NONE ARE SO DEAF AS THOSE WHO WOULD NOT HEAR

Identifying where, who, and how the coal industry influences Australian federal energy policies

Martin Fox

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Sustainability Studies

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*Identifying where, who, and how the coal industry
influences Australian federal energy policies*

Martin J. Fox

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Abstract

The widespread consequences of climate change are becoming more and more evident around the world and are raising crucial awareness to world leaders that a sustainable transition is direly needed to mitigate against disastrous climatic events. In Australia, in early 2020, these events took the form of some of the most devastating and largest forest fires the country has ever seen. This devastation is raising important questions concerning the country's decarbonisation process, as academic studies highlight the link between increasing greenhouse gas emissions (GHG) and amplification of climatic events. The science of climate change is solid and established: it is now up to the political arena to enact sustainable change. In Australia, electricity production is one of the largest and most extensive GHG emitting industries as well as one of the most environmentally degrading, as it is almost entirely dependent on fossil-fuel burning (mainly coal). The country has a strong and deeply-rooted history with coal, which to some extent has provided the significant economic prosperity the country benefits from today. This history, alongside the multiple strategic power plays that the coal industry enacts, especially within the federal government, has proved to be a monumental roadblock towards the country's transition away from coal-burning as the major source of electricity towards renewable energy. The results of this thesis highlight, grounded in theories of Sustainability Science, *where* the power of the coal industry lies within the Federal Government, *who* exercises that power, and *how* it is exercised. These show that within the Federal Government, the major political arena for nationwide energy policy, the coal industry exercises its influence and manipulation through various and complex interactions with high-ranking decision-makers. By de-complexifying an entangled web of interactions, the objective of this thesis is to provide potential targets for future change-makers to "hit" to efficiently enact a sustainable transition to shift the Federal Government's stance away from coal and towards renewable energies. Further recommendations are provided in regards to creating a path ahead that is grounded in environmental governance theory, transitioning away from network governance to a more adequately suited adaptive governance to balance social, economic, and environmental sustainability that is required today. Such recommendations, centred around the shift from engineering resilience to ecological resilience, could also serve as an inspiration for other case studies around the world where unsustainable practices exercise hegemony over policy-makers, hindering sustainable transitions.

Keywords: Sustainable transitions, Fossil-fuel hegemony, Decarbonisation, Environmental Governance, Australian Federal Government, Ecological Resilience

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"The twentieth century has been characterized by three developments of great political importance: the growth of democracy, the growth of corporate power, and the growth of corporate propaganda as a means of protecting corporate power against democracy."
Alex Carey

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1. Introduction

Early 2020 will be marked in Australia as the time when the worst wildfires the country has seen to date hit (Tharoor, 2020). The devastation has been extensive, countless homes destroyed, multiple lives lost as well as record-breaking burnt forest areas (Glover, 2020). Whilst fires are a common occurrence and part of the natural growth cycle of certain forests in Australia, there is general agreement that their current intensity and frequency have been amplified by anthropogenically caused greenhouse gas (GHG) emissions in the atmosphere (Oldenbrough et al., 2020; Worland, 2020). There is consensus in the literature that if such GHG emissions are not severely decreased, the frequency, intensity, and magnitude of such disasters will increase significantly: such fires will only become worse in years to come (IPCC, 2014, 2018). To do so, countries around the world must undertake a decarbonization path on which high GHG-emitting industries and activities must transition to a sustainable (i.e., renewable) energy base (IPCC, 2014). In Australia, for this to take place, there must be a combined bottom-up and top-down approach to allow for a sustainable transition, finding dynamic balance between environmental, social and economic sustainability (Baer, 2016). Governmental policies must shift from supporting fossil-based systems for energy such as coal-fired power plants to renewable energy development such as solar, wind, hydro and other sources of power (Byrnes, Brown, Foster, & Wagner 2013; Baer, 2016). On top of this, individual lifestyle changes must take place, towards more sustainable everyday practices in order for Australia to reach its climate target goals agreed in the Paris agreement in 2015 (Kilvert, 2018).

Australia has one of the highest environmental footprints in the world, significantly contributing to global GHG emission**s** (Climate Council of Australia, 2018). This mainly revolves around unsustainable lifestyle choices and political dominance of the coal industry blocking renewable energy implementation, seeping into all forms of government and the general population (Byrnes et al., 2013; Baer, 2016). Examining the latter, Australia has a strong history of economic growth linked to coal via coal extraction and burning for electricity production (Baer, 2016). This has led to the federal economic and political system maintaining and favoring the industry's empowerment, resulting in coal's hegemony over national electricity production (consent of political, economic, and socio-cultural domination (Gramsci, 1971)) (Effendi and Courvisanos, 2012; Baer, 2016). This has put significant obstacles for any alternative energy source development, especially federal renewable energy plans (Byrnes et al., 2013): in 2018, 17% of Australia's electricity production stemmed from renewables, in contrast to over 60% stemming from coal (DOEE, 2019). There have been multiple attempts to contest

this hegemony and attempts to install effective decarbonization policies, yet most of them have failed due to action taken either directly or indirectly on behalf of the fossil fuel industry (Pezzey, Mazouz, & Jotzo, 2010).

This project **aims** to provide a more in-depth analysis of the interactions of the coal industry and the Australian federal government in the context of transitioning away from coal as a source of energy and towards renewable energy. More specifically, this thesis provides clarity to a complex issue and highlights the dimensions of power that the dominant group exercises on federal energy policies. Doing so could significantly aid in the process of identifying transition points to shift the direction of Australian energy away from fossil fuels and towards renewable energies (Lukes, 1974; Geels, 2011; Storey, 2018). This paper has the potential to serve as an important stepping stone for future action to strategically combat the dominance of the coal industry to aid in reducing GHG emissions. Within a Sustainability Science framework, such work is crucial to mitigate environmental impacts and deadly climatic events (Lang et al., 2012).

Therefore, the main research questions are:

RQ: What are the political hindrances to a sustainable transition away from coal dependency to renewable energy implementation within the Australian Federal Government?
A: Where do these hindrances come from?
B: Who exercises them?
C: How are they exercised?

To answer these, first a historical analysis of the coal industry's federal dominance is presented, followed by its influence on hindering renewable energy development (specifically wind and solar). Second, a multilevel perspective is provided to visualise this case's complex and dynamic actor interactions. Third, a Gramscian hegemony framework is used to identify the power plays by the coal industry and the federal government, i.e. hegemonic and counter-hegemonic forces. This is followed by framing these according to Lukes' (1974) Power theory, identifying the three dimensions of power exercised. Finally, future pathways are recommended.

2. Link to Sustainability Science

The field of Sustainability Science emerged out of the necessity for a new field to aid in solving complex global environmental challenges, requiring effective dynamics between social, economic and ecological systems (Kates et al., 2001; Clark et al., 2003). One of the major objectives of the field is to build synergies between political decision making agendas and sustainable development to curb human activities within ecological limits (Kates et al., 2001; Lang et al., 2012). To do so, transdisciplinary approaches, combining natural sciences with social sciences are crucial in order to understand and work within the complexity of inter-related fields to solve such issues within specific systems, coined socio-ecological systems (Rotmans & Loorbach, 2009; Smith & Stirling, 2010). National governments must play their part in reducing their high GHG emitting industries in order to mitigate against potentially disastrous climate consequences such as, in the context of Australia, increasing bushfires, floods and droughts (IPCC, 2018). Recent events during late 2019 and early 2020 highlight the urgency of this project and how governmental actions linked to industry can affect both the local and global environment.

This project analyses the influence and power plays of the coal industry on the Australian government, more specifically within the context of hindering a shift away from coal towards renewable energy development. This issue is important in the field of Sustainability Science as halting the actions of the coal industry, a high greenhouse gas (GHG) emitting industry, needs to be stopped and a transition away from fossil fuel use through renewable energy is necessary in light of the current conditions of the Earth's climate (IPCC, 2018). Indeed, this no longer becomes a socio-ecological system (characterised by being restricted to a specific geographic location such a region), but rather a socio-technical one due to its lack of place-boundness as well as socio-technical regimes operating simultaneously across multiple levels within the system (Smith & Stirling, 2010). Renewable energy presents a more optimal and less GHG emitting source of energy for human consumption, with benefits being observed and growing around the world, having for the large part been provided by governmental support with the goal to phase away from fossil-fuel dependency (IPCC, 2018).

This links directly back to Sustainable Development Goal (SDG) 7, "Affordable and Clean Energy" (UN, n.d.), where renewable energies provide affordable and clean energy to citizens, in this case in Australia. Indirectly, this can lead also to SDG 8, "Decent Work and Economic Growth" through providing

new employment opportunities as well as the opportunity to transition to a Green Economy, focused on renewable energies and sustainable lifestyles as well as to SDG 9, "Industry, Innovation, and Infrastructure", by the phasing out of the coal industry and replacing it by innovative and sustainable industries (UN, n.d.). Other SDGs are also connected to the coal industry's electricity production, but these three SDGs, especially SDG 7, are the prime goals that this thesis aims to aid in achieving.

3. Background

3.1. A Historic Dependency on Coal

Coal and other fossil fuels are naturally abundant in large quantities throughout Australia, especially in the states of Queensland and Northern Territory (Baer, 2016). Due to this high availability, Australia has a long history (Table 1) of coal mining and burning for electricity use and coal exportation, which have been the major source of the country's historic economic prosperity (Byrnes et al., 2013). This has resulted in positive social consequences, where coal's rise resulted in increased well-being levels throughout the country, leading to the coal industry obtaining an important and respectable image amongst the general population, to the point where coal mining is perceived to be an essential part of Australia's economic prosperity (Baer, 2016). To ensure it maintains and grows its revenue, the coal industry has historically provided financial support to political parties holding power in the Australian Federal Government, which is still currently taking place with the current Prime Minister (PM) Scott Morrison, who brought a piece of coal to a Parliament session stating that coal was not harmful for Australia and is a clean source of energy (Hudson, 2017). On top of this, the 1980's marked a crucial point in the coal industry's history when priorities shifted from domestic to international use, skyrocketing the industry's revenue, leading it to become one of the government's top priorities and primary focus (Byrnes et al., 2013).

Table 1. Notable dates in the history of the coal-lobby hegemony in Australian federal politics.

Date	Explanation
1980's	Formation of a national advisory committee on climate policy led by fossil-fuel industry representatives, known as the "Greenhouse Mafia" which has exercised significant control of policy making decisions since then and only green-lighting policies that are towards their own benefits and red-lighting any policies that might threaten or put in danger their activities (Baer, 2016). Members of the Greenhouse Mafia have become major donors to both leading Australian political parties (Australian Labor Party and the Liberal Party) in order to guarantee coal export fluxes in their favor (Pezzey et al., 2010). These members include: Business Council of Australia, Minerals Council of Australia, Australian Coal Association (ACA), Australian Greenhouse Network
1997	The Australian Prime Minister at the time, John Howard (in office from 1996 to 2007) chose not to ratify the Kyoto Protocol as it would set into motion a decrease in dependency on fossil fuels, hence threatening the ever-powerful coal lobby in Australia (Pearse, McKnight, & Burton, 2013). The Prime Minister's justification at the time was based on climate change skepticism, more precisely doubting the link between coal mining and rising global temperatures (Baer, 2016). After the Kyoto conference, the Howard government set policies into motion that eradicated or reduced regulations aimed at the coal industry, granting the industry more freedoms in terms of land use, quantity of mined coal as well as shipping rights along the Eastern coast (Pearse et al., 2013).
2007	During the office of PM Kevin Rudd (in office from 2007-2010 and briefly in 2013), members of the former Department of Foreign Affairs and Trade, who had supported PM Howard's coal dependent policies, were transferred to the new Department of Climate Change: " *[…] parts of the government became a branch of the mining industry"* (Pearse, 2009, as cited in Baer, 2016, p.198).

Table 1. Notable dates in the history of the coal-lobby hegemony in Australian federal politics. *continued*

Notable Date	Explanation
2008	Under PM Rudd, the federal government designated $580 million AUD aimed at developing and expanding port facilities used for coal transportation and $500 000 AUD in order to increase efficiency between mines and the ports (Pearse, 2009, as cited in Baer, 2016, p.198).
2010	PM Rudd sought to put a carbon tax scheme into place, aimed particularly at high-emitting industries such as the coal industry, regardless of his own political party not supporting his decision and ambition (Baer, 2016)
	This led to him being overthrown from his position the same year, which was in large part caused by a media campaign heavily funded (over $20 million AUD) by members of the fossil fuel industry, especially the Greenhouse Mafia (Davis, 2011; Williams, 2013)
2011	PM Rudd's replacement, Julia Gillard also attempted to set a carbon tax into place, which was revoked 3 years later once the new conservative government, led by PM Tony Abbot (2013-2015) took office (Pearse et al., 2013).
	The new PM stated that repealing the carbon tax set in place by his predecessor was one of his most iconic triumphs as newly elected PM, using opinion polls that showcased that the general population was *not* in favour of the carbon tax, to support his statement (Pearse et al., 2013).

It has been shown that the Australian coal industry has heavily influenced the glacially slow development of federal decarbonization policies and resulting renewable energy implementation (Pearse, 2009). The industry works towards maintaining economic and political monopoly in order to maintain control over the electricity market to supply the country's electricity, all whilst guaranteeing the government gives it free reign (Pearse, 2009; Baer, 2016).

3.2. Renewable Energy Development in a Coal-Dominated Political Arena

The fossil fuel hegemony in Australian politics has severely hindered any development towards decarbonization, especially renewable energy development (Byrnes et al., 2013). Both dominating political parties, the Australian Labor Party and the Liberal Party (currently in power) have significantly reduced their commitments towards renewable energy development (Parkinson, 2017). The conflict of interest on a federal level, between economic benefits stemming from the coal industry and its negative environmental impacts leans towards the former, as it is believed that economic benefits outweigh all other alternatives (Hudson, 2017). Iconically, in 2004, it was revealed that PM Howard, alongside the federal energy minister, met with coal industry representatives to request their aid in hindering renewable energy development as these were developing at a faster pace than anticipated, potentially harming the Australian economy (Baker, 2005). This has allowed the coal industry to spearhead Australia's electricity grids, controlling them, and ensuring large financial subsidies are used to maintain them and their activities through monopolizing the electricity compatibility (Baer, 2016).

Furthermore, the 1980's marked the privatization of electricity production, making it difficult for government-funded renewable energy development to compete economically with such easily accessible, cheap and reliable electricity (Schlapfer, 2009). Extensive coal produced electricity has allowed Australians to benefit from cheap and reliable electricity over the past decades, installing a norm of excessive electricity supply at an affordable price, to the point where any change is not supported by the general public (Luthi & Prassler, 2011). Socially, the Australian public holds the coal industry in high esteem and praise as a source of economic growth and important job opportunities, advantages which the coal industry utilizes to de-incentivize decarbonization efforts (Baer, 2016).

Under PM Gillard's Labor government, sustainable change was initiated with the creation of the Australian Renewable Energy Agency (ARENA) and the Clean Energy Finance Corporation (CEFC) to facilitate sustainable energy development (Ekins, 2015). Once the Liberal Party took over, it attempted to abolish both bodies due to alleged inefficiency and not being aligned with Australian economic growth values, yet failed (Ekins, 2015). Instead, it significantly reduced their funding to de-incentivise research and made them dependent on the Labor party for financing approval (Australian Associated Press (AAP), 2014). At the same time, they appointed a prominent climate change skeptic to review the Renewable Energy Target (AAP, 2014). This review led to even more policy uncertainty on the issue of renewable development in the country and resulted in significant decreases in investment in research and development on renewable energy (Hudson, 2017).

3.3. The Case of Wind and Solar Energy:

Why Australian Politicians Oppose Their Implementation

Due to its large size and diverse climates, Australia is highly abundant in sun and wind resources and has significant potential in becoming a global leader in the field of solar and wind energy if it undergoes serious infrastructure development (Valentine, 2010). Yet, since the late 1990's, policymakers in Australia are very hostile towards renewable energy implementation on the basis of monetary, psychological, and ideological factors (Tables 2 - 4). (Baer, 2016; Hudson, 2017).

Instead of allowing the development of sustainable and green energy sources, the Federal government is green-lighting the construction of new coal-fired stations to be built to continue supplying electricity (Hudson, 2017). Many arguments provided by the government in *opposition* towards wind and solar energy development stem from ineffectiveness towards meeting Australian electricity demand, alleged environmental impacts, lack of aesthetics, and health impacts to neighbouring inhabitants (Hudson, 2017). Another argument used is that renewable energy development would be ineffective as part of Australia's decarbonization process (Prest, 2007). In the state of Victoria, important wind and solar development plans were blocked with the argument of wind farms negatively impacting the beauty of the landscape and their potential to decrease the landscape's value for tourists (Mercer, 2003). This lack of faith in renewable energy has led to slow federal financial support towards nation-wide renewable energy research and development (AAP, 2014).

Regarding the lack of aesthetics argument of wind farms, in the early 2000's conservative politicians in both dominant political parties began openly opposing renewable energy (especially wind and solar) development (Hudson, 2017). In 2006, the Treasurer of Australia and member of the Liberal Party, Peter Costello, openly stated "*I think they're* [wind farms] *ugly, I wouldn't want one in my street, I wouldn't want one in my own back yard*" (Prest, 2007, p.255). His successor also was openly opposed to their development, calling them "*utterly offensive*" (Milman, 2014, p.1) both publicly and during international energy summits.

For the negative health argument, conservative politicians in both parties have historically supported this argument with claims that they can seriously harm human health (Quiggin, 2013). This argument was so prevalent amongst politicians that PM Abbott in 2014 granted extensive funds for research to be undertaken to prove that wind farms were harmful to human health in order to stall their development (Hannam, 2014, 2016).

From an efficiency perspective, politicians claim that renewable energies require a traditional energy source (i.e., fossil-fuel based) as a backup energy due to their lack of reliability (i.e., dependent on weather conditions) (Hudson, 2017). Indeed, in 2006, the Environment Minister at the time and senior politician of the Liberal Party, Ian Campbell told the Senate: "*If you genuinely tell people that building a wind farm here will save the planet from climate change you are doing a massive disservice to the environment. It is an atrocious misleading of the Australian community*" (Prest, 2007, p.230). At the same time, the Federal Industry Minister criticized renewable energy plans as "*Mickey Mouse schemes*" (Prest, 2007, p.254). Such hostility towards sustainable energy development is still present, with both major political parties firmly believing in such arguments (StopTheseThings, 2014).

Economically, many politicians state that renewable energy development requires a significant amount of governmental subsidies in order to compete economically with the cheap electricity provided by fossil-fuel burning: this has been deemed unsustainable and unfair by politicians (Australian Broadcasting Corporation (ABC), 2006). Conservatives argue that there will be devastating consequences for Australian electricity consumers due to the inefficiency of wind and solar energy as they would drive up energy prices, rendering it unavailable for the general population (Hudson, 2017). Their main argument revolves around the blunt statement that renewables are not able to "*keep the lights on*" (Hudson, 2017, p.11).

Table 2. Examples of monetary factors used by Australian politicians to oppose renewable energy development. Inspired by Hudson (2017).

Examples of Monetary Factors	Explanation (Hudson, 2017)
Money (campaign donations, post-career jobs)	Mining companies provide financial support and incentivise favourable policy actions through their donations (Keane, 2012).
	Employment opportunities based on party leaders and voters are priorities for Australian politicians (Hilman & Mitt, 1999).
	Currently, renewable energy companies do not have as well-paid jobs with impressive benefits as in the corporate or fossil-fuel worlds which de-incentivises (former) politicians to enter this world.
Blame avoidance	Politicians avoid supporting renewable energy development as they want to avoid being blamed for alternative energy sources that result in higher prices and/or irregular electricity availability as that could threaten their position of power.
Lack of capacity of government to act	Bureaucrats moving between businesses and governments back and forth: former Mineral's Council of Australia's Climate Policy director transferred to the office of the PM in 2017 (Slezak, 2017).
Informational factors	Corporations and trade associations in the fossil fuel industry provide (Hilman & Mit, 1999): - Information to shape policy through "independent" studies; - Financial and informational support to individual voters through "constituency building".
Active disinformation by incumbents	Target rural areas and voting constituencies to prevent/weaken renewable energy support through campaigns such as the "*Let's cut emissions, not jobs*" campaign in 2009.
Constant news availability/cycle	Has created new attentional pressures on policy-makers and politicians and is argued to be the root cause of a decrease in time used for explanation of complex issues as well as reduced reflection time (Tingle, 2015).

Table 3. Examples of psychological factors used by Australian politicians to oppose renewable energy development. Inspired by Hudson (2017).

Examples of Psychological Factors	Explanation (Hudson, 2017)
Biographically-based world views	Many of Australia's founding policy makers on this topic were raised in the 1950's and 1960's which was the peak of technological "optimism" where technological beliefs were rooted in Man's ability to manipulate and control nature (Pusey, 1991).
Tribal nature of beliefs and bounded reality	To be able to be a part of political parties, prospective politicians have to share ideological beliefs to belong to the "tribe" of the party, in this case, continuing an anti-renewable energy rhetoric. Based on the hierarchical system of the Australian political parties, acceptance within the hierarchy might depend on the opinions and beliefs of the limited number of politicians at the top of the political food-chain, rather than the general community/political spectrum (Kiraly, Koves, & Balazs, 2017). The strong connectivity, "friendship" and networking nature of the political system also highlight significant personal costs of being opposed to renewable energy implementation, rendering it more optimal to "turn a blind eye" on the situation rather than delve into it (Kahan, 2016).
Deep-seated needs and motivations	Renewable energies, especially very visible ones such as solar and wind farms, remind passersby as well as politicians that human activities require limits based on the environment and that humanity must work *with* nature rather than *control* it.
Need for "authenticity" and "toughness	The realization that human activities require limits threatens many politicians aspirations of power, status and hierarchy.
Denial of death	The ever present discussions and information concerning climate change and its potential disastrous effects may cause many to associate it with death, to which they potentially respond to it by avoiding the topic and decide to continue with their ways rather than facing potential death-related reality (Dickinson, 2009).

Table 4. Examples of ideological factors used by Australian politicians to oppose renewable energy development. Inspired by Hudson (2017).

Examples of Ideological Factors	Explanation (Hudson, 2017)
Neoliberalism and the role of the state	Australian politicians have been following economic rationalism since the 1980's where they prioritise economic growth as well as arguing that the government should not intervene in the economy and steer it (Pusey, 1991).
Growth at all costs	Explained through path dependency and the mentality that since economic growth made Australia what it is today, hence Australia should stay on such path (path dependency). Switching to renewable energy development appears to be too expensive and disruptive to the current economic system and could potentially hinder growth, hence is unattractive.
Climate change denial	Politicians either do not believe that climate change is real, or that humans are amplifying its effects or that it is a serious issue (but rather a simple natural process): a shift in political stance towards climate change could potentially cause doubts about consistency and legitimacy amongst the voters.

There has been extensive resistance to renewable energy development (especially wind and solar) in Australia caused by various complex and interconnected issues (Hudson, 2017). The majority of these revolve around the coal industry's hegemony and the strong ideological foundations of current political institutions: over time, the hostility towards renewable energy development has grown rather than shrunk, reinforced by the current political deadlock in favour of coal (Pezzey et al., 2010; Baer, 2016; Hudson, 2017).

Further research on this issue recommends discovering methods to destabilise such deadlock in Australia by **targeting the foundational power dynamics** that form the current federal anti-renewable energy rhetoric (Farla, Markard, Raven, & Coenen, 2012; Kuch, 2017; Hudson, 2017).

4. Theoretical Grounding

4.1. Transition Theory

As highlighted previously, the issue of a renewable energy shift in Australia is not simply a scientific problem, but is also political: the influence of the coal industry at the federal level poses a serious threat towards a sustainable energy transition (Schlapfer, 2009; Baer, 2016). Within the field of Sustainability Science, topic literature highlights that a shift in current political dynamics is required through transition management (Markard, Raven, & Truffer, 2012). This transition specifically targets persistent problems due to their complexity and strong embeddedness in societal and political structures, and their wide range of actors and connections amongst them (Smith, Stirling, & Berkhouf, 2005). A common example is that of current fossil-fuel energy systems, which have resulted in increased anthropogenic GHG emissions (Grin, Rotmans, Schot, Geels, & Loorbach, 2010; Geels, 2011).

Such systems evolve over time and interact with the socio-political systems that control them: here, the focus is on socio-technical systems which encompass alterations of energy systems, technology, policy, as well as cultural significance (Elzen, Geels, & Green, 2004; Smith & Stirling, 2010; Geels, 2011). Regarding involved actors, these include government officials such as policy makers, scientists, industry, civil society, and the feedback loops that connect them all to each other, which can either amplify or dampen current dynamics (Smith & Stirling, 2010). Looking at the origins of such issues, they mainly stem from strongly reinforced system failures (relative to sustainable outcomes), which are exceedingly difficult to correct through current policies (Geels, 2011). Such system failures include locked-in institutional flaws, bias towards specific technological dependencies, shared beliefs among policy-makers, economic incentives, power dynamics, and lobbying by actors who stabilize the existing system (Geels, 2011; Farla et al., 2012; Hess, 2014). These can be summarized as path dependency reinforced by strong institutional barriers, resulting in the existing system being lodged heavily in place (Rotmans & Loorbach, 2009; Farla et al., 2012).

Geels (2011) shows that transitions must take place on a policy level as current policy makers will object to such external changes due to their interests being threatened. This would entail a reorientation of those that defend existing political structures, which for Sustainability Science is performed by transition management (Rotmans & Loorbach, 2009; Geels, 2011; Hess, 2014).

The mindset behind transition management is to build strategies and guidelines to shift political systems towards more sustainable pathways (Smith et al., 2005). This helps understand the emergence of environmental innovations within political systems and their potential for reconfiguring existing political structures (Pahl-Wostl, 2009; Smith & Stirling, 2010; Geels, 2011; Hess, 2014). Sustainable transitions are feasible, but a better understanding of governance dynamics to remove lock-in is needed (Evans, 2012). Here, a transition is generally defined as

"[…] A radical, structural change of a societal (sub)system that is the result of a coevolution of economic, cultural, technological, ecological, and institutional developments at different scales" (Rotmans & Loorbach, 2009, p.185)

In sum, it is a set of dynamic cyclical strategies that interact with various components across multiple scales of its socio-political system (Rotmans & Loorbach, 2009; Geels, 2011). Historically, a wide range of management problems originated in the ignorance of policy makers towards cross-scale dynamics and their temporal consequences, resulting in inadequate actions taken leading to more negative outcomes: the field of Sustainability Science aims to remove such trends. Indeed, "*In a world increasingly recognized as being multilevel, solutions must be as well"* (Cash et al., 2006, p.9). In-depth insights into how societal and political systems function and behave provide a better understanding into how they can transition towards sustainable outcomes, focussing on internal structural change (Smith & Stirling, 2010).

Hence, applying the theory of transition management results in a set of guidelines and goals that aid in transitioning a current political system towards a more sustainable state (Farla et al., 2012). Indeed, a systematic approach is crucial due to potential side effects as well as being able to locate and foster the growth of emergent properties (Markard, 2017). Analytically, the application of such theory includes tools such as multi-level perspectives that allow cross-scale and cross-level analysis to identify patterns and showcase potential locations for systematic change (Geels, 2011). Indeed, as Cash et al., (2006, p.9) emphasise:

"*A middle path that addresses the complexities of multiple scales and multiple levels is much more difficult, but also what is required"*

4.2. Multi-Level Perspective

Looking more specifically at the multi-level perspective, a component of the multilevel analysis in the systemic instruments for transition management (Figure 2), it is different to traditional analytical tools as it goes more in depth than a mono-study of technology, looking more at the multi-scalar nature of technological innovations, and highlights the connections between various subsystems found in the socio-technical system (Geels, 2011). There is a strong focus on showcasing group dynamics within the MLP framework, looking at their strategies, beliefs, resources and interactions among actor groups and the environment (Geels, 2011). Relating back to transitions, the MLP highlights the nonlinear nature of processes within socio-technical systems and categorizes such processes within three overarching domains, going from the micro-level to macro-level with stability increasing as the levels go higher, respectively (Rip & Kemp, 1998; Geels, 2005):

➔ **Niches**, where radical innovations take place;
➔ **Socio-technical regime**, where established practices, rules and systems are found and stabilized;
➔ **Socio-technical landscape**, deeply rooted overarching socio-cultural, economic and material backdrop that influence the regime and niches and changes slowly.

Regarding analysis, **the regime level is regarded as the most important level** as sustainability transitions encompass a shift from one regime to another, whereas niches and landscapes are of secondary priority as these are defined based on the regime, not vice-versa (Geels, 2004). Such regimes are characterized by 'deep structure' which are responsible for the stability of the existing socio-technical system and its consequences (Geels, 2011). These include a set of guidelines and enforcing rules to guide and coordinate policies and actions to achieve desired outcomes of the socio-technical system, relative to the actors, policy-makers and those maintaining the decision making power (Geels, 2011). There is a strong dynamic relationship between the actors and these guidelines/rules: the actors create, amend, enact and draw upon such rules to apply concrete actions, yet these rules forge the actors and their scope of power (Smith & Stirling, 2010; Geels, 2011; Hess, 2014).

Geels (2011) outlines such regime rules: beliefs, user practices, regulations, capabilities and competences, legally binding contracts, and institutional arrangements. It is in this dimension where institutional lock-in takes place, where small adjustments take place that accumulate and form a stable

trajectory occur in the fields of industry, science, politics and culture (Figure 1) (Geels, 2011; Farla et al., 2012; Hess, 2014). Indeed, MLP showcases interactions amongst all these fields as they influence each other and coevolve together, and add stability to the current system, even though they each have their respective cultural meanings and preferences, each guided by their own sub-regimes (Figure 1) (Geels, 2004, 2011).
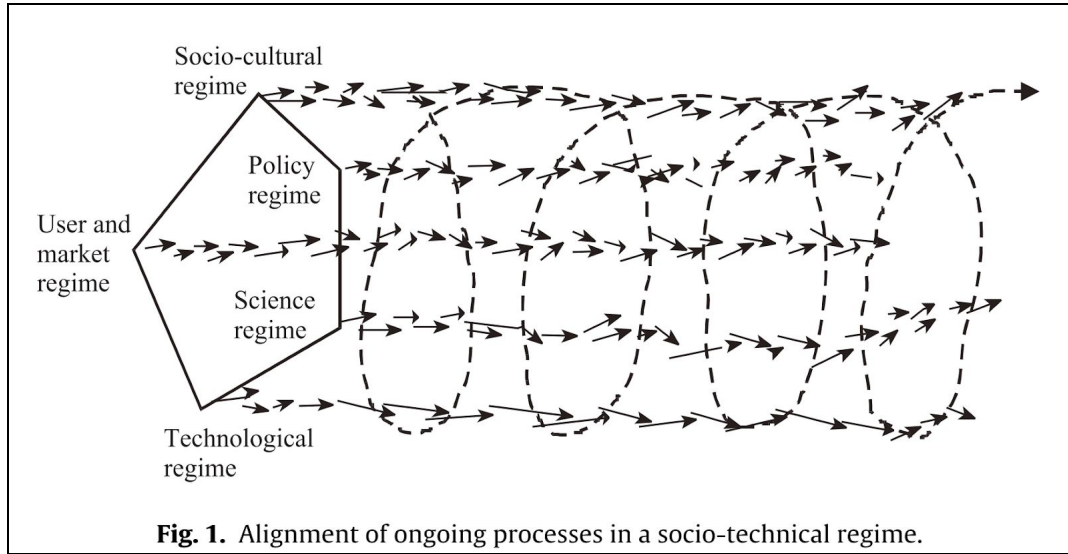
Fig. 1. Alignment of ongoing processes in a socio–technical regime.

Figure 1. Overview of the alignment of ongoing processes encompassing a socio-technical regime, reinforcing and constructing each other. Copyright 2011, Geels.

Moving on from the regime dimension are the niches. These include spaces in which innovations take place and are grown before attempting to shift the regime: they are the "*seeds for systemic change*" (Geels, 2011, p.27). These innovations that deviate *away* from the current regime are undertaken by a wide range of actors who aim to have their innovations absorbed by the regime in place or replace it (Schot & Geels, 2008). This opposition between niche innovation and regime is for the large part due to the stabilizing nature of lock-in mechanisms, which oppose shifts on the regime level (Geels, 2011). Maximizing the effectiveness in niches allows them to gain momentum and general acceptance due to stability and a powerful actor participation, which increases their likelihood of being incorporated into the current regime or increasing their suitability to replace it (Smith & Stirling, 2010; Hess, 2014).

Finally, the socio-technical landscape encompasses the larger context surrounding the system in place, which influences both the regime dynamics as well as the niche ones (Rip & Kemp, 1998). This landscape refers to the interconnectedness of demographic patterns, political systems, societal dynamics, economic trends, material dependencies and technological support which sustain societies (Geels, 2011). Due to their extensive and wide reach, landscapes change slowly, thus actors at both

regime and niche dimensions can not influence or change them in the short-term, but rather have to opt for a long-term approach (Geels, 2011; Hess, 2014).
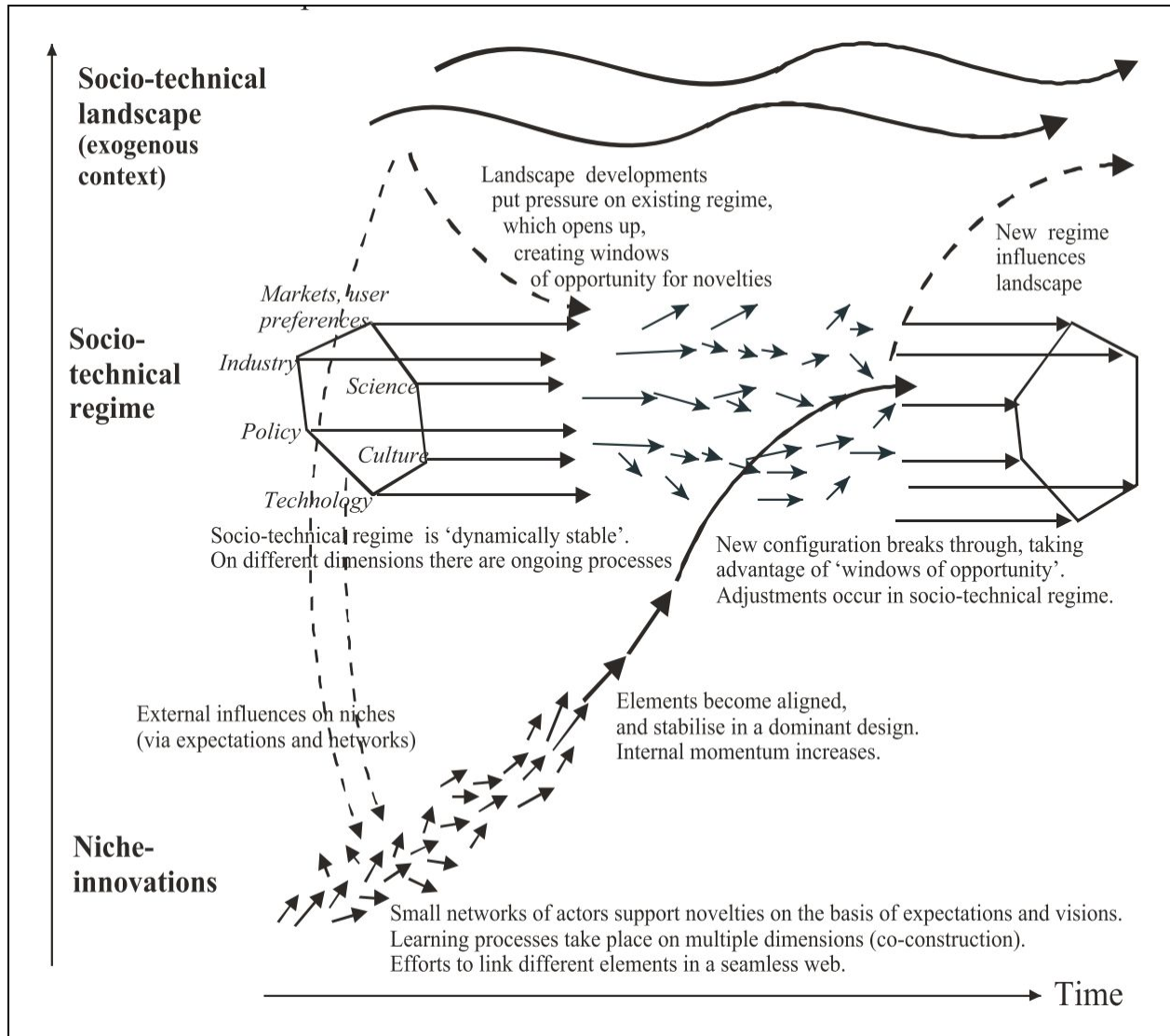
Figure 2. Presentation of the three levels of the multiple-level perspective, Socio-technical landscape, Socio-technical regime, and Niche-innovations and how they interact with each other over time. Copyright 2011, Geels.

Regarding dynamics between the three dimensions, Geels (2011) succinctly outlines how the three interact with each other to enact sustainability transitions

➔ Innovations within niches build up momentum and gain legitimacy;

➔ Large-scale changes on the landscape level put pressure on the regime dimension;

➔ Too much pressure causes a de-stabilization of the regime, allowing the previously mentioned innovations to take its place.

A key point to mention concerning the MLP is that it focuses on the processes amongst these multiple dimensions, their respective levels, and their circular causality rather than looking at linear relationships as historic management strategies have (Geels, 2005, 2011). The reinforcing and connective nature of the processes is an essential part of sustainability transitions, especially with energy systems (Rotmans & Loorbach, 2009; Geels, 2011).

The previous section has highlighted the crucial role of the regime dimension in socio-technical systems for sustainability transitions, especially in terms of the power it exercises over the other two dimensions directly through rules and institutional lock-in (Geels, 2011). Indeed, transition management literature states that for future application of transition management, the processes of political power and people must be further studied within socio-technical systems (Geels, 2011; Farla et al., 2012; Hess, 2014).

4.3. Gramscian Hegemony

Before looking at the exact power plays exercised by the various actors and how they influence the direction of federal energy policies, the structure of potential power must be analysed (i.e. who has it). Whilst the MLP framework showcases patterns, potential locations for systematic change, and Socio-technical regime trends, revealing which actors/group of actors are dominant over another is the next step in determining potential locations of change within the regime power structure (Geels, 2011; Farla et al., 2012). Doing so allows for a deeper understanding of the plays at hand, rather than a strict overview as provided by the MLP (Farla et al., 2012). To do so, a Gramscian hegemonic framework is used to frame the current issue to achieve the goals of determining who are the *dominant* actors and who are the *subordinate* ones, which will help recommend strategies for a shift in hegemonic direction (Adamson, 1980; Mastroianni, 2002; Storey, 2018). Here, the terms hegemonic force and dominant group will be used interchangeably, as well as subordinate group and counter-hegemonic force.

This framework was chosen as Gramsci goes beyond the notion of classical economic dominance and delves more in-depth into socio-cultural dominance of one group over another (Gramsci, 1971; Mastroianni, 2002; Storey, 2018): as shown in the background section, this is the case with the coal industry and high-ranking federal decision-makers using cultural and social arguments in their favour and against renewable energy development. On top of this, Gramsci's framework analyses

governmental/State interactions (Gramsci, 1971), which in this case is the main study area of this thesis, as presented further on.

4.4. Power Theory

In his work *Power: A Radical View*, author Stephen Lukes outlines three dimensions of exercisable power, which as he defines is the capacity of one actor (or an entity of individuals) to influence another(s) (Lukes, 1974). These 3 dimensions can be used as analytical tools to identify power dynamics within interactions, with the goal of changing current observable outcomes (Lukes, 1974): which is why it was chosen for this project. Overall, the three dimensions can be summarised as the first one looks directly at change through observable exercise of power, the second delves into the capacity of decision makers to set the agenda, and the third looks at the socio-cultural aspect of the shift of important values (Figure 3) (Lukes, 1974).
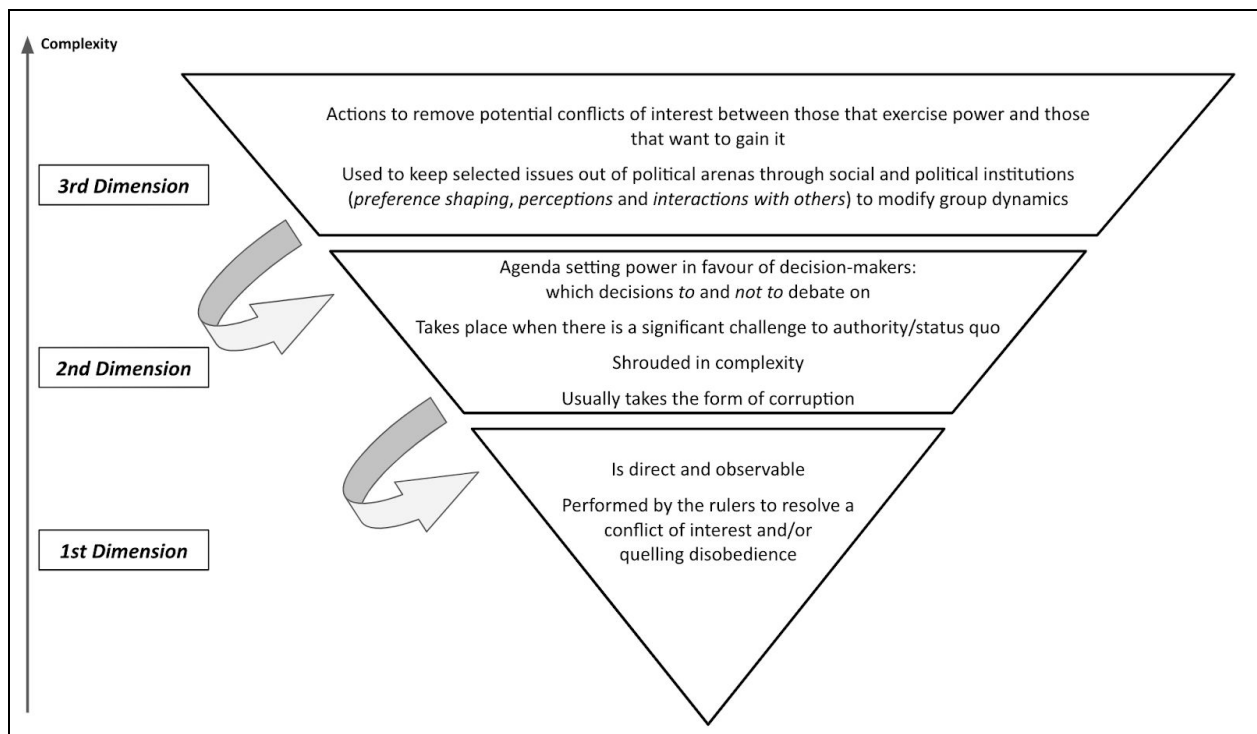
Figure 3. Overview of the dynamics of the 3 dimensions of power as outlined by Lukes (1974) in relation to increasing levels of complexity. Own creation using the online programme Google Slides.

4.5. Summary

To match the complexity of the socio-technical system at hand, three theories are combined in order to bring clarity to this complexity. These theories go from a general scale of understanding to a more narrowed focus to be able to understand the power structures at play. The outline of this section follows the logic behind these theories (Figure 4), which follows a reverse pyramid approach, from general to specific.
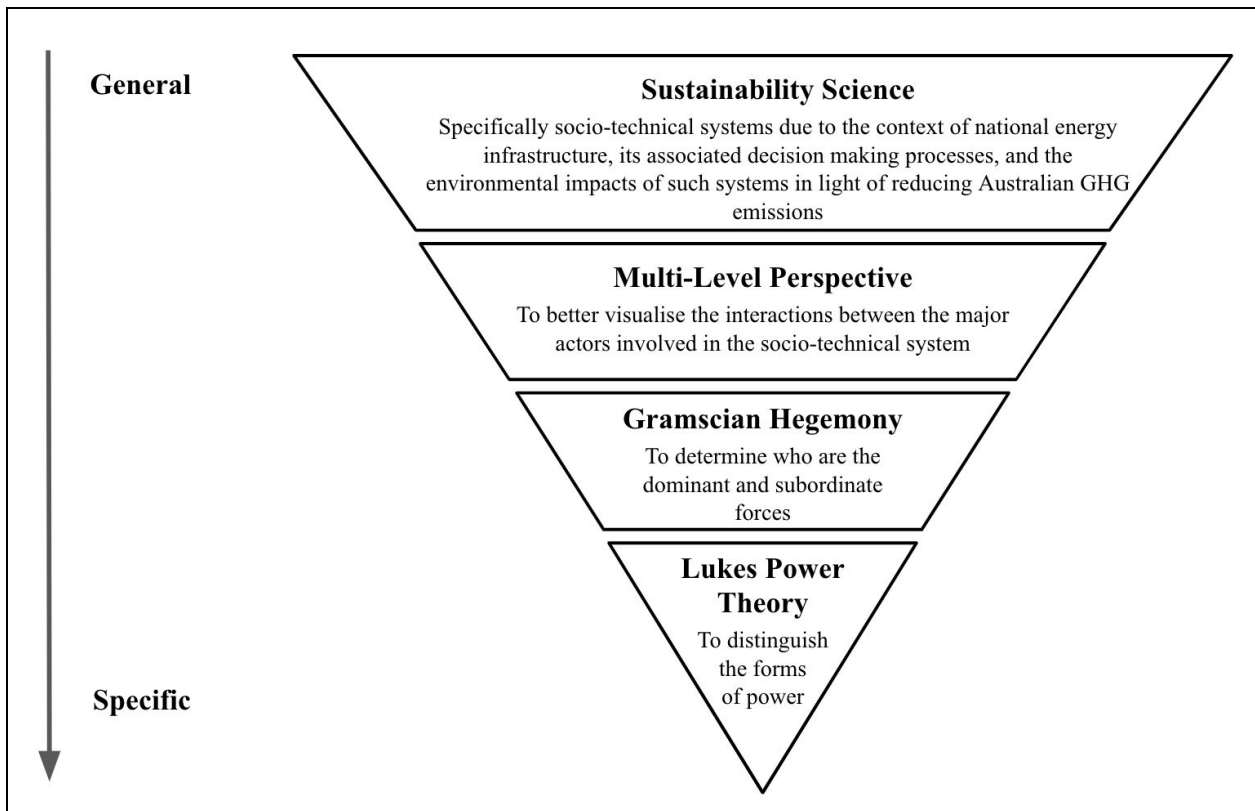
General

Sustainability Science
Specifically socio-technical systems due to the context of national energy infrastructure, its associated decision making processes, and the environmental impacts of such systems in light of reducing Australian GHG emissions

Multi-Level Perspective
To better visualise the interactions between the major actors involved in the socio-technical system

Gramscian Hegemony
To determine who are the dominant and subordinate forces

Lukes Power Theory
To distinguish the forms of power

Specific

Figure 4. Summary of reverse pyramid methodology used for theoretical grounding of this project to answer the research questions. Theories inspired by Rotmans & Loorbach (2009) for Sustainability Science, Geels (2011) for Multi-Level Perspective (MLP), Gramsci (1971) for Gramscian Hegemony, and Lukes (1974) Power theory.

5. Methodology

5.1. Study Area and Scope

Regarding scope, this project focuses on the dynamics between the Australian coal industry and the Australian federal government, and how these influence federal energy policy. This study does acknowledge the role that the federal government has in influencing other levels of government (Appendix A) yet **the scope of this topic will remain solely within the federal government**. Analysing the influence over other levels of government would move away from answering the research questions and requires its own study.

The federal government was chosen as it is the leading decision making body related to federal energy policies (Byrnes et al., 2013; Williams, 2013; AAP, 2014; Baer, 2016). Within the context of sustainable transitions, regarding the phasing out of fossil-fuel energy production, the federal government is the leading player in this process (Appendix A) (Loorbach & Rotmans, 2010; Farla et al., 2012; Hess, 2014). Its trickle-down policies significantly influence the direction Australia takes for energy production and can be the leading figure for sustainable change (Hudson, 2017; Kilvert, 2018). However, as highlighted in previous sections, this is currently not the case, as the federal government is a leading body *against* renewable energy development and the phasing out of the coal industry. Sustainable transitions highlight the importance of transitions across *all* levels of government, yet a shift in federal policies towards sustainable energy production would have the highest benefits for Australia to reduce its GHG emissions (Pearse et al., 2013; Hudson, 2017).

The coal industry was chosen as coal production is the major source of energy (60% of electricity production) for Australia and is the most used fossil-fuel (Pearse et al., 2013; Baer, 2016; DOEE, 2019). Not only is it widely used for energy, but without even being able to vote in government, it is able to shift policy direction in its favour (Quiggin, 2013; Parkinson, 2017). Sustainable transitions define the phasing out of fossil fuel energy sources as removing important political, social and economic empowerments that supply these industries, which here, stems mainly from the federal government (Loorbach & Rotmans, 2010; Farla et al., 2012; Hess, 2014). In Australia, doing so would help the country reach its climate goals and mitigate against disastrous future climatic events both locally and globally.

Looking more specifically at the coal industry, only the actions it takes to influence and manipulate the Australian federal government, either directly or indirectly, were taken into account.

Concerning the federal government, the connectivity between the coal lobby and specific members of the federal government was inspected regarding federal energy policy related decisions. Available data was selected based on relevance to this characteristic as well as its compatibility within the theoretical grounding of this project.

5.2. Data Collection and Manipulation

The following sections focus on the search and manipulation of available data to answer this thesis' research questions. The theoretical section has laid the groundwork in terms of lenses to look through this case study, yet the next step was to find and analyse data accordingly, following three distinct, yet interconnected parts. First, academic literature used in the background section, alongside additional necessary data, was used to fill the MLP framework, then this analysis, alongside more additional data, was used to adequately fill the Gramscian Hegemony framework. Finally, all of this information combined served to fill Luke's Power Framework (Appendix B). Strengths and weaknesses of such data are presented in the discussion section.

5.3. Applied Multi-Level Perspective

First, data concerning the functioning of the Australian federal government in connection to the coal industry was located in accordance with the Multi-Level Perspective framework as outlined in the previous section. This included collecting components that are found in and between the micro-, meso-, and macro- levels that illustrate the connectivity between the actors groups, framed under the categories of the Niche-innovations, Socio-technical regime, and Social-technical landscape (Rip & Kemp, 1998; Geels, 2005, 2011). The overarching goal of doing so was to be able to create a manipulable overview of the dynamic interactions throughout various scales that shape federal energy policy (Figure 5).
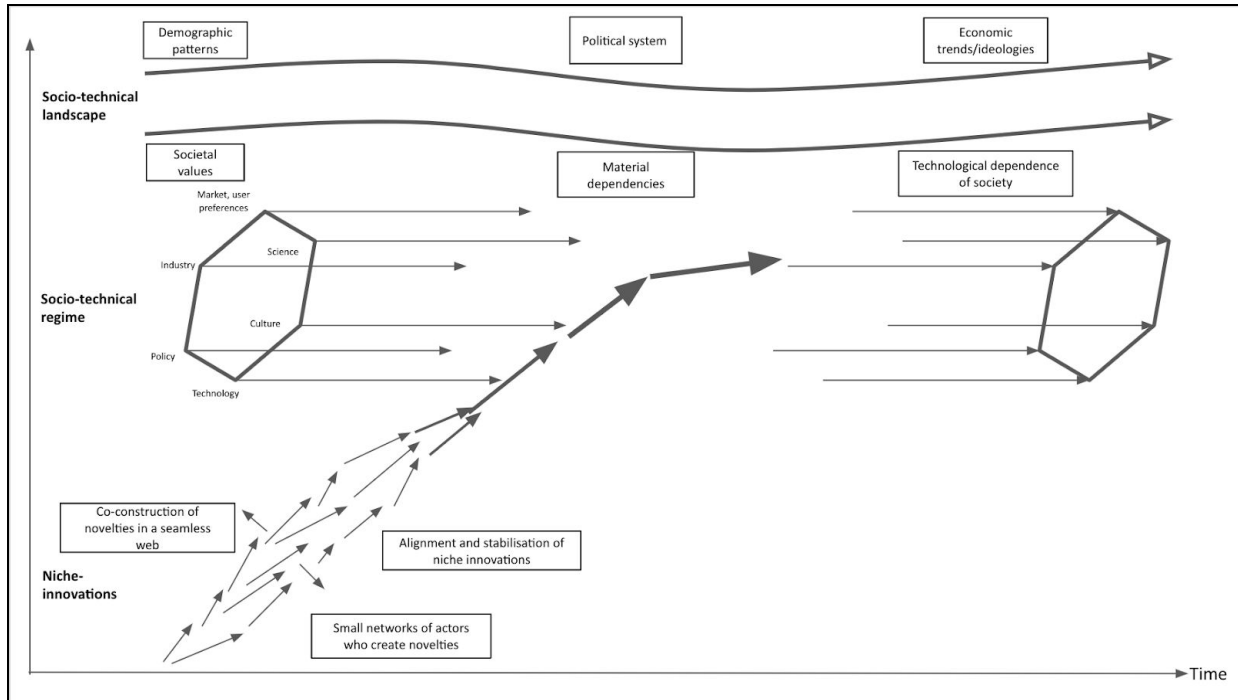
Figure 5. Overview of the Multi-Level Perspective (MLP), inspired by Geels (2011), incorporating the dynamics of the three levels of MLP over time: Socio-technical landscape, Socio-technical regime, and Niche-innovations. Own creation, using the online programme Google Slides.

Hence, data supporting this was filled into Table 5, for the levels as distinct sections, Table 6, for how these influence each other, and Table 7, once the new regime and landscape have been influenced by the novel niche innovations, to recreate Figure 5. For the large part, data consisted of utilising academic references used throughout the background section to present the issue, followed by additional data (academic + non academic) used to fill in necessary gaps (Appendix B). Academic data consisted of searching through online academic libraries such as Lund University Library and Google Scholar, for a mix of keywords related to "coal+Australia+fossil fuel+governance". For non-academic data, newspaper articles, reports, and multiple forms of online content were consulted.

For both forms of research, a modified snowball effect was fully utilised, using the recommendations of each individual source to find more information, then actively selected to fit within the scope of this research project (Dudovskiy, 2019).

Table 5. Main components of the three levels of the Multi-Level Perspective (MLP) as outlined by Geels (2011) to be used to guide data collection to frame how the fossil fuel industry backed federal government shapes energy decisions under the MLP framework.

MLP Level	Socio-technical landscape	Socio-technical regime	Niche-innovations
Components	Demographic patterns Political system Societal dynamics Economic trends Material dependencies Technological dependencies of society	Institutional lock-in Dynamic stability Market and user preferences Industry direction Science Policy Culture Technology	Small-networks of actors who create novelties Co-construction Seamless web

Table 6. Main components of the connectivity between the three levels of the Multi-Level Perspective (MLP) as outlined by Geels (2011) to be used to guide data collection to frame how the fossil fuel industry backed federal government shapes energy decisions under the MLP framework.

Connectivity between MLP levels	Landscape to regime	Landscape to niche	Regime to niche	Niche to regime
Components	External pressures/influences			Alignment of Niche innovations

Table 7. Main components of the Socio-technical regime and Socio-technical landscape levels of the Multi-Level Perspective (MLP) once Niche-innovations have aligned and broken through the regime as outlined by Geels (2011) to be used to guide data collection to frame how the fossil fuel industry backed federal government shapes energy decisions under the MLP framework.

Connectivity between MLP levels *once* new innovations have been aligned and incorporated into the regime	*New* regime	*New* landscape
Components	Breakthrough in 'windows of opportunity' Adjustments taking place	Demographic patterns Political system Societal dynamics Economic trends Material dependencies Technological dependencies of society

Here, **MLP is strictly an analytical tool** rather than a methodology to draw conclusions from (Rotmans & Loorbach, 2009; Geels, 2011; Farla et al., 2012). Using the tables as a way to categorise data provides an applicable MLP to the case at hand, but also to begin to distinguish *who* exercises the power to shape federal energy policy (Geels, 2011; Hess, 2014).

5.4. Applied Gramscian Theory

Following this is the methodology aimed to identify *who* is the driving force behind shaping federal energy policy, hence a Gramscian approach was used (Gramsci, 1971; Storey, 2018). First, essential takeaways from the MLP analysis were taken into account to distinguish key drivers of change, or lack thereof (Appendix B). Second, additional academic and non academic data were collected, following Gramscian requirements, in a similar fashion as with the MLP. Third, combining the previous two tasks to frame the actor(s) who exercise hegemonic forces (the dominant group), and the counter-hegemonic forces (subordinate group) (guidelines in Appendix C). These include parameters related to economic growth, control of financial resources, as well as identifying the institutions that formalize power and the actors who control/run them (Gramsci, 1971; Mastroianni, 2002; Storey, 2018).

In this case, the expected results were that the coal industry-backed federal government is the hegemonic force whilst the counter-hegemonic force consists of all actors, groups and organizations aimed at transitioning away from coal-burnt electricity towards renewable energy generation. Within the MLP, the expectations were that the hegemonic force operates throughout the micro-, meso-, and macro-levels and the counter-hegemonic force mainly struggles to move beyond the niche level.

In combination with the MLP, the results now encompass *where* and *who* exercises the power to shape federal energy policies, especially in favour of maintaining coal for electricity production. The following step was to identify *how* this power is exercised. Such a process can be viewed as identifying the source of a trickle-down process: identify the source, modify it towards sustainable goals, and such change would trickle down towards all levels of influence over time.

5.5. Applied Lukes Power Theory

The three dimensions of Power outlined by Lukes (1974) (Figure 6) were used as they are deemed the most relevant in light of the governance and multiple-dimensions of dominant forces in this project to shed light on a complex issue (Lukes, 1974), as well as identifying crucial sources of sustainable change. To this, an adapted framework was provided (Table 8) to distinguish the three dimensions of power exercised by the dominant group, and identifying applicable trends (Figure 3). To fill this framework, the same data as collected previously as well as the results of the two previous sections was used. The expected results of this data manipulation were to distinguish how the dominant group exercises the three dimensions of power, to then be further used as leverage points to transition away from coal dependency (Lukes, 1974).
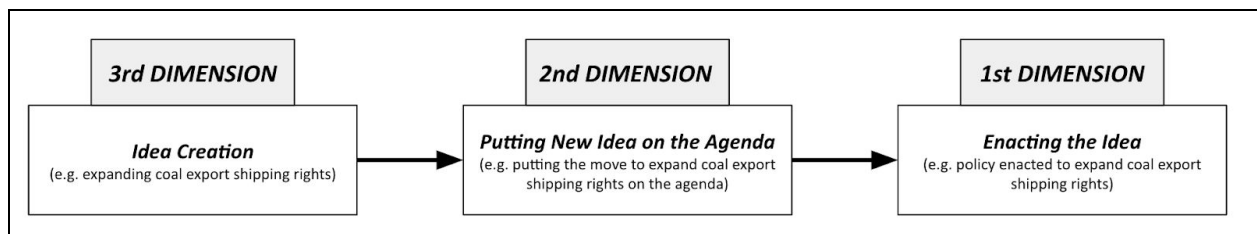
Figure 6. General overview that characterises Lukes (1974) three dimensions of power in the context of decision making processes, outlining the creation and evolution of policy ideas (i.e. plans, objectives, actions etc.) throughout the three dimensions. Own creation using the online programme Google Slides.

Table 8. Three dimensions of power as outlined in Lukes (1974) and their respective different characteristics.

Power Dimension	Specificities
1	Performed by ruler(s)/elite(s): who and why they are making decisions is known
	Capacity to make decisions for the governmental system
	Direct/observable interactions based on conflicting interests between two actors with actual visible effects → ensuring obedience
2	Limiting political and social processes to specific topics, at the benefits of those in power: creates system bias → agenda setting power
	Ability to make specific decisions based on interests as well as *not* make others based on the same interests of the dominating power
	Is usually exercised when a significant challenge to the dominant authority arises
	Takes place in a complex system, away from public eyes
	Usually takes the form of corruption
	Can take the form of: **Coercion** (threat of deprivation) **Influence** (without using threat of deprivation) **Authority** (recognition of legitimate command) **Force** (removing the choice between compliance and non-compliance) **Manipulation** (indirect use of force, absence of recognition of exercised power)
3	Removing latent conflicts, i.e. conflicts of interest between those that exercise the power and those who want to gain it
	Keeping issues out of political arenas by the means of institutions and societal dynamics
	Modifying group behaviour, collective forcing, institutional practices and their social and cultural foundations
	Shaping preferences, perceptions, and cognition of others without questioning

5.6. Summary

To summarise this section, Table 9 was created to highlight the key takeaways and methodologies of this process:

Table 9. Summary of the methodological component of this research project based on the theoretical grounding presented previously. Inspired by Geels (2011) for Multi-Level Perspective (MLP), Storey (1997) and Mastroianni (2002) for Gramsci, and Lukes (1974) for power theory.

Theoretical Grounding/ Lens	Manipulation	Expectations
Multi-Level Perspective	Quantitative and qualitative data linked to the multi-level and multi-scalar functioning of the coal industry and the Australian federal government and the interactions between them in the context of federal energy policy	Creating adaptive components of Figure 2 to the case at hand, highlighting the various influence of the australian federal government across multiple levels in relation to maintaining the coal as a major source of power and reducing the support for renewable energy on the federal level
Gramscian Hegemony	Combining an analysis of the newly produced MLP figure with qualitative data to distinguish the hegemonic forces from the counter-hegemonic forces	The hegemonic force is the combination of the coal industry and the coal-industry backed federal government. This influence occurs throughout the micro-, meso-, and macro-levels of the MLP. The counter-hegemonic forces are the actors, groups, organizations and entities that oppose coal burning as a source of energy and aim to shift towards renewable energy sources. This mainly occurs on the niche-innovations micro-level and struggles to become incorporated into the existing regime (meso-) level
Lukes' Power Theory	Qualitatively quantifying the dimensions of power of the hegemonic force, following Lukes' (1974) 3 dimensions of power	Identifying the three dimensions of power, with the 3rd dimension, as it provides a more in-depth and accurate analysis, consisting of optimal leverage points/targets to enable a shift towards renewable energy development

6. Results

6.1. Overview

This section covers the results of the methodological manipulation of data to answer this project's research questions: Appendix B shows which data sources fill which theoretical framework. This is divided into MLP, Gramscian Hegemony, and Lukes Power theory, followed by a summary of the results to highlight key takeaways in the context of this research. It is important to point out that whilst the various analytical and conceptual frameworks will be presented individually, they follow a concise order and are connected to help in answering the research questions.

6.2. Multi-Level Perspective

The MLP is an *analytical* tool, where the goal is to visualise complex interactions between various levels of a scope and the complex interactions that occur within and between them (Geels, 2011). The applicable characteristics of the three levels of MLP, Socio-technical landscape, Socio-technical regime, and Niche-innovations, were found for this study and transposed to follow as close as possible Figure 2, which was modified to be able to best fit within the scope of this project and can be found in Figure 5. To reduce complexity and represent the current situation of the influence of the coal industry on the Australian government, each level (landscape, regime, and niches) was depicted individually. How these levels interact with *each other* was also found and depicted to comprehend the complex fluxes that flow within each other.

6.2.1. Socio-technical Landscape

To showcase the current dynamics of the Socio-technical landscape, i.e., the strongly rooted socio-economic and political norms, trends, values, and ideologies that shape the decision making of the federal government in Australia, were summarised following the format of Figure 5, as shown in Figure 7.
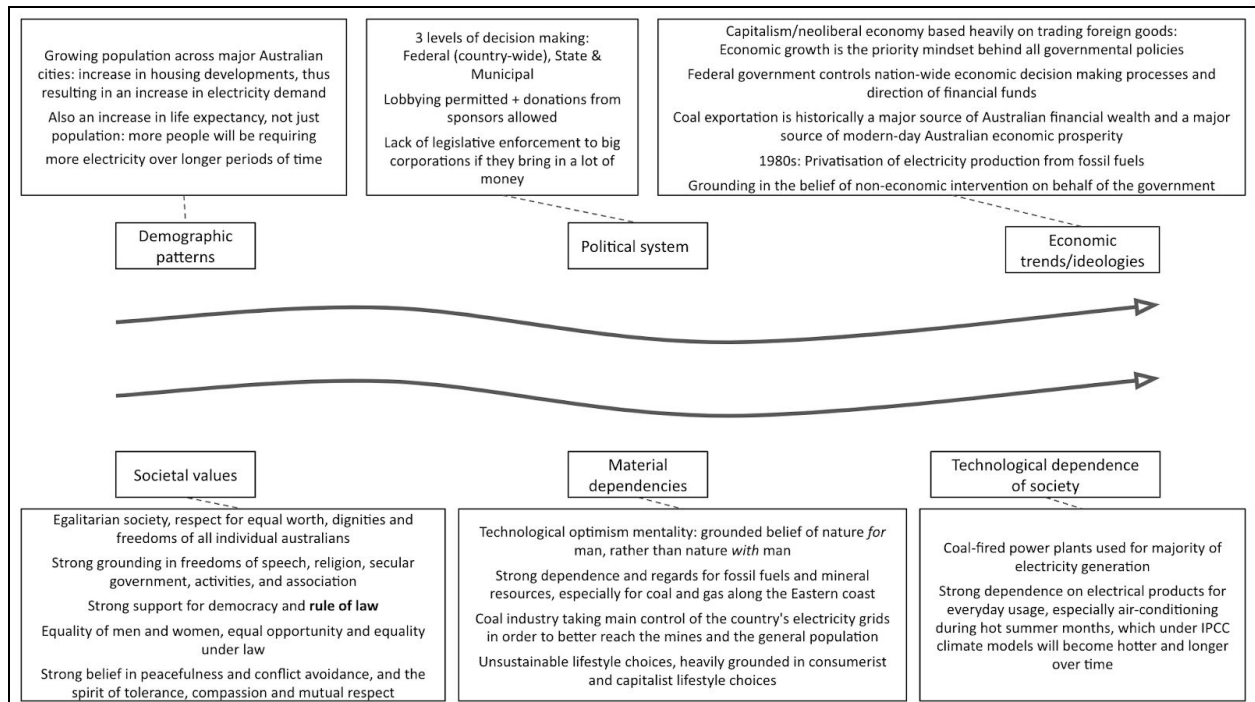
Figure 7. Dynamics of the Socio-technical landscape, as part of the Multi-Level Perspective, applied to the project's case study, illustrating the overarching societal, economic, and ideological dynamics in Australia, linked directly or indirectly to the activities of the coal industry. The two parallel arrows indicate the deeply-rooted-ness of these components. Inspired by Geels (2011) and own creation, using the online programme Google Slides.

The description of the various components of the Socio-technical landscape were selected based on their relevance to the criteria in Table 5. Whilst each of the six components has an important role in describing the current situation, there are notable characteristics that serve as important bridges to following sections:

➜ **Political system**: Federal government is where international commerce and environmental treaties decision-making takes place;

➜ **Economic trends/ideologies**:

◆ Majority of federal policies are shaped around economic incentives;

◆ Strong belief in Australia's economic prosperity due to the coal industry;

➜ **Societal values**: strong grounding in obedience of the rule of law;

➜ **Material dependencies**: Federal decision makers believe in technological optimisation, where it is nature *for* man, rather than nature *with* man;

6.2.2. Socio-technical Regime

Within the MLP, the **Socio-technical regime is the most important of the three levels** as it maintains the key structural foundations that ensure system stability (Geels, 2004, 2011). In this context, these include institutional arrangements, political and economic regulations as well as binding governmental policies that the federal government chooses to follow regarding the coal industry's activities (Figure 8).

Figure 8. Detailed overview of the essential components of the Socio-technical regime, as presented in Geels (2011) and Figure 2, applied to the case study of the Australian federal government in relation to the dominance of coal as the major source of national electricity. The red arrows and boxes highlight the two crucial processes that maintain a business as usual scenario, *Institutional lock-in* and *Dynamic stability*, that combine all 6 other components of the Socio-technical regime. Own creation, using the online programme Google Slides.

The circular arrows in red, *Institutional lock-in* and *Dynamic stability*, illustrate crucial dynamics of the current regime that allow the maintenance of the status quo (i.e., the coal industry's activities) and the strong blockade that blocks entry to any alternative niche-innovations. For these two dynamics, key takeaways include:

➔ **Institutional lock-in**:

◆ Federal climate policy recommendations are provided by former fossil-fuel industry representatives, who maintain close ties with their former employers;

◆ Reduction of renewable energy commitments by the three dominant political parties (the Liberals, Labor, and the Nationals)

➔ **Dynamics stability**:

◆ Revolving door process of federal government members and coal industry representatives exchanging positions, maintaining status quo in both sectors;

◆ Significant difference in financial resources of the privately-run coal industry in comparison to the government-run, renewable energy sector, granting the former more maneuverability in influencing federal governmental trends in its favour;

Other important takeaways include:

➔ **Science**: bias in favouring pro-coal think tanks and research groups for policy advice, and using their results as policy foundations and information to the public;

➔ **Culture**:

◆ Firm presence of **institutional tribalism**: to belong to political parties, new members align their ideologies with dominant ones. Here, this results in new members of dominant parties following the pro-coal, anti-renewables stance of the parties' dominant members;

◆ Significant lack of trust of renewable energies, especially wind and solar;

➔ **Technology**: glacially slow development in nationally provided renewable energies due to lack of federal investment;

➔ **Policy**:

◆ Increased financial subsidies to ensure maintenance of coal activities;

◆ Significant lack of efficient federal decarbonisation policies;

➔ **Industry**

◆ Coal industry maintains business as usual trends;

◆ Industrial companies can sue the government if the latter enacts detrimental policies to the company's interests (Australian law);

➔ **Market, user preferences**: coal exports are still believed by federal decision-makers to be crucial components of the Australian economic market.

6.2.3. Niche-innovations

Geels (2011) shows, within MLP, that to enact change at the regime level, niche-innovations must be incorporated by that regime. Here, niche-innovations are divided into two categories,

Pro-coal/fossil fuel and *Anti-fossil fuel* to then illustrate *which* type of innovations are incorporated by regime decision-makers (Figure 9).
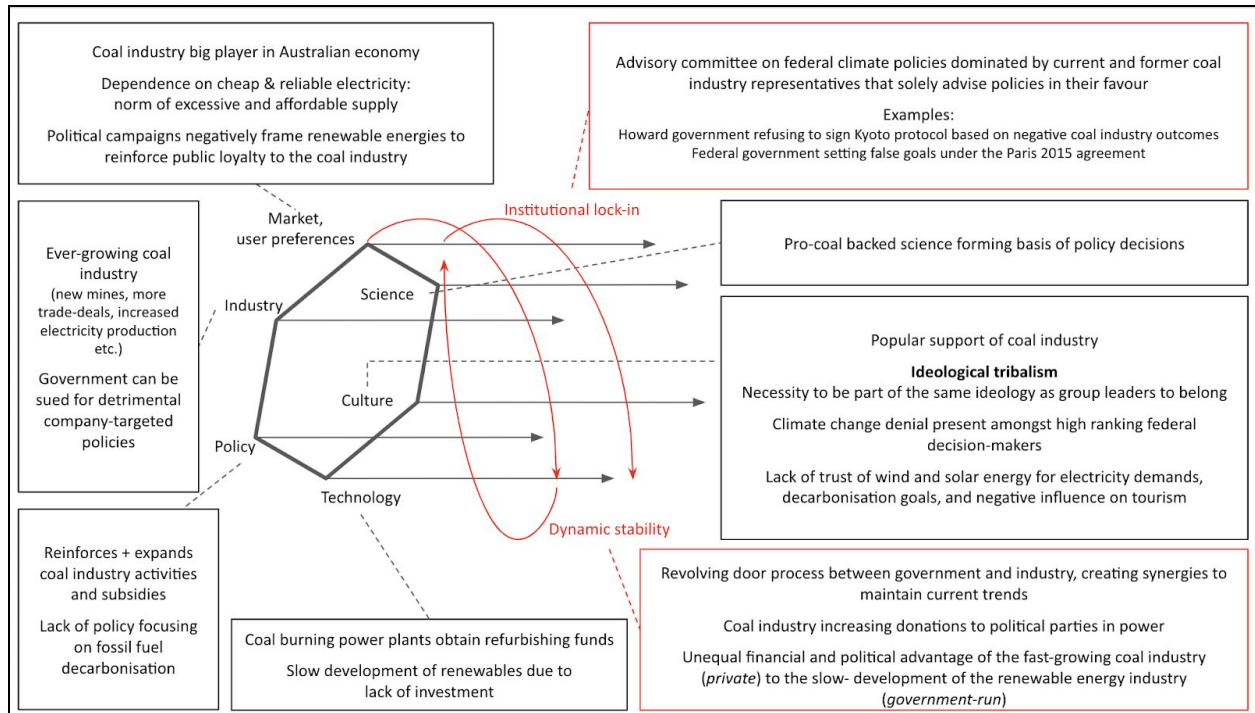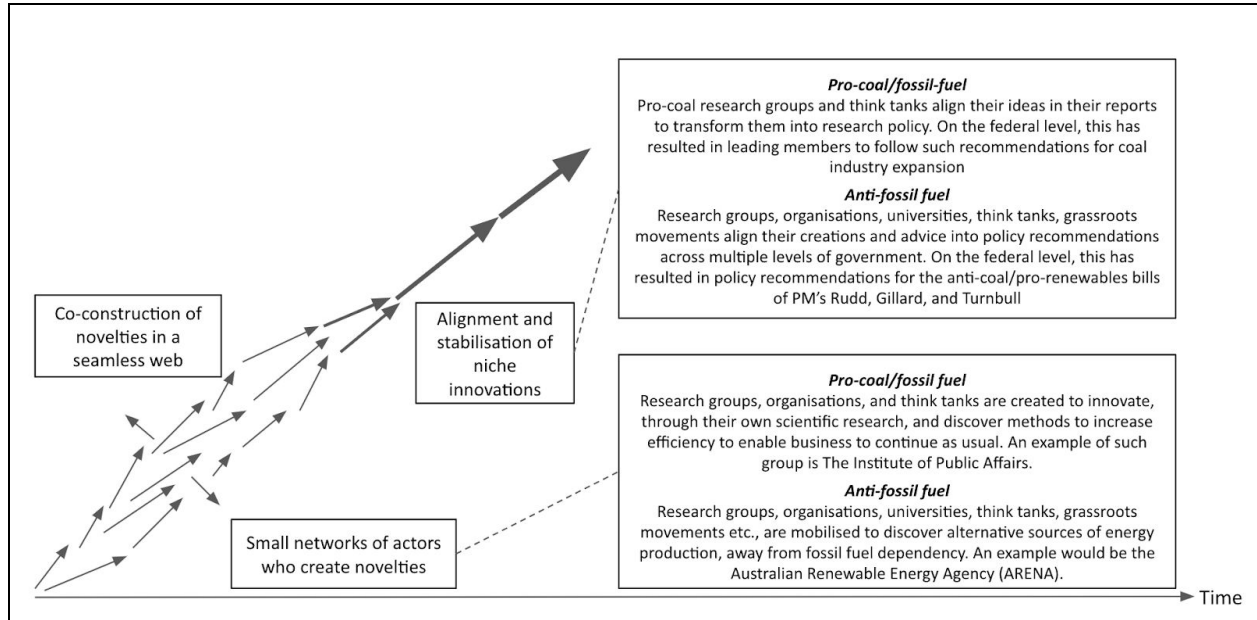

Figure 9. Detailed overview of the essential components of the Niche-innovations, as presented in Geels (2011) , applied to the case study of the Australian federal government in relation to the dominance of coal as the major source of national electricity. The multiple arrows on the bottom-left indicate the creation of a multitude of innovations, whilst as they progress diagonally upwards to the right, they become less and less yet bolder, indicating alignment of innovations into one dominant innovation . Own creation using the online programme Google Slides.

It is important here to point out:

➔ Arrows on the bottom left of Figure 9 illustrate niche-innovations, which through co-construction become aligned into a single arrow, to be incorporated into the regime (Geels, 2011);

➔ There are anti-fossil fuel innovations, not only pro-coal innovations, which showcase the potential policy recommendations for them to follow, as will be delved later on in this thesis.

6.2.4. How the Levels Interact with One Another

The previous section presented each level of the MLP individually. Yet Geels (2011) emphasises the importance of the interactions of these levels within and between each other, which later shapes regime direction (Figure 10).
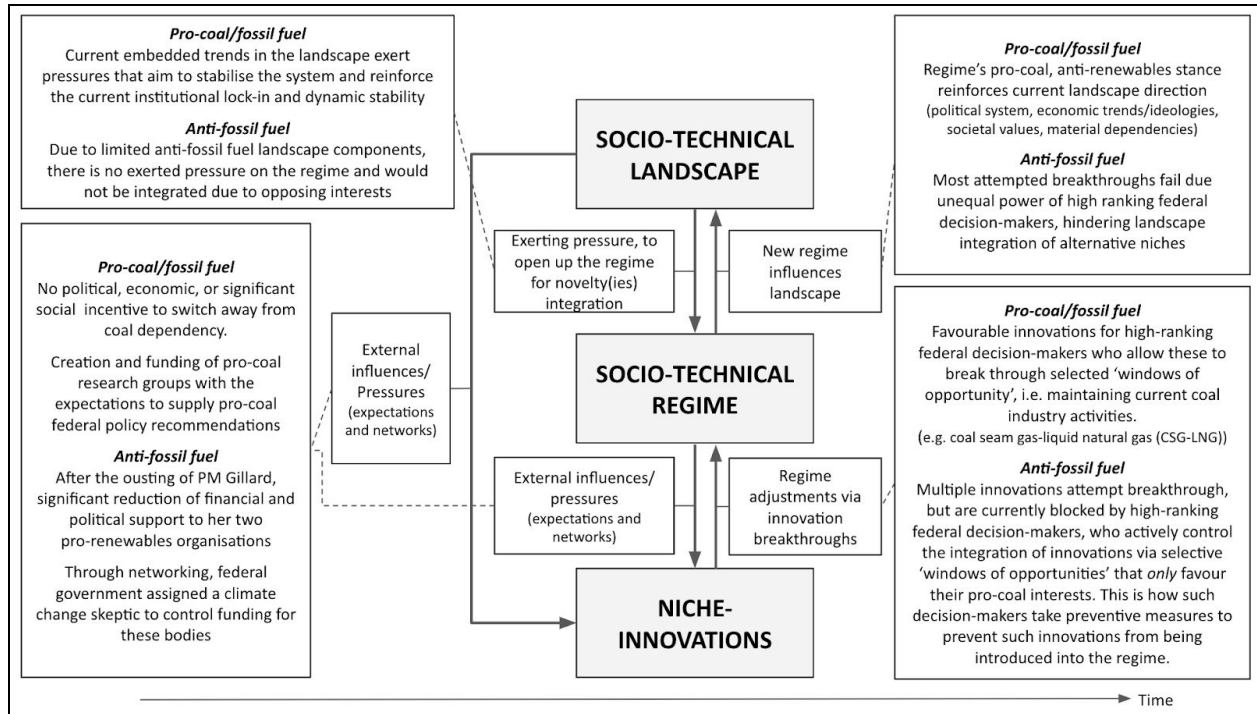
Figure 10. Overview of the applied three levels of the Multiple-Level Perspective (MLP), Socio-technical landscape, Socio-technical regime, and Niche-innovations, as shown in Geels (2011), and the dynamics of their interactions applied to the case study of maintaining the activities of the coal industry and its monopoly on electricity production in Australia. Own creation, using the online programme Google Slides.

The interactions amongst the 3 levels were divided into *Pro-coal/fossil fuels* and *Anti-fossil fuel* categories to show the integration dynamics of niches within and across levels. Here, the crucial take-away is that **the current trends of the landscape and regime have reinforcing blockades in place to ensure the non-integration of anti-fossil fuel innovations into the Australian federal government**. To illustrate these integrated dynamics over time, they were framed within a Causal-Loop-Diagram (CLD) (Figure 11).

Current landscape trends show maintaining coal activities and its extensive political, social, and economic support

Lack of landscape anti-coal movements: minimal pressure to move *away* from coal dependence

Lack of political incentive to move away from coal-sourced electricity dependence.

Significant efforts are taken to ensure political, social, and economic empowerment of the coal industry: reducing popular and federal support for anti-coal political movements.

Governmental support for sustainable energy research is limited to minimize its capacity as a competitor to coal

SOCIO-TECHNICAL LANDSCAPE

Exerting pressure, opening up regime to allowing novelty(ies) integration

+ +

New regime influences new landscape

External influences/ Pressures (expectations and networks)

+

SOCIO-TECHNICAL REGIME

External influences/ Pressures (expectations and networks)

+ +

Regime adjustments occur via innovation breakthroughs

NICHE-INNOVATIONS

Due to strong regime blockade, pro-renewables innovations are not able to be integrated into the landscape

The regime's pro-coal stance reinforces current landscape trends, such as economic incentives driving federal policies and maintaining coal as the major source of Australian electricity

High ranking federal decision-makers who control the regime only incorporate favourable innovations based on their interests (i.e., only pro-coal)

Notable example is the greenlighting of Coal Seam Gas - Liquid National Gas expansion

Figure 11. Causal-Loop-Diagram of the interactions between the three levels of the applied Multi-Level-Perspective, to the issue of the Australian Federal Government showing strong bias for coal burning for electricity production. Inspired by (Haraldsson, 2000). Here, the (+) indicate, the increase in action on every level to maintain the status quo of coal used as a source of burning for electricity production and blocking renewable energy development. Own creation, using the online programme Google Slides.

6.2.5. Summary

This section has shown the extent of the Institutional lock-in and Dynamic stability that the regime has to shape federal policy in favour of coal, i.e. the reinforcing blockades shown in Figure 10, within this socio-technical system. This has shown *where* the power to hinder the integration of alternative niche-innovations stems from within the regime: the following section highlights *who* exercises it.

6.3. Applied Gramscian Hegemony

This section showcases who is the dominant group that exercises hegemonic power over the subordinate group to shape federal energy policy in favour of the coal industry (Table 10). In addition to looking at economic dominance, a Gramscian approach also looks at socio-cultural dominance (Storrey, 1997; Morton, 2007).

Table 10. Summary of the dominant and subordinate group following a Gramscian approach in the case of dominating national energy policy in Australia. Circles represent groups of actors, and were selected based on scope and scale of this thesis. *Federal Gov.* refers to the current Coalition Nationals-Liberals government and *Selected MPs* refer to selected MPs within the Federal Government, past and present, that oppose fossil-fuel expansion in Australia.

Dominant Group	Subordinate Group
COAL INDUSTRY FEDERAL GOV.	THE GREENS Selected MPs

6.3.1. Dominant Group
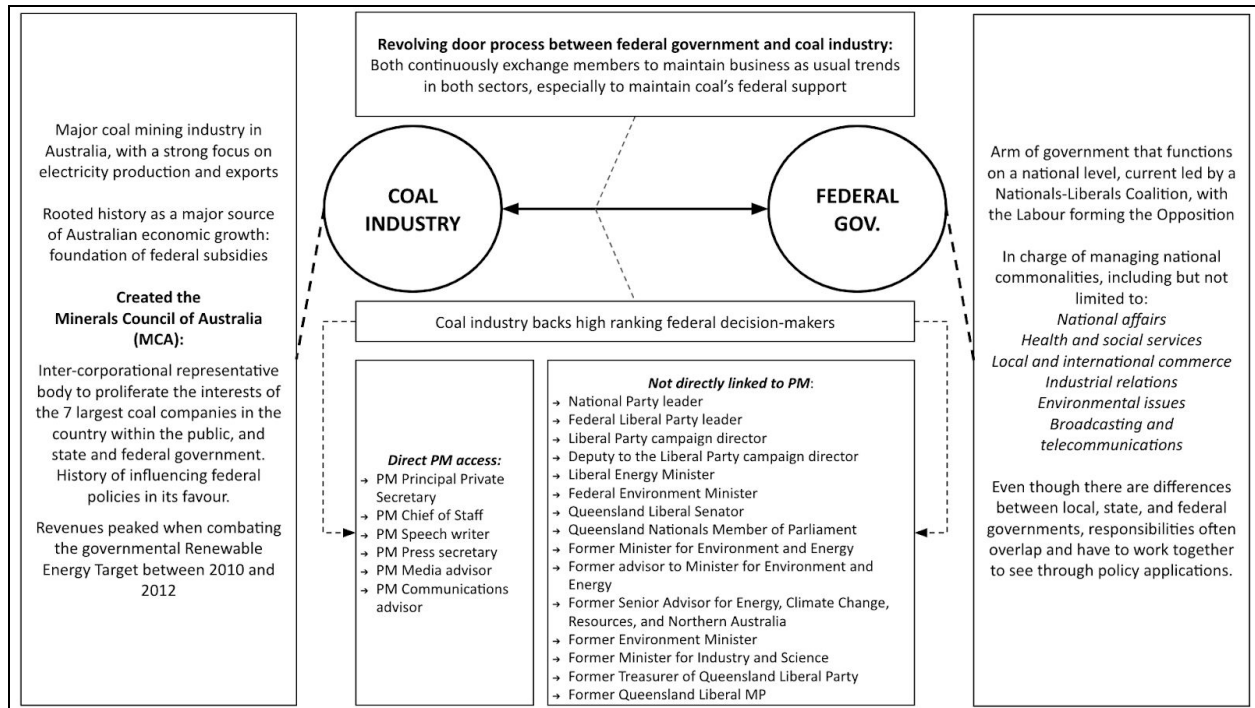
Figure 12. Overview of the two main actors involving the dominant group, the coal industry and the Federal Government, and the dynamics linking the two in the context of them being the major influencers in shifting national energy policies towards coal being used as the main source of electricity production in Australia. *Coal Industry* refers to the industrial body of the coal industry and its subsequent lobby and research groups, and the *Federal Government* refers to the Nationals-Liberals Coalition in the Federal Government, who for the large part shape Australian federal policies. Own creation, using the online programme Google Slides.

Figure 12 helps us understand the connectivity between the coal industry and the federal government as the drivers behind shaping federal energy policy in favour of coal-based electricity, and how the synergies between them maintain their positions of power. This is essential because these synergies, identified as *Dynamic stability* and *Institutional lock-in* (Figure 1, Figure 2, and Figure 6), lock-in the process of selecting coal for Australian electricity (Baer, 2016). Important takeaways are:

➔ **The Coal Industry**:

◆ Major source of historic economic prosperity in Australia, leading to tax exemptions and Federal Government subsidies;

◆ Created the Minerals Council of Australia (MCA), a unificiation body of major coal companies in Australia, serving as a bridge between industry and Federal Government, and as a financial powerhouse for backing pro-coal activities;

→ **The Federal Government**:

◆ Decision making arena for national policies, especially related to local and international trade, and environmental issues;

◆ Historically dominated by right-wing/conservative parties, who enact policies that prioritise economic growth: since 2013, Federal Government has been led by centre-right coalition of the Liberal and National parties (Parliament of Australia, n.d.);

→ **Synergies between both**:

◆ Revolving door process between both groups, often swapping employees to reinforce the institutional lock-in of greenlighting current and future coal industry activities, tax exemptions, and government subsidies;

◆ Important advisors to the PM have close ties to the coal industry. Important federal decision-makers (past and present) also stem from the coal industry, lobby groups, or the MCA, especially members from Queensland and Northern Territory;

6.3.2. Subordinate Group

Opposing this dominant group, i.e. the coal industry and high-ranking members of the Federal Government, is the subordinate group, which Table 10 summarises as a combination of The Greens and "*Selected MPs*", the latter referring to past and present MPs from the Labor and Liberal parties who have diverged *away* from their parties pro-coal standpoint. Notable examples include former PMs Rudd and Gillard (Byrnes et al., 2013).

Looking more closely at The Greens, Australia's leading pro-environmental sustainability, pro-renewables and anti-fossil fuel political party, have emerged relatively recently in the Australian political arena (late 90's) (Parliament of Australia, 2008). Their attempts to gain federal power have been hindered by deeply rooted federal forces (Figure 13) and by strong pro-coal, anti-renewables State governments in Queensland and Northern Territory, as they have opposing fundamental values and belief systems (Hudson M., 2017).
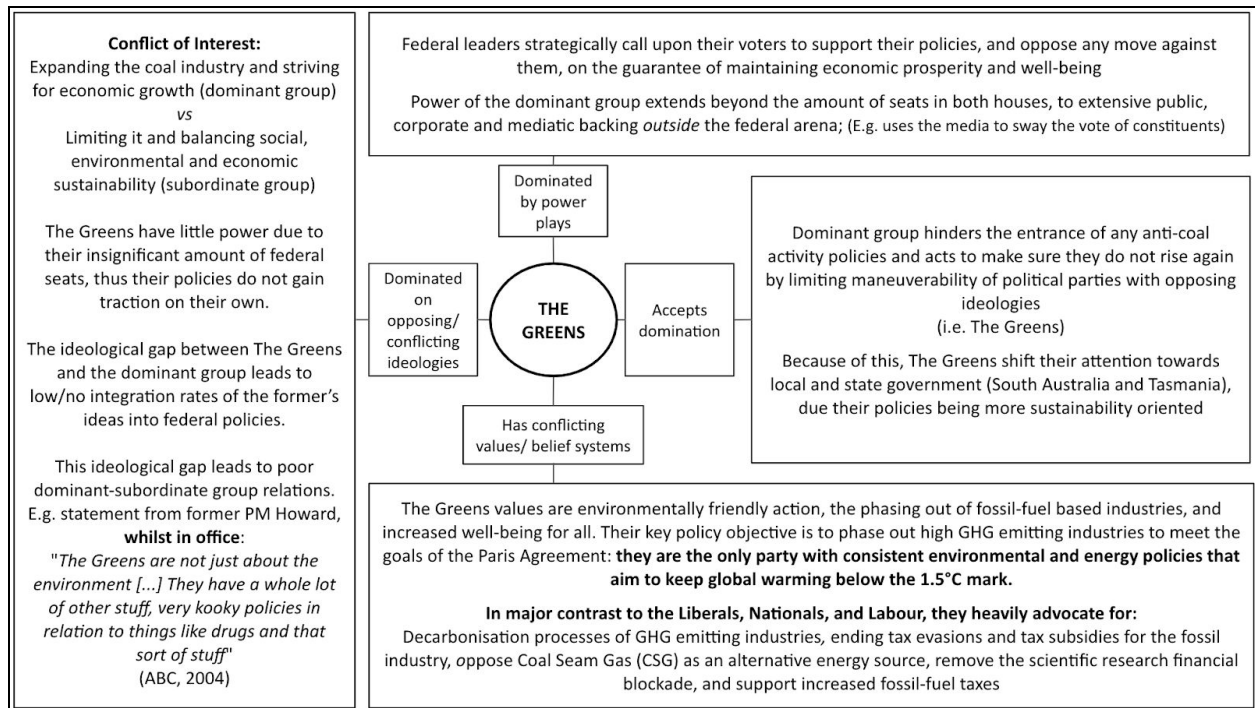
Figure 13. Overview of the subordinate group, The Greens based on *dominated based on opposing/conflicting ideologies*, *dominated by power plays*, *accepts domination*, and *has conflicting values and belief systems to the dominant group* in the context of The Greens being the subordinate group in a coal and coalition combined dominant group deciding the direction of energy policy at the federal level in Australia. Own creation, using the online programme Google Slides.

The dynamics between The Greens and the dominant group are complex and vary across the three scales of government in Australia. On a federal level, these are:

➔ **Conflicting values and belief systems in comparison to the dominant group**:

◆ The Greens are grounded in values and goals of sustainable action such as reducing GHG emissions and shifting government interests and funds towards such activities (i.e. away from fossil-fuels)

◆ The Greens are the only Australian political party with a Paris Agreement-grounded energy policy that strives to maintain global warming below the 1.5°C mark;

➔ **Dominated based on opposing ideologies**:

◆ Dominant group policies prioritise economic growth, opposing The Greens grounding in balancing economic, social, and environmental sustainability;

◆ Historically negative relations with the dominant group, claiming that the Greens are a threat to the ideological foundations of Australia's economic prosperity.

➔ **Is dominated by power plays**: power of the dominant group extends beyond the amount of seats in both houses, to extensive public, corporate and mediatic backing *outside* the federal arena;

➔ **Accepts domination due to no other available alternative**

◆ The dominant group's maneuverability is extensive to the point where energy policy will follow its directions without major opposition, and not integrate anti-status quo policies from the subordinate group;

◆ Hence, The Greens shift their action arena *away* from the federal government arena and *to* local and state governments such as in South Australia and Tasmania.

In contrast to the federal level, on a state level, a dichotomy appears: in Queensland and Northern Territory, The Greens, and any anti-fossil fuel movements, are politically "crushed" due to overwhelming majority of seats in those governments having close ties to the local coal industry (Greenpeace Australia Pacific (GAP), 2019). However, on the converse of this, state energy policy direction in South Australia and Tasmania are being dominated by widespread renewable energy development (GAP,2019).

6.3.3. Fitting Dominant and Subordinate Groups Within the MLP

It is possible to associate the operating space of each group within the MLP presented in the previous sub-section (Figures 6, 7, 8 and 9). The dominant group, i.e the coal industry and high-ranked members of Federal Government hierarchy, is able to spread its influence throughout the Federal Government and connected bodies whilst the subordinate group, The Greens, is *not* able to exercise as much power in the Federal Government and rather exercises its influence in specific state and municipal governments.

Following landscape, regime, and niche-innovations characteristics, the dominant group operates mainly at the level of the **Socio-technical regime,** with intertwining dynamic reinforcing loops with the other two levels (Figure 11), ensuring continued economic activities of the coal industry as well as mass consensent for its actions. Conversely, due to limited maneuverability enforced by the dominant group within the regime and the landscape (Figures 10 and 11), the subordinate groups's main arena of operations is through **Niche-innovations** via pro-renewables research groups in attempts to *break-through* the current regime blockade on a federal level, as well as operating across other forms of government.

6.3.4. Summary

It was determined that a combined effort of the coal industry and key high-ranking decision makers in the Federal Government form the dominant group: they hold the most decision making powers and shape federal energy policy based on their interests. Conversely, the subordinate group is mainly composed of The Greens, a minor political party in the federal arena holding little power who have opposing ideologies to the dominant group, oppose coal-fired power plants, and are in favour of renewable energy development.

Linking this to the thread of this thesis, MLP served as an analytical framework to declutter complex issues spanning multiple scales to isolate important drivers and actors. Following this, it is necessary to determine *who* contains (and does not) the power to shape federal energy policy, hence the use of a Gramscian hegemony framework. Having determined this, the next step is to determine *how* and through which means the dominant group exercises power.

6.4. Applied Lukes Power Theory

This section outlines the power plays that the dominant group acts, following Lukes (1974) three power dimensions. The first encompassing direct observable outcomes, the second, agenda setting powers, and the third ideological dominance (Lukes, 1974).

6.4.1. 1st Dimension of Power

The 1st dimension is deemed the least complex of the three as its exercise is direct and observable, and performed by actor(s) in charge (Lukes, 1974). In this case, the dominant group (coal industry + high ranked federal decision-makers), enacting and enforcing certain policies (Table 11).

Table 11. Presentation of how the dominant group (coal industry + high ranking Federal Government members) exercise the 1st dimension of power according to Lukes (1974) in the case of shaping federal energy policy in favour of the coal industry.

1st dimension of dower	Notable Expressions of the 1st dimension
	Greenlighting policies that maintain a BAU scenario where coal maintains and/or expands its activities as the main source of electricity for Australia and export capacities
	This includes providing funding for associative research bodies and think tanks, as well as approving **government subsidies** towards the coal industry and providing them with **tax exemptions**.
	Redlighting policies that aid in the development of renewable sources of energy as alternatives to coal. This includes not providing financial resources to pro-renewables research groups. For example, allocating a climate change skeptic as the authority to approve financial fund allocations for climate change research group ARENA
Observable and direct Performed by ruling elites/those in charge of the decision-making-pro cesses	**Notable examples** 1980s: approving the privatization of the coal industry and it's exportation aspect in order to increase its revenue and maneuverability 1997: Howard Government refusing to sign the Kyoto Protocol due to grounded belief in climate change skepticism and lack of belief that it would aid Australia's economy: this lead to the creation, passing, and enforcing of policies that increased land-use for coal mining, mining quotas, and most importantly prioritisation for shipping rights in Eastern Queensland 2008: Rudd Government greenlights the expansion of coal ports facilities in Queensland and funding efforts to increase mine-to-port connectivity. Total of 500.5 million AUD 2010: PM Rudd is ousted of his position by his own party, in part influenced by a 22 million AUD advertising campaign funded by the MCA 2011: PM Gillard passes her carbon tax, entitled *Clean Energy Act*, encompassing heavy taxes targeted at high carbon-emitting industries 2013: PM Gillard loses her leadership vote to Kevin Rudd amongst her own political party 2014: PM Abbott revoking former PM Gillard's Carbon Tax as one of his first moves in position of PM and attempts to discontinue pro-renewables research groups, fails, therefore allocates climate change skeptic as decision-maker for their financial allocations. 2018: PM Turnbull ousted for his *National Energy Guarantee*, a policy targeted to drive emissions down

Here, the important take-away is that the high-ranked federal decision-makers shape and enact energy policies that aligns with their ideologies and interests, and the compatibility of those based on what Australia *perceives* to need.

6.4.2. 2nd Dimension of Power

Whilst the 3rd dimension outlines the creation of ideas and the actions taken to reinforce them, the 2nd dimension looks more at the process of federal decision-makers setting the agenda for decision-making processes to take place (Lukes, 1974). In this case, this encompasses analyzing the processes of influenced high-ranking federal members, more specifically their actions to control (or attempt to control) the agenda setting process of federal energy policy in favour of the coal industry and against the development of renewable energy sources.

Table 12. Presentation of how the dominant group (coal Industry + high ranking Federal Government members) exercise the 2nd dimension of power according to Lukes (1974) in the case of shaping federal energy policy in favour of the coal industry.

Traits of the 2nd Dimension	Applied to the Dominant Group
Takes place when a significant challenge to authority arises	Global action is taking place to move away from fossil-fuel dependency and shift towards renewable energies to curb GHG emissions in attempts to mitigate against disastrous climatic events. This has come to Australia, with anti-fossil fuel movements moving to challenge the status quo of coal powered electricity. Today, on the federal level, this exhibits itself through the means of The Greens, challenging the dominant pro-coal policies in the Federal Government.
Usually takes the form of corruption	The 2nd dimension consists of federal members *accepting* financial funds from fossil-fuel industries in return for shaping federal energy policies in a specific direction (i.e. a form of corruption)
Consists of agenda-setting capacities, *i.e. which policies get debated on and which do not*	***Access to the Prime Minister's Office*** The members of the PM's personal entourage have shown strong and long-standing ties to the coal industry, lobby groups, or pro-coal media, or a combination of these. Today, this leads to the advice *being provided* to PM Scott Morisson heavily grounded in pro-coal actions. ***Outside the Prime Minister's Office*** The agenda setting powers fall under MP's capacities to put forward policies. Considering that a substantial amount of MP's have been funded by, or stem from, the coal industry and/or lobby groups and/or pro-coal media outlets, as well as combined with ideological tribalism taking place, these MP's rarely put forward policies that *are not* in favour of maintaining the coal industry. In a situation where anti-coal policies do arise, these MPs will overwhelmingly vote against such policies, either out of loyalty to their party (ideological tribalism) or by fear of losing financial support (corruption).

Here, the important take-away is that a form of corruption is taking place through the means of members of parliament accepting financial support from the coal industry and/or lobby groups in exchange for favourable policies. This, in combination with ideological tribalism, plays a strong role in

setting the agenda of federal energy decision making processes: **pro-coal policies are put forward and anti-coal ones are put down.**

6.4.3. 3rd Dimension of Power

The 3rd dimension encompasses actors creating an idea with the end-goal of it being enacted within federal policy (Figure 6). Here, this includes the dominant group creating ideas to maintain coal as the dominant source of electricity production in Australia **and** to stop any alternative source of energy (i.e. renewables) to provide that electricity instead (Figure 14). The dominant group takes extensive actions to create such ideas (Table 13).
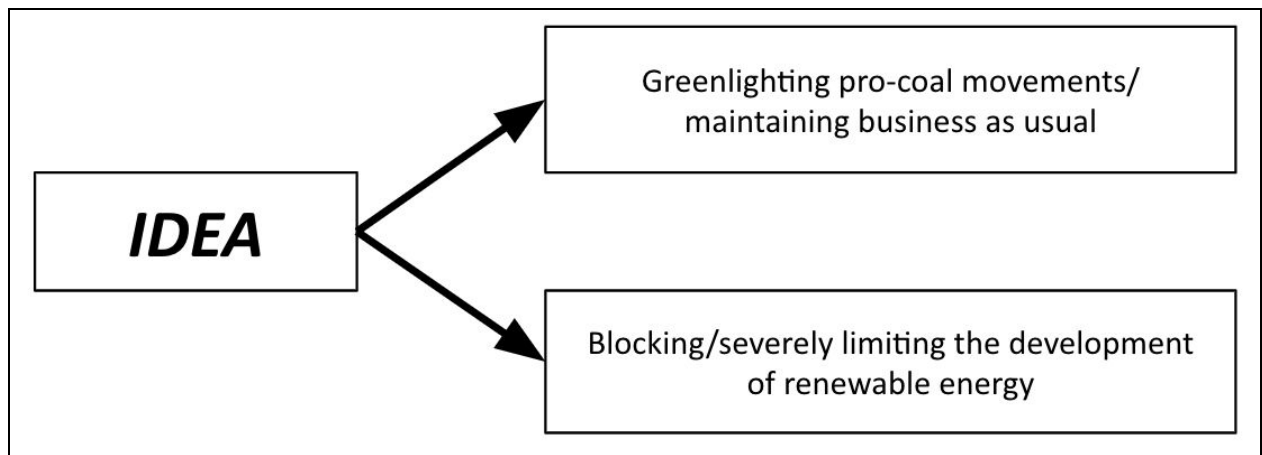
Figure 14. Overview of the two ideas/policy objectives that the dominant group aims to achieve, following the application of Lukes (1974) third dimension of power to this thesis case study. Own creation, using the online programme Google Slides.

Table 13 separates the two ideas outlined in Figure 14, yet in practice both ideas are usually connected: when shaping federal energy policies towards coal, federal decision-makers de facto shape these policies *away* from renewables, and justify this publically (Byrnes et al., 2013). The important takeaway is that the coal industry has established processes to ensure that its ideologies are strongly rooted into fundamental decision-making processes of federal energy policy. Having reinforced this process over several decades, the coal industry and these decision makers now share the same ideological foundations that form the basis of decision making: **coal should be expanded and renewables should not be developed.**

Table 13. How the dominant group exercises the 3rd dimension of power according to Lukes (1974).

Idea	Actions Taken to Reinforce Ideas	
	Coal Industry	**Federal (Coalition) Government**
Greenlighting pro-coal movements/ maintaining a business as usual scenario	Coal industry's goal is to maintain majority control over Australian electricity by controlling the agenda setting power of the Federal Government: it creates ties with politicians and widespread media to reduce the probability of any potential conflict of interests during decision making processes: This is further reinforced by their public statements in support of the coal industry and by creating strong financial ties with widespread media to increase reach. **Examples** 1950's - present: Providing significant financial funds for all major political parties holding office, in exchange for favourable policies. Revolving door process between employees of coal industry and Federal Government: *PM Principal Private Secretary, Chief of Staff, Federal Environment Minister, Federal Minister for Industry and Science, and Liberal Energy Minister* Creating and funding research groups to provide pro-coal scientific information Embedding the idea that coal provided Australia with its current economic prosperity and that without it, that economic prosperity can not be matched	**1980's** Maintaining members of federal climate advisory committee who are former fossil-fuel representatives Reinforcing the idea that coal has been the source of Australia's prosperity, therefore needs to be maintained **Ideological tribalism** (trickle-down process of new political party members incorporating dominant ideologies to belong)
Blocking/ severely limiting the development of renewable energy	Creating and funding research groups to prove pro-coal arguments Creating financial ties with popular media to increase reach and spread pro-coall / anti-renewables rhetoric.	Ideology: renewables did not create Australia's economic prosperity, therefore they can not provide such prosperity Climate change denial Reducing belief in renewables as effective decarbonisation process

6.4.4. Fitting the 3 Dimensions Within the MLP

The three dimensions fit in various positions within the MLP of Figures 2 and 6 (Table 14).

Table 14. Fitting the 3 dimensions of power presented by Lukes (1974) and how these are exercised by the dominant group into the Multi-Level Perspective presented by Geels (2011) (As shown in Figure 2).

Dimension of Power (Lukes 1974)	Location in the MLP (Figure 2 and Figure 6)	Elaboration
1st	External influences from landscape to niche and regime to niche	Policies that the regime acts on the Niche-innovations to influence their direction (e.g. red-lighting pro-renewables research and greenlighting pro-coal work)
	From niche to *New* regime through the means of '*Windows of Opportunity*'	The regime controls the opening of such '*Windows of Opportunity*' to strategically only incorporate innovations that favour its ideologies and not those with which there is a mismatch (e.g. incorporating coal seam gas as potential emission reduction technology instead of renewable energy innovation)
2nd	Dynamic stability and institutional lock-in in the regime	The dynamic stability and institutional lock-in mechanisms of the regime, in this case to maintain business as usual for the coal industry, takes place within the agenda setting powers of the Federal Government (e.g. only putting forth policies and actions that would entail maintaining the status quo of coal as the main source of electricity production in Australia)
	External influences from landscape to niche and regime to niche	The landscape and regime also influence niches through the means of corruption, providing financial support to research/advisory groups to provide information strictly in their favour, regardless of scientific accuracy
3rd	landscape to regime	The opening of '*Windows of Opportunity*' includes the incorporation of ideologies within the regime, such as embedding pro-coal ideologise
	New regime to *New* landscape	The process of regime influencing the landscape also involves taking action to embed or reinforce current ideologies within the landscape, especially those that are aligned with pro-coal activities

6.5. Summary of Results

The crucial results that are fundamental basis for understanding this thesis are:

Table 15. Summary of Results, encompassing the application of Multi-Level Perspective (Geels, 2011), Gramsci (1971), and Lukes (1974) to de-complexifying how, through the means of controlling the Federal Government, the Australian coal industry shapes federal energy policy in its favour.

Sub-Section	Key Take-Aways
Multi-Level Perspective	The vast majority of efforts to maintain business as usual scenarios and policy for coal burning as the main source of electricity production takes place at the level of the **Socio-technical regime**, with reinforcing dynamics to maintain this BAU through causal loops spreading to the other two levels (dynamic stability and institutional lock-in)
Gramscian Theory	The dominant group that enacts power and dominates federal energy policy is composed of the connectivity between **high-ranking members of the Australian Federal Government** (and their close associates) and **the coal industry**
Lukes Power Theory	Lukes' theory frames the complex processes that result in power being exercised in the shape of federal energy policy. It shows the power that is exercised by the dominant group to firmly embed pro-coal and anti-renewables values and ideologies into the minds of the federal energy decision-makers. This is to guarantee the reinforcing processes that maintain the activities of the coal industry to provide electricity for Australia. **In the short-term:** providing extensive funding to political parties (directly or through lobby groups) **In the long-term:** relying on ideological tribalism to ensure that lower-ranking officials absorb the ideologies of higher ranking members (pro-coal, anti-renewables, maintaining the status quo etc.)

7. Discussion

7.1. General

7.1.1. Where do the Political Hindrances to Renewable Energy Development Come From?

The results indicate that the essential decision making powers that shape Australian federal energy policy are located within the Socio-technical regime, housing dynamics between policy, industry, market, science, culture, and technology (Figure 8; Geels, 2011). The regime has created mechanisms that reinforce over time the synergies between these components, guaranteeing their implementation (Figure 2). These dynamics are Institutional lock-in and Dynamic stability (Figure 8), which combined form the backbone of maintaining the current scenario in which coal-fired electricity is the major source of Australian electricity.

Institutional lock-in's main component is that the advisors to federal climate policies are **dominated** by former fossil-fuel employees: these employees have heavily influenced federal policies to move *against* alternative sources of energy: their advice has proved to be the crucial turning point (Baer, 2016; Hudson, 2017). Institutional lock-in, in unison with dynamic stabilisation processes such as maintaining the "*revolving door*" process between the federal government and the coal industry, and the significant financial advantage of the coal industry to support its incentives in comparison to renewable energy development, has reinforced the pro-coal trend of the Federal Government. In relation to the other two levels of the MLP, Socio-technical landscape and Niche-innovations, the synergies of institutional lock-in and dynamic stability also spread to these two sub-levels, creating reinforcing loops that ensure the coal industry's dominance over federal energy policy (Figures 10 and 11).

This framework was used *analytically* as a first-step in clarifying a complex topic. It was selected to isolate *where* essential decision-makings stem from within the system, then as a stepping stone towards identifying *who* makes such decisions to then distinguish *how* they are being made.

7.1.2. Who Exercises the Power to Hinder Federal Renewable Energy Development?

The goal of applying a Gramscian framework was to identify *who* was the controlling force behind federal energy policy: it is a combined effort of the coal industry with high-ranking members of

the Federal Government (Figure 12). This shows that domination is beyond purely economic, but also socio-cultural (Figures 7,10, and 11). A noteworthy trend of the dominant group is *who* within the Federal Government are its members. To better illustrate the dominant groups two punch-approach to influencing high-ranking federal decision-makers, the dominant group in Figure 12 was divided into two groups: "***Direct access to the PM***" and ***"Not directly linked to PM"***.

With the former, the dominant group shapes policy direction in its favour, with the four closest members to the PM stemming from the coal industry, coal industry lobby-groups, and pro-coal news outlets: they are known for "*Wargaming the approach of the government*" (Patrick, 2019) and "*Although C|T* [pro-coal lobby group] *doesn't write coalition policy, sources say it's reach is so influential that the firm's feedback will inevitably shape the government's message"* (Patrick, 2019).

With the latter, the coal industry targets the top members of the political food-chain to its side, i.e. the Nationals Party leader, the Federal Liberal Party leader, and the Liberal Party campaign director, who are strategically chosen as they are the party leaders that form the majority within the Federal Government (Coalition). In the long-term this installs a reinforcing loop of a pro-coal stance for future members and leaders of those two political parties, i.e. ideological tribalism (Hudson, 2017). Another safety net is targeting MPs that shape federal energy policy directly: the Federal Environment Minister and the Liberal Energy Minister.

In contrast to the dominant group is the *counter*-hegemonic force, i.e. the subordinate group (Table 10 and Figure 13), composed mainly of The Greens who symbolise the anti-coal policy stance at the federal Level, yet their federal power is significantly small (Parliament of Australia, 2020), almost negligible. They are the only political party which have consistent goals based on the 2015 Paris Agreement, especially for renewable energy development and divesting government subsidies *away* from the coal industry and *towards* renewable energy R&D (The Greens, n.d.a), even though that same agreement was signed by the Australian government at the time (Climate Tracker, 2015).

This ever-growing gap between both groups has been weaponized by the dominant group on an ideological stance to garner popular support: claiming The Greens are against maintaining Australia's core democractic and economic ideologies that are the basis for Australian economic prosperity (GAP,2019). Aided by its power house of Federal MPs, the dominant group is able to squash any federal anti-coal policy shift (Baer, 2016). For this reason, The Greens have shifted their main centre of activity *away* from the Federal Government towards multiple State and Local governments, where they are able to have a more influential role in local energy directions (The Greens, (n.d.)b).

7.1.3. How is the Power to Hinder Renewable Federal Energy Development Exercised?

As pointed out in the literature, understanding *how* the power behind unsustainable practices is exercised forms the next step of sustainability transitions studies (Farla et al., 2012). Here, Lukes (1974) power theory was used as a conceptual tool to frame the power exercised by the dominant group (Tables, 11 12, and 13).

The least complex power, the 1st dimension (Table 11), is direct expressions of power, such as policies that provide government subsidies and expansion for the coal industry, are targets of directing policy *away* from a pro-coal direction. Yet these are backed by complex power plays within the decision-making process, i.e. the 2nd power dimension. Indeed, the dominant group has created dynamics that *block* potential debates on anti-coal policies: the most notable being PM Gillard's *Clean Energy Act* which was vehemently opposed and later abolished (Copland, 2019).

The 2nd dimension (Table 12) is characterized by three essential points: it is exercised when threats to authority arise, takes the form of corruption, and encompasses agenda-setting powers , all of which in turn influence the 1st dimension of power (Lukes, 1974). Here, these three characteristics were fully exploited to shape federal policy by the dominant group (Table 12). The most important challenge to face any anti-coal movement within the federal arena is **the dominant group's capacity to shape the agenda**: if such policies arise, the dominant group chooses *not* to debate them (Table 12, Lukes, 1974). Indeed, *non-decision making* also characterises the 2nd dimension of power. Here, agenda-setting power, through corruption by the coal industry to federal members *accepting* the industry's financial support in return for a shift in policy direction, is a significant obstacle that anti-fossil fuel movements must overcome.

The 3rd dimension, the most complex, forms the foundation for the other two dimensions to be exercised, and revolves around the ideological grounding of decision-making processes (Lukes, 1974). By exercising this power, the coal industry removes potential conflict of interests that arise in federal energy decision-making processes, by grounding two ideas into decision-makers (Table 13, Figure 14):

➔ Coal is the optimal source for electricity production and the Federal Government should maintain and increase its activities;

➔ Renewable energies (*coal industry competition*) are unreliable in providing electricity and reaching Australia's decarbonisation goals: the Federal Government should hinder their widespread development;

To do so, the coal industry creates connections with these decision-makers, which take the form of financial links with attached ideological components (Lukes, 1974). In the long-term, the coal industry

relies on ideological tribalism within political parties: by creating the ideological mindset of the highest ranking members of the party's pecking-order, lower ranking members have to *incorporate* the same mindset in order to belong to the party and ensure their feeling of belonging (Hudson, 2017). Thus, the coal industry ensures short- and long-term maintenance of its ideological goals (Figure 14) as it has created institutional lock-in and dynamic stability in its favour.

While the coal industry *directly* creates links with high-ranking Federal Government members, it also creates *indirect* links through lobby groups and pro-coal news media to spread ideologies to these politicians and the public (GAP,2019). In return, these media outlets and lobby-groups, also pro-coal advocates through trickle-down processes, create their own links with these high-ranking federal members to spread the coal industry's agenda (Figure 14) (GAP,2019).

Attacking on multiple fronts, **the coal industry has planted ideological seeds within the Federal Government**, which have led to agenda setting powers and corruption (2nd dimension) to then be able to shape policy in its favour (1st dimension). This shows that the ideological roots of current policy must be targeted for Australian electricity production's sustainable transition: not only must the symptoms of Australia's love with coal (policy action) be cured, but also its source (ideological grounding). This is easier said than done, considering the coal industry's impressive arsenal of political, economic, and social support. However, the next section attempts to decipher a path ahead, where this research serves as an initial stepping stone towards building sustainable energy policies.

7.2. The Path Ahead: from Network Governance to Adaptive Governance

Following an environmental governance approach, it is possible to chart a path towards a sustainable direction for the Australian Federal Government: this would constitute shifting away from the **network governance** (*exercising governance how it's always been done, maintaining the status quo*) (Weber & Christopherson, 2002) visible today to an **adaptive governance** state (Figure 15) (*achieving the same governance goals, yet shifting how to reach those goals to be more adaptable based on potential uncertainties)* (Folke et al., 2002; Evans, 2012).

More specifically, this would entail a significant shift away from the *engineering* resilience the Federal Government has built, where it mitigates against system shocks, through dominant policy processes (Taylor, 2007) and network influencing (Tienhaara, 2009) to maintain the same state and system functioning, to that of *ecological* resilience, where it can shift state yet still maintain system

functioning (Holling, 1973; Walker, Holling, Carpenter, & Kinzig, 2004). Indeed, the current network governance approach aims to maintain the current socio-technical system of coal-produced electricity (state) to provide electricity for the country (system function) (Ansell & Gash, 2008): maintaining such system works *against* the goals of sustainability as it uses fossil-fuel burning as a source of energy production, emitting high amounts of GHG, amplifying anthropogenic climate change in the process (IPCC, 2018), as well as blocking sustainable energy implementation (Baer, 2016).

To that, an adaptive governance approach would enable the use of renewable energy (change of state) to provide electricity for Australia (maintaining system function) (Folke et al., 2002) (Further transition guidelines found in Appendix D). This state is an optimal alternative to embrace future uncertainties in light of incoming climatic events as well as maintain environmental, social, and economic sustainability through a flexible and adaptable governmental system (Evans, 2012). This new approach would engage in innovative and efficient ways of shifting the mindsets from historically single-minded system operation approaches of environmental managers and decision-makers, to mindsets that embrace uncertainty and feedback loops in development processes (Evans, 2012). Such processes would be reinforced by adequate political and institutional support and empowerment that would strengthen the flux stemming from and between the environment, society, and the economy in order to best prepare for future system disruptions (Pahl-Wostl, 2007; Elmqvist, 2008). Park, Conca, & Finger (2008) and Geels, Monaghan, Eames, & Steward (2008) add to this that an effective Adaptive Governance path should utilise *pre-existing* policy dynamics, networks and markets to best enhance system resilience in the face of system shocks. However, governments must tread carefully as inadequate policies can backfire *against* an effective sustainable transition (Kemp, Rip, & Schot, 2001),

The current global system functions on the model of economic interdependence (Walter, 1975), where global leaders strive solely for economic growth, reducing the resilience of global systems against environmental and economic shocks, which in Australia, is the inadequacy of the Federal Government to adequately adapt to increasing climate risks (Ekins, 2015; Baer, 2016). The global environmental, economic, and social contexts are raising awareness towards the needs to balance all three in decision-making processes: **adaptive governance just does that** (Evans, 2012).
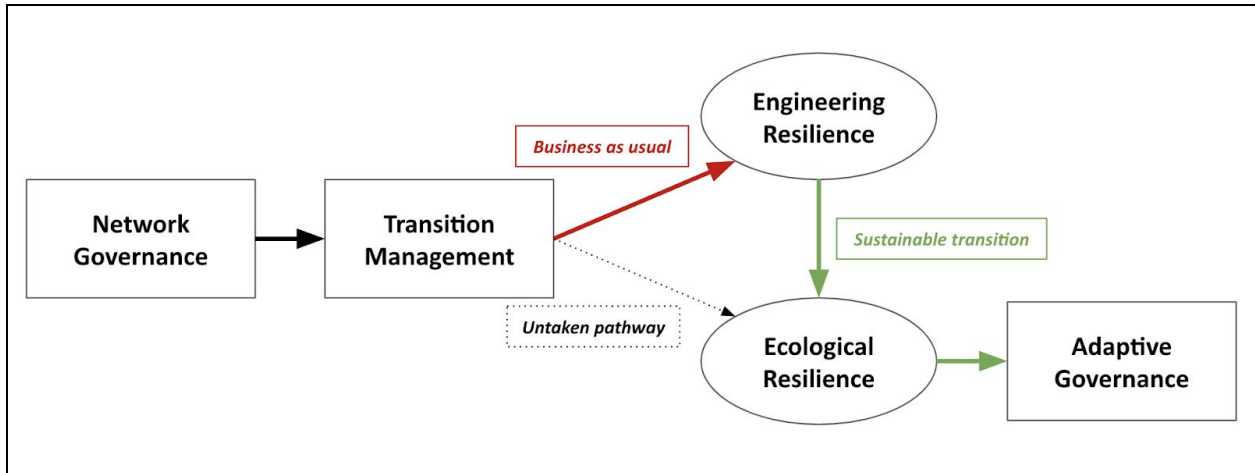
Figure 15. Overview of governance process required for a sustainable transition for the Australian Federal Government to transition away from engineering resilience to ecological resilience to reach a state of adaptive governance, in this case creating supporting infrastructure for the transition away from fossil-fuel based energy to renewable energy as well as building resilience against prospective system shocks. Inspired by Evans (2012). Own creation, using the online programme Google Slides

7.3. Limitations

As pointed out by Cash et al., (2006), such a study of multiple levels and scales is difficult but necessary. This was done within the project scope and the capabilities of the author, and hopefully serves as an inspiration for more in-depth and accurate work to enhance sustainability transitions. Such work should isolate in even more detail potential leverage points to shift power towards sustainable directions, as well as investigate, measure, and enact ways to influence the general population in *favour* of sustainable transitions (Farla et al., 2012) to put pressure on all levels of government.

7.3.1. Limitations of Theories and Methodologies Used

The theories presented in this study were chosen as they served as the base for analytical frameworks to aid in clarifying a complex decision-making issue. However, they also present their own limitations:

➔ **MLP** analysed *where* the pro-coal power stemmed from within the Federal Government. Limitations include (Geels, 2011):

◆ Does not produce answers to research questions, rather serves as an analytical framework;

◆ Aims to identify variables, yet their interactions can not always be identified, thus analysis is dependent on in-depth case knowledge;

◆ Presents landscape, regime, and niches as nested hierarchies: in practice their delimitations might be blurry and not as strict as presented here;

◆ Focuses on (usually) rare macro-changes, making it difficult to develop MLP databases to aid in case study applications, thus requires creative interpretation/integration;

→ **Gramscian hegemony** analysed *who* exercised this power. Chosen due to its ability to isolate hegemonic and counter-hegemonic activities within a society, its underlying limitation is (Adamson, 1980; Mastroianni, 2002; Storey, 2018):

◆ Gramsci's work is grounded in the context of WWII and only translated into English in the 1970's: countries and their interactions have changed since then, questioning the modern-day application of such theories (Schwarzmantel, 2009). An updated theory, to better fit future work, could stem from the works of Cox (1983) and/or Mouffe (1979).

● **Cox:** adds to coercion/consent concepts, legitimising modern political authority, and the influence of historic trends (Cox, 1983)

● **Mouffe:** focuses on hegemonic expansions, ideology, collective will, and their application to leading discourse (Mouffe, 1979)

→ **Lukes Power theory** to analyse *how* such power was being executed. Chosen due to its analysis of power features within governance dynamics. Limitations include (Lukes, 1974):

◆ Cultural perception of power is a key limitation: an analysis of how power is *perceived* on a cultural level in Australia must be undertaken;

◆ 2nd and 3rd dimensions: how can analysts locate *non*-decision making? Distinguishing what decisions haven't been made and how they influence power is a difficult task;

◆ Without in-depth knowledge of those executing power, it is difficult to distinguish conscious and unconscious decision-making;

◆ Lukes does not tackle how society can be used as a means to influence decision-makers. This links to another research pathway on sustainable transitions recommended by Farla et al., (2012).

7.3.2. Data Limitations

Within the context of data collection, there are a handful of general flaws within the data collection process.

First, initial data was collected from academic literature on the topic of the coal hegemony within Australia, as shown in the methodology section. This information was based on available data during the time of writing which mainly involved *publicly* available data, either through observation of

parliamentary debates or through reports. Due to this, it is very difficult to know what takes place *behind* closed doors of the Federal Government, political parties, and the coal industry. Second, this project tackles the connectivity between actors of the dominant group and members of the Federal Government: what are other potential connections that take place and have not been found and/or reported on? If so, what are the influences that such connections have over decision-making processes?

On this topic, data that stemmed from news media faces a similar issue: with very tight connections between the coal industry, lobby groups, the Federal Government and pro-coal news outlets, it is not unwise to question the filters that high-ranking officials enforce on their content in light of heavily supporting coal across Australia (GAP, 2019). Conversely, anti-coal/pro-renewables media presents a strong bias *against* the dominant group (GAP, 2019), which highlights the vast gap that exists between right wing (usually pro-coal) and anti-coal media in Australia, with very little news outlets meeting halfway. For this, data stemming from news articles was cross-referenced with peer-reviewed literature for correlation.

This project analyses connections between the coal industry and federal government, with connections to lobby groups and the media taking secondary positions, whereas more in-depth reports have identified that there is a much stronger connection amongst all four entities that influences decision-making processes. This was not tackled as it would have been too big of a task under the scope of this project, and could serve as a potential pathway for future work on the topic.

7.4. Contribution to Sustainability Science

This thesis contributes to the field of Sustainability Science by presenting an adaptable framework to understand underlying political power dynamics behind unsustainable activities (e.g., fossil-fuels) hegemonies over decision-making processes. This forms the next step of sustainable transitions research and practice, as emphasised by Farla et al. (2012). Hegemonies linked to unsustainable resources are not uncommon around the world (Copland, 2019): this thesis could serve as a backdrop to inspire and/or study sustainable transitions *outside* Australia. A common thread amongst such cases is the strong political, economic, and social arsenal at the disposal of unsustainable practices to block sustainable changes (Byrnes et al., 2013; Baer, 2016; Copland, 2019). Following Sustainability Science, the IPCC (2018) highlights that the science of sustainable transitions is known, it is now up to the relevant decision-makers to enact this change. The thesis bridges the overarching disciplines of Sustainability Science, economy, ecology, and society, in a transdisciplinary fashion to be able to set plans into place to balance these three fundamental disciplines to build a sustainable future for all.

Grounded in Sustainability Science, decision-makers must enact policies that build *synergies* between the economy, society, and the environment around us, and not *tradeoffs,* as has been the current case in Australia, trading environmental sustainability for economic gain.

8. Conclusion

This thesis has achieved its overarching goal of adding clarity to a complex sustainability science issue, the political dimension of a sustainable energy transition, and contributing to the field by presenting a transposable framework that can be applied to political sustainable blockades around the world. By tackling political aspects within a socio-technical system, this thesis aims to aid in balancing the three underlying disciplines of Sustainability Science, economy, ecology, and society, to create a safe living space for all. Applying this to the Australian Federal Government, the results showcase *where* the power is exercised to block the transition to renewable energy sources for national electricity production (Figures 7 to 11), *who* exercises this power (Table 10 and Figures 12 and 13), and *how* it is exercised to maintain coal as the overwhelming go-to energy source (Tables 11 to 13 and Figure 14).

The coal industry, having built strong and deeply-rooted connections with high-ranked Federal members, influences federal energy policy and has been able to install reinforcing dynamics that guarantees its employment (Figures 10 and 11). These are **Institutional lock-in and Dynamic stability**, who, following a Sustainability Science framework (MLP), create synergies to reinforce coal-lock in and grow stronger over time, strengthening coal's federal domination (Figure 8).

Following a Gramscian approach, the coal industry's influence extends beyond economic domination (giving financial funds to federal members), but also **shapes dominant socio-cultural ideologies** throughout the political arena and the population (Figure 12).

The former is reached through the 3rd and 2nd dimensions of power (Lukes, 1974) (Tables 12 and 13), and through **ideological tribalism**, an essential component of Institutional lock-in, describing the trickle-down processes of new political party members grounding their ideological beliefs with those of the top hierarchy members, which as future leaders, results in the maintaining the same ideologies over time (Hudson, 2017).

The latter is reached through the strong connections the coal industry has with dominant Australian news media, where it is able to influence popular beliefs, in turn influencing voting trends (GAP,2019).

Finally, recommendations for future pathways recommend following a path towards adaptive governance to best prepare for future system shocks (Evans, 2012). This entails shifting management direction away from maintaining engineering resilience (Walker et al., 2004) to building ecological

resilience (Figure 15) (Holling, 1973; Taylor, 2007), where the Federal Government will be able to maintain providing electricity for Australia whilst shifting away from a fossil-fuel, high GHG-emitting base, to a new renewable energy source.

If no sustainable political action is taken, Australia will continue alongs its current trajectory of unsustainable energy practices. Dramatic climatic events such as the devastating forest-fires witnessed in early 2020 will appear more regularly and at higher intensities (IPCC, 2018), and the country will not be able to provide adequate safety for its citizens (Hudson, 2017). Hopefully, this work can serve as a stepping stone for Australia to move in a sustainable direction, one that is gravely needed to balance social, economic, and environmental sustainability to ensure the safety of its citizens (Evans, 2012).

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10. Appendix

Appendix A. Different Levels of Government in Australia

The goal here is to provide information that aids the reader in differentiating between the three forms of government in Australia (Federal, State, and Local). The scope and responsibilities of each form of government differ, yet can also remain interconnected: in times of alignment of interests, much can be accomplished, yet in non-alignment, conflicts of interests can arise leading to confusion and potential conflicts within jurisdictions (Commonwealth of Australia, 2006).

Table A1. Difference between the responsibilities of Australian local, state and federal government, inspired by Parliament of New South Wales (n.d.)

Daily Activities	*Local Government*	*State Government*	*Federal Government*
Preparing the Day	Health inspections of food produce and purchasing stores	Sewerage, water, gas and power from state run corporations Consumer, and shop and workplace laws	Commercial trade (exports and imports) Advertising laws
Transportation		Traffic and transportation infrastructure (laws, police, signs, etc.) + Road taxes	National road and transportation connectivity
Education	Local school management	Depart of Education funding infrastructure Providing subsidies to councils	Higher education infrastructure Providing funding to state Departments of Education
Telecommunications	National (federal controlled) telephone services		
Televised Entertainment	National (federal controlled) broadcasting laws and television rights		
Health Services	Community based services	Hospital and management services	National health insurance (medicare) Providing funding to states Department of Health
Waste Services	Waste collection services Local environmental management	Waste disposal Pollution controls	Accepting and enacting international and environmental treaties

Recently, the gap between Federal Government and some State Governments has been growing wider and wider, as there is no alignment of interest and the states decide to choose their own path as they believe the Federal Government is inadequate to serve their interests (Commonwealth of Australia, 2006). This is currently the case with the states of Tasmania and South Australia, separating themselves away from Federal Government guidelines, especially in terms of economic policy and energy sources (The Greens, (n.d)b). Indeed, according to the Australian constitution, states have the right to deviate *away* from Federal policy if it is not in their interests, meaning that states that *do* have similar interests can follow on the path outlined by the Federal government (hence the strong Federal Government - Queensland connection) (Commonwealth of Australia, 2006).

Whilst the Federal Government does serve as the entry point for international environmental treaties to enter Australia, Tasmania and South Australia have decided to take matters into their own hands as sustainability remains an important underpinning for their policies (The Greens, (n.d)b). The growing gap between Federal and some State governments is beginning to grow a divide between the pro-coal states and the pro-renewables state: this can cause serious issues in the future as in these times unity is needed to chart a positive and sustainable course, rather than what we're seeing now where some states are becoming more environmentally friendly, undertaking positive energy transitions whilst some are going in the opposite direction (GAP,2019; Oldenbrough, 2020).

In times of crisis, unity and consistency is required to be able to set a consistent path ahead *for the entire country*. As shown throughout this thesis, the Federal Government is spearheading an energy transition that is unsustainable and more environmentally harmful than helpful (Copland, 2019). Perhaps if the pro-coal states of Queensland, Northern Territory and possibly even Western Australia follow the paths of South Australia and Tasmania, then together these states can spearhead the sustainable change that is needed in Australia.

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Appendix B. Data Used to Fill in the Theoretical Frameworks

This Appendix presents the data used to fill in the MLP and Gramscian Hegemony theoretical frameworks, based on Figure B1 and the **Data Collection and Manipulation** section. It is reminded here that:

➔ Academic literature referenced in the **Background section** was used to fill in the **MLP** framework (alongside additional data to fill in some gaps);

➔ Then, the information provided stemming from this MLP analysis (**subsection 6.2**.) was used to fill in the **Gramscian Hegemony** framework (alongside additional data to fill in some gaps);

➔ Finally, all this previous information combined (**subsections 6.2 and 6.3**), was used to fill in the **Lukes power** theory framework.
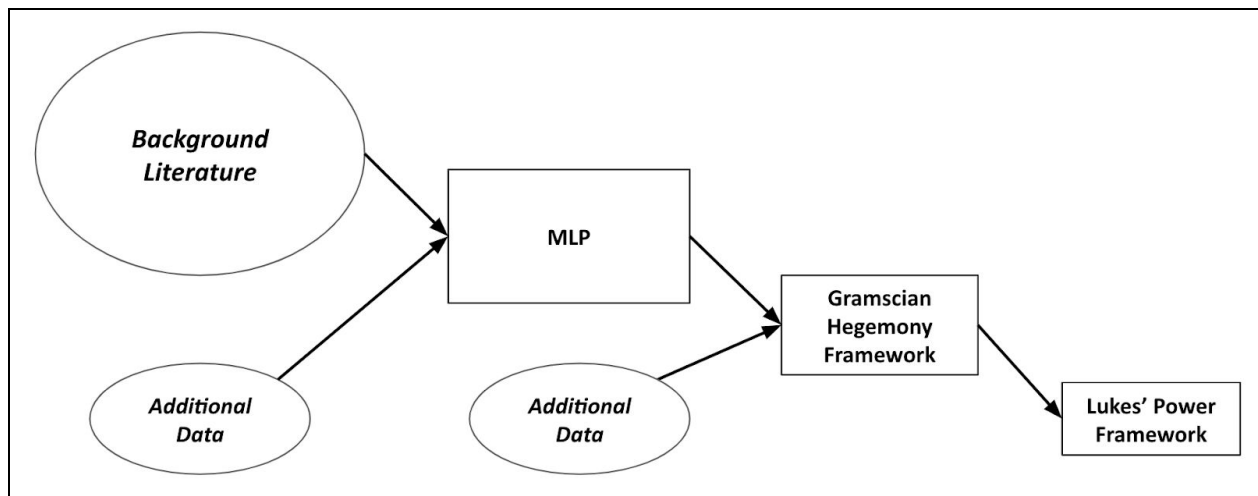

Figure B1. Overview of which data sources fill (arrows) which theoretical framework. Ovals indicate data sources and rectangles indicate theoretical frameworks. The Background Literature oval is larger than other ovals as the vast majority of data to fill the MLP stems from the references used in the Background section. Own creation, using the online programme Google Slides.

Table B1. Data used to fill the MLP and Gramscian Hegemony frameworks, as presented in Figure B1.

Academic literature in Background section used to fill MLP framework	Additional data to fill MLP framework	Additional data to fill Gramscian Hegemony framework
AAP, 2014	Commonwealth of Australia, 2016	Parliament of Australia n.d., 2008, 2020
ABC, 2006	Greenpeace Australia Pacific (GAP), 2019	ABC, 2004
Baer, 2016		The Greens n.d.a, n.d.b
Byrnes et al., 2013		Bagshaw, Gartell, & Remeikis, 2017
Cambell, 2006		Coal21, n.d.
Effendi & Courvisanos, 2012		Conifer, 2019
Ekins, 2015		Crowe, 2018
Hannan, 2014, 2015		Davis, 2011
Hudson, 2017		Donovan, 2014
IPCC, 2018		Dwyer, 2016
Kilvert, 2018		Government of South Australia
Luthi, & Prassler, 2011		Karp, 2018
Mercer, 2003		Knaus, 2018, 2019a, 2019b
Parkinson, 2017		Liberals, n.d.
Pearse, 2009		MCA, 2018
Pearse, McKnight, & Burton, 2013		Newlands Group, n.d.
Pezzey, Mazouz, & Jotzo, 2010		Parkinson, 2019
Pusey, 1991		Patrick, 2019
Quiggin, 2013		Queensland Resources Council, n.d.
Schlapfer, 2009		Readfern, 2018
Williams, 2013		Roe, 2017
		West, n.d.
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Appendix C. Data Entry Tables for Gramscian Applied Theory

Table C1. Data entry table to identify the dominant group/hegemonic force following a Gramscian approach: applicable data following each *Characteristic* row is inputted into its associative *Application* column. Inspired by Gramsci (1971) and Mastroianni (2002).

Characteristic	*Application*
Political and ideological institutions that formalise power, and have economic and political decision making powers	
These institutions create specific organizations/groups of individuals to enact their will, propagate their message and do what they can to ensure the maintenance of power of these political and ideological institutions	
Combining these institutions with their new groups, together they reinforce the legitimacy and sovereignty of these institutions through the means of advertising, publications, and education	
This results in a reinforced loop of distinct yet interconnected social relations, ideas, cultures, and visions or the futures, spread throughout the general population	
Put together, they exercise "dominance" over certain groups with whom they have conflicting interests and who (might) threaten their power	

Table C2. Data entry table to identify the subordinate group/counter-hegemonic force following a Gramscian approach: applicable data following each *Characteristic* row is inputted into its associative *Application* column. Inspired by Gramsci (1971) and Mastroianni (2002).

Characteristic	*Application*
Has opposing/conflicting values and belief systems to the dominant (the one that maintains the most power) group	
Is dominated through economic, intellectual and moral means based on these ideas and resulting conflicts of interest	
Is dominated by power plays through the means of coercion, influence, authority, force, and manipulation, or a combination of several or all of these	
Accepts this domination because there are no alternative sources of dominant powers	

Appendix D: The Path Ahead: from Network Governance to Adaptive Governance

*Note to reader: this appendix is a detailed expansion of **7.2 The Path Ahead: from Network Governance to Adaptive Governance**, where a shift from network governance visible today to the required adaptive governance is presented.*

Taking a step back into the overarching lens of Environmental Governance theory as presented in Evans (2012), it is possible to chart a course towards a sustainable direction for the Australian energy system using the work provided in this thesis as an initial building block. Indeed, Evans (2012) outlines that modern day national and/or federal governments are for the large part *reactive* entities, i.e. that their policies enact actions once events/tipping points occur rather than create *preventive* policies, which set plans into place to create efficient safety nets in order to mitigate against disastrous climatic events. For this reason, negotiations to implement such strategies take extensive amounts of time and such lengthy debates result in the creation of vague, unclear, and indecisive policies (Evans, 2012). In the case of modern-day Australia, federal policies were enacted to financially support the displacement of thousands of homeowners in light of the catastrophic forest fires having hit New South Wales and Victoria earlier this year, instead of creating *preventive* policies that could have anticipated the arrival of the fires, as were heavily advised by fire chiefs in both New South Wales and Victoria (Oldenbrough et al., 2020). To this, environmental governance recommends empowering a decentralized and flexible governance system to best prepare for such unexpected shocks to the system as well as efficiently incorporating civil society dynamics to enable wide-spread adaptation of mitigative measures (Evans, 2012). Park et al. (2008) add to this that the path ahead for effective environmental governance must encompass utilising already existing networks and markets in order to best tackle the two most adamant issues of environmental governance: underrepresenting economic forces as drivers of change and analysing systems as closed, isolated systems. This would entail shifting from the current Network Governance visible today to that of Adaptive Governance (Evans, 2012).

D.1. Network Governance

Looking in-depth at network governance, Weber & Christopherson (2002) identify an underlying characteristic of such governance as the presence of NGO's and/or semi-governmental organizations exerting important influential power within existing governmental decision-making processes without being an integral part of the political arena in question. As outlined throughout this work and visible in Australian federal politics, the coal industry (an NGO) exerts **heavy** influence on decision-making

process, shaping policies in its favour (GAP,2019). Indeed, Taylor (2007) highlights that within network governance systems, decision-making processes clone (or improve) pre-existing dominant processes rather than producing innovative measures to mitigate against future dangers in order to maintain the steady flow of financial resources from donors. Figures 10 and 11 showcase clearly these dynamics applied to this case study, where the Socio-technical regime enacts policies that reinforce the maintenance of the current system as well as severely hindering the integration of innovations that move *against* pre-existing processes. Thus, those with power, i.e., governments, use their vast networks of resources to execute such reinforcing dynamics to achieve their goals (Tienhaara, 2009): the most notable case of this in the context of federal Australia was the Coalition government allocating a climate change skeptic as the financial resource allocator for two federal climate-change research bodies (AAP, 2014).

Table B1 outlines the strengths and weaknesses of network governance. The overarching message taken from Table B1 and transposing it to the case study of the Federal Government in Australia favouring coal as the main source of electrical energy in the country as well as the strong dynamics between the federal decision-making arena and the coal industry presented in the previous section, is that the *strengths* of network governance work in favour of the coal industry and the *weaknesses* work as obstacles towards renewable energy implementation. Noteworthy components of this include, within the strengths, Innovative restructuring of institutions, where the coal industry "innovates" its approach, only incorporating pro-coal innovations such as coal-seam-gas exploration as a prospective means to reduce coal GHG whilst keeping a BAU scenario for the coal industry (Figure 11). Within the weaknesses, the Ineffective as decision taken in advance characteristic highlights the *reactive* nature of such governance, rather than the *preventive* stance required in light of current global environmental governance (Evans, 2012). More comparisons can fit the current Federal Government through the lens of a network governance framework, but would stem away from the goal of this subsection.

Table D1. Strengths and weaknesses of network governance, taken from Evans (2012).

Strengths	*Weaknesses*
Collective and reflexive	No real political power
Widens representation	Ineffective as decision taken in advance (becomes a public relations exercise)
Broadens participation	Non-accountability of non-state actors and capture by dominant interests
Consensus (conflict resolution)	Compartmentalization of policy
Innovative restructuring of institutions	Dominance of expert and industry knowledge due to complexity of problems
Recognizes complexity of real world	Disperses responsibility for making change happen
Diversity of institutions	Turf wars over areas of operation

Following the characteristics outlined by Ansell & Gash (2008), the current coalition government is a successful network governance because it has a strong history of cooperation, creates firm incentives for stakeholder participation, presents a strong imbalance of resources and power dynamics, leadership dynamics, and deeply-rooted institutional design (Byrnes et al., 2013; Williams, 2013; Baer, 2016), all within the perspective of maintaining coal as the main source of electricity production in Australia. The last characteristic, deeply-rooted institutional design, forms the foundation of network governance, thus the most important characteristic, as it allows for the other four characteristics to emerge (Evans, 2012).

D.2. Back to Transition Management

Moving away from a network governance approach entails undertaking an adequate transition management, which in this case can be transposed to a sustainable transition towards a low carbon energy source, such as a renewable energy base, as it encompasses the governance dimension of sustainable transitions (Evans, 2012, Rotmans & Loorbach, 2009). Multi-Level Perspective is an important part of transition management as a framework to identify the various interacting components influencing the direction that policy making will take (Geels, 2011): that is why it was chosen for this case study, as shown in the Theoretical Grounding section. As shown in previous sections, the Socio-technical landscape, regime, and Niche-innovations were identified and analysed in order to visualise the processes that changes would have to go through in order to be integrated within the

central Socio-technical regime, which is the centre of federal decision making power within this case study, and later on to the Socio-technical landscape. Indeed, sustainable transitions, following the framework of transition management, will originate within Niche-innovations (Geels, 2011; Evans, 2012). However, due to their radical differences to the current regime, they must be protected from the latter through strong political (and potentially social) networks (Evans, 2012): due to a lack of supportive political networks at the federal level, sustainable innovations are not able to be integrated into the Socio-technical Regime (Figures 10 and 11).

Indeed, the Federal Government in Australia strengthens bonds with innovation actors to enable the creation of *specific* niches that are favourable within its long-term objectives (Figures 10 and 11). Such dynamics can also be reversed in light of sustainable transitions, where sustainable innovations are fast-tracked by the government in place to streamline their integration in light of taking *preventive* measures to mitigate against the consequences of increased GHG emissions (Geels 2011). This project has highlighted the political dynamics that the coal industry-backed Federal Government has taken to ensure the maintenance of technological transition *in favour* of coal-fired technology. Yet Geels et al., (2008) highlight how these same dynamics can be redirected to *decouple* away from coal-fired technology for electricity production and *towards* renewable energy, all that is needed is a shift in direction and can be used as a foundational building block to shift Australian energy production in a sustainable direction. These include (Geels et al., 2008):

➔ Involving a wide range of actors;

➔ Multiple-level and long-term transitions;

➔ Co-evolutionary and cross-dimensional transitions;

➔ Radical system change (*time-dependent*);

➔ Non-linear changes and results;

On top of this, pro-coal technologies enjoy their strongly rooted implementation due to institutional lock-in, where the institutions in place (i.e. the Federal Government) will not deviate *away* from their usage as they feel threatened by new, potentially paradigm shifting technologies (Byrnes et al., 2013; GAP, 2019). These are reinforced by financial pressures as well as the goal to maintain a BAU scenario rather than risk an unpredictable innovation, which in return results in tax exemptions, government subsidies as well as research funds to maintain current course (Geels et al., 2008): all three of these characteristics, in the case of this project, stem from the Federal Government and act in favour of the Australian coal industry (Baer, 2016). Here as well, such dynamics as institutional lock-in and dynamic stability can also be redirected in *favour* of ensuring renewable energy electricity generation (Evans, 2012). However, governments must tread with caution in such situations, as there are cases

where government interventions in favour of sustainable transitions have backfired, such as in California, where government-promoted wind power streamlined widespread production of wind turbines, yet due to their poor quality resulted in inefficient and unreliable electricity production (Kemp et al., 2001).

Another important factor of transition management is the interplay of technological objectives with social aspects of the regime (Evans, 2012). Indeed, the landscape (Figure 7), showcases that economic prosperity is the underlying ideological goal of federal policies. However, cultural stereotypes and objectives can be shifted in terms of identifying progress and successes in the right direction to enable a sustainable transition (Evans, 2012). In this case, this would entail shifting priorities away from solely economic gains towards ensuring social and environmental sustainability as well: in light of current crises, these underlying policies are not offering adequate financial support to mitigate against the devastating forest fires that took place earlier this year (Oldenborgh, 2020). As Evans (2012) adequately puts it: simply because the world is built around what has previously existed, policy-makers often look past its designed features and even more that they can be altered in light of new, sustainable requirements. Such inadequacy is replaced if following a transition management **to build resilience**: all in all, for a sustainable transition, adequate political goals must be set, supported by relevant and efficient technologies as well as fostering their economic development and integration (Evans, 2012).

D.3. From Engineering Resilience to Ecological Resilience

Holling (1973) describes resilience as a metric of system persistence in light of absorbing disturbances and their resulting changes to the system whilst still being able to maintain system functioning. Modern-day climate threats, such as the case of wildfires in Australia as well as the current global COVID-19 crisis, indicate a strong necessity for governments to build resilience for their countries in order to minimise the negative consequences of such events (Evans, 2012). Indeed, the concept of resilience puts foundational assumptions into question, doubting the adequacy of current governance systems in light of current global threats (Evans, 2012): such inadequacies include socio-technical systems that are grounded in *one* system, which might have been efficient in the past, yet presents little adaptive capacities, in turn reducing resilience.

This is the case with Australian energy production, as this thesis has shown the vast majority of the country is heavily reliant on coal for electricity production, which when sustainability transitions imply a shift *away* from coal, the system in place presents little to no resilience in its capacity to adapt, as has been shown throughout previous sections. Within resilience, Evans (2012) identifies two forms of resilience: Engineering and Ecological (Table B2). The core differences between both is that the former

aims to build resilience to maintain current trajectory and current status quo whilst the former aims to build resilience to maintain current trajectory whilst under a new state of functioning (Table B2). Applied to this case study, the coal-industry backed Federal Government has enabled engineering resilience through its dynamics of Institutional lock-in and Dynamic stability, which allows the system to resist anti-coal disturbances such as renewable-energy innovations as well as maximizing efficiency in terms of coal-sourced electricity dominating the Australian energy grid (Effendi & Courvisanos, 2012; Williams, 2013; Copland, 2019).

In contrast, **ecological resilience is what is required to be built under a sustainable transition management in order to adapt the energy grid under low carbon requirements as well as shift the source of electricity production in Australia as a whole yet still provide electricity for the general population** ("Adapts to disturbances to continue functioning" (Table D2)) (Evans, 2012). Indeed, building engineering resilience on natural resource management leads to the *Pathology of Resource Management*, a process of which managers of the resource in question (here, electricity production), enforce processes to ensure their system remains in a single state (coal used for electricity production) and prevents it from shifting to another state (renewable energies replacing coal) (Evans, 2012). For this reason, a shift to ecological resilience is required to be able to shift electricity production from one state to another (Holling, 1973).

Table D2. Differences between engineering and ecological resilience, inspired by Walker et al. (2004) and Evans (2012).

Engineering Resilience	*Ecological Resilience*
Controllable	Adaptable and unpredictable
Reinforces the ability of a system to resist disturbance and rebound to pre-disturbance state	Reinforces disturbance absorbance within a system and ability to reorganize to maintain system functioning
Efficiency is maximized	Adapts to disturbances to continue functioning
Best fitted in to systems with reduced uncertainty and predictable disturbances	Measures disturbances required for a system to change state but still to continue functioning

Within the process of ecological resilience implementation, the adaptive process arises, where a state moves from reorganization, to growth, to release, followed by reorganization in order to create a cyclical process of adaptability to shocks within systems (Evans, 2012). Engineering resilience follows a similar path, but only maintains the first three states (reorganization, growth and conservation) and

stays there whilst ecological resilience goes beyond the two states to move to release and create cyclical dynamics to reorganize according to new disturbances and so forth (Evans, 2012).

Considering the analysis that the case of Australia has strong engineering resilience and needs to transition towards building ecological resilience, the path of action ahead to aid in Australia transitioning towards a sustainable source of electricity entails **bringing down the blockade that the Federal Government has set between the conservation and release section, and allow for the creation of cyclical adaptive cycle**.

D.4. Adaptive Governance

Within the political sphere, a method to take down such barriers is implementing an adaptive governance framework that aims to increase resilience of systems by enhancing internal processes to adapt to changes (Folke et al., 2002). Under the current scenario, the features of the system in place that enable the creation of stable states of electricity production are the most attractive and guide policy making (i.e., gaining economic wealth), whereas under an adaptive governance framework, the ability to change states in light of disturbances is the attractive feature of the system (Folke et al., 2002).

To do so, Elmqvist (2008) outlines the three foundations of adaptive governance: **understanding socio-technical system dynamics**, **management networks and processes**, and **governing institutional dynamics**. However, undertaking the task of implementing adaptive governance also entails being able to effectively tackle the underlying challenges of strongly grounded social systems that are locked-in to one socio-technical system, newly developed resilience-lacking systems, and the lengthy process of technological experimentation (Evans, 2012). Indeed, the results of adaptive governance include institutions shifting the way they function across the levels of Multi-Level Perspective, in order to reinforce their role of supporting ecological resilience, especially in terms of information sharing, as historically speaking institutions that own data have been known to have a firm grip on such information and refuse to share it (Pahl-Wostl, 2007).

Adaptive governance is strongly rooted in the concept of sharing information amongst stakeholders and government members, bridging the gap between institutions across fields and sectors to fill existing knowledge gaps which in turn facilitates wide-spread integration of innovations (Pahl-Wostl, 2007). Adaptive governance employs a transdisciplinary approach to decision-making, pooling in information across such wide-spread fields in order to best balance environmental, economic and social sustainability within its policy implementation processes as well creating strong financial roots through public-private dynamics (Pahl-Wostl, 2007).

D.5. Summary

As pointed out throughout this section, the end goal is for the Australian government to enable the change and maintenance to an adaptive governance stance, which is a significant shift away from the inadequate network governance already in place, that is inadequate to reach sustainability goals (Folke et al., 2002) (Figure 15). **In light of embracing the uncertainty that the future holds of never-before-seen climatic events on unprecedented scales, embracing ecological resilience offers an optimal alternative** (Evans, 2012).

The current network governance state aims to maintain the current socio-technical system of coal-produced electricity, which firmly works against the goals of Sustainability Science and in fact weakens the socio-technical system and the global environment as a whole in the long-term, rather than protect it as so many leaders claim (Byrnes et al., 2013).

This new state would find innovative and efficient ways to persuade historically single-minded environmental managers as well as decision-makers as a whole to explore new ways of operating, embracing uncertainty, and feedback along the way: this would be reinforced by institutions and political procedures that strengthen the feedbacks between the spheres of the environment, society and the economy to best prepare for system disruptions (Evans, 2012).

The current global system is built on the model of economic interdependence (Walter, 1975), where economic growth is strived for as a single goal by global leaders, which has reduced the resilience of global systems in light of environmental and economic shocks, which on an Australian level, is the inadequacy of the Federal Government to effectively mitigate against incoming climatic events (Oldenbrough, 2020). The global environmental, economic, and social contexts are raising awareness towards the needs to balance all three in decision-making processes throughout scales and levels: **adaptive governance just does that** (Evans, 2012).