all of the examined texts were produced by representatives of the Liberal-National Coalition, the three socio-technical storylines have been located within the 'political field' of Australia. This field is made up of the actors and government institutions which comprise Australia's political system (parties, legislatures, state departments, etc.) and is characterised by a set of dominant norms and practices which influence what kind of discourse can be produced. Since the text producers investigated in this study represent Australia's Federal Government, they are classified as *incumbent* actors within the Australian political field due to the privileged position of power which they maintain. This means that the discourses and storylines which they produce play a significant role in shaping the dominant norms and practices for their field, thereby influencing which meanings other actors take for granted. Thus, as it is in the interests of an incumbent actor to perpetuate the existing distributions of political power, it can be assumed that the examined texts were intentionally constructed to reproduce (rather than transform) the status quo of the Australian political field.

Moreover, since the normative assumptions and value orientations embedded in each of the socio-technical storylines were found to prioritise reduced intervention and spending, private enterprise, debt reduction, consumer choice, and competition, it can be inferred that they reproduce a status quo based upon a prevailing neoliberal ideology. The influence of neoliberalism has had an observable effect on the discursive construction of public policy in Australia, particularly in the area of climate policy (Coffey & Marston 2013). This is evident in past attempts at market-based climate policies, such as the carbon pricing scheme that was briefly introduced in 2011 under the Gillard Labor government (Chubb 2014). Much like these previous policy efforts, the Technology Investment Roadmap presents the climate crisis as an issue of inefficiency and poor management and therefore seeks to produce a policy pathway which is compatible with neoliberal ideals. Moreover, it frames climate action as an opportunity for economic growth and prosperity, and advocates a “hands off” policy approach in which responsibilities for the development and deployment of the proposed low emissions technologies are offloaded to the private sector. This ‘minimal state’ narrative reproduces many of the neoliberal norms and practices which underpin the Australia political field, and further reveals the Liberal-National government’s struggle to maintain its position as an incumbent actor.

4.6 Discussion

The aim of this research project is to explore the ways in which socio-technical discourses combine to shape the Australian federal government’s recently introduced ‘technology-led’ emissions reduction strategy (articulated primarily through the Technology Investment Roadmap). In particular, it aims to find out whether the prevailing representations of the proposed low emissions technologies carry embedded meanings which contribute to further climate delay in Australia. By conducting a Critical Discourse Analysis (CDA) in conjunction with Hajer’s (1997) storyline concept and Bourdieu’s (1992) field theory, this

research project was able to gain a deep insight into the underlying textual, discursive, and social processes which constituted, and are constituted by, the discourses within the examined government publications.

The results of the CDA reveal that each text producer has a strong preference for non-transformative policy pathways, which they articulated through three dominant socio-technical storylines; one which promises readers a carbon constrained future (the ‘climate action storyline’), one which assures readers of further economic growth (the ‘prosperity storyline’), and one which stresses the policy’s compatibility with the fossil fuel industry (the ‘business-as-usual storyline’). All three of these storylines hold a high discursive affinity and are united in their advocacy for a non-transformative policy pathway; promising prosperity and rapid decarbonisation *within* Australia’s existing fossil energy regime. Thus, a prevailing representation of technology emerges as the discursive ‘bridge’ between each storyline, promising a policy pathway which reconciles typically conflictual concerns for fossil fuel extractivism, economic growth, and climate action. This representation of technology is largely built upon ideas of technological optimism and determinism, constructing a discursive reality in which low emissions technologies are taken for granted as an *inevitable* solution for enabling rapid emissions reductions in Australia. As such, more disruptive solutions are not seen as necessary, as it is taken for granted that future technologies will unlock possibilities for addressing climate change.

Furthermore, by situating the examined texts within a wider political context, the pervasive influence of neoliberalism becomes increasingly apparent. This ideology manifests itself in the norms and practices of all actors within the political field of Australia, thereby establishing a political status quo which affects how discourses are constructed. Since the Liberal-National government holds a position of power within the current configuration of this political field, the discursive construction of the Technology Investment Roadmap is

characterised by their struggle to perpetuate, rather than transform, the current political status quo. This explains why all three socio-technical storylines take an ambiguous position on climate change that superficially acknowledges it as an issue worthy of a policy response, while simultaneously denying its reality as a systemic problem. By advocating exclusively for *non-transformative* low emissions technologies, the examined texts reveal an underlying preference for a policy pathway which does not pose a threat to the government's current position of political power. Instead, the discursive components behind each storyline are intentionally constructed to offer socio-technical solutions which *reproduce* the dominant neoliberal norms and practices, thereby perpetuating the status quo. Thus, it can be concluded that these dominant technological discourses do indeed play a principal role in obscuring alternative avenues for social and institutional change, resulting in a policy which once again serves to delay meaningful climate action in Australia.

Chapter 5: Conclusion

The final chapter of this research project considers the original contributions and key findings that were examined in Chapter 4. These findings are summarised and situated academically to show how they relate to the literature reviewed in Chapter 2, and how they contribute to ongoing debates over the role of technology in climate policy. The policy implications and recommendations are then identified, and the project's limitations and its future avenues of research are discussed. Lastly, the overarching argument and purpose of the research project reiterated in the concluding remarks.

5.1 Summary of Key Findings and Contributions

This research project demonstrates how the technical discourses that shape the Australian Federal Government's 'technology-led' emissions reduction strategy serve to delay meaningful climate action. The Critical Discourse Analysis (CDA) revealed three dominant socio-technical storylines that were embedded within the examined government publications. These storylines were characterised by elements of technological optimism and determinism, and were each constructed from a number of interrelated discursive components. At the micro and meso level of analysis, these components were found to downplay the need for non-technical climate solutions; instead presenting low emissions technologies as the *inevitable* solution decarbonising Australia. In this way, the scope for more transformative policy pathways was effectively obscured. When examined in a broader social context with the help of Bourdieu's Field Theory, this bias towards non-transformative technical solutions revealed the Liberal-National government's desire to maintain a discursive hegemony over the Australian political field. Therefore, in order to preserve this position of discursive power, the Technology Investment Roadmap was found to reproduce, rather than transform, the dominant norms and practices which constitute Australia's neoliberal status quo.

With regard to the academic debates surrounding the role of technology in climate policy, this research project builds on the argument that technological solutions do indeed pose a risk to effective climate mitigation. The key findings from the CDA contribute to current understandings of how policymakers can use pernicious promises of future low emissions technologies to construct visions for reducing carbon emissions *within* an existing fossil fuel regime. Not only does this detract from non-technical climate strategies, but it allows technology itself to become a discursive vehicle in which the policymaker can embed certain political interests which may conflict with environmental objectives. Furthermore, given the uncertainties, high costs, and slow pace of development associated with the proposed low emissions technologies, a just energy transition will most likely demand some form of social or institutional change. That is not to say that technology should be excluded from discussions of climate policy; renewable technologies will need to play a key role in any successful clean energy transition. Rather, this research project contends that technical innovation should not be prioritised over other, non-technical, emissions reduction strategies. Moreover, by bringing Lamb et al.'s (2020) notion of climate delay into an Australian political context, this research project hopes to contribute to the existing body of literature on Australian climate policy. In particular, this project hopes to provide researchers with a deeper understanding of how technological discourses of climate delay have been operationalised in Australian climate policy, as well as how they combine into dominant storylines which justify inadequate mitigation efforts. Additionally, by using CDA to examine these technological discourses, this research project demonstrates a means for taking environmental policy research in a direction that has to date attracted relatively limited interest; that is, the critical analysis of the influence of discourse on environmental policy-making. By linking language, ideology, and social change, a more comprehensive policy analysis which recognises wider social processes is shown to be possible.

5.2 Policy Implications and Recommendations

If the Technology Investment Roadmap is to have any credibility as an emissions reduction strategy, then policymakers must work to re-prioritise environmental objectives amongst other social and economic interests. This would first necessitate a more equitable process of public deliberation that highlights responsibility, addresses social injustice, and identifies appropriate policy pathways that emphasise climate action. Furthermore, since fossil fuels are deeply entrenched in the Australian way of life, it must recognise that removing them will demand significant social and institutional change. Australian climate policy must therefore aim to transform, not sustain, the neoliberal status quo that currently dominates the Australian political field by promoting more transformative solutions.

Drawing on the results of the analysis, this research recommends five key policy changes:

- The policy needs to articulate a goal of ‘net-zero emissions by 2050’ as its destination to give stakeholders an understanding of emissions reductions required.¹³
- The policy needs to avoid excessively optimistic or deterministic language in its representations of low emissions technologies.
- The policy needs to prioritise commercially viable technologies with proven abatement potential over unproven technologies such as BECCS and CCS.
- The policy needs to update its stretch goals to evaluate environmental and social outcomes, rather than exclusively economic ones.
- The policy needs to acknowledge the economic trend away from fossil fuels and stop prioritising ‘end-of-the-pipe’ technologies which perpetuate its use.

¹³ Alternatively, the policy could be re-articulated to align with the 1.5°C goal of the Paris Climate Agreement and the Sustainable Development Goals.

5.3 Limitations and Future Research

Although CDA does not require a large data set to achieve a comprehensive critical analysis, the scope of this research project was partially restricted by the small amount of relevant material that was available at the time for examination. This makes it difficult to generalise from some of the research projects' findings, as the identified discourses only pertain to a limited set of government publications. Nevertheless, as scholarship in Australian climate policy continues to evolve, these limitations present opportunities for future research. To further develop the findings of this research and to expand its limited data set, a comparative analysis of similar emissions reduction strategies from different countries could provide a better understanding of the alternative forms technological discourses could take. The findings of this project could also be developed further to include the critical analysis of how the Technology Investment Roadmap has been represented in major media outlets. This would provide insight into how the identified technical discourses are perceived by the Australian public.

Furthermore, the Federal Government has recently indicated that a second Low Emissions Technology Statement will be released in early November 2021. By applying a similar qualitative methodology, future research would be able to identify whether the dominant socio-technical storylines have changed since the policy was first published. This would also serve to test the robustness of the results of this research project, and could expand on the detail of the identified discursive components. There is also an opportunity for researchers to quantitatively analyse the Technology Investment Roadmap, as the second Low Emissions Technology Statement plans to establish an approach to evaluating the future impact of each priority technology. Such an analysis might consider the economic assumptions surrounding developing technologies such as carbon capture and storage to determine whether the modelling used is also influenced by the technological optimism of the text producer.

5.4 Concluding Remarks

To effectively tackle climate change, Australia must move beyond technological questions and develop a more ambitious emissions reduction strategy. This will require the Federal Government to consider more transformative policy pathways and leave behind some of the stories that contribute to ecological destruction. Nevertheless, this study shows that the Technology Investment Roadmap is not currently equipped to deliver these systemic changes as it reproduces long-held assumptions regarding the inevitability of continued economic growth, energy consumption, and future fossil fuel extraction. It is the hope of this research project that these insights feed into a more crucial conversation around Australia's long-term response to the climate crisis.

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