Enabling a Coal Transition in South Kalimantan, Indonesia

An Exploratory Case Study Research with a Political Economy Analysis & Development of Institutional Interventions

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Executive Summary

According to the UNFCCC, the generation of electricity from coal fired power production (CFPP) is regarded as the greatest cause of climate change. Phasing-out CFPP and accelerating the deployment of renewable energy sources (RES) is, therefore, a crucial part of energy transitions for mitigating climate change. As part of the Paris Agreements and international climate negotiations, the Indonesian government has announced ambitious plans to reduce Greenhouse Gas Emissions and reach net-zero by 2060. However, despite these ambitious plans, Indonesia plans to expand their use of CFPP in the coming years and deployment of RES is limited. Research suggests that the main problem with regard to a coal transition in Indonesia arises from vested interests of powerful and influential actors in the political economy of coal in Indonesia.

In the province of South Kalimantan, coal contributed 18.8% of the provincial GDP in 2017. The economic dependency of South Kalimantan poses a significant barrier to a coal transition. However, research suggests that the economic, social, and environmental costs of not preparing for collapsing coal markets are high and disruptive. This suggests that South Kalimantan should prepare in advance for a coal transition.

The purpose of this thesis is to conduct research on possible ways to enable a coal transition in South Kalimantan. A literature review on coal transitions has revealed that policies are regarded as the main drivers for coal transitions. This thesis adopts a broader view of policies as part of institutions. In view of the theory of New Institutional Economics (NIE), institutions can be defined as rules that structure social interactions. Crucially important in this regard is the fact that NIE applied to politics is synonymous with Political Economy. This thesis aims to assess how a coal transition in South Kalimantan can be enabled by institutional interventions. The main research question of this research is: *How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy of coal through institutional interventions?*

The research approach of this thesis is a case study on the political economy of coal in Indonesia, and more specifically in South Kalimantan. The case study is an exploratory, single case study. The research methodology for the case study combines literature reviews, a desk study and expert interviews. The desk study aims to analyse the political economy of coal in South Kalimantan, Indonesia. Multiple data sources were used for the case study, such as academic articles, reports, and newspaper articles. For the analysis of the data from the desk study, the 'Analytical Framework for Understanding the Political Economy of Sectors and Policy Arenas' from Moncrieffe and Luttrell (2005) (henceforth called Analytical Framework) was used.

After the political economic analysis based on the desk study, the second part of this research aims to explore how a coal transition in South Kalimantan can be enabled by institutional interventions. This part of this case study is conducted by using a theoretical framework for the analysis of institutions by Williamson (2000). The theoretical framework guides the exploration of possible institutional interventions. The exploration of institutional interventions is conducted in two ways. First, insights from the literature on coal transitions, political economy of coal- or energy transitions, and literature directly related to coal or energy transitions in South Kalimantan and Indonesia are used to identify possible institutional interventions. These insights are complemented with insights from expert interviews. The expert interviews aim to establish insights into which of the *proposed* institutional interventions would be *politically feasible*, given the existing political economy of coal.

The results of the political economic analysis have revealed that multiple factors influence the political economy of coal in South Kalimantan. These include historical and foundational factors, existing institutions in the coal and electricity sector, processes of change, structural features, power

dynamics and vested interests, and ideologies and values in the coal sector. An actor analysis reveals that multiple actors and organisations influence the political economy of coal and policymaking in the electricity and coal sector to a varying extent. The results from the desk study and literature review revealed that multiple institutional interventions could influence a coal transition in South Kalimantan. Formal institutional interventions include international climate agreements, the creation of an independent regulator, environmental regulations, changing the allocation of mining permits, providing compensation schemes, providing alternative means for economic development, restructuring the electricity market, introducing carbon pricing, reforming energy subsidies, introducing emission or renewable portfolio standards, introducing feed-in tariffs (FiTs), attracting investments into other technological solutions, implementing measures for rationing or banning, or introducing moratoria. Informal institutional interventions could include increasing awareness of climate change and environmental issues among key stakeholders and the local population in South Kalimantan, increasing citizen engagement, fostering the emergence of new actors aimed at disrupting the current regime, fostering the influence of voters on political processes, and fostering strong political leadership.

However, based on insights from literature and expert interviews, many of these *possible* institutional interventions are deemed *unfeasible* to be implemented in South Kalimantan and Indonesia due to existing power dynamics, vested interest, and institutional lock-ins. For example, creating an independent regulator seems rather infeasible and ineffective. Implementing stricter environmental regulations seems to be rather ineffective due to existing corruption and non-adherence to laws and regulations. Complete liberalisation of the electricity sector seems unfeasible, but the creation of separate entities of SOEs responsible for generation, transmission, and distribution could increase transparency and could accelerate the deployment of RES. The possibility of reforming the state-owned enterprise PLN might be gaining momentum. Several market instruments, such as carbon pricing, subsidy reform, renewable portfolio standards, or FiTs, seem feasible and are already partially considered in current energy planning processes. However, their effectiveness remains questioned, especially with regard to lobbying efforts to keep carbon prices low and with regard to the market structure of the electricity market, whereby currently, competition is weak or even non-existent due to the monopolistic position of PLN.

Based on the results of this case study and the expert interviews, several institutional interventions are proposed to enable a coal transition in South Kalimantan that seem politically feasible, given the political economy of coal. These are complemented with insights from systems thinking and insights to overcome the prevalent systems archetypes of the *Tragedy of the Commons*, *Rule Beating*, and *Policy Resistance*.

In conclusion, enabling a coal transition in South Kalimantan would have to arise from a shared understanding of the current and expected market dynamics and the need to prepare for collapsing coal markets and stricter climate targets. Increasing awareness at the provincial level, providing financial and technical assistance, and fostering citizen engagement could facilitate a bottom-up approach for influencing the political spectrum through the electorate. Strong political leadership would be required to align the interests of powerful and influential actors, to reduce the extent of vested interests, and to reduce corruption to enable a coal transition. A *democratic symbiosis* of a bottom-up and a top-down approach is required since political leadership is required to facilitate citizen engagement, and citizen engagement is required to foster the emergence of new political actors favouring reforms or to create pressure on the current regime. However, any efforts to enable a coal transition would have to consider the current political economic reality. Especially the overarching goals of the Indonesian government for providing public infrastructure, ensuring energy access and security, and maintaining low electricity prices, would have to be acknowledged. Compensation measures and providing alternative means for economic development are crucial in

this regard. Reduced costs for RES could aid in providing affordable and reliable energy access by simultaneously providing infrastructure development and employment opportunities. Pressure from international climate agreements can exert influence on the current regime to accelerate a coal transition. International financial and technical support is crucial for enabling a coal transition in South Kalimantan. From a systems thinking perspective, systems archetypes can be overcome by: (1) increasing awareness and increasing coal mining regulations to reduce the *Tragedy of the Commons*; (2) providing alternative means for economic development for redirecting *Rule Beating* and for reducing *Policy Resistance.* (3) Compensation for affected stakeholders might also reduce the archetype of *Policy Resistance*. These measures are required to overcome the prevalent systems archetypes and to intervene in the complex system of the political economy of coal to enable a coal transition in South Kalimantan, Indonesia.

Further research needs to be conducted on: (1) adaptive management of the proposed institutional interventions, (2) how *key actors* can be convinced of the importance of anticipating and preparing for coal transitions, (3) examining the required investments for a coal transition, how these can be distributed, and how to ensure that investments and international financial support are used for the intended purposes and not redirected or misused, (4) exploring adequate alternative pathways for economic development in South Kalimantan, and (5) possibly modelling the proposed institutional interventions.

Keywords:
energy transition, coal transition, political economy, new institutional economics, systems thinking.

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List of Abbreviations

ADB:	Asian Development Bank
CCOWs:	Coal Contracts of Work
CCS:	Carbon Capture and Storage
CCT:	Clean Coal Technologies
CFPP:	Coal-Fired Power Production
CME:	Coordinated Market Economies
CoSEM:	Complex Systems Engineering and Management
DPR:	Dewan Perwakilan Rakyat (engl.: Indonesian parliament)
EBKTE:	(Directorate General for Renewable Energy)
ETS:	Emission Trading Scheme
EU:	European Union
FiT:	Feed-in Tariffs
GDP:	Gross Domestic Product
GHG:	Greenhouse Gas
GHGE:	Greenhouse Gas Emissions
IMF:	International Monetary Fund
IPPs:	Independent Power Producers
KEN:	Kibijakan Energi Nasional (engl.: National Energy Policy)
LCOE:	Levelized Cost of Electricity
LNG:	Liquefied Natural Gas
MEMR:	Ministry of Energy and Mineral Resources
MOEF:	Ministry of Environment and Forestry
MoF:	Ministry of Finance
MLP:	Multi-Level Perspective
MW:	Mega Watts
NDC:	Nationally Determined Contributions
NIE:	New Institutional Economics
NWO:	Dutch Research Council
OECD:	Organisation for Economic Co-operation and Development
PPAs:	Power Purchase Agreements
RES:	Renewable Energy Sources
RUED:	Regional Energy Plan
RUEN:	National Energy Plan
RUKN:	The National Electricity Plan
RUPTL:	Regional Electricity Plan from PLN
SRQ(s):	Sub Research Question(s)
STS:	Socio-Technical Systems
UNEP:	United Nations Environment Program

1 Introduction

Anthropogenic climate change is partly caused by Greenhouse Gas Emissions (GHGE) into the earth's atmosphere (Fouquet, 2016; WCED, 1987). The energy sector is one of the main contributors to climate change by GHGE from fossil fuels (Climate Analytics, 2019b; IPCC, 2021). In order to reduce global warming caused by the emission of GHGs, the energy system needs to transition from a fossil fuel-based energy production to a low-carbon energy system which is based on renewable energy sources (RES) (Fouquet, 2016). This process is known as the energy transition (Ialnazov & Keeley, 2020). The energy transition from coal as a fossil fuel to alternative, low-carbon energy sources is called a *coal transition* (Diluiso et al., 2021).

The generation of electricity through coal-fired power production (CFPP) is deemed to be the most significant cause of climate change (UNFCCC, 2021). Phasing out-coal production and accelerating the deployment of RES is, therefore, a crucial part of energy transitions for mitigating climate change (Diluiso et al., 2021). Research indicates that CFPP needs to be reduced by 80% by 2030 and phased out by 2040 to meet the 1.5°C target from the Paris Agreement (Climate Analytics, 2019b; Yanguas Parra et al., 2019). However, models indicate that global coal production is expected to exceed the required reduction to meet global climate targets (Yanguas Parra et al., 2021). Further, Maggio and Cacciola (2012) conclude in their study that global coal production is expected to continue to increase and peak around the year 2050-2060.

Predictions estimate that energy consumption will increase especially in developing countries (Ialnazov & Keeley, 2020; UNEP, 2017). The high growth of the energy demand in developing countries is related to factors such as population growth, economic growth, and structural changes in economies towards more energy-intensive industrial sectors (Kalkuhl et al., 2019). Southeast Asia is believed to significantly contribute to the global energy demand in the future, with predictions estimating the primary energy demand and the demand for coal growing significantly (IEA, 2019). Three countries alone, India, Vietnam, and Indonesia, account for over 30% of the world's planned expansion of CFPP (Climate Analytics, 2019b). Yanguas Parra et al. (2019) argue that phasing out coal in Asia is particularly difficult due to its absolute size and the relative share of CFPP and that "policy action in the power sector is particularly critical for the global achievability of the Paris Agreement" (p.21).

Indonesia in Southeast Asia is hereby no exception, and it is believed that the country, with its 270 million citizens spread across Indonesia's 17,000 islands, will be the fourth-largest economy in the world by 2050 (IEA, 2021a). Indonesia has enormous potential for RES, such as solar energy, hydropower, geothermal, wind-, bio-, and ocean energy and the deployment of these sources could be used to meet the steeply increasing energy demand and simultaneously reduce GHGE from fossil fuels (Langer et al., 2021; see also Climate Analytics, 2019b; Yudha et al., 2021). Langer et al. (2021) conclude in their study that the electricity demand of Indonesia could technically be met by 100% of RES. The costs for RES have been dropping significantly, and the Levelized Cost of Electricity (LCOE) from RES is within the range of fossil fuels or even cheaper for some projects (Yanguas Parra et al., 2019). The energy transition of the Indonesian energy system could provide numerous advantages, such as increased access to low-carbon energy sources, increased energy security, reduced environmental degradation, and economic development and employment opportunities in newly emerging industries, such as the renewable energy sector (Climate Analytics, 2019b).

The Indonesian government has recently announced ambitious plans and targets for accelerating its energy transition (IEA, 2021a). The "National Grand Strategy on Energy" (GSEN) aims at securing long-term energy demand, limiting energy imports, achieving 100% electrification across Indonesia,

expanding the use of RES to 23% of the total demand by 2025 and 31% by 2050, and reducing GHGE as part of the Paris Agreement (SETKAB, 2021).

However, Bridle et al. (2018) emphasise that despite these ambitious plans, increases in electricity generation since 2007 have been supplied mainly by coal, and the share of RES has remained at around 12% of total generation, without any significant relative increases. Further, none of the questioned interviewees in their study believes that the 23% target for RES by 2025 will be met (Bridle et al., 2018). In addition, at the COP26 meeting in Glasgow in 2021, Indonesia did not sign clause 3 of the "Global Coal to Clean Power Transition Statement", which declares to cease issuance of new projects for CFPP. Hereby Indonesia stated that: "to reach net-zero by 2060 [...], Indonesia will consider accelerating coal phase-out into the 2040s, conditional on agreeing additional international financial and technical assistance" (UNFCCC, 2021, Section: Statement supported by:). This commitment to increase the use of CFPP in Indonesia is visible in the expansion plans of Indonesia. The Fast-Track Program (FTP) aims to increase coal production, and the 35,000 MW Program1 aims to build 35,000 MW additional capacity for CFPP (Arinaldo & Adiatma, 2019). Yanguas Parra et al. (2019) conclude that some countries and regions like the EU and OECD states need to phase out coal earlier (by 2031) and that Non-OECD countries in Asia, such as Indonesia, need to phase-out coal by 2037 to meet the 1.5°C target. This discrepancy between the announced plans of Indonesia to phase-out coal and the estimated phase-out timeline highlights the need to accelerate the energy transition in Indonesia by phasing-out coal to meet global climate targets.

Why does Indonesia plan on further promoting coal as an energy source, despite the massive impact on climate change from GHGE and despite the announced targets for reducing GHGE by accelerating the energy transition? The increasing production of coal is expected because Indonesia aims to offset the declining global coal demand by increasing domestic demand from CFPP (Arinaldo & Adiatma, 2019; Atteridge et al., 2018). Reducing coal production in Indonesia is especially difficult due to the heavy reliance of the Indonesian economy on coal (Arinaldo & Adiatma, 2019). In general, the economic dependency of regions on coal is regarded as a huge barrier to phasing out coal (Brauers et al., 2020; Diluiso et al., 2021; Kalkuhl et al., 2019), and countries with large coal resources seem to be more reluctant towards policies fostering decarbonisation (Biber et al., 2017). Furthermore, Indonesia, like many other countries, is facing an *energy trilemma* - the challenge of providing energy security, addressing energy poverty, and mitigating climate change (Gunningham, 2013). In addition, multiple studies have shown that the resistance to the energy transition and the increase of coal production in Indonesia is mainly due to the interests of powerful and influential actors which oppose the phasing-out of coal production due to political and economic reasons (Ordonez et al., 2021; see also Atteridge et al., 2018; Bridle et al., 2018). In research conducted by Atteridge et al. (2018), interviewed experts frequently stated that the political elite benefits from coal mining operations either by ownership structures or by receiving financial contributions. The strong link between the coal industry and politics poses a significant challenge for the energy transition (Brown & Spiegel, 2019; Geels, 2014).

The relationship between political and economic systems is studied in the social sciences of *Political Economy* (Wamsley & Zald, 1973; see also Ukar, 2013). Energy transitions in the view of political economy are especially difficult due to power dynamics and conflicts of interest between influential actors (Lamb & Minx, 2020; Moe, 2010). Biber et al. (2017) argue that especially the political economy of coal poses significant barriers to decarbonisation since coal produces the most emissions per unit of energy, and it has historically been the cheapest fuel.

Several external factors could pose a threat to further economic development, which is reliant on coal. Decreasing global coal demand, rapidly declining costs of RES, dampened global investment interest in the coal industry, and international pledges for mitigating climate change may increase the risk of further investing in coal mining and CFPP (Atteridge et al., 2018; Dutu, 2016; Yanguas Parra et al.,

2019). Caldecott et al. (2017) argue that the economic, social, and environmental costs of being unprepared for collapsing coal markets are high and the impacts disruptive. Preparing for energy and coal transitions in advance could reduce social and economic costs (Malahayati & Masui, 2021). Iskander et al. (2021) emphasise that political conflict was caused in East Kalimantan by the negative impacts of mining operations and the neglect of local governments to enforce the rehabilitation of coal mines. The conflict ushered in demonstrations and violence from several groups, such as local communities, NGOs, environmental groups, and associations of farmers and fishers. Protests from villagers against mining practices have also occurred in East and Central Kalimantan (Brown & Spiegel, 2017). This suggests a growing awareness of local communities of the detrimental impact of coal mining operations and highlights the need for the Indonesian government to take these considerations into account. Overall, the above-discussed aspects emphasise the need for governments to consider transitioning away from coal and seeking alternative pathways for economic development.

1.1 Problem Statement

Indonesia is a rapidly developing country with vast potential for RES and has already committed itself to achieving net-zero by 2060. Despite these plans, coal production is increasing in Indonesia, and it is expected that Indonesia will not meet its 23% targets for RES by 2025 (see Bridle et al., 2018). The difficulties of phasing out coal in Indonesia are related to the heavy reliance of the Indonesian economy on coal and the vested interests of powerful actors in the political economy of coal. Energy transitions are complex processes influenced by various external factors and the interaction of different stakeholders with diverging interests (Fouquet, 2016; Marquardt, 2014; Sovacool, 2016). Several external factors could threaten further economic development, which is dependent on coal. Research has shown that the impact of collapsing coal markets on economies and societies can be high and disruptive. Indonesia should prepare in advance for these scenarios, consider alternative pathways for sustainable economic development, and accelerate the energy transition by phasing out coal to ensure future well-being and prosperity.

The Indonesian government has already made steps on their path to an energy transition. The Indonesian Ministry of Research and Technology and the Dutch Research Council (NWO) cooperate in the research project *"Regional Development Planning and Ideal Lifestyle of Future Indonesia - By Utilizing Advance Green Energy Technology and Trans/Inter-disciplinary Approaches",* which focuses on energy transitions in Bali and Kalimantan (NWO, 2020). This thesis is part of this research project and aims to contribute to enabling part of a regional energy transition in Kalimantan by phasing out coal.

The coal resources and their production in Indonesia are mainly distributed over the four provinces of South Sumatra, Central-, East-, and South Kalimantan. In South Kalimantan, for example, coal has been a significant source of economic development and contributed to 18.8% of the provincial GDP in 2017 (Arinaldo & Adiatma, 2019). The heavy reliance of South Kalimantan on coal and the lack of research having been conducted for this region highlights the necessity to conduct research on the topic of phasing out coal in South Kalimantan. The case selection for this research will be further discussed in Chapter 3.1

The literature review in Chapter 2.1.1 shows that the resistance to an energy transition and the increase of coal production in Indonesia arises mainly due to the interests of powerful and influential actors which oppose the phasing-out of coal production due to political and economic reasons. The coal lobby thereby significantly influences policy making (Jakob et al., 2020; Ordonez et al., 2021; Setyowati & Quist, 2022), the state-owned enterprise PLN seems reluctant towards phasing-out coal and increasing RES (see Atteridge et al., 2018; Bridle et al., 2018; Ialnazov & Kennedy, 2020), and influential politicians seem to have vested interests in the coal sector (see Atteridge et al., 2021; Ordonez et al., 2021).

Based on these insights, the problem that this thesis addresses is the resistance of powerful actors in the political economy of coal in Indonesia towards a coal transition in South Kalimantan. This thesis aims to explore how this problem can be overcome to enable a coal transition in South Kalimantan.

1.2 Research Questions

The literature review on the current state of research dealing with a coal transition and the political economy of coal in Indonesia, which will be presented in Chapter 2.1.1, has shown that research on the political economy of coal in Indonesia already exists. The literature provides numerous causes for the growth of Indonesia's coal mining sector and the expansion of CFPP. Several studies offer policy recommendations for enabling an energy transition in Indonesia (see Burke et al., 2019; Dutu, 2016, Gunningham, 2013, Kennedy, 2018, Maulidia et al., 2019; Setyowati, 2021; Setyowati & Quist, 2022). However, it seems that research has not yet been conducted to identify how a coal transition can be enabled specifically in South Kalimantan. The identification of this research gap is discussed in Chapter 2.3. More specifically, Chapter 2 provides the theoretical background of this thesis by reviewing existing literature on relevant topics. Chapter 2.3. identifies several research gaps based on the literature reviews and provides justifications for the choice of this research topic and scope. In particular, Chapter 2.3 highlights that policies are regarded as the main driving force behind coal transitions (Diluiso et al., 2021; Jewell et al., 2022; Yanguas Parra et al., 2019). Furthermore, Chapter 2.3 discusses the link between policies and *institutions*, whereby institutions are defined as social rules that structure social interactions (Hodgson, 2006). The hypothesis of this thesis is that institutions can influence actors in the political economy of coal to enable a coal transition in South Kalimantan. This hypothesis is further grounded in the theory of New Institutional Economics, as discussed in Chapter 2.2.5.

In summary, this thesis aims to provide suggestions for institutional interventions to phase out coal by firstly analysing the political economy of coal in Indonesia and secondly identifying viable entry points based on the political economic analysis. This thesis focuses on the Indonesian region of South Kalimantan. This choice is further justified in Chapter 2.3 and 3.1. Based on the literature review from Chapter 2.1.1, the following main research question is derived:

How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy of coal through institutional interventions?

This main research question will be answered by further Sub Research Questions (SRQ). These SRQs are based on the structure of the analytical framework which will be used for this research, and which is presented in Chapter 2.2.4. The SRQs are as follows:

SRQ1: How do historical and foundational factors influence the political economy of coal in South Kalimantan, Indonesia?

SRQ2: How do relevant actors and institutions influence the political economy of coal in South Kalimantan, Indonesia?

SRQ3: What institutional interventions could influence the political economy of coal to enable a coal transition in South Kalimantan, Indonesia?

The SRQs will provide insights into which institutional interventions, which could enable a coal transition in South Kalimantan, are politically feasible, given the political economy of coal.

1.3 Alignment with Complex Systems Engineering and Management

This research topic aligns well with the aim of a master thesis project from the master's programme Complex Systems Engineering and Management (CoSEM) to design solutions for complex socio-technical problems, which take technical, institutional, economic, and social aspects into consideration.

The research is situated in a socio-technical system, the Indonesian energy system, with a focus on the coal system. A comprehensive *system analysis* is conducted for this research. The coal system is thereby analysed comprehensively by utilizing an analytical framework for analysing the political economy of sectors. The political economy of coal is analysed by conducting a brief country and provincial analysis, by delineating the coal and electricity sector, by conducting an actor analysis, and by analysing different factors influencing the coal sector, such as relevant institutions, structural features, processes of change, power dynamics and interests, and ideologies and values. The system analysis is followed by the development of institutional interventions which could enable a coal transition in South Kalimantan. The research therefore has a clear design component by designing institutional interventions. The development of institutional interventions is guided by theories and a theoretical framework used in the curriculum of CoSEM. Technical issues are addressed by investigating technical requirements for phasing-out coal from the current electricity system. Furthermore, the topic also covers values from the public and the private sector, taking interests of the private coal sector and the political sector into account to derive politically and socially beneficial solutions. Lastly, insights from systems thinking, which are taught in the master's programme, are integrated into the discussion part and provide CoSEM typical perspectives on the problem under investigation.

1.4 Thesis Outline

The following thesis is structured as follows. The second chapter presents the literature reviews which were conducted for this research and covers the theoretical background. The analytical framework for the political economic analysis and the theoretical framework for the development of institutional interventions are presented. Research gaps are identified and the scope of the research is justified. The third chapter presents the research approach of this thesis and the research methodologies used to answer the research questions.

The fourth chapter presents the political economic analysis of the coal sector in South Kalimantan and Indonesia. These insights are based entirely on a literature review and a desk study. The fifth chapter is dedicated to the development of institutional interventions. Insights from the literature on coal transitions, the political economy of transitions, and context-specific insights regarding the political economy of coal in South Kalimantan and Indonesia are synthesised, and *possible* institutional interventions are presented which could enable a coal transition. Thereafter, results from expert interviews are presented for institutional interventions, which could *be politically feasible* given the political economy of coal.

The sixth chapter discusses the results of the research. Implications for practice are addressed, whereby the presented results from the expert interviews are discussed and synthesised with insights from the preceding political economic analysis. The synthesis is further complemented with insights from systems thinking. Implications for theory and research are further addressed, whereby the scientific contributions of this thesis are highlighted. The societal relevance of this thesis is discussed, research limitations are presented, and suggestions for further research are highlighted. The seventh chapter concludes the research and answers the main research question by firstly answering the SRQs and by secondly synthesising the main results of the research for answering the main research question. Lastly, policy recommendations are presented, and an outlook is provided.

2 Literature Review, Theoretical Background & Research Gaps

This chapter presents insights from two different literature reviews which were conducted for this research and the theoretical background underpinning the research. The theoretical background includes the analytical framework which is used for the political economic analysis of this research. The theoretical background of New Institutional Economics (NIE) is addressed, which serves as the theory guiding the development of institutional interventions. Research gaps are defined based on the reviewed literature, and the choice for the focus of this research is justified. Lastly, the insights from the literature review and the theoretical background are synthesised to identify the appropriate research approach for this research, which will be discussed in Chapter 3.

2.1 Literature Review

This chapter presents two different literature reviews which were conducted for this research. The first literature review aims to analyse the current state of research dealing with coal transitions in Indonesia and South Kalimantan and the political economy of coal in Indonesia. This literature review enabled the identification of research gaps, which are discussed in Chapter 2.3. The second literature review aims to explore historical coal transitions to gain insights into different factors influencing coal transitions. This literature review shall contribute to answering the main research question by providing insights into enabling a coal transition in South Kalimantan, Indonesia.

2.1.1 Coal Transition in Indonesia and South Kalimantan

This chapter provides a brief literature review on the political economy of coal in Indonesia in view of phasing-out coal. The literature review was conducted by performing several search requests in the databases 'Scopus' and 'Web of Science' with specific keywords and their combinations. Table 1 exemplary lists several keywords from the main domains 'Energy Transition', 'Political Economy' and 'Indonesia' and the possible search combinations of these keywords.

Key Words regarding Energy or Coal Transition:
energy transition, coal transition, coal phase-out, coal industry, coal economy
Key Words regarding Political Economy:
political economy, power relation, power dynamics, regime resistance, corruption, polic*, politic*
Key Words regarding Indonesia:
Indonesia, Kalimantan, South Kalimantan

Table 1: Keywords for Search Queries on the current state of research

The search query for this search is as follows: ("energy transition" or (coal near/4 transition) or (coal near/3 phase-out) or "coal industry" or "coal economy") and ("political economy" or politic* or polic* or "power relation*" or "power dynamic*" or corruption or "regime resistance") and (Indonesia or "South Kalimantan" or Kalimantan). This search query led to 35 results in the Web of Science Core Collection and 69 results in Scopus. An abstract scan was conducted, and the articles were further filtered based on double results, sources with no or limited relevance, poor language or grammar, and inconsistent results. Furthermore, an internet search for relevant reports on the topic of energy or coal transitions in Indonesia led to eight reports which were further analysed. Lastly, a forward snowballing

approach was used to find additional relevant sources. Figure 2-1 presents an overview of the process for the conducted literature review.

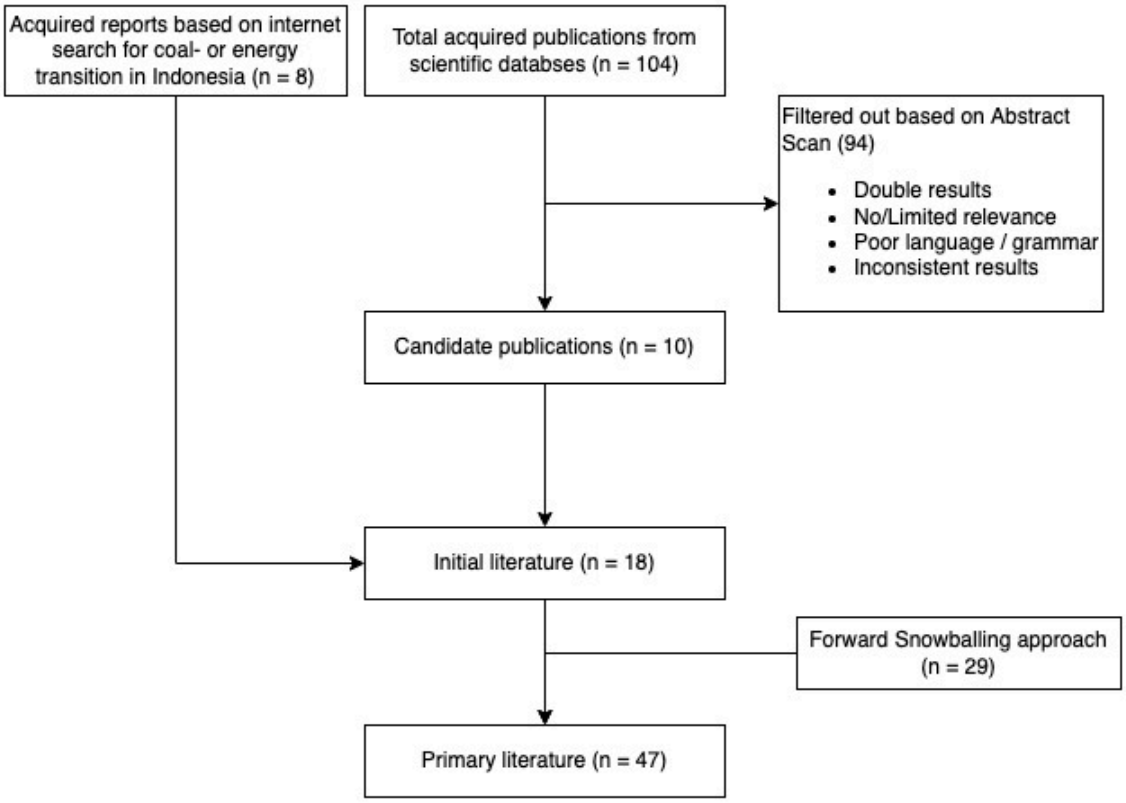

Figure 2-1: Process Diagram of Literature Review

A brief overview of the main insights from literature directly related to coal transitions and the political economy of coal is in Indonesia is given in the following. A detailed analysis of the primary literature is provided in Chapter 4. Further insights from sources which cover coal and energy transitions more broadly are discussed in Chapter 5.1.

Ordonez et al. (2021) conducted expert interviews to investigate the underlying reasons for the contradiction of aiming to reduce GHGE while increasing CFPP and concluded that current energy policies are largely driven by the development ambitions of public infrastructure while appealing to voters for electoral reasons. Further, they conclude that the expected reduction of coal exports may have led to lobbying by the politically highly connected coal industry to support domestic coal consumption by CFPP. This view is shared by various researchers who conclude that the coal mining industry and the powerful state-owned enterprise (SOE) for electricity production Perusahaan Listrik Negara (PLN) are reluctant to increase the share of RES and phasing out CFPP (Atteridge et al., 2018; Bridle et al., 2018; Ialnazov & Kennedy, 2020). Bridle et al. (2018) argue that the final barrier to the energy transition is the unsupportive influence of powerful stakeholders who even oppose the energy transition. Various studies emphasize the strong political ties of the coal mining industry and the influence they have on current energy policy and the increase of coal production in Indonesia (Arinaldo & Adiatma, 2019; Atteridge et al., 2018; Jakob et al., 2020), in South Kalimantan (Setyowati & Quist, 2022), and for coal transitions in general (Brauers et al., 2020; Diluiso et al., 2021).

The strong economic dependency of South Kalimantan in particular, strongly influences provincial energy planning processes (Setyowati & Quist, 2022). In research conducted by Atteridge et al. (2018),

interviewed experts frequently stated that the political elite benefits from coal mining operations either by ownership structures or by receiving financial contributions for election campaigns. Further factors related to increasing coal production and consumption in Indonesia are socio-economic factors, such as urbanization, rising incomes, and population growth (Kurniawan et al., 2020; Li et al., 2021).

The strong link between the fossil fuel industry and politics, and the economic and political power it possesses, pose significant challenges for energy transitions (Brown & Spiegel, 2019; Geels, 2014). Atteridge et al. (2018) argue that the decentralized allocation of mining permits and the sharing of revenues of mining operations are drivers for domestic coal production. They indicate that the transfer of the licensing authority from a centralized level to the provincial level has led to a rapid increase of mining permits which were allocated to mining companies. They emphasize that local politicians were financially incentivized to allow mining operations since the provinces are highly dependent on rents and revenues from the mining operations (see also Dutu, 2016; Fünfgeld, 2016; Yuliani, 2017).

Yudha et al. (2018) analysed the network of stakeholders in the fossil fuel industry of Indonesia and identified from their relationships that a close collaboration between the central and regional governments is required for developing effective energy policies. Marquardt (2014) emphasizes the importance of collaboration and governance on multiple levels of decision-making, especially for such a decentralized system as Indonesia. He emphasizes the importance of focusing on the process of implementing policies, and he identifies the missing links between different levels of decision-making as a barrier to the energy transition.

2.1.2 Historical Coal Transitions

This chapter presents a literature review on coal transitions. The databased Scopus and Web of Science were searched for scientific contributions in the field. The search query ("coal transition*" or "coal phase-out") was used to find relevant articles. The main insights of this chapter are based on the extensive literature review on historical coal transitions from Diluiso et al. (2021). In addition, highly cited scientific contributions from the mentioned databases were analysed. In total, nine scientific contributions related to coal transitions and coal phase-out were analysed for this literature review. The low number of analysed sources seems justified due to the use of the extensive literature review from Diluiso et al. (2021).

The generation of electricity in CFPP is regarded as the greatest cause of climate change (UNFCCC, 2021), which highlights the need to accelerate the energy transition by phasing-out coal (Diluiso et al., 2021). Diluiso et al. (2021) conducted a systematic literature review of studies on coal transitions and emphasize that a growing literature on the topic is emerging. The authors argue that despite the relevance of the topic, research remains scarce and evidence not easily accessible. This chapter provides a literature review on the topic of coal transitions by discussing the types of coal transitions, barriers, drivers, policy instruments, and potential outcomes.

Literature on coal transitions differentiates between supply-side- (stagnating production) and demand-side transitions (declining consumption) (Diluiso et al., 2021; Oei et al., 2020). Diluiso et al. argue that supply-side transitions either occur through economic circumstances, such as increased competition for coal from cheaper alternatives due to privatization or market liberalization, or through environmental regulations reducing mining profitability. Demand-side transitions were historically caused by market dynamics in the electricity sector and disruptive events, such as wars or the collapse of the Soviet Union. Increasing environmental awareness for climate and health-related impacts facilitates demand-driven coal transitions. Furthermore, the authors emphasize that supply- and demand-side transitions need to occur simultaneously in order to reduce coal dependency (Diluiso et al., 2021).

Despite the need for coal transitions to mitigate climate change, coal transitions have proven to be challenging (Diluiso et al., 2021). The main barriers regarding coal transitions are discussed in the following. Firstly, coal is in some regions abundantly available, and the extraction and handling of coal are technologically proven, which makes economic utilization attractive (Diluiso et al., 2021; see also Caldecott et al., 2017; Steckel et al., 2020). Secondly, coal plants have long lifetimes, and the investment for construction is capital-intensive (Diluiso et al., 2021; Jewell et al., 2022). Early retirement would make these plants stranded assets (Caldecott et al., 2016). The already existing coal infrastructure and the construction of new coal plants lead to the so-called lock-in effect. Rentier et al. (2019) define the lock-in of the coal industry as a "self-perpetuating inability to change from existing carbon-intensive activities and technologies to less carbon-based activities and technologies in time to prohibit large-scale damage from climate change" (p.620). This technological or infrastructural lock-in (Seto et al., 2016) is seen in related literature as a main barrier to coal transitions (Jewell et al., 2022; Oei et al., 2020; Rentier et al., 2019). Thirdly, regional economies are often dependent on the coal sector, which is often an inherent and deeply rooted part of the regional economic and cultural system (Diluiso et al., 2021). Brauers et al. (2020) hereby emphasize that coal transitions are not just about replacing coal with alternative energy sources, but that the biggest challenge in coal transitions lies within the shift of affected regions to other forms of economic development. The coal transition must therefore be accompanied by region-specific measures for creating alternative employment opportunities (Yanguas Parra et al., 2019). The possibility of job losses from coal transitions poses a significant political barrier (Jewell et al., 2022). Historical coal transitions have been accompanied by significant job losses. For example, in the coal mining sector, the Dutch coal transition between 1965 and 1990 led to 75,000 job losses, the Polish coal transition to 230,000 lost jobs in 9 years, and the coal transition in the UK to 188,000 lost jobs (Caldecott et al., 2017; Gales & Hölsgens, 2017). Coal transitions have also caused social conflicts, involving hunger strikes, violence, and protests in the UK and Spain, and threats of social conflict affecting compensation packages in the Netherlands or Poland (Caldecott et al., 2017). The literature review from Diluiso et al. (2021) highlights that the economic dependency of regions on the coal industry is seen as the most important barrier to coal transitions. Caldecott et al. (2017) argue that "economic regeneration [...] in former mining regions is arguable the most important aspect of any transition strategy" (p.13). This is especially important for coal exporting countries, and coal-dependent regions (Steckel & Jakob, 2022).

Additionally, the coal industry and coal miners' unions are often reluctant to coal transitions and lobby as powerful and influential actors against coal transitions (Brauers et al., 2020; Diluiso et al., 2021; Jakob et al., 2020). Lamb and Minx (2020) indicate that the institutional structure of economies depending on coal can make them prone to corruption while facilitating the emergence of vested interests. Further barriers to coal transitions relate to the lack of climate policies and the existence of policies favouring fossil fuels, such as subsidies or research funds (Diluiso et al., 2021). Skovgaard and van Asselt (2019) argue that the persistence of fossil fuel favouring subsidies and policies stems from their benefit to powerful actors, such as fossil fuel companies and unions, to structural factors of a country, such as socio-political factors or macroeconomic development, and to ideational factors such as norms and beliefs. This situation is described in the literature as an "institutional lock-in", where powerful actors try to maintain or reinforce the status quo by "coordinated efforts to structure institutional rules, norms, and constraints to promote their goals and interests" (Seto et al., 2016, p.433; see also Oei et al., 2020; Rentier et al., 2019). Brauers et al. (2020) argue that coal transitions and related policy outcomes are heavily influenced by different actors, such as coal companies, governments, unions, and NGOs. Institutional lock-ins, which are exacerbated by powerful actors, can be overcome by inducing institutional change and by shifting the lock-in to alternative modes of favouring powerful actors (Seto et al., 2016). Other barriers to coal transitions include the need for substitution of fossil fuels (Jewell et al., 2022), the strong social identity of regions to coal, the lack of educated labour forces

in coal mining regions to find alternative employment (Caldecott et al., 2017), and a lack of public debate regarding coal transitions (Diluiso et al., 2021).

The literature on coal transitions provides ample drivers for coal transitions. Firstly, Diluiso et al. (2021) argue, based on their extensive literature review, that policymakers are the main driving force regarding coal transitions (see also Jewell et al., 2022; Yanguas Parra et al., 2019). Jewell et al. (2022) argue that historical fossil fuel phase-outs were "almost always accompanied with strong state policies" (p.6) and that coordinated long-term policies are required to phase-out fossil fuels. Diluiso et al. (2021) emphasize that coal transitions require policy interventions, even when adequate market forces exist. Coal transitions have also been historically driven by technological innovations (Jewell et al., 2022). Hereby access to alternative energies and affordable prices have been the main drivers (Diluiso et al., 2021). Technological innovation is seen as a crucial aspect of transitions (Geels et al., 2017). Yanguas Parra et al. (2019) argue that "[c]oal phase-out policies need to be accompanied by ambitious renewable energy phase-in strategies" (p.23). Climate-, health-, and local environmental concerns have been driving forces. Pressure from interest groups and societies has been either a driver or barrier, depending on the interests (Diluiso et al., 2021). A further driver of coal transitions is seen in the employment potential in the renewable energy sector, especially since manufacturing-related jobs are not geographically bound to certain regions (Jewell et al., 2022). Further drivers are the vulnerability of the coal sector to global policy changes related to air- and soil pollution regulation, possible limitations on import quantities, decreasing global investment interest in CFPP, and overall increased uncertainty regarding the dynamics of the global coal market (Yanguas Parra et al., 2019).

The literature differentiates between different policy instruments for coal transitions. Diluiso et al. (2021) group the main policy instruments for coal transitions in their literature review into two main categories, namely (1) transition- and (2) management policies. Transition policies aim at initiating or accelerating the transition, while management policies aim to manage the transition once it has been initiated and to prepare for future developments. (1) Transition policies consist mostly of regulatory instruments and economic measures. Regulatory instruments include *environmental regulations* (e.g., air quality regulations), *market regulations* (e.g. privatization, liberalization, or industrial regulations), regulations regarding *rationing, bans, and moratoria* (e.g. limiting production or consumption quotas, banning coal, and moratoria on plants or mines), and lastly *performance and technology standards* (e.g. renewable portfolio- and emission standards). Regulatory measures, and especially environmental regulations, have been identified by Diluiso et al. to be the most prominent policy measures to drive coal transitions. (2) Economic measures include *subsidies and taxes* (e.g. carbon taxes, emission trading schemes) and *investments* in alternative energy sources or research and development. (2) Management policies deal with the management of the economic and social costs of the coal transition. These can include either *investments* in regeneration, infrastructure, education, research and development, new technologies, or *compensation schemes* for affected stakeholders. Further measures can include the restoration of mining sites and re-naturalization measures for surrounding landscapes (Diluiso et al., 2021).

The literature on policy instruments suggests that there are ample opportunities for interventions. Further, as discussed above, policymakers are regarded as the main driving forces in coal transitions (Diluiso et al., 2021; Jewell et al., 2022). However, case studies on historical coal transitions show that most policies have been implemented after plant and mine closures (*ex post*) and not *ex ante* in anticipation of the closures (Caldecott et al., 2017). Further, the literature suggests that these measures should not be seen in isolation. Oei et al. (2020) emphasize that a key lesson from historical coal transitions is that policy measures should be combined, such as policies addressing unemployment and fostering the development of new energy enterprises, with broader investments in infrastructure, education, and research and development. Kalkuhl et al. (2019) argue similarly that policymakers

should take a holistic view of coal transition in view of overall sustainable development. They emphasize that trade-offs between economic, social, and environmental goals can arise and must be acknowledged. Further, they highlight that this is politically challenging, due to different involved organisations with diverging policy goals and often lacking coordination being responsible for different sectors. Rentier et al. (2019) highlight the difficulties of implementing policies in political systems where markets are to some extent regulated and often owned by governments, so-called "Coordinated Market Economies" (CMEs). The ownership structures of public utilities and the resulting responsibility and accountability issues may make policy decisions susceptible to political influence, which may increase resistance to required coal transition policies. Rentier et al. (2019) hereby emphasize that coal transitions in CMEs "might only be able to phase out coal through consensual agreements that require extensive compensations and side payments in order to compensate for job losses and for writing off sunk assets" (p.630). Compensation could be paid to the different affected actors, such as: coal regions (e.g. through business project support, grants, energy bill subsidies), workers (e.g. through various financial aid, or retirement incentives), and the coal industry (e.g. through government sponsored rehabilitation of coal mines, subsides, or deficiency grants) (Diluiso et al., 2021). The institutional lock-in caused by powerful actors seeking to maintain the status quo for personal interests (Seto et al., 2016) may be overcome by disruptive political, technological, or social changes which could reduce the chance of powerful actors to veto against coal transition policies (Rentier et al., 2019).

Meadowcroft (2011) indicates that the political dimension of transitions, such as the coal transition, heavily influences policies, and that "getting the politics right appears to be a prerequisite to getting the policies right" (p.73). Meadowcroft indicates that this can be done by political engagement for building new coalitions aimed at reforms, changing power dynamics to create novel centres of power, buying off influential lobbies, compensating disadvantaged actors, or isolating extreme incumbents. Meadowcroft also emphasizes that political ideologies heavily influence sustainability transitions.

Several studies emphasize that even though coal transitions might mainly impact regional areas, a multi-level or polycentric governance approach is required to overcome the challenges of coal transitions which takes the national and the regional or local context into account (Diluiso et al., 2021; Marquardt, 2014; Geels et al., 2017). This is especially important since financial resources and expertise is often lacking on subnational levels (Diluiso et al., 2021).

Historical coal transitions documented in the academic literature provide evidence of coal transition outcomes, both positive and negative. Diluiso et al. (2021) provide an overview of possible outcomes. On the one hand, negative outcomes include, inter alia, the crucial and significant impact on the labour market due to job losses in the coal sector, macroeconomic effects (such as reduced GDP on subnational level), production declines and overall economic stagnation. Negative social outcomes can be expected due to decreased quality of life stemming from worsening living conditions. The energy market in general is expected to experience increased electricity prices. The coal sector specifically is expected to experience significant economic impacts, such as bankruptcies, decreased profits, and increased debts. On the other hand, positive outcomes can be expected from technological innovations and a shift of research and development from coal to renewable energy sectors. Health benefits, especially in view of improved air quality, are reported in line with coal transitions (Diluiso et al., 2021; see also Yanguas Parra et al., 2019). Positive economic outcomes from coal transitions can be expected due to an increased diversification of the economy and sectoral expansions in, for example, manufacturing, renewable energy, and tourism, which can lead to the creation of new jobs in those sectors (Diluiso et al., 2021; Jewell et al., 2022). An increased energy security and independence, and an increased access to clean energy can be expected (Yanguas Parra et al., 2019; see also Climate Analytics, 2019b). Furthermore, research indicates that the economic and monetary benefit of limiting climate change by

mitigation efforts can outweigh the cost of adaption (Krupnick et al., 2000; Maddison, 1995). Coal transitions could be part of climate change mitigation to reduce future costs.

Lastly, Caldecott et al. (2017) argue that the cost for not being prepared for collapsing global coal markets can be high and the impact disruptive. The changes in the economics of coal mining are felt by companies, regions and workers, through the risk of financial losses, risk of unemployment, and risk of declining economic activity. Analysed case studies have shown that the economic and social cost of not supporting coal transitions can be significantly higher than the cost of the transition from a societal perspective. The authors argue that anticipated and well-planned phase-out efforts could reduce risk to stakeholders and reduce future costs while providing social, environmental, and economic benefits (Caldecott et al., 2017).

2.2 Theoretical Background

This chapter presents the theoretical background of this research by discussing fields of research related to energy transitions and political economy. The analytical framework which will be used for this research is presented, the theory of NIE is discussed, and insights from the study of complex systems are presented.

2.2.1 Energy Transitions

This chapter presents a brief theoretical background on the topic of energy transitions, based on selected scientific contributions on the topic. These scientific contributions were selected from scientific articles used in the curriculum of the master's course CoSEM and from highly cited articles scientific articles from the databases Scopus and Web of Science.

Transitions in general are understood as "processes of structural change" (Meadowcroft, 2009, p.324) in socio-technical systems. Socio-technical systems (STS) are systems that consist of technologies, organisations, markets, infrastructures, and regulations, and deliver societal functions (Geels et al., 2017). Transitions in STS may involve changes in the existing rules, technological transformations, or changes in societal practices (Meadowcroft, 2009). Transition study is a field of study which encompasses several disciplines, such as complex systems theory, governance studies, and social science of technology, to study socio-technical transitions (Avelino & Rotmans, 2009).

The current global energy system is largely based on fossil fuels (IEA, 2021b). The burning of fossil fuels releases CO_2 and other GHG into the atmosphere, which contribute to climate change. The energy sector is one of the main sources of GHGE globally (IPCC, 2021). To limit climate change, the current, largely fossil fuel-based energy system needs to transition to a low-carbon energy system (Fouquet, 2016). This process of changing the energy system from carbon-emitting, non-renewable fossil fuels to a system of low-carbon or carbon-neutral RES is known as the energy transition (Meadowcroft, 2009; see also Ialnazov & Keeley, 2020). Fouquet and Pearson (2012) define an energy transition as the change from an economic system which is dependent on certain energy sources to other energy sources. Meadowcroft (2009) further indicates that an energy transition can also be seen as the process of changing an energy system from a largely centralized system to a decentralized energy system.

Grubler (2012) emphasizes that the need for energy transitions is "widely apparent as current energy systems are simply unsustainable on all accounts of social, economic, and environmental criteria" (p.8). Sovacool (2016) argues that energy transitions not only require technological changes, but also changes in the political and economic structures, and in the behaviour of actors. Sovacool further emphasizes that energy transitions need to occur quickly to mitigate climate change, since otherwise newly created fossil fuel infrastructure could lead to lock-in syndromes. Various researchers highlight problems which relate to the 'lock-in' syndrome (Jewell et al., 2022; Meadowcroft, 2009; Seto et al., 2016). Sovacool

(2016) provides empirical evidence which suggest that energy transitions have varied strongly in their duration. Similarly, Fouquet (2010) suggests that in the United Kingdom it has taken on average 50 years for sector-specific energy transitions to occur since the Industrial Revolution.

The Multi-Level perspective (MLP) is a theoretical framework which aims to provide a perspective on multiple pathways for transitions. Transitions hereby are understood as "outcomes of alignments between developments at multiple levels" (Geels & Schot, 2007, p.399). These levels consist of the socio-technical regimes, the socio-technical landscape, and niche innovations. Transitions in the MLP are defined as "changes from one sociotechnical regime to another" (Geels & Schot, 2007, p.399). The MLP has been expanded by scholars to also incorporate aspects of political economy into the regime level, addressing actors, power distribution, economics, politics, culture, and discourses (Geels, 2014; see also Avelino & Rotmans, 2009; Avelino & Wittmayer, 2016; Sovacool & Brisbois, 2019). In relation to the MLP, Loorbach et al. (2017) further argue that transitions occur on different levels and depend on their context. They emphasize that within the analysis of transitions, attention must be given to the relationships between different levels and the resulting *interscale dynamics*.

Politics also plays an important role in relation to transition theory (Meadowcroft, 2009, 2011). Geels (2014) concludes hereby that regime incumbents, consisting of policymakers and incumbent firms aiming to maintain the status quo, may show resistance to low-carbon transitions and that green innovations might be insufficient for transitions to occur. Geels even argues that "politically inspired regime destabilization may be necessary to create opportunities for the wider diffusion of renewables, which now face uphill struggles against resistant regimes" (Geels, 2014, p.37). Sovacool and Brisbois (2019) conclude similarly in their study on the effects of power in low-carbon transitions that "power relations [are] asymmetrical but (promisingly) unstable" (p.8), suggesting that destabilization of existing power regimes seems possible.

2.2.2 Political Economy

This chapter presents a brief theoretical background on political economy. The term political economy has several different meanings which evolved over time (Weingast & Wittman, 2011; see also Wamsley & Zald, 1973). Weingast & Wittman (2011) argue that the term political economy had contradictory meanings throughout the last century. On the one hand, the term could refer to an area of study which examines the interrelationship between politics and the economy. On the other hand, political economy can be seen as a methodological approach. This thesis adopts the view of political economy as the former, adopting the definition of political economy as "the interrelationship between structure of rule [(politics)] and a system for producing and exchanging goods and services (economy)" (Wamsley & Zald, 1973, p. 64). Political economy falls under the domain of the social sciences and deals with the relationship of political and social organisations with economic processes. In the theoretical economic process, input factors are transformed in the production process into goods and services. The input factors can include natural resources (renewable and non-renewable resources), humans, capital, technology, information, or the environment (Veseth & Balaam, 2022; see also Ukar, 2013). The political economy of nations is influenced by determinants, such as the structure of authorities, power and authority distribution, incentive systems, division of labour, and resource allocation (Wamsley & Zald, 1973)

The political economy of coal in Indonesia can therefore be characterized as the relationship of the coal economy and the Indonesian political and social system. Coal, as a non-renewable natural resource, is either used directly for exports, or transformed in the production process through combustion into electricity via CFPP.

2.2.3 Political Economy of Coal, Transitions, & Decarbonisation

The previous chapter discussed political economy in general, while this chapter presents theoretical background on the political economy in the context of coal, transitions, and decarbonisation. Brown and Spiegel (2019) define the political economy of the coal industry as a "coal complex", which is characterised as a "global assemblage of finance, infrastructure, and expertise that together constitutes the political economy of coal and determines the speed and scale of its extraction, transportation, and eventual combustion" (pp.153-154).

Several studies highlight the importance of political economy in coal transitions (Brown & Spiegel, 2019; Caldecott et al., 2017; Diluiso et al., 2021). Further, several studies emphasise the importance of mapping different actors which are involved in the political economy of energy or coal transitions for political economic analysis (Jakob et al., 2020; see also Bridle et al., 2018; Diluiso et al., 2021; Yudha et al., 2018). Jakob et al. (2020) argue that climate policies are heavily influenced by the interaction of different stakeholders in the political economy of specific sectors and that the political economy needs to be understood to identify entry points for intervention. They further hypothesise that political decisions surrounding climate and energy policies are heavily influenced by specific interests of actors, and do not necessarily aim at improving overall well-being. These interests could be, inter alia, the desire to create employment, to facilitate structural change, lobbying from interest groups, or meeting the demand for affordable energy prices. Further, Jakob and Steckel (2022) conclude in their study on various case studies of the political economy of coal across several countries, that the main objectives which drive coal production and consumption are affordable energy supply, energy security, and climate change mitigation.

Biber et al. (2017) emphasize that previous research on energy policies mostly focused on policies that would be economically efficient given the technical constraints. However, they argue that this focus neglects the more urgent question of which policies would be politically feasible, since "potential economic efficiency of a policy is irrelevant if it is politically infeasible" (p.609). They emphasize that political actors are the final decision-makers regarding the implementation of policies. Geels (2014) argues that the transition towards a low-carbon energy system can be hindered by powerful regime incumbents, who use discursive, instrumental, material, and institutional forms of power. Geels argues that considering those complexities emerging from the political economy of sectors, niche innovations might not be sufficient to accelerate energy transitions and that destabilization of fossil fuel industries might be required for transitions to occur (Geels, 2014). Lamb and Minx (2020) emphasize that the interests of actors in the fossil fuel industry are of vital importance for political economic analysis. They emphasize that these interest groups could utilize significant political measures and financial resources to prevent policies harming their business operations. These measures could include lobbying, altering public discourses around fossil fuels and climate policies, or seizing offices in regulatory government offices (Lamb & Minx, 2020). This resistance can be explained by the distributional effects of climate policies, which impose costs on some actors, while the benefits are mainly enjoyed by others. The costs for energy transitions are mainly beared by the fossil fuel industries (Biber et al., 2017). However, the fossil fuel industry is not the only actor resisting energy transitions. Biber et al. (2017) emphasize that political resistance towards energy transitions is also visible from other actors. Businesses utilizing fossil fuels can profit from their use and production, citizens are employed by the fossil fuel industry for extraction and processing and depend on the industry for their income, and industries can profit from cheap electricity being supplied by fossil fuels (Biber et al., 2017).

The literature suggests various constraints to energy transitions and decarbonisation in view of political economy. These include the dependency of the economy on fossil fuels, the extent of fossil fuel mining or extraction activities, the endowment of the country with natural resources, the potential for RES,

structural features of the industry, the level of corruption, the extent and depth of democratic norms, the public awareness of environmental issues and climate change, and the level of social trust in social and political organisations (Jakob et al., 2020; Lamb & Minx, 2020). Biber et al. (2017) hypothesise that countries with vast fossil fuel resources would be less likely to support energy transition policies, whereas countries with high potential for RES could be more inclined to support energy transition policies. However, they also argue that the lock-in syndrome and the dependency of countries on fossil fuels is a fundamental problem for further decarbonisation.

Regarding the extent of economic dependency of regions on fossil fuels, Diluiso et al. (2021) conclude that, in view of coal transitions, structural change in regions is of major importance for establishing interventions which are feasible within the political economic context. They emphasize that taking the negative effect of mining closures on the labour market into consideration, is of crucial importance for any *just transition* (Diluiso et al., 2021).

2.2.4 Analytical Framework for Political Economic Analysis

This chapter presents an analytical framework which will be used in this research to analyse the political economy of coal in South Kalimantan. This is conducted by firstly presenting several existing frameworks for political economic analysis, and by secondly justifying the choice of a particular framework.

Several different tools, analytical-, and theoretical frameworks have been developed for political economic analysis. An overview of these tools and frameworks is provided by GPPAC (2009). The overview broadly groups the tools into the following three categories. (1) Macro-level country analysis: These tools aid in understanding the political economy of countries and their overall development ambitions. (2) Sector-focused analysis tools and frameworks: These aim to facilitate understanding of the specific sectors, with a focus on different actors, their interest, incentives, and their institutional context within the sector. (3) Problem-focused analysis: These tools focus on a specific problem, and how it can be resolved.

From these tools and frameworks, the sector specific frameworks seem to be the most suitable category for the analysis of the coal sector in this research. Two main frameworks are presented here by the GPPAC. The 'Analytical Framework for Understanding the Political Economy of Sectors and Policy Arenas' and the Framework for 'Addressing Governance in Sector Operations'. Both frameworks aim to generate a comprehensive understanding of different actors and their relationship and are useful for designing sector programmes and support strategies. However, the second framework is mostly focused on the governance of the specific sector, while not focusing extensively on political economy issues. The first framework extends the focus on the sector by also guiding an analysis of the country context, which includes political economic aspects (GPPAC, 2009).

From this overview, the 'Analytical Framework for Understanding the Political Economy of Sectors and Policy Arenas' from Moncrieffe and Luttrell (2005) (henceforth called analytical framework) seems to be the most suitable framework, for the following reasons. The analytical framework aids in conducting analyses of the political economy of specific sectors and for analysing the policy arena within those sectors. The authors emphasize that political economic analyses can aid in understanding the relationship between economic processes, political policies, and social institutions. Moncrieffe and Luttrell (2005) adopt the definition of institutions as "the standards and rules of operations" (p.8) and emphasize that these can either be formal institutions (rules and procedures) or informal institutions (norms). This view of institutions is closely aligned with view of institutions within New Institutional Economics (NIE), which will be discussed in Chapter 2.2.5.

Moncrieffe and Luttrell (2005) emphasize that the framework aims to: (1) facilitate a broad understanding of *local* sector and policy arenas and provide explanations for how and why sectors function within a national context; (2) enable an independent sector analysis, comparative analysis, and the analysis of relations between national and sub-national sectors; and (3) provide explanations for how actors and organisations function within an institutional context and how their interactions affect policies (their creation, implementation, and outcome). They further argue that the analysis can aid in assessing the appropriateness of interventions in the sector (Moncrieffe & Luttrell, 2005).

The framework seems ideally suitable for the analysis of the political economy of coal in Indonesia in view of the above-described issues for the following reasons. Firstly, the sector analysis can aid in understanding the functioning of the coal sector in South Kalimantan. The independent sector analysis can provide sufficient depth of analysis to understand the specifics of the sector. Moreover, the analysis of the relation between the national and sub-national sectors enables an embedded analysis of the sub-national political economy of coal in South Kalimantan within the national context of Indonesia. Thirdly, the literature review has identified that the main barrier to the energy transition in Indonesia is the reluctance of regime incumbents due to their political and economic interests. The focus of the framework on actors and organisations and how they interact within the institutional context can provide a deeper understanding of these interactions and their underlying causes. Lastly, the focus of the analysis for assessing possible interventions is closely aligned with the aim of this research to develop institutional interventions for intervening in the political economy of coal.

The analytical framework is presented in Figure 2-2. The framework is divided into three stages. The first stage offers a broad analysis of the country and its context. Stage 2 aims to facilitate a deep and comprehensive understanding of the organisations, actors, and institutions within the sector. The third and last stage aims to determine points of interventions from the sector analysis.

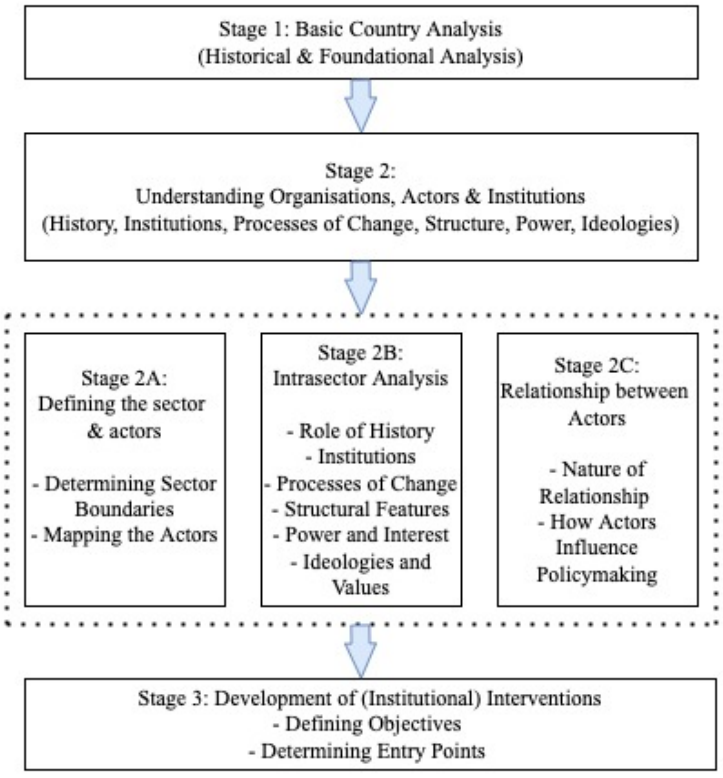

Figure 2-2: Analytical Framework for Political Economic Analysis, adapted from Moncrieffe and Luttrell (2005)

2.2.5 New Institutional Economics & Theoretical Framework

Institutional economics is a stream of economic thought that originally dealt with the role of institutions in economies. In 1975, Oliver Williamson coined the term "New Institutional Economics" (NIE), which was essentially a new school of economics thought surrounding institutional economics. NIE aims to provide explanations of how legal, political, or social institutions influence human behaviour and economic processes (Hodgson, 2001).

The term institutions can be defined differently. This thesis adopts the definition of institutions as "systems of established and prevalent social rules that structure social interactions" (Hodgson, 2006, p. 2). This definition implies that human interactions are influenced by *social rules*. North (1986) similarly defines institutions as "regularities in repetitive interactions among individuals" (p.231). Ostrom (2005) defines institutions as "prescriptions that humans use to organize [...] structured interactions including those within [...] markets, firms, [...] and governments [...]" (p.3). Ostrom states that the actions which individuals can take are influenced by rules which structure a given situation. These social rules exist either in the form of implicit, often unconsciousness knowledge of how to behave in the diversity of interactions which humans encounter, or in the form of explicit, codified rules, such as laws and regulations (Ostrom, 2005).

There are two underlying assumptions for the theory of institutions. The first is the individualistic behavioural assumption which suggests that individuals aim to maximize their own utility. The second assumption is that each individual attributes different values to goods and services and that measuring these multiple attributes is costly. This results in an exchange of goods and services as an exchange of rights between individuals. This results in contracting between individuals and the structuring of these transactions. Institutions hereby structure these interactions between utility maximizing individuals exchanging goods and services in economic processes (North, 1986). Williamson (2000) argues that human actors being involved in transactions are capable of cognition, yet rationally bounded, opportunistic, and capable of conscious foresight. These assumptions are of critical importance for this research. The individualistic utility maximizing nature of individuals interacting in transactions will serve as the theoretical assumption underlying the behaviour of actors in the political economy of coal in Indonesia.

Institutions therefore influence how humans interact in different social interactions. NIE studies these interactions in economic processes. Crucially important in this regard is the fact that NIE applied to politics is synonymous with *Political Economy* (North, 1994). This connection is of vital importance for this research. North (1994) emphasizes that "[politics] significantly shape economic performance because [it] define[s] and enforce[s] [...] economic rules" (p.366). The *economic rules* are institutions which are defined by political processes.

Williamson (2000), who coined the term NIE, developed a theoretical framework for the economics of institutions, henceforth called the Williamson's framework. The Williamson framework, which is depicted in Figure 2-3, consists of four different levels of institutions. According to Williamson, the institutions on the different levels change with different frequencies. The higher levels change with a slower pace, whereas the lower levels can change with a quicker pace. The four levels can be analysed from different perspectives, ranging from social theory, to economics of property rights, positive political theory, transaction cost economics, and neoclassical economics (Williamson, 1998).

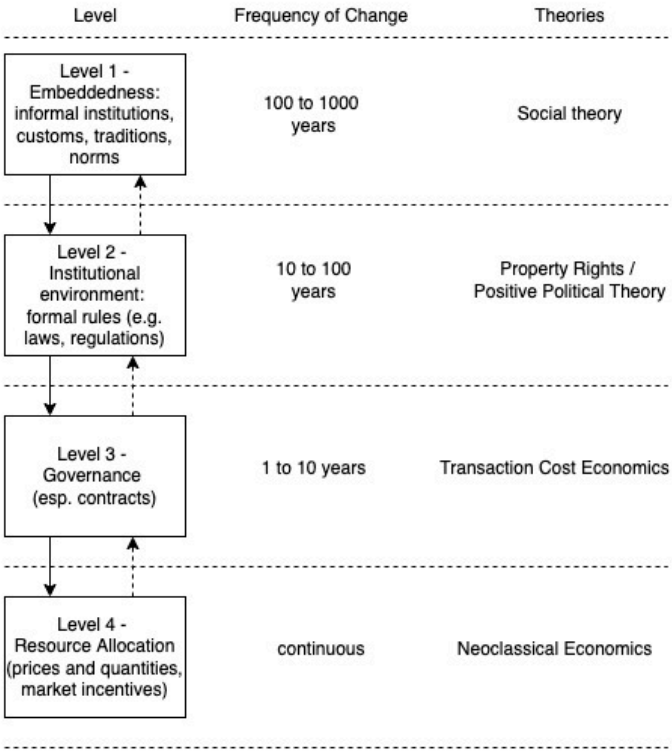

Figure 2-3: Williamson's Framework for Institutional Analysis, adapted from Williamson (1998)

The following information is taken from Williamson (2000). The framework consists of four different levels. The first level (L1) deals with informal institutions, such as customs, traditions, norms, and religion. L1 is called the embeddedness level. The institutions on this level usually change at a slow pace, ranging from 100 to 1000 years. Williamson highlights that these institutions strongly influence the structure and working of societies.

The second level (L2), called the institutional environment, deals with formal rules, such as laws, regulations, constitutions, and especially property rights. These institutions are mainly formed by the legislative, judicial, and executive branches of governments and are influenced by the distribution of powers within the different levels of governments. Williamson emphasizes that progressive change on L2 is difficult to implement due to rigid structures in governments, but that certain defining moments can produce the opportunity for sharp breaks and drastic change. Historical moments of this nature included civil wars due to massive discontent, occupations after the second world war, societal breakdowns (e.g., in the Soviet Union), military coups, or financial crises. Nevertheless, these moments occur rarely, and the usual frequency of change lasts from 10 to 100 years.

The third level (L3) concerns itself with institutions of governance, especially the governance of contracts. This level can be analysed through the lens of transaction cost economics. The unit of analysis is a transaction between entities, such as people or organisations, which can be structured by contracts. The frequency of change on this level ranges usually from 1 to 10 years.

The fourth level (L4) deals with neoclassical economics, which deals with resource allocation and employment. The frequency of change is continuous since demand and supply continuously influence prices and quantities of products and services.

The four different levels in the framework directly influence each other. The solid arrows in Figure 2-3 indicate that the higher levels directly influence the lower levels of institutions. Vice versa, the dashed arrows, which connect the lower levels with higher levels of institutions, indicate a feedback loop between the levels. Lower levels can therefore also influence higher levels (Williamson, 2000). The notion of different levels of institutions which influence each other has also been brought forward by Ostrom (2005; 2010).

In summary, the analysis of a given context through the lens of institutions provides explanations on how institutions shape the behaviour of humans. NIE deals with how institutions shape economic processes, and NIE applied to politics is synonymous with Political Economy. Williamson's framework serves as a theoretical framework to identify different levels of institutions and to explain how these influence each other. The second and third level, according to Williamson (2000), are of special importance for many public policy issues. This research will use Williamson's framework to identify different levels of institutions and to explain their relationship and how these interact. This will serve as the foundation to develop institutional interventions to enable a coal transition in Indonesia.

2.2.6 Complex Systems, Systems Thinking & Systems Archetypes

This chapter presents insights from the study of complex systems, systems thinking, and systems archetypes, which will provide further insights for the development of institutional interventions. These insights shall contribute to this research by providing perspectives from the master's course CoSEM for enabling a coal transition in the complex system of the coal sector.

Meadows (2008) defines a system as "an interconnected set of elements that is coherently organised in a way [to achieve a purpose or a function]" (p.11). A system consists of elements, interconnections, and it has a purpose or a function. Many complex systems exist in the physical world, ranging from the Internet, to GPS, to human societies, and to power grids (Arnold & Wade, 2015). Systems thinking is a *way of thinking* for understanding these complex systems (Checkland, 1993). Richmond initially defined systems thinking "as the art and science of making reliable inferences about behaviour by developing an increasingly deep understanding of the underlying structure" (Richmond, 1994, p.6). Arnold and Wade (2015) define systems thinking as a skill set which helps to better understand complex systems and their behaviour, to predict their functioning, and to steer the systems towards a desired outcome. They emphasize that systems thinking involves the following aspects: recognizing interconnections, understanding feedback loops, understanding system structure, identifying non-linearities in the relationship of elements and their relationship, understanding dynamic behaviour, reducing complexity, and understanding systems at different scales.

The analytical endeavour of systems thinking and viewing the world as complex systems is also adopted by Ostrom (2005) in her studies of institutions. Ostrom argues that, for example, individuals are part of larger structures which are composed of multiple individuals, which are themselves part of larger systems. Ostrom emphasizes that: "What is a whole system at one level is a part of a system at another level" (Ostrom, 2005, p.11). Ostrom (2005) emphasizes that her analytical work, is "a form of "dissecting" complex systems into [subsystems] that are then dissected further" (p.11).

Meadows (2008) emphasizes that in order to change the functioning of systems, leverage points need to be identified. Furthermore, complex systems can be grouped into so called system *archetypes*. These are "common system structures that produce characteristic patterns of behaviour" (Meadows, 2008, p.187; see also Stroh, 2015). The first system archetype which Meadows defines is *Policy Resistance*. This occurs when multiple actors pull the system towards different goals. Any policies affecting the system would draw it further away from the goals of the different actors, thereby producing resistance to the policy. As discussed in Chapter 2.1.1, currently many actors have different interests in coal, with

each actor pulling the system in different directions. Possible policy interventions could further exacerbate the resistance of actors. A solution out of this archetype is to seek out ways to realize the goals of the actors in a mutually satisfactory way (Meadows, 2008).

The second system archetype, according to Meadows, is the *Tragedy of the Commons*. This occurs when a common pool resource, such as coal, is commonly shared and the consumers of the resource benefit from it, but the *cost* of using the resource is shared by everyone. This results in overuse and erosion of the resource until its depletion (Meadows, 2008). This can be clearly seen in the case of coal in South Kalimantan. Even though coal is technically not freely available to everyone because mining requires permits, coal is practically often used as a free resource due to illegal mining. Meadows (2008) argues that possible solutions to the Tragedy of the commons could be: education of the users to understand the consequences of their resource extraction; privatizing the resource; or regulating the access to the resource.

The third and last systems archetype is *Rule Beating*. This occurs when rules, indented to govern the system, are not obeyed by actors (Meadows, 2008). This can be seen in the case of coal in South Kalimantan, where illegal mining and corrupt practices are widespread, as discussed in Chapter 2.1.1. A possible solution to this problem is to design rules in a way that even if actors beat rules, the consequences of the rule beating serve the purpose of the rule (Meadows, 2008).

These insights from systems archetypes will be used in Chapter 6.1 to develop institutional interventions which could enable a coal transition in South Kalimantan.

2.3 Research Gaps and Scope of Research

This chapter identifies research gaps and justifies the choice for the scope of this research. Jakob et al. (2020) argue that climate and energy policies are heavily influenced by the interaction of different actors in the political economy of specific sectors and that the political economy of sectors needs to be understood in order to identify entry points for interventions. Brauers et al. (2020) further emphasise that an analysis of the different actors in coal economies, their influence, relations, and interests, can aid in exploring why a coal regime is maintaining the status quo and why efforts for coal transitions remain ineffective. Research suggests that country-specific analyses are required to develop adequate policy recommendations for phasing-out coal (Caldecott et al., 2017; Carbon Trust, 2021; Yanguas Parra et al., 2019). Biber et al. (2017) highlight the importance of developing policies for countries which might be reluctant towards energy transitions due to their endowment with cheap fossil fuels. Lastly, Diluiso et al. (2021) identified based on their extensive literature review on coal transitions that there is a genal lack of research for developing economies and the Global South and that little is known about the political economy of countries currently investing in coal.

In summary, the research mentioned above on coal transitions and aspects of political economy suggests that the focus of this research on South Kalimantan, Indonesia, seems justified for the following reasons. Firstly, Indonesia is a developing country that relies heavily on coal and plans to further expand coal production and CFFP. Secondly, research has shown that the expanding coal economy is mainly caused by influential actors in the political economy of coal, aiming to benefit from coal operations and who are reluctant towards RES since they could harm their economic and political interests. In addition, the focus on South Kalimantan seems justified due to the lack of scientific contributions in this area and the expected complexity of reducing coal production in this region due to the dependency of South Kalimantan on coal for economic development. Furthermore, since policies and state interventions are regarded as the main driving force behind coal transitions, and the development of policies in coal-dependent countries is vital, focusing on possible policy interventions for enabling the coal transition in Indonesia seems justified.

Policies can be defined as a set of actions, for example, laws, plans or behaviour, adopted and implemented by a government (Bevir, 2021). Based on the theory of NIE (Williamson, 2000; see also North, 1986), this thesis adopts a broader view of policies being part of institutions. NIE studies how institutions influence economic processes (Hodgson, 2001), and more importantly, NIE applied to politics is synonymous with *Political Economy* (North, 1994). North (1994) emphasises that economic performance is shaped and influenced by economic rules (i.e., institutions), which are defined and enforced by political processes. Therefore, the hypothesis of this thesis is that institutions can influence the behaviour of actors in the political economy of coal and possibly enable a coal transition.

The focus on institutions within this research seems justified for the following reasons. The coal sector in South Kalimantan is influenced by the political economy of coal in Indonesia, which could be influenced by institutions. Furthermore, the theoretical link between NIE in relation to the political economy of coal in Indonesia seems to be a research gap. In addition, to the best of the knowledge of the author of this thesis, the Williamson framework seems to have not been used for the analysis of coal transitions before. Due to the resistance of influential actors in the political economy of coal in Indonesia and the need to improve the situation, the phrasing "institutional interventions" seems appropriate, since interventions can be defined as "the action of becoming intentionally involved in a difficult situation, in order to improve it or prevent it from getting worse" (Cambridge Dictionary, n.d).

Lastly, as discussed in Chapter 2.1.2, several studies highlight that even though coal transitions might mainly impact regional areas, a multi-level or polycentric governance approach is required which takes the national and the regional or local context into account (Diluiso et al., 2021; Marquardt, 2014; Geels et al., 2017). This highlights the importance of analysing multiple levels of the political economy of coal in the Indonesian context. Even though the focus of this research lies on the province of South Kalimantan, the broader national context of Indonesia must be taken into consideration to analyse the political economy of coal on multiple levels. Therefore, this thesis addresses aspects which must be viewed from the national perspective, and aspects which are more relevant for the provincial level in South Kalimantan.

2.4 Synthesis of Insights from Chapter 2

Chapter 2 has presented the theoretical background underpinning this research. The literature review on coal transitions has revealed that political economic aspects seem to influence coal transitions significantly. The literature review on coal transitions for Indonesia, and more specifically South Kalimantan, from Chapter 2.1.1, has revealed that the political economy of coal in Indonesia presents a major challenge for phasing-out coal in South Kalimantan. Chapter 2.2.2 and Chapter 2.2.3 presented various important insights from literature on political economy related to this research. The present study aims to combine insights from literature on coal transitions with insights from political economy of coal to analyse how a coal transition in South Kalimantan can be enabled. This analysis requires an in-depth understanding of the political economy of coal in South Kalimantan and Indonesia. The analytical framework from Moncrieffe and Luttrell (2005) presented in Chapter 2.2.4 serves as a guideline to conduct this analysis by providing a structure for analysis. Furthermore, Chapter 2.2.5. presented theoretical background on NIE and illustrated how institutions influence economic processes. In addition, emphasize was given on the fact that NIE applied to politics is synonymous with Political Economy. The Williamson framework from NIE (Williamson, 1998) will be used in this research as a theoretical framework to explain how the political economy of coal can be influenced by institutions for enabling a coal transition in South Kalimantan, Indonesia. The notion of institutions as enabling coal transitions aligns well with insights from the theoretical background from Chapter 2.1.2, that coal transitions are primarily driven by policies. Policies in this research are defined as being a part of institutions.

This research will therefore use two different frameworks. First, the analytical framework by Moncrieffe and Luttrell (2005) will be used for the political economic analysis. Second, the theoretical Williamson framework will be used to discern and develop various entry points for institutional interventions. The two frameworks are used in a consecutive order, whereby the theoretical framework is used in stage 3 of the analytical framework.

3 Research Approach and - Methodology

3.1 Research Approach - Case Study

Yin (1994) indicates that a case study is a research approach which is particularly well-suited for understanding complex social phenomena. Case studies are often employed in research areas, such as policy, political science, organisational, and management studies. The case study allows a holistic analysis of real-life, contemporary events where the researcher has no control over behavioural events (Yin, 1994). A case study is appropriate for exploratory studies for understanding complex, temporal processes that involve multiple participants where the context and experiences of participants are important (Bhattacherjee, 2012). Yin indicates that case studies can be either exploratory, descriptive, or explanatory and that the appropriate research approach depends on the research question. The research questions in case studies often answer *Why*, *How*, and *What* questions (Yin, 1994).

Conducting a case study for this research seems particularly suitable in view of the above-described aspects for the following reasons. Firstly, the coal transition in South Kalimantan is a complex, contemporary phenomenon, over which the researcher has no control. Secondly, the political economy of coal contains a multitude of different actors with diverging interests. The political and economic context plays a vital role in influencing the coal transition. Lastly, the literature review has revealed that research has already been conducted to understand the underlying causes of the current situation (*Why*). However, the literature has not yet adequately addressed *how* this situation can be resolved or *what* interventions would be necessary. This suggests that a case study that explains the underlying causes based on existing literature and explores how the current situation can be resolved by what institutional interventions is particularly well-suited. Therefore, the case study in this research will be foremost *exploratory*, but the exploratory analysis will be enabled by a preceding *explanatory* inquiry.

Bhattacherjee (2012) also distinguishes between interpretative and positivist case research. Interpretative research is a technique where data is collected, systematically synthesised, and analysed to expand on theories or generate new theories. Positivist research is conducted to *test* theories or hypotheses. This research will be of interpretative nature since the collected data will be used to expand on the theory of NIE by applying it to the case.

General Approach to Designing Case Studies

In the following, the research approach for conducting a case study for this research will be elaborated upon, based on the work of Yin (1994). Yin indicates that the following four components are of great importance for conducting case research.

(1) The first and foremost important component is the research question. As already elaborated above, case studies tend to address *why*, *how,* and *what* questions. As discussed in Chapter 1.2, the main research question for this research is: *How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy of coal through institutional interventions?*

(2) The second component deals with defining study propositions. Study propositions bring attention to the scope of the study and hint at theoretical issues addressed. The study proposition in this research is that institutions influence actors in the political economy of coal. The theory of institutions guides the further case study and limits its scope.

(3) The unit of analysis defines what the *case* is. The case in this research is the political economy of regional or provincial coal sectors. The political economy contains different actors who interact based

on their interests and are influenced by their context and existing institutions. The justification for the choice of this research has been presented in Chapters 1.1 and 2.3.

(4) This component deals with data collection, linking data to propositions, and defining criteria for interpreting the findings. Data collection in case research can occur through a multitude of sources, such as documentations (e.g., academic articles, reports, or newspaper articles), direct observations, or interviews (Bhattacherjee, 2012). The data collection for this research will be conducted by a literature search in scientific databases for academic articles dealing with the topic of interest, by reviewing relevant reports and newspaper articles on the issues, and by conducting expert interviews. The data collection will be further discussed in Chapter 3.2.

Yin (1994) emphasises that a theoretical or analytical framework can serve as a blueprint for a research design and for guiding data collection and data analysis. The framework can also aid in generalising the results of the case study. The analytical framework from Moncrieffe and Luttrell (2005), which was presented in Chapter 2.2.4, will be used for the data analysis in this case study. Furthermore, the theoretical Williamson framework (Williamson, 1998) will be used to structure the development of institutional interventions in this case study's exploratory part.

Case Selection

This section briefly addresses the case selection. Chapter 2.3 already addressed the justification for choosing South Kalimantan for this research. The most important aspects will be discussed in the following. Generally, country-specific analyses are required to develop adequate policy recommendations for phasing-out coal (see Caldecott et al., 2017; Carbon Trust, 2021; Yanguas Parra et al., 2019). Furthermore, developing policies for phasing-out coal is especially important for countries with large endowments with fossil fuels (Biber et al., 2017). In addition, a general lack of research has been identified by Diluiso et al. (2021) for developing economies in the Global South and for the political economy of countries currently investing in coal. These aspects suggest that the focus of this research on South Kalimantan, Indonesia, seems justified since Indonesia is a developing country in the Global South with an endowment of coal and existing plans to further invest in coal. In addition, the political economy of coal in Indonesia seems to be the main cause for the increasing coal production and investment plans, as discussed in Chapter 2.1.1. Lastly, in South Kalimantan, coal has been a significant source of economic development and contributed to 18.8% of the provincial GDP in 2017 (Arinaldo & Adiatma, 2019). The heavy reliance of South Kalimantan on coal and the lack of research conducted for this region highlights the necessity to research the topic of phasing out coal in South Kalimantan.

Case Study Research Design

Yin (1994) distinguishes between four types of case study designs. In the following, the rationale for choosing a specific one will be clarified. The first distinction which can be made is between a single- or a multiple-case study design. A single case design is more suitable for a revelatory and unique or extreme case. Multiple-case research is suitable for testing theories and for establishing the generalizability of cases. In this research, single-case research seems most appropriate since this research aims to generate theories about how institutional interventions can influence the current political economy of coal. The political economy of coal in Indonesia, and more specifically in South Kalimantan, is furthermore a unique case due to its political and economic structure, and the results will be revelatory since there exists a knowledge gap in the field.

The second distinction which can be made, according to Yin (1994), is between a holistic versus embedded case study. An embedded case study design involves multiple units of analysis, whereas a holistic design focus only on one global unit of analysis. This research will focus on several units of

analysis. Units of analysis could include the physical coal and electricity system, the institutional environment, the actors and their interest, their relationship, and their behaviour.

Yin (1994) emphasises that an embedded design can have some disadvantages. The most eminent one is that the researcher could focus too much on one subunit of analysis while neglecting the overarching unit of analysis. This can easily lead to the outcome that the original phenomenon of interest becomes the study's context and not the main inquiry. This pitfall will be dealt with by utilising an analytical framework that divides the case into several units of analysis on different levels that interact with each other. The framework's structure prescribes a systematic inquiry of the separated units of analysis without neglecting the overall relationship among them. This structure will reduce the likelihood of neglecting the overarching unit of analysis in the analytical investigation.

In summary, this case study will be a single case study with an embedded design with multiple units of analysis. The case study will be explanatory in the first stage before shifting its nature towards an exploratory inquiry to answer *how* the coal transition in South Kalimantan can be influenced by *what* institutions. Table 2 provides an overview of the most important components of the case study, according to Yin (1994).

Main Research Question	*How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy of coal through institutional interventions?*
Case Study Design	Single Case Study; Embedded Design, Exploratory; Interpretative.
Proposition	Institutions influence the behaviour of political and economic actors.
Unit of Analysis	The political economy of provincial coal sectors.
Data Collection	Qualitative Desk Research; Expert Interviews.
Analytical Framework	'Analytical Framework for Understanding the Political Economy of Sectors and Policy Arenas' by Moncrieffe and Luttrell (2005)
Theoretical Framework	Williamson Framework for Institutional Analysis (Williamson, 1998)

Table 2: Overview of the Case Study Design

3.2 Data Collection

This chapter addresses the means of data collection. Data collection in case research can occur through multiple sources, such as documentations (e.g., academic articles, reports, or newspaper articles), direct observations, or interviews (Bhattacherjee, 2012). The data collection for this research is divided into two stages, namely desk research and expert interviews.

3.2.1 Qualitative Desk Research - Literature Review and External Sources

The first stage of data collection will occur through desk research. The data will be collected from different sources. Firstly, a literature search in scientific databases will be conducted for academic articles dealing with the topic of interest. Secondly, relevant reports and newspaper articles on the issues will be reviewed from the internet.

The main barrier to this research is the lack of understanding of the Indonesian language of the principal investigator of this research. The desk research and the analysis of relevant literature will therefore be focused on English literature. The database search queries will be limited to English or German academic articles. The two most prominent English language newspapers from Indonesia will be analysed, Jakarta Post and Mongabay.

3.2.2 Expert Interviews

The second part of the data collection will be performed by conducting expert interviews. Previous studies have conducted extensive expert interviews on the underlying causes of the current situation in the political economy of coal in Indonesia (see Ordonez et al., 2021). Therefore, the expert interviews for this case study will mostly focus on *how* the situation can be resolved by institutional interventions and not *why* the situation exists. This seems to be a research gap that this thesis intends to fill. However, the expert interviews will also aim to validate data from literature *why* the situation exists. The main part of the expert interviews will be dedicated to exploring *how* a coal transition can be enabled. Insights from the literature on coal transitions will be used to explore which institutional interventions (e.g., policies, market instruments) could enable a coal transition. The literature on possible institutional interventions is presented in Chapter 5.1. The aim of the expert interviews is to explore the political feasibility and expected effectiveness of the proposed interventions from Chapter 5.1. In addition, the expert interviews shall explore whether other interventions or instruments exist, which could enable a coal transition in South Kalimantan. The results of the expert interviews are presented in Chapter 5.2.

Bhattacherjee (2012) indicates that the first aspect of conducting interviews in case studies is to create instruments and protocols to guide the interview process. The questions can either be structured or unstructured or a combination of these. This research will conduct a semi-structured interview process, where open-ended questions are asked. The interview protocol with questions will be developed based on insights from Chapter 5.1. The interview protocol is attached in Appendix D. The questions aim to explore the political feasibility and the expected effectiveness of institutional interventions for the specific case of South Kalimantan. The insights obtained from the expert interviews will then be synthesised with insights from literature to develop recommendations for influencing the political economy of coal by institutional interventions.

Bhattacherjee (2012) emphasises that the second step in conducting interviews is to select interview respondents. He suggests that preferably interview respondents should be selected randomly, but that these should have different backgrounds to provide a variety of different perspectives. Respondents should be selected by assessing their personal involvement with the case under investigation and their ability and willingness to answer the questions. The respondents who will be interviewed for this case study will be carefully selected based on these criteria. Potential candidates could include but are not limited to: authors of scientific articles or reports covering the subject, academics in the field, experts from Think Thanks, policy experts in various companies, or governmental bureaus. Furthermore, the political economic analysis, which is conducted in Chapter 4.3, includes a stakeholder analysis. This stakeholder analysis could reveal further interview candidates who could be interviewed.

In total, 11 experts were interviewed for this research. The experts were selected based on the selection of academic articles and scientific reports on the topic of this thesis. Further, some interviewees were selected based on suggestions from already interviewed experts. The experts have different backgrounds. Table 3 provides an overview of the interviewed experts and their backgrounds.

Stakeholder Cluster	Interviewee / Expert#(e#)	Description	Date of Interview
International Organization	Expert 1 (e1)	Social Development Specialist	09/06/2022
International Think Tank / Research Institute	Expert 2 (e2)	Coal Transition Lead	13/06/2022
	Expert 3 (e3)	Global Sustainable Energy Transitions Specialist	14/06/2022
	Expert 10 (e10)	Energy and Climate Consultant	01/07/2022
	Expert 11 (e11)	Researcher on climate finance	06/07/2022
Indonesian Think Tank / Research Institute	Expert 4 (e4)	Researcher for climate change mitigation and adaptation strategies	16/06/2022
	Expert 5 (e5)	Energy Transformation Specialist	17/06/2022
	Expert 7 (e7)	Researcher on Indonesian coal sector	24/06/2022
	Expert 8 (e8)	Researcher on climate and energy policies	27/06/2022
International University Researcher	Expert 6 (e6)	Researcher on Coal Transitions	22/06/2022
	Expert 9 (e9)	Researcher on Coal Transitions	28/06/2022

Table 3: Overview of Expert Interviewees

3.3 Data Analysis of Expert Interviews

This chapter clarifies how the qualitative data from the expert interviews will be analysed. The following information is taken from Bhattacherjee (2012).

The qualitative data from the expert interviews will be analysed by *open coding*. Hereby text is categorised into codes related to certain concepts, categories (i.e., constructs), and relationships. The aim is to identify certain concepts which emerge throughout the analysed data. The text is analysed, and segments are categorised into codes. The next stage in open coding is to group concepts into higher-order categories. Categories are broader and more generalisable, whereas concepts tend to be context-specific. Categories can aid in generating an understandable "big picture" of the phenomenon. Open coding is especially useful when the researcher continuously identifies new concepts throughout the analysis (Bhattacherjee, 2012).

Open coding seems particularly suitable for the qualitative analysis of the expert interviews for the following reasons. Firstly, the semi-structured interviews will pose the interviewee's questions surrounding possible institutional interventions. These interventions and the interviewees' opinions on the suitability and feasibility of interventions can vary significantly. Open coding allows to categorise the different interventions and group them into concepts. Secondly, since the researcher is not yet aware of all the different interventions that interviewees might suggest, the process of continuously being able to identify new concepts throughout the analysis seems to be particularly useful. Lastly, the research aims to develop a set of institutional interventions and explain their interrelationship through NIE and Williamson's framework.

The different levels of Williamson's framework can aid in grouping the different *concepts,* which are coded into *categories*. The concepts relate to the different institutional interventions, whereas the categories represent the different levels of Williamson's framework (L1-L4). For example, different proposed changes of laws or new regulations can be grouped into concepts, such as environmental regulations or legal changes in the allocation of mining permits, which are categorised into L2 interventions from Williamson's framework. The relationship between the different concepts can then be explained by NIE and the workings of Williamson's framework.

The qualitative analysis will be conducted by using the software ATLAS.ti, Mac (Version 22.1.0). The interviews, which will be held online either in Microsoft Teams or Zoom, will be recorded, if the interviewees give permission, and automatically transcribed by the software. The automatically transcribed interviews will be checked after the interview by listening to the recording and by adjusting any errors in the transcription. The transcribed interviews will then be coded into different concepts and further categorised into the levels of institutions.

3.4 Data Protection and Data Processing

The research, which entails expert interviews with human subjects, was approved by the Human Research Ethics Committee (HREC) from the TU Delft. This chapter addresses the main means for data processing which is being collected throughout this research. The interviewees are further obliged to sign a consent form for participating in this research. The consent form with all relevant data protection and processing information is attached in Appendix E. The main data protection and processing information are summarised in the following.

The collected data consists primarily of qualitative data from expert interviews. The collected data includes interviewees' personal data (name, occupation, organisation, e-mail address), audio recordings of online interviews conducted via Microsoft Teams or Zoom, and anonymised transcripts of the interviews. Personal data will only be collected for purposes related to the thesis and not included in the thesis. The anonymised results from the interviews will be part of this thesis, which will be published in the TU Delft Repository, which is publicly accessible via the internet. The transcripts of the interviews will be completely anonymised and only made available to the supervisor of the thesis within an external appendix and will not be published on the TU Delft Repository or elsewhere. This is conducted to minimise any risk that could arise from the interviewees' re-identification and possible reputation damage. The entire data collected for this research will safely be stored on the personal TU Delft OneDrive of the author of this thesis. The interview audio recording will be deleted one month after the thesis project has been finished.

3.5 Validity and Reliability of Qualitative Research

This chapter discusses the validity and reliability of the qualitative research conducted within this thesis. According to Noble and Smith (2015), the validity of research refers to the integrity of the research methods used and the accuracy to which the methods can reflect the collected data, whereas reliability ensures consistency throughout the analytical procedures and reduction of potential bias influencing the findings. Yin (1994) highlights that the quality of empirical social research can be established by four tests, including construct validity, internal validity, external validity, and reliability. These four tests will be elaborated upon in the following.

Construct validity deals with establishing correct operational measures for the concepts being studied. Yin highlights that construct validity can be established by using *multiple sources of evidence* and by establishing a *chain of evidence.* This will be conducted throughout this research using different sources and by data triangulation. According to Noble and Smith (2015), data triangulation ensures that different perspectives are considered for generating a comprehensive understanding of the problem and of potential interventions. This is conducted throughout the political economic analysis and throughout the data analysis from the qualitative expert interviews. In addition, the validation part of the expert interviews will provide further triangulation with the insights from the literature. Furthermore, the expert interviews will provide further triangulation for the exploratory part, assessing the political feasibility and expected effectiveness of the proposed institutional interventions based on literature.

Internal validity, according to Yin (1994), aims to establish causal relationships between analysed data. However, Yin highlights that is mostly relevant for explanatory case studies. Since this case study is

mostly an exploratory case study, threats to internal validity are not critical. However, as discussed in Chapter 3.1, the first part of this case study is partly an explanatory case study, since it aims to explain why the current situation in South Kalimantan exists. Nevertheless, this explanatory part is mostly based on existing literature. The responsible researcher therefore does not intend to make causal relationships between data which is not substantiated. Further, data triangulation will again ensure that claims of causal relationships are substantiated by multiple sources. In addition, the validation part of the expert interviews will provide further data triangulation to some of the causes which have led to the current situation in the coal sector in South Kalimantan, Indonesia.

External validity, according to Yin (1994), refers to the generalizability of the study's findings to other cases. Yin emphasizes that the case studies are often criticised for their lack of generalizability to other cases. This case seems to have some generalizability to other cases. In particular, the findings from this research could be generalized to other coal dependent provinces in Indonesia. Furthermore, the findings could be generalized to some extent to other countries with similar features. However, the case is unique due to, for example, the market structure, the existing institutions, the existing distribution of power and authority, and the extent of vested interests in Indonesia.

Reliability, according to Yin (1994), refers to the repeatability of the findings, where another researcher would arrive at the same results for the case study. One way of ensuring reliability is to document the procedures followed in the case study. This is conducted in this research by documenting the procedure for the literature review and by transcribing the expert interviews (see also Noble & Smith, 2015). However, the interview transcripts and the list of experts will not be publicly available, due to data protection issues discussed in Chapter 3.4. This reduces the reliability of the case study. However, the interview protocol, which is attached in Appendix D, could be used to replicate the study, with ensures reliability to some extent. Furthermore, Noble and Smith (2015) emphasize that ensuring validity and reliability within qualitative research, can be achieved by discussing data elaboratively to ensure that the interviewees' perspectives are comprehensively described. This will be conducted for this research in Chapter 5.2. In addition, biases in data sampling will be acknowledged in Chapter 6.4., and the use of methods is critically reflected. Lastly, the experts interviewed are chosen to represent a diverse background to ensure that different perspectives are taken into account (see Noble & Smith, 2015).

4 Political Economic Analysis of Coal in South Kalimantan

This chapter presents the case study on the political economy of coal in South Kalimantan, Indonesia. The following chapters are structured according to the framework by Moncrieffe and Luttrell (2005), which is used for this research.

4.1 Basic Country Analysis

The first stage in the framework involves an analysis of the country, which serves as the context for analysing the specific sector. The country analysis provides insights into how historical legacies, processes of change, and structural features influence actors, the institutional context, and their relationship. Subsequently, the analysis provides insights into how these aspect influences policy-making and - implementation (Moncrieffe & Luttrell, 2005). These relationships between the different concepts are depicted in Figure 4-1.

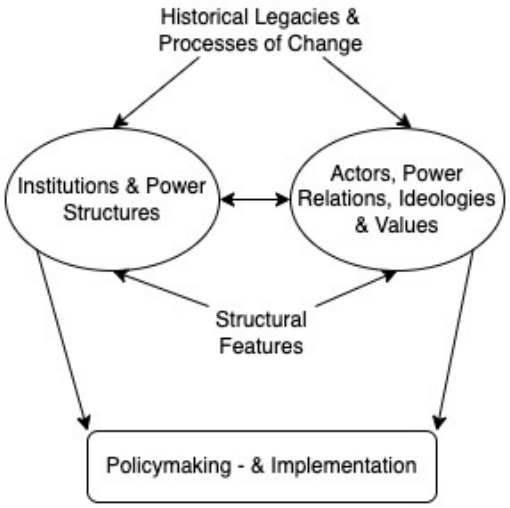

Figure 4-1: Relationship of Factors influencing Policymaking in Sectors, adapted from Moncrieffe and Luttrell (2005)

In the following two subchapters, a brief country and provincial analysis shall provide insights into the above-described factors and their role in South Kalimantan. To understand the role of South Kalimantan, it is important to provide an analysis of Indonesia as well. Chapter 4.1.1. provides a country analysis of Indonesia and Chapter 4.1.2. provides an analysis of the Indonesian province of South Kalimantan.

4.1.1 Indonesia - Basic Country Analysis

This chapter provides a country analysis of Indonesia by addressing such issues as the role of history, institutions, processes of change, structural features, power and interest, and ideologies and values.

The following information is taken from Legge et al. (2022). Indonesia is a country in Southeast Asia located within the Pacific and Indian oceans. Indonesia has much volcanic activity due to its location between three sections of the earth's crust. Indonesia is an archipelago with several larger islands, Borneo (Kalimantan) being one of them. Indonesia is the largest and most populous country in

Southeast Asia and the fourth most populous in the world, with a population of approximately 270 million. Indonesia consists of 17,500 islands, over 7000 of them being uninhabited. The capital of Indonesia is Jakarta, located on the island of Java.

More information regarding the Basic Country Analysis of Indonesia can be found in Appendix A. The information is grouped into: People, Culture, and Society; Economy of Indonesia; Resources and Power; and Government and Political System.

4.1.2 South Kalimantan - Basic Provincial Analysis

An overview of the province of South Kalimantan is provided in Appendix B. In the following, some important data is presented which is relevant for this research.

According to the Global Data Lab (2022), has South Kalimantan a population of approximately 4.14 million, which is about 1.57% of the Indonesian population. Around 40% of the population in South Kalimantan live in urban areas, whereas around 60% live in rural areas. Approximately 97% of the population in South Kalimantan has access to electricity. Around 46% of the population is classified as poor households with an International Wealth Index of below 70. The mean years of education for the population older than 20 years is 8.19 years, with men's education being slightly longer than women's education.

4.2 Definition of the Coal and Electricity Sector and involved Actors

The second stage of the analytical framework focuses on the interaction between actors and institutions and the influence of these interactions on policies (Moncrieffe & Luttrell, 2005). The first part of this stage (2A) aims to delineate the sector of interest. The sector of interest is the coal sector in South Kalimantan. However, the coal sector is also embedded in the electricity system in South Kalimantan since the objective of phasing out coal production will inevitably influence the electricity system, which is heavily reliant on coal. Therefore, both sectors need to be defined. First, the coal sector in South Kalimantan will be defined, and the electricity sector will be defined thereafter.

4.2.1 Defining the Coal Sector in South Kalimantan

The national coal sector of Indonesia influences the provincial coal sector in South Kalimantan. This chapter will therefore define the coal sector in Indonesia, with a particular focus on the coal sector in South Kalimantan.

According to Arinaldo and Adiatma (2019), Indonesia has vast coal resources distributed across four provinces: South Sumatra, East-, Central-, and South Kalimantan. The coal reserves in East Kalimantan have medium-quality coal resources, while South Sumatra and Central Kalimantan tend to have low-quality coal resources with a lower calorific value. According to data from Rosyid and Adachi (2016), coal reserves in South Kalimantan, in the Barito Basin, amounted to 4772 Million tonnes in 2016, from which 17% were of low calorific value, 66% of medium calorific value, and the remaining 17% of high calorific value. Furthermore, the average operating costs for coal mining have increased from 1998 to 2013, while the average gross profit margin has decreased from 39% to 29%. In addition, their study found that the cost of coal mining will continue to increase and that peak coal production will be reached in 2024 (Rosyid & Adachi, 2016).

Indonesia's total coal reserves amount to approximately 99.2 billion tonnes, of which 13.3 billion are classified as proven reserves. Based on the production levels of 2015 of 461 million tonnes per year, the coal reserves are expected to be depleted by 2046 (Budiono & Rizky Ananda, 2017).

Coal extraction provides revenue to the state budget through royalties, taxes, land rent payments, and the sale of coal. In South Kalimantan, coal contributed in 2017 to 18.8% of the provincial GDP (Arinaldo & Adiatma, 2019). In 2010, the mining sector in South Kalimantan employed approximately 2% of the provincial workforce, whereas the agricultural sector employed approximately 51% of the workforce (Down to Earth, 2010). The absolute workforce is, therefore, rather small compared to the mining sector's contribution to the provincial GDP. The mining sector in Indonesia, in general, is of significant importance to the economy in Indonesia and contributed between 2010 and 2015 on average 28% per year to the country's GDP (Yudha et al., 2018).

Figure 4-2: Annual production of coal in Mtonnes - Export and domestic use, adapted from Atteridge et al. (2018)

As shown in Figure 4-2, most of the coal produced in Indonesia is exported, with the share of exports over domestic use increasing significantly since the beginning of the 21st century. However, since 2013, the share of exports has dropped, while domestic demand is steadily increasing.

The export of coal was spurred by increasing coal demand from neighbouring countries, with China and India being the main coal importers (Diluiso et al., 2021). However, the trend of declining exports and increasing domestic use, as seen in Figure 4-2, is indicative of expected future developments, whereby exports are expected to decrease while domestic use is expected to increase due to declining global coal demand (Atteridge et al., 2018).

According to Arinaldo and Adiatma, the heavy dependence of Indonesia on coal is partly due to their growing electricity demand. The Fast-Track Program (FTP) aims to increase coal production, and the 35,000 MW Program1 aims to build 35,000 MW additional capacity for CFPP. In 2017, 58,1% of electricity was generated from coal, and its share has increased over the last decade. Most of the capacity of CFPP is thereby owned and operated by PLN. However, the share of electricity generated by coal from Independent Power Producers (IPPs) is steadily increasing (Arinaldo & Adiatma, 2019).

Another important aspect of the coal sector is transport infrastructure. According to Atteridge et al. (2018), adequate infrastructure for transporting coal is underdeveloped in some areas with coal reserves. In East Kalimantan, coal is typically transported by river barges to ports. Difficulties arise, for example, from the limited capacity of barges, limited port capacities, and limited transport periods depending on the height of water levels. In the dry season, coal is often stored at the mines due to lacking transport

options via rivers. Some ports and barges are owned or operated by large coal companies, while other coal companies negotiate terms for transporting coal via barges and handling it at ports. Several districts have announced plans to construct further ports to generate revenue streams for the districts (Atteridge et al., 2018).

According to Dutu (2016), most of the coal mining is carried out in remote areas with open-cast mines, which increases the risk of environmental damage. Some mining companies are pursuing mining rehabilitation. However, Dutu highlights that most of the environmental damage stems from smaller, illegal mining sites in remote areas and stresses that illegal mining, known in Indonesia as PETI (Penambangan Tanpa Izin: "Mining Without Permits"), is widespread in Kalimantan (Dutu, 2016).

4.2.2 Defining the Electricity Sector in South Kalimantan

The electricity sector in Indonesia is rather centralised due to the dominant role of the state-owned enterprise (SOE) PLN. PLN is responsible for most of the country's electricity production and for the transmission and distribution of electricity. IPPs need to make contracts with PLN to sell electricity to the grid (Marquardt, 2014). A schematic overview of the Indonesian electricity sector is shown in Figure 4-4, adapted from Marquardt (2014). The schematic overview in Figure 4-3 illustrates the dominant role of PLN in the electricity sector.

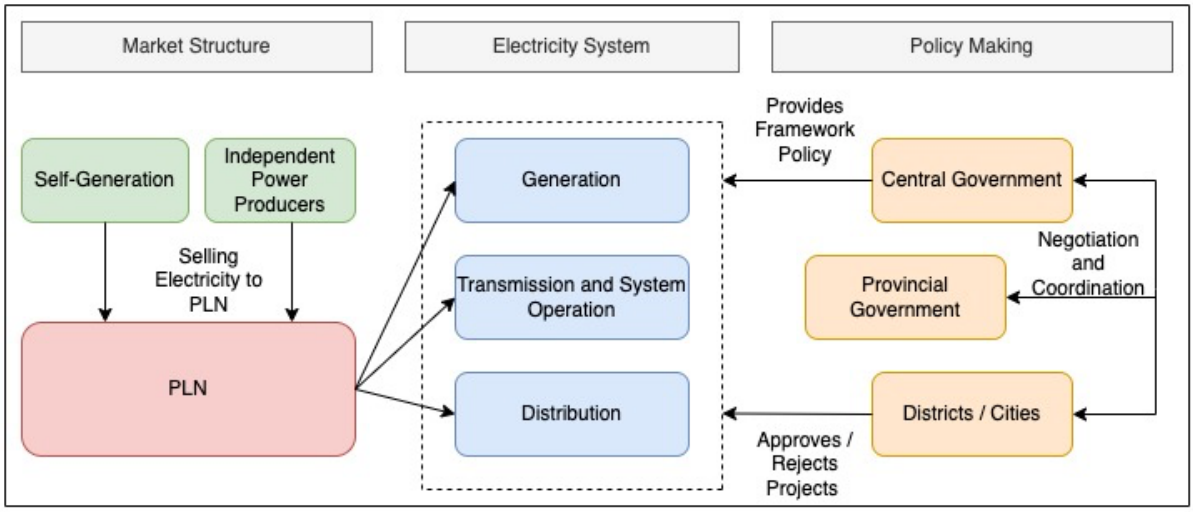

Figure 4-3: Multi-Level Perspective of the Indonesian Electricity Sector, adapted from Marquardt (2014)

Figure 4-4 shows the share of different energy sources in the Indonesian electricity sector. The data for the Figure is taken from Arinaldo and Adiatma (2019, p.12). Figure 4-4 shows that coal is the dominant energy source for generating electricity in Indonesia. Indonesia uses coal to supply base load power (Gunningham, 2013). Furthermore, the use of coal is expected to increase over the next years. Hydropower and geothermal power play a minor role in Indonesia, but they are expected to play a larger role in the near future. The use of gas for electricity generation is also expected to play a larger role in the coming years. Figure 4-4 also shows the plan of the Indonesian government to become energy independent by reducing energy imports. Furthermore, the overall energy demand is expected to increase, from 316.7 TWh in 2020 to 501.9 TWh by 2027. In addition, Figure 4-4 illustrates that the share of RES in the Indonesian electricity system is marginal.

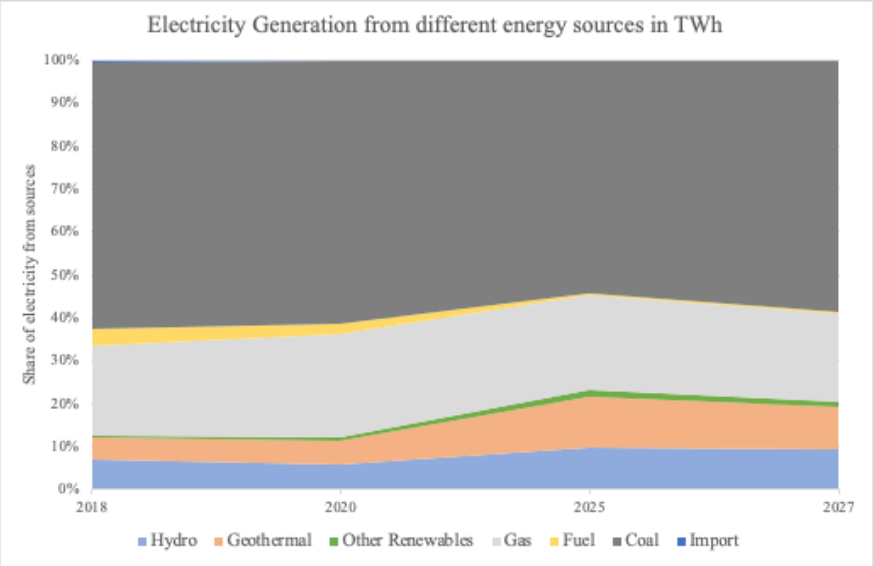

Figure 4-4: Electricity Generation from different energy sources in Indonesia, adapted from Arinaldo & Adiatma (2019)

Bridle et al. (2018) provide an explanation for the limited generation of electricity from RES in Indonesia. They highlight that technical factors play a role, such as the existence of many different electricity grids across the different islands, the limited capacity of the grids, the intermittent nature of RES, and the limited availability of land near populated areas for the construction of facilities for RES. Indonesia's geographic features thereby pose a challenge for the development of RES, which will require technical solutions, such as the operation of different grids, varying in their size and nature, either being centrally operated or being designed as off-grid solutions. The variety of grids poses a further challenge for the deployment of RES since intermittent electricity supply from RES can be more easily handled in larger grids. This challenge could be overcome by various technological solutions, such as integrating storage facilities, integrating regional grids through expanding the transmission grid, and increasing expertise in grid management (Bridle et al., 2018).

The electricity grid from South Kalimantan is shown in Figure 4-5. The electricity grid in South Kalimantan is interconnected with the grid in Central Kalimantan, whereby Barito is the largest interconnected system in South Kalimantan and Kotabaru is the largest isolated system. Kotabaru is supplied with electricity from local diesel plants with a capacity of around 16 MW in 2019. The electricity grid in South Kalimantan was further connected to the grid from East Kalimantan in 2018 (Riva & Vestarchi, 2019; PT PLN Persero, 2019).

Figure 4-5 shows that the electricity grid in South Kalimantan is mainly located around the capital city of Banjarmasin. The grid also spans along the northern part of South Kalimantan and the southern coastline. The map also shows the mountainous region in the centre of South Kalimantan, where no grid lines are located due to the resulting geographic constraints. However, as discussed in Chapter 4.1.2, around 97% of the population in South Kalimantan has access to electricity. The impact of phasing-out coal on the electricity grid would mainly be felt in regions connected to the large grid. The interconnection to Central- and East Kalimantan could therefore aid in mitigating the impact of intermittent RES, which would have to be increasingly deployed to meet the supply gap resulting from phasing-out coal.

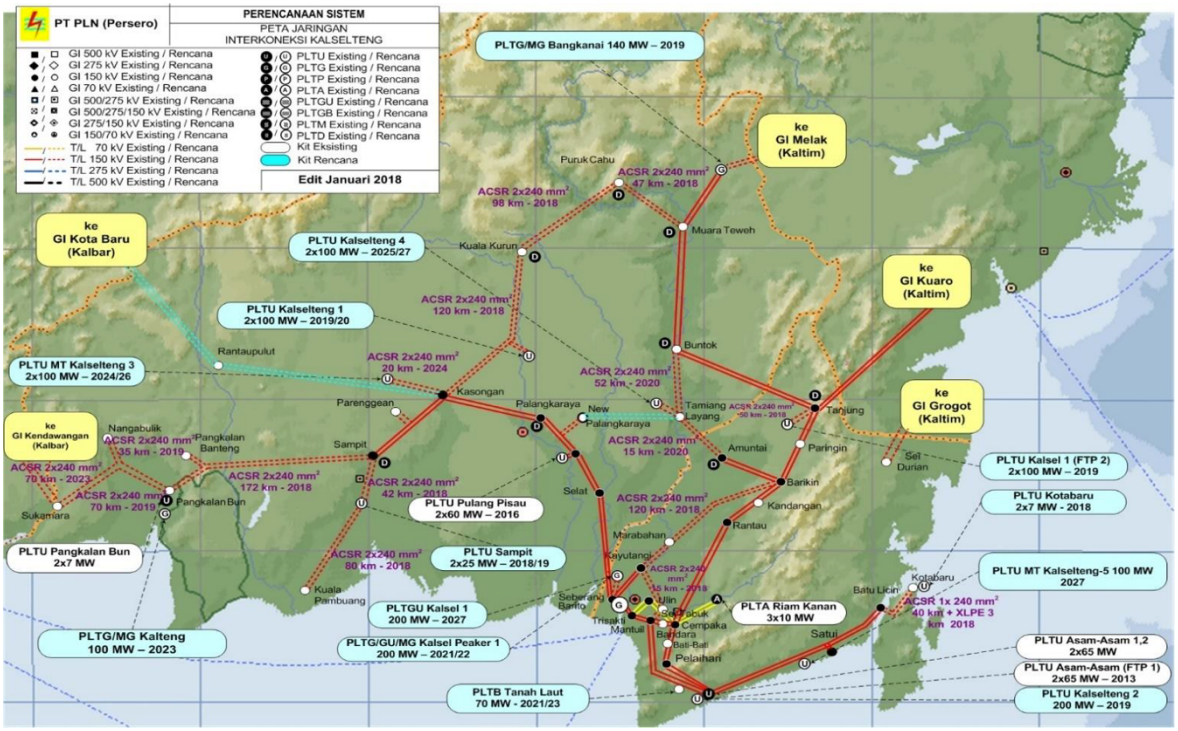

Figure 4-5: Electricity Grid in South Kalimantan (taken from Riva & Vestarchi, 2019; Original Source: PT PLN Persero, 2019)

The following information is taken from Riva and Vestarchi (2019). South Kalimantan also has vast potential for RES, mostly from solar, wind and biomass. South Kalimantan thereby has the second-highest potential for wind energy in Indonesia. A 70 MW wind farm in the region Tanah Laut at the southern tip of South Kalimantan was constructed in 2021. Further wind farms with a capacity of 80-130 MW and a biomass plant with 12.4 MW are planned.

The electricity demand in 2018 amounted to 2597 GWh. The projected demand for South Kalimantan is expected to grow to 5581 GWh by 2028. This increased demand is mainly due to increased mining operations and expanding palm oil plantations. However, other projections expect the demand to grow to 10 TWh by 2030. The average load profile for South Kalimantan suggests that peak demand occurs between 6-7pm with an average peak load of 550 MW.

In 2019, the total installed capacity in the Barito was 460 MW, of which 260 MW came from coal. The only supply from RES came from a hydro plant in Riam Kanan with a capacity of 30 MW. in 2019 and 2020, two coal plants with a capacity of 200 MW each were constructed. A 200 MW gas plant for peak demand was constructed in 2022, and further gas and coal plants are already planned (Riva & Vestarchi, 2019)

In summary, even though some projects for the development of RES are planned, the majority of current and planned capacity comes from CFPP. However, South Kalimantan has vast potential for RES, such as wind and solar, which could be exploited to meet the increasing electricity demand.

4.3 Actor Analysis of the Coal Sector

This chapter aims to identify relevant actors in the political economy of coal as part of the analytical framework from Moncrieffe and Luttrell (2005). Identifying relevant actors involved in the coal sector, their influence, their interests, and their relations can aid in explaining why coal regimes persist and why phasing-out coal is met with resistance (Brauers et al., 2020).

Various researchers have conducted an actor analysis of the political economy of coal in Indonesia (see Bridle et al., 2018; Jakob et al., 2020; Yudha et al., 2018). A brief overview of the actors, their influence and interests is provided in Table 4. The information from Table 4 is taken from Bridle et al. (2018), Jakob et al. (2020), Atteridge et al. (2018), and Ordonez et al. (2021). A detailed actor analysis is provided in Appendix C.

As the detailed actor analysis, and especially the analysis of the different ministries, in Appendix C shows, the different involved ministries significantly influence energy planning processes. The ministries' important role and influence on energy planning is depicted in Figure 4-6, adapted from Ordonez et al. (2021).

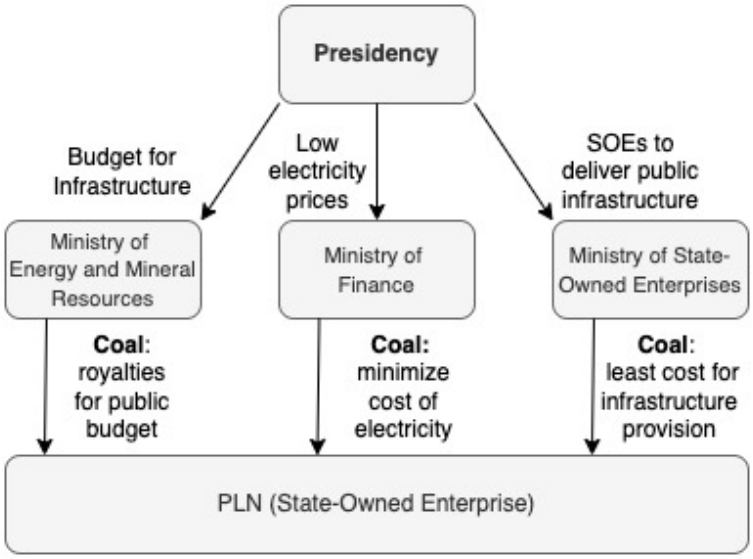

Figure 4-6: Relationship between Ministries and Influence on Policymaking, adapted from Ordonez et al. (2021)

Figure 4-6 shows that the President influences all ministries through the presidential agenda. The MoF is responsible for the budget for infrastructure and is dependent on coal for royalties and its contribution to the public budget. The MEMR aims to maintain low electricity prices and minimise costs which makes increases in tariffs impossible. The MSOE aims to deliver public infrastructure and sees coal as the least cost option for this pursuit. All three ministries directly influence PLN and its course for extraction and use of coal (see Ordonez et al., 2021). Further relations between the ministries and their influence on policymaking will be further discussed in Chapter 4.5.

Actors	Interest	Influence
Presidency	• Ensure prosperity and domestic growth • Maintaining low electricity prices • Providing infrastructure developments • Ensure energy security and -access	• Highest influence on policymaking; power to revoke regulations • Definition of KEN and approval of RUEN
Parliament	• Diverging interest and views towards coal or RES (some not too supportive of RES) • Close connection to coal industry by some members • Concerned for effect of increasing electricity prices • Limited knowledge of the energy sector by some members	• Legislative enactment of policies • Strong influence on energy policymaking • Partly influenced by coal sector
MEMR	• Course of energy policy dependent on minister in charge • Development of RES at low costs • Coal as domestic resource for ensuring energy security and independence • Possibly in favour of opening market for generation by IPPs	• Regulatory body of energy and mining sector with strong influence • Energy planning influenced by PLN
MoF	• Keeping subsides low • Reluctant to increase subsidies for RES • Concerns over indebtedness of PLN • In favour of increased electricity tariffs • Interest in coal due to rents and revenues • Increase domestic use of coal	• Management of government budget • Determining financial support for energy sector
MSOE	• Develop public infrastructure • Expansion of CFPP	• Shareholder of PLN • Strong influence on policymaking
PLN	• Required to return profits to the government • Keep operating costs low; dependent on subsidies • Resistant towards RES due to expected higher costs • Zero emission targets by 2060 • Maintain grid stability • Risk of CFPP becoming stranded assets	• Significant influence on energy policymaking • Monopoly on transmission • Strong negotiation position towards IPPs • Heavily regulated electricity tariffs by MoF
Coal Industry	• Cost pressure to return profits • Mainly export of coal, but increasing domestic demand • Negative or neutral attitude towards RES	• Contributes to government budget through royalty payments • Significant influence on policies • Strong connection to responsible regulators
Province: South Kalimantan	• Incentive to extract coal for rents and revenues • Dependency on coal sector for economic development • Corruption and lack of law enforcement drives coal production	• Strong influence on coal sector • Vertical fragmentation of responsibilities • Rather low influence on national policymaking
Communities	• Interest in economic development • Fear of unemployment and loss of social identity from coal transition • Increasing concerns over environmental damage from coal operations • Territorial claims to natural resources from indigenous communities	• Low political influence
Development Partners & NGOs	• Provision of technical and financial assistance • Fostering public engagement, raising awareness • Supportive of RES and in favour of coal transition	• Low political influence

Table 4: Actor Analysis of the Political Economy of Coal

4.4 Intra-Sector Analysis of the Coal Sector

Moncrieffe and Luttrell (2005) emphasise that different factors, such as historical legacies, institutions, processes of change, structural factors, power relations, ideologies and values, influence different sectors within a country. However, these aspects may differ between sectors. This stage (2B) aims to conduct an in-depth intra-sector analysis of these factors within the coal sector. This analysis is crucial for identifying the main barriers in the sector and potential entry points for interventions (Moncrieffe & Luttrell, 2005).

4.4.1 The Role of History

This chapter aims to analyse the role of history in the coal sector. Moncrieffe and Luttrell (2005) highlight that historical circumstances can strongly influence institutions, power dynamics, and ideologies within a sector.

Lucarelli (2010) provides a comprehensive overview of the historical developments within the coal sector, which are elaborated upon in the following. Coal extraction in Indonesia began in the 19th century during Dutch colonial times. Coal was primarily extracted on a small scale. During the first part of the 20th century, coal production declined due to cheap oil, global wars, and political concerns over coal. The introduction of Law No. 11/1967 in the 1960s under President Suharto allowed foreign mining investments, spurring mining production in Indonesia. Major production did not start until the 80s and the production volume was still rather low compared to today. The most drastic increase in mining occurred around the turn of the 21st century. Since then, Indonesia has become a global exporter of coal (Lucarelli, 2010).

Lahiri-Dutt (2016) suggests that coal has played a role in establishing a new *postcolonial identity* in India, leading toward *coal nationalism*, which fostered the attitude toward managing the country's natural resources to improve living standards (see also Brown & Spiegel, 2019). The same could apply to Indonesia. Brown and Spiegel (2017) indicate that under the Dutch colonial regime, claims of local communities to natural resources in Kalimantan were extinguished, and the property rights for these resources were handed to the central government with the establishment of licensing authorities for the extraction of the resources. The administrative and fiscal decentralisation process in Indonesia has then granted more power to local authorities, being responsible for issuing mining permits in the coal sector. This has led to corrupt practices in Kalimantan, where politicians and local authorities were given financial contributions for mining rights or financial support for political campaigns (Brown & Spiegel, 2017; see also Atteridge et al., 2018; Fünfgeld, 2016). This has led to the over-licensing of mining permits, resulting in a drastic increase in mining operations across Indonesia (Arinaldo & Adiatma, 2019; Atteridge et al., 2018). Dutu (2016) highlights that the decentralisation process has resulted in inconsistencies in the regulatory and legal framework between national and sub-national authorities, which were exploited and led to increased illegal mining.

Atteridge et al. (2018) provide an overview of several problems caused by the historical coal production in Indonesia. They indicate that coal mining was accompanied by poor oversight, which has led to conflicts over land management, including issues of deforestation (see also Arinaldo & Adiatma, 2019; Susanto, 2017). They further argue that coal mining also has led to violence, social conflict, and displacement of communities. According to interviewees, some coal mining companies hire local armed groups (called ormas), which exert physical violence on opponents of mining activities in East Kalimantan. They further stress that mining, especially illegal mining, has led to *resource sterilisation*, where deeper coal deposits become difficult to mine due to increased inaccessibility from mining operations without an approved mining plan (Atteridge et al., 2018).

In summary, coal has been an important source of economic development and could have led to a form of coal nationalism in Indonesia, as seen in India. There are, however, several negative historical legacies. These seem to result from corrupt practices and illegal mining, which are suggested to have been exacerbated by the decentralisation process in Indonesia.

4.4.2 Institutional Changes

This chapter addresses the main institutional changes in the coal sector. In line with the definition of institutions presented in Chapter 2.2.5, Moncrieffe and Luttrell (2005) distinguish between formal institutions, such as rules and procedures, and informal institutions, such as norms. This chapter mainly addresses the formal institutions in the coal sector. Since phasing-out coal will affect the electricity sector, relevant formal institutions concerning the electricity sector will be addressed as well. Chapter 4.4.2.1 will address institutions in the coal mining sector, whereas Chapter 4.4.2.2. addresses institutions in the electricity sector.

4.4.2.1 Institutional Changes in the Coal Mining Sector

Article 33, paragraph 2 and paragraph 3 of the Indonesian Constitution state that "sectors of production which are important for the country and affect the life of the people shall be under the powers of the State [, and] natural resources within [the country] shall be under the powers of the State and shall be used to the greatest benefit of the people" (Constitute, 2022, p.17). This article lays the foundation for the extraction and use of coal as a natural resource for economic development and for coal to be under the powers of the state.

In the following, further institutional changes in the coal mining sector will be elaborated. According to Atteridge et al. (2018), one main reason for the increased coal production in Indonesia was the change in the regulation of coal mining and coal production. Before 2009, the right for coal mining was issued by Coal Contracts of Work (CCOWs), based on Law No.11/1967. The CCOW were granted to mining companies by the national government. This regulation fostered foreign investments and increased coal production (see also Lucarelli, 2010). In 2009, the introduction of Law No. 4/2009 (henceforth called Mining Law 2009) led to important changes in the regulation of coal mining by changing the regulation from contractual agreements based on CCOWs to a licensing system. The key change concerned the change of responsibility for granting the licenses from the national to the district area. This change was part of Indonesia's decentralisation agenda based on Law No. 22/1999 (Atteridge et al., 2018). The decentralisation program granted district and provincial governments more authority over their territory. The decentralisation of mining permits led to a dramatic increase in coal mining across Indonesia (Faisal, 2015). However, a key change was initiated by revising the Decentralization law (Law. No. 23/2014) in 2014, which transferred the authority for granting mining permits from the district to the provincial level.

Furthermore, Regulation No. 43/2015 regulates the certification of mining permits and ensures that these are issued in accordance with stated requirements. The regulation also requires districts to report to the provincial governments. These evaluate the mining permits in cooperation with the national Post-Mining Reclamation Supervisory Commission and issue "Clean and Clear" certificates for correctly issued mining permits. However, many mining companies that have not acquired Clean and Clear certificates are still in operation (Atteridge et al., 2018). In 2016, up to 61% of mining permits did not have a Clean and Clear Certificate (Yudha et al., 2018).

Atteridge et al. (2018) indicate that the dramatic increase in mining operations is linked to the allocation and distribution of mining revenues. The government in Indonesia receives revenues from coal mining operations through taxes (e.g., income - and value-added taxes) and non-tax sources, such as royalties

and land rent. Royalties are percentual payments based on the gross sales values and can vary between 2% and 7% of the sales revenue. Land rent payments have to be made according to the land area. Law No. 33/2004 and Law no 55/2005 declare that revenues from royalties are shared among central and sub-national governments, such as provinces and districts. Land rent payments, however, are only allocated to districts. Atteridge et al. (2018) argue that districts and local politicians are incentivised to maximise the use of the land area for mining to increase revenues since it is based on land area and not on profit or productivity. Faisal (2015) further emphasises that about 40% of the licenses issued between 2009 and 2011 were issued without the required documents and that mining is often conducted illegally without any licenses.

Further, as Yudha et al. (2018) emphasise, many mining permits are issued without conducting the required Environmental Impact Assessment (EIAs) or having EIAs copied from other documents without considering local contextual data. Furthermore, many of the EIAs are not made public, which exacerbates a lack of transparency for local communities regarding the environmental impacts of mining operations (Yudha et al., 2018). Fünfgeld (2016) further stresses that local communities are rarely given access to information regarding mining operations, despite several regulations addressing this issue. Fünfgeld argues that many practices in the process of mining permits are opaque and that the responsibilities of mining companies which should be followed are neglected. Illegal mining constitutes a major problem in the mining sector. In 2014, a collaboration between the Corruption Eradication Commission and the MEMR was initiated to supervise coal mining activities (Yudha et al., 2018). However, many of the problems the collaboration should address are still existing (Atteridge et al., 2018).

In 2014, a new restriction on the export of coal was introduced in Indonesia, which required mining companies to obtain a certificate from the Ministry of Trade to export coal. This certificate was granted under the condition that mining companies have the Clean and Clear Certificate (Harris, 2014). Atteridge et al. (2018) further highlight that Presidential regulation No. 22/2017 requires the MEMR to pursue certain activities, such as capping coal production and coal exports and issuing moratoria for licenses in certain areas. However, the authors stress that these announcements were not implemented and that it seems unlikely that the regulations will be implemented.

The MEMR has also issued Regulation No. 34/2009, which requires coal mining companies to keep a certain amount of coal for domestic purposes (Domestic Market Obligations). However, Atteridge et al. (2018) stress that this regulation failed to meet its targets since, between 2009 and 2018, on average, only 20% of coal was used domestically. An export tax further incentivises coal mining companies to reduce exports. These regulations aim to increase energy independence and security (Yudha et al., 2018).

Further, the governor of East Kalimantan announced a moratorium on limiting new mining licenses in 2013 and 2015 (Bell, 2015). However, this moratorium was never implemented or codified into regulation (Atteridge et al., 2018; see also Arinaldo & Adiatma, 2019). The Mining Law 2009 also set annual production caps for coal mining in each province of Indonesia. The provinces then distribute the production caps to individual mining companies. This distribution depends on various factors, such as revenues, royalty payments, tax compliance, safety measures, and environmental and rehabilitation plans (Atteridge et al., 2018).

In general, royalties from coal and other sources of income incentivise the Indonesian government and various involved actors to support coal extraction and use (Jakob & Steckel, 2022). Atteridge et al. (2018) conclude that, even though the Indonesian government has made many announcements, such as moratoria, production caps, or Domestic Market Obligations, these were often not implemented as intended or codified into regulation.

4.4.2.2 Institutional Changes in the Electricity Sector

This chapter addresses man institutions in the electricity sector related to coal. Susanto emphasises that PLN is facing a dilemma concerning the tariffs it can claim for the following reasons. PLN's revenues depend on consumer tariffs and subsidies from the government. The consumer tariffs PLN can claim are highly regulated, adjusted monthly, and depend on factors such as inflation, exchange rates to the US dollar, and oil prices. The MoF regulates the subsidies. These continually decrease and do not cover all the variable costs PLN faces. This means that PLN is facing the difficulty of recovering its costs. This is especially difficult given higher generation costs for RES, which PLN is required to purchase based on decree 12/2017. This dilemma partly explains the slow growth and difficulties within the renewable energy sector in Indonesia (Susanto, 2017).

Before 2017, decree 31/2009 introduced a single feed-in tariff (FiT) for purchasing electricity from RES by PLN. In 2017, The MEMR introduced the new regulation (Decree 12/2017), which requires PLN to purchase renewable electricity from independent power producers (IPPs) and caps the price of electricity from RES at 85% of the local generation cost if the price would be higher than the national average generation cost of PLN. This partly eliminates the dilemma that PLN is facing because PLN can purchase electricity from RES below its average generation costs (Susanto, 2017; see also Atteridge et al., 2018). The FiTs were then abolished in line with Decree 12/2017 (Jakob et al., 2020).

In March 2018, the Ministerial Decree 1395K/30/MEM/2018 was introduced, which imposed a price cap for coal being used for CFPP, which kept costs for CFPP low (Arinaldo & Adiatma, 2019). This step is argued to be a sign of the vulnerability of CFPP in Indonesia (Climate Analytics, 2019a). A further institutional aspect to be considered is the difference in financing costs for coal or renewable energy projects. Coal projects typically have lower interest rates, whereas renewable energy projects can face up to 10% interest rates (Ordonez et al., 2021).

4.4.3 Processes of Change

This chapter addresses relevant processes of change in the coal sector in Indonesia and South Kalimantan. The chapter is divided into two subchapters, addressing the drivers in coal production and the drivers for a coal transition.

4.4.3.1 Drivers of Coal Production

A driver of coal production is Indonesia's goal to increase trade revenue and reduce the trade deficit from the oil and gas trade (Arinaldo & Adiatma, 2019; see also Syahni, 2018). In 2018, Indonesia exported approximately 80% of its annual coal production (Atteridge et al., 2018). The high share of exports makes the coal market heavily reliant on global market dynamics (Arinaldo & Adiatma, 2019). However, as discussed in Chapter 4.2.1, coal exports are expected to decrease in the future, and Indonesia is planning to offset this reduction by increasing the domestic use of coal. The increase in domestic use shall spur economic growth while increasing energy access in Indonesia (Arinaldo & Adiatma, 2019).

Ordonez et al. (2021) highlight that interviewees from their study state that the increased use of coal, especially in view of the 35,000 MW Program, resulted from lobbying efforts from the coal industry. Tampubolon et al. (2018) analysed data from PLN and concluded that the coal consumption for CFPP has increased per unit of electricity production by over 44% in the last 15 years. They indicate that this could be the result of the use of lower quality coal (with lower calorific value) or inefficiency increases in CFPP. Arinaldo & Adiatma (2019) stress that this could further increase the use of coal for domestic purposes. They further highlight that Indonesia's coal reserves of high calorific value are declining and

that the newest CFPP are designed for using coal with a calorific value of 4000 kcal/kg (Arinaldo & Adiatma, 2019).

A further driver in coal extraction and use stems from the government's subsidies towards the coal sector. Coal is being subsidised through tax exemptions, preferential tax rates, beneficial royalty agreements, and loan guarantees (Arinaldo & Adiatma, 2019). Furthermore, the cost of CFPP does not include externalities, the environmental and social costs, which makes it more cost-competitive than RES (Atteridge et al. 2018). As previously discussed, illegal mining constitutes a main problem in Indonesia and South Kalimantan. Dutu (2016) indicates that informal prices for illegally mined coal can be up to 40% lower than market prices, further increasing demand.

4.4.3.2 Drivers of a Coal Transition

Arinaldo and Adiatma (2019) highlight that East Kalimantan underwent several economic transformations and argue that another economic transformation seems inevitable due to depleting coal reserves. They emphasise that South Kalimantan is facing the same challenge and that sustainable development based on RES is needed (Arinaldo & Adiatma, 2019). This chapter addresses several processes of change which act as drivers of a coal transition.

As discussed, PLN holds a strong position in the Indonesian energy system and is rather reluctant to transition to more RES. However, one interviewee in the study conducted by Ordonez et al. (2021) stated that costs are the biggest factor influencing PLN's agenda and that PLN would utilise more RES if the costs were lower. Bridle et al. (2018) highlight that costs for RES are declining gradually and that many actors in Indonesia would support RES at low costs. One main driver for coal transitions is declining RES costs (Atteridge et al., 2018) and storage technologies (Arinaldo & Adiatma, 2019). This is especially relevant from a political economic perspective (Diluiso et al., 2021; Jakob & Steckel, 2022). Arinaldo and Adiatma (2019) argue that electricity from CFPP in Indonesia could be reduced as soon as RES reach grid parity. They stress that by 2030, solar PV and geothermal energy could be cheaper than CFPP and wind energy by 2050. These results do not even include costs for emission or pollution, which could, if imposed, further favour RES. Attwood et al. (2017) indicate that the cost of CFPP could increase significantly when all externalities and the cost of subsidies would be considered. However, Bridle et al. (2018) argue that costs for RES, especially solar, would be significantly higher if storage is included in the calculation and that these costs would have to fall before grid parity can be reached.

Atteridge et al. (2018) provide an overview of the changing economics of coal. Firstly, coal is experiencing a reduced international investment interest from international banks and private investors. A perceived policy instability in Indonesia further reduces investments in coal projects. Secondly, they highlight the cyclical nature of the coal market, with various fluctuations over time due to changing market prices, costs, and investment interest (Atteridge et al., 2018). Market fluctuations affect coal mining companies with small-scale, provincial mining permits the most, which was evident when coal prices decreased between 2013 and 2015 and small-scale mining companies were forced to shut down their business (Arinaldo & Adiatma, 2019). Apriando (2017) indicates that in East Kalimantan, 125 coal mining companies went bankrupt in 2015 due to declining coal prices. The impact of declining coal prices also had a significant impact on South Kalimantan. Yudha et al. (2018) hereby indicate that in 2015, the economic growth rate decreased by 1.01% from the previous year, partly due to declining coal prices. Atteridge et al. (2018) further highlight that lower international demand and resulting lower market prices further influence coal mining profitability. However, the authors also indicate that even though international demand is expected to decrease, regional demand is expected to increase (Atteridge et al., 2018). Yet, the heavy reliance on coal exports could make Indonesia prone to risks from the international market- or policy changes (Arinaldo & Adiatma, 2019). The global expansion of coal is

reaching its limits also due to further developments in shale gas and possible export bans of low calorific value coal (Dutu, 2016).

In general, it is expected that the costs of coal mining will increase. Rosyid and Adachi (2016) show in their model that the average cost for coal extraction, processing, transport, and royalty payments are expected to increase to 100 US$ by 2040. International oil prices also influence mining profitability since diesel is the largest operating cost (Atteridge et al., 2018). Increasing production costs for coal mining is the main driver for coal transitions from a political economic perspective (Diluiso et al., 2021).

Many illegal coal mining operations have ceased their operations due to the global demand decline (Faisal, 2015). Illegal mining operations or bankrupt coal mining companies sometimes leave behind unclaimed coal mining pits. These abandoned coal mines pose a deadly trap for local communities, and news spread in Indonesia of children drowning in these mine pits (Apriando, 2017). Atteridge et al. (2018) highlight that public discussions revolving around mining rehabilitation are increasing in Indonesia. They emphasise that stricter requirements would increase costs, rendering some operations unprofitable. However, they also argue that the enforcement of stricter regulations seems unlikely due to the vested interests of politicians (Atteridge et al., 2018). In 2016, thick smoke from peat fires to clear land for coal mines spread to neighbouring countries, putting the Indonesian government under pressure to react (Arinaldo & Adiatma, 2019). Air pollution, dust from coal transport along hauling roads, river pollution, soil contamination, and loss of land and forest have led to growing concerns from local villagers in East and Central Kalimantan over coal mining, resulting in various protests in the region (Brown & Spiegel, 2017). Diluiso et al. (2021) argue that from a political economy perspective, increasing environmental concerns are a main driver for coal transitions. As already discussed, the increased risk of resource sterilisation from fragmented coal mining also led the government to temporarily stop coal mining (Atteridge et al., 2018).

4.4.4 Structural Features

This chapter addresses some structural features in the coal sector. Moncrieffe and Luttrell (2005) indicate that structural features can aid in understanding how institutions and actors interact. Structural features include demographic patterns and changes, social identities, the level of development, or the distribution of resources (Moncrieffe & Luttrell, 2005).

Ordonez et al. (2021) highlight that one aspect influencing the coal industry's strong position relates to Indonesia's decentralisation process. Interviewees in their study stated that the coal industry is the main source of finance for political campaigns. Politicians on the provincial or district level, who have the authority over issuing coal mining permits, promise favourable treatment in return for campaign financing (Ordonez et al., 2021). The decentralisation process also resulted in subnational governments having more authority over energy policy matters, making congruent policy implementation more difficult (Jakob & Steckel, 2022). Jewell et al. (2022) similarly argue that phasing-out coal seems more difficult in larger, more diverse countries with different geographies and legislative environments. The structural features of Indonesia seem to be a prime example of these conditions.

Biber et al. (2017) further argue that the political structure of states can influence the political economy of decarbonisation. They argue that democracies tend to have incentives to promote feed-in tariffs (FiTs) for RES due to environmental benefits, improving energy access and promoting rural development. This suggests that the democratic political system in Indonesia and policies related to RES and coal could be influenced by the electorate. However, this would also depend on the interest of the population. As discussed previously, South Kalimantan's economy is heavily reliant on coal for economic development and could be against policies promoting to phase-out coal. Social identities in

South Kalimantan related to coal could further be a hindering factor. This is especially relevant considering that only 38% of Indonesians are aware of climate change (Lamb & Minx, 2020).

Another important structural feature to consider is the market structure of the coal and electricity sector. Biber et al. (2017) hereby emphasise that public ownership or heavy regulation can influence decarbonisation efforts. For the electricity sector, PLN, a SOE, is heavily subsidised by the government. As discussed previously, PLN is pressured to produce at low costs, favouring electricity from cheaper CFPP. The Indonesian government is promoting coal extraction as a means for economic development and revenue streams through different channels, such as royalty payments. The structure of PLN, as the grid operator and responsible for energy security, makes reliable CFPP for base load capacity attractive (Jakob & Steckel, 2022). The market structure suggests that phasing-out coal seems difficult. The possibility of restructuring or re-regulating the electricity market will be further discussed in Chapter 5.1.6.2.

Another important structural feature is the endowment of Indonesia and South Kalimantan with natural resources. Yudha et al. (2021) hereby emphasise that even though Indonesia has significant potential for RES, the historical dependency of Indonesia on coal makes it difficult to break out of coal dependency.

Another important structural feature is related to the size of the Indonesian population. Malahayati and Masui (2021) argue that some environmental issues, such as land conversion and deforestation, are inevitable since Indonesia must maintain its agricultural production. The same could be said for the coal and electricity sector, and that coal can aid in ensuring economic development, energy access, and energy security for the vast Indonesian population.

4.4.5 Power and Interest

This chapter addresses the role of power and interests in the coal sector in Indonesia. Different forms of power in a sector can significantly influence policymaking (Moncrieffe & Luttrell, 2005).

Ordonez et al. (2021) highlight that several objectives influence energy policies in Indonesia. These include infrastructure development, fiscal sustainability, ensuring market security for the coal industry, and environmental and climate protection. They highlight that several interviewees suggested that the provision of infrastructure is deemed the most important objective for the current governmental administration under President Jokowi. This can be seen in the 35,000 MW Program for the expansion of CFPP. They further highlight that the goal of ensuring fiscal sustainability, including reducing energy subsidies while maintaining low electricity prices, influences policymaking. They highlight that the MEMR ensured that electricity prices should not be raised by PLN during the election period from 2018 to 2019 to avoid popularity losses for Jokowi (Ordonez et al., 2021). Jakob and Steckel (2022) highlight similarly that policymakers fear potential protests or loss of power and popularity when increasing electricity prices. Ordonez et al. (2021) further indicate that the government also aims to maintain low electricity prices to attract investors, drive industrialisation, and ensure competitiveness.

CFPP is thereby seen as the cheapest form for providing electricity. As stated above, securing the market for the coal industry is also one of the main objectives influencing energy policy. Ordonez et al. hereby emphasise that coal contributes significantly to the government's budget through various channels, as also described in Chapter 4.2.1. They highlight that coal is used to drive economic development and that the coal industry significantly influences political processes, especially through the vested interests of influential actors (Ordonez et al., 2021). Jakob et al. (2020) emphasise that the MoF is especially interested in ensuring revenue streams from royalty payments as contributions to the government's budget. Jakob and Steckel (2022) argue that actors often influence energy policies by directly lobbying

or bribery or by using arguments related to potential job losses, regional development issues, or loss of royalty payments. Ialnazov and Keeley (2020) conclude that any incentives to expand the use of RES in Indonesia might be hindered by policy objectives to maintain low electricity prices, ensure reliable electricity supply, and reduce the government's financial burden from subsidies.

Faisal (2015) indicates that local politicians are often incentivised to issue mining licences to generate income streams from royalty payments. At the same time, those mining companies receiving mining licences often have familiar relationships or other close ties to local politicians or other powerful actors. Furthermore, Faisal suggests that coal mining operations and other business activities often serve as the source of financial contributions to political election campaigns (Faisal, 2015; see also Jakob et al., 2020). In return for the funding investment, actors in the coal sector expect to receive compensation in the form of policies favouring their mining operations or by having mining projects approved (Faisal, 2015). An interviewee in a study conducted by Atteridge et al. (2018) stated that a large permit (100-200 ha) could cost - under the table - up to 5 billion IDR (equivalent to approximately 350.000 USD). Atteridge et al. (2018) emphasise that these coal payments are widespread and that "every [political] party benefits financially from an active coal industry" (p.13). Arinaldo and Adiatma (2019) argue that over-licensing coal mining permits is one of the main drivers for increased coal production in Indonesia. They further highlight that the over-licensing of permits has emerged after the decentralisation process, which could indicate corrupt practices at the regional or provincial level.

Atteridge et al. (2018) provide several examples of corrupt behaviour in the Indonesia coal sector, which include: mining permits being *aggressively* offered by district heads in exchange for under-the-table fees; backdating mining licences; potentially existing informal agreements for mining in protected areas between the MOEF and district heads; or financial contributions by mining companies for avoiding obligations for mining site reclamation. They further highlight that since the Corruption Eradication Commission has tackled corruption issues related to mining licences, corrupt practices have shifted towards the transportation sector of coal. Thereby letters of inspection for coal barges are circumvented, payments are made to avoid inspections, or illegal waterways are used (Atteridge et al., 2018). Further forms of corruption in Indonesia and the Indonesian coal sector are provided by Hickman (2010). Fünfgeld (2016) further highlights that some protests against coal mining in Kalimantan were suppressed through physical violence. Fünfgeld (2016) indicates that local activists stated that coal mining companies bribed the police to interfere in the protests and that coal mining companies are even employing private forces to maintain mining operations. The private forces consist of paramilitary groups, often retired or active army members (Fünfgeld, 2016).

Several authors highlight the strong connection between the coal industry and the political actors (see Atteridge et al., 2018; Jakob et al., 2020; Ordonez et al., 2021). Jakob et al. (2020) hereby highlight that the coal industry has lobbied for increasing domestic use of coal in CFPP due to decreasing global demand and exports. They highlight that the coal industry's influence currently exerts the most influence on policymaking. Atteridge et al. (2018) emphasise that the majority of the interviewees from their study stated that it is *common knowledge* that some politicians benefit from coal mining operations or that they are shareholders or owners of companies operating in the coal sector.

In general, ownership structures of mining companies are highly secretive (Apriando, 2017) and vested interests between the economic and political elite in Indonesia related to coal and other natural resources are widespread (Ordonez et al., 2021). Besides the coal industry, PLN also has a substantial influence on energy policies and the trajectory of future coal production, even actively opposing the development and expansion of RES (Atteridge et al., 2018). Atteridge et al. (2018) further argue that provincial governments can gain leverage against the national government by having access to and control of natural resources. For example, in 2012, East Kalimantan requested a larger fuel allocation, which the national government rejected. In response, East Kalimantan blocked the coal supply to Java by river

transport. In the end, an agreement was formed, and the fuel allocation to East Kalimantan was increased (BPH MIGAS, 2012; see also Atteridge et al., 2018).

To summarise this chapter, there exist strong relationships in the political economy of coal between different actors. These actors often use their power, due to their positions, relationships, or financial means, to influence policymaking in their favour. The coal industry has a strong position, but also PLN exerts influence on policymaking. Politicians often have direct interests in the coal sector in various ways. Policy objectives related to maintaining low electricity prices, ensuring reliable electricity supply, developing infrastructure, and reducing fiscal pressure guide policy-making and hinder the further expansion of RES. The interest of powerful actors seems to be the most important factor hindering a coal transition in South Kalimantan and Indonesia more broadly. Chapter 6.1 will address this issue and how a coal transition could be enabled given these inherent interests and power dynamics.

4.4.6 Ideologies and Values

Moncrieffe and Luttrell (2005) indicate that the ideologies and values of people can influence their behaviour and that these beliefs differ between sectors. The following will discuss the main ideologies and values in the coal sector.

The Indonesian government frames coal as being a *national development capital,* which has led to some form of resource nationalism (Jakob et al., 2020; Ordonez et al., 2021). Furthermore, coal in Indonesia is being perceived by policymakers as a cheap energy source for providing energy to the country (Arinaldo & Adiatma, 2019) and for providing infrastructure (Ordonez et al., 2021). Atteridge et al. (2018) further indicate that the Indonesian government highlights the importance of energy independence, or self-sufficiency, for energy security. The government wants to ensure its independence, especially given historical difficulties with the neighbouring energy exporter Australia. The domestic coal supply shall ensure energy security (see also Jakob & Steckel, 2022). In addition, the government emphasises the importance of natural resources for economic and social development and frames coal as a driver for economic growth (Atteridge et al., 2018).

In view of RES, interviewees in the study conducted by Ordonez et al. (2021) indicated that the targets by the Indonesian government for RES are *rather symbolic*. Additionally, Ordonez et al. highlight that climate change mitigation has been mainly framed in Indonesia as a matter of forestry and agricultural issues. They indicate that interviewed representatives from ministries have stated that the energy sector is not seen as a vital concern for climate change mitigation. They further indicate that there is little awareness of the adverse effects of coal mining and related operations within the population (Ordonez et al., 2021). This is in line with the results from Lamb and Minx (2020), which indicate that only 38% of the Indonesian population is aware of climate change. However, Fünfgeld (2019) indicates that public attitudes towards coal mining and CFPP are changing in Indonesia due to the increased efforts of NGOs and civil society movements. However, even though this information is rather outdated, especially given updated energy policies and international climate targets, Gunningham (2013) argues that climate change concerns are subordinate to concerns over addressing energy security and energy poverty.

In summary, a strong political narrative around coal is influencing the coal sector in Indonesia, targets for RES are rather symbolic, and awareness of climate change is limited.

4.5 Relations between Actors & Influence on Policymaking

This stage (2C) aims to identify and analyse the relationship between different actors in the coal sector and to identify their influence on policymaking. The relationship between actors can occur across organisations, within or external to the sector, or between organisations and actors. The analysis aims to establish insights into how these relations influence the behaviour of actors (Moncrieffe & Luttrell, 2005). As already discussed in Chapter 4.4.5., there exist various vested interests in the political economy of coal. For example, coal mining companies are affiliated with companies operating CFPP, politicians are direct shareholders of coal companies (Apriando, 2017; Faisal, 2015), or politicians receive financial contributions for election campaigns from the coal lobby (Atteridge et al., 2018).

The actors hereby influence political actors responsible for policy-making by different means and to a differing extent. This chapter mainly focuses on how policy related to energy and coal in South Kalimantan, and thereby in Indonesia, is influenced by different actors. Setyowati and Quist (2022) highlight that the decentralisation process has influenced the energy planning processes towards a multi-scalar and dynamic state (see also Marquardt, 2014; Maulidia et al., 2019). Setyowati and Quist (2022) thereby provide an overview of the processes related to energy policies in Indonesia. A schematic scheme of this process is depicted in Figure 4-7 (adapted from Maulidia et al., 2019; Setyowati & Quist, 2022; Schmidt et al., 2013).

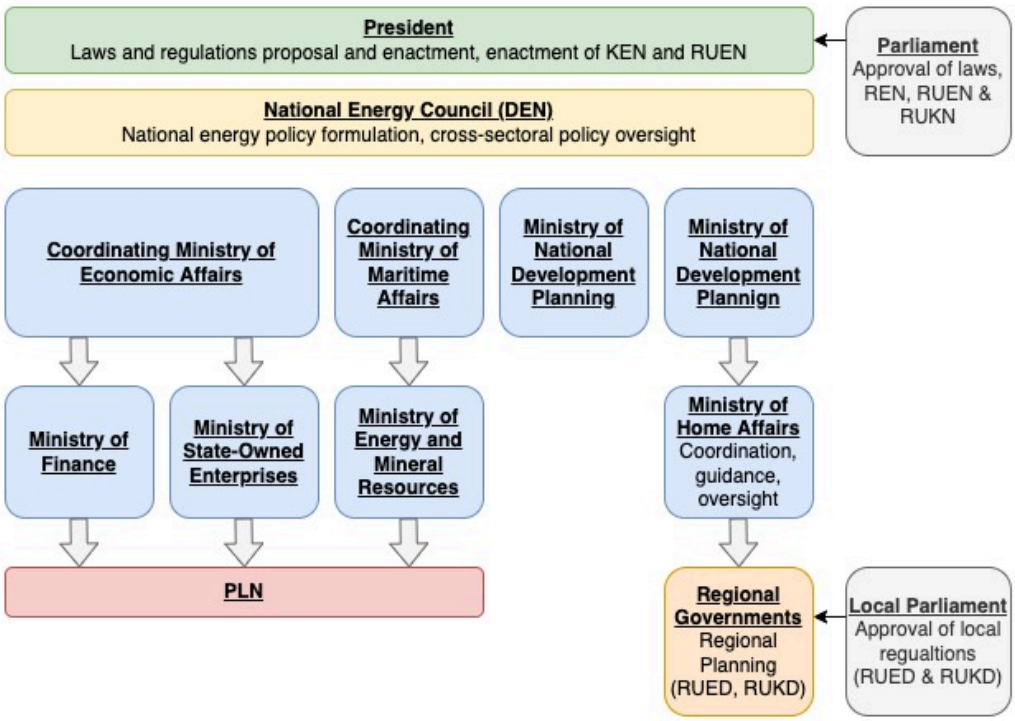

Figure 4-7: Overview of Energy Planning in Indonesia, adapted from Maulidia et al., 2019; Setyowati & Quist, 2022; Schmidt et al., 2013

According to Setyowati and Quist and Figure 4-7, the most important energy policy is KEN, followed by the National Energy Plan (RUEN). The provincial governments, such as in South Kalimantan, are responsible for implementing the targets from the RUEN through the Regional Energy Plan (RUED). Presidential Regulation 01/2014 thereby mandates that the RUED shall be developed in negotiations with multiple stakeholders, such as district governments, government agencies, universities, and civil society groups. The negotiated terms shall then be implemented through a provincial regulation. As can be seen in Figure 4-7, the local parliament would then be responsible for approving the regulation. The

National Electricity Plan (RUKN) guides electricity generation, transmission, and distribution. PLN is also responsible for translating the RUKN into Regional Electricity Plans for PLN (RUPTL). However, in reality, the intended alignment between the RUED and the RUPTL is often not met by PLN (Setyowati & Quist, 2022).

Especially for the case of South Kalimantan, Setyowati and Quist (2022) highlight that relevant government agencies and PLN mainly conducted the development of RUED. They stress that the provincial governments showed their willingness for more ambitious targets for deploying RES. They also highlight that most of the interviewees from their study had limited knowledge of the processes associated with developing the RUED. As already discussed in Chapter 4.3 and depicted in Figure 4-7, the MoF, MOEM, and the MSOE all directly influence PLN.

Jakob et al. (2020) highlight a lack of cooperation between the ministries with *silo mentalities.* For example, the MOEF is responsible for the climate policies but can mainly implement forestry measures, whereas energy policies are decided in the MEMR (Jakob & Steckel, 2022). Bridle et al. (2018) stress that the MoF sometimes conflicts with the MEMR. For example, the MEMR issued regulations on FiTs without including the MoF. There also exists no obligation for the ministries to cooperate, nor for the Ministry of Economic Affairs to facilitate cooperation (Bridle et al., 2018). As can be seen in Figure 4-7, the Ministry of Economic Affairs should be responsible for coordinating issues between the MoF and the MSOE.

5 Development of Institutional Interventions

This chapter marks the second stage of this research and refers to stage 3 of the analytical framework from Moncrieffe and Luttrell (2005), the development of institutional interventions. Chapter 5 is divided into two main parts. The first part, Chapter 5.1, presents results from literature and the conducted desk study for possible institutional interventions for enabling a coal transition. The possible institutional interventions are categorised according to the Williamson framework (see Chapter 5.1.3-5.1.6). Insights on possible institutional interventions are further complemented with insights from political economy and insights regarding the contextual specifics in South Kalimantan and Indonesia from Chapter 4. Chapter 5.2, the second main part of Chapter 5, presents the results from the expert interviews conducted for this research. The results from Chapter 5.1 are synthesised into an interview protocol, as discussed in Chapter 3.2.2. and presented in Appendix D. The interviews are conducted to evaluate the proposed interventions' expected effectiveness and political feasibility from Chapter 5.1.

5.1 Results from Literature & Desk Study

5.1.1 Objectives & Determining Entry Points

This chapter addresses possible points of intervention for enabling a coal transition in South Kalimantan. Before dealing with specific insights on possible interventions, the objectives and the expectations for the interventions need to be clarified, according to the analytical framework for political economic analysis from Moncrieffe and Luttrell (2005). This thesis adopts the view of possible interventions in the political economy of coal from Jakob et al. (2020), Biber et al. (2017), and Brauers and Oei (2020). The authors argue that instead of pursuing policy objectives which would be socially optimal, possible interventions should focus on what is politically feasible. Jakob et al. (2020) emphasise that in the political economy of coal Indonesia, the policies which fulfil the objectives of the most powerful actors influencing policymaking are most likely to be pursued. They emphasise that the social optimum can serve as a benchmark but that every ambition for interventions should consider the political reality and the power dynamics influencing policymaking. Ordonez et al. (2021) conclude that the effectiveness of interventions in the energy sector depends on the extent to which the influence of the coal lobby can be reduced or to which extent interventions harm public and private actors with interests in the political economy of coal. Yudha et al. (2018) stress similarly that policies aimed at reforming the fossil fuel industry should be aligned with the interests and needs of affected stakeholders.

In the following subchapter, insights from the literature will be analysed, and possible interventions will be explored under the paradigm of political feasibility. These insights are based on the literature on the energy transition in Indonesia, dealing either with phasing-out coal or the expansion of RES. Further insights from Chapter 2.1.2 on coal transitions and Chapter 2.2.3 on the political economy of transitions and decarbonisation are used as input for this chapter.

5.1.2 Considerations for Implementing Institutional Interventions

Before addressing different possible interventions, this chapter addresses important considerations for implementing institutional interventions in the political economy of coal. These insights shall aid in the further analysis of possible interventions in the following subchapters.

As discussed previously, several authors emphasise the need for a multi-level governance approach in energy transitions. The researchers hereby emphasise the need to involve various actors, also on the local level, at an early stage of planning and that a bottom-up development should be ensured during policy formulation (Setyowati & Quist, 2022; see also Atteridge et al., 2017; Caldecott et al., 2017;

Marquardt, 2014; Oei et al., 2020). In addition, subnational authorities in Indonesia seem to lack awareness of national intentions, and national policy- and decision-makers seem to have insufficient understanding and knowledge of local and regional circumstances (Marquardt, 2014). Setyowati and Quist (2022) analysed the interplay between national and provincial actors in Indonesia for decision-making in energy planning and concluded that policymaking at subnational levels is influenced by factors such as political economic factors, power relations, stakeholder engagement, political leadership, and civil society. Further insights from their study will be used in the following chapters to analyse the political feasibility of proposed institutional interventions. Yuliani (2017) further highlights the challenge of the energy transition in Indonesia caused by inconsistent and unclear policies between ministries and different levels of government. Multi-level governance approaches seem especially important for Indonesia due to its decentralisation agenda (Jakob & Steckel, 2022). As already discussed in Chapter 2.3, even though this research focuses on South Kalimantan, multiple levels of analysis and the broader national context of Indonesia must be considered for developing institutional interventions which then impact the province of South Kalimantan. Furthermore, collaboration between countries in South East Asia could help advance energy transitions in regions (Erdiwansyah et al., 2019; Merdekawati et al., 2022).

Caldecott et al. argue that the involvement of affected stakeholders is especially important due to potential political and social conflict which could arise from coal transitions which do not take the considerations of affected actors into account. They emphasise that consensual approaches to coal transitions which involve affected stakeholders, such as companies, workers, unions, communities, and governments, have been generally successful in previous cases. They stress that a central question for coal transitions is how to persuade affected and involved actors about the need for a coal transition and how to motivate them to collaborate on the transition. They argue that one possible way to conduct this is to showcase the high risks to affected actors of not being prepared for collapsing coal markets and to communicate the interdependency of these risks. The authors argue that this could motivate actors to collaborate on strategies for preparing, enabling, and managing coal transitions (Caldecott et al., 2017). Collaboration and participation of affected stakeholders could also increase acceptance of the expected transition (Oei et al., 2020). Biber et al. (2017) further emphasise that the enactment of policies at subnational levels might initiate the adoption of similar policies at national or international levels and that collaboration can foster a process of learning. Setyowati and Quist (2022) further highlight that the participation of the public in decision-making in Indonesia can provide momentum for energy transitions.

Furthermore, and directly related to the political economy of coal in Indonesia, Atteridge et al. (2018) conclude that "[t]he fundamental structures of the system that triggered such rapid growth in coal production over the last decade remain relatively unchanged" (p.25). They stress that corruption is widespread, politicians have vested and financial interests in mining activities, mining management and oversight are weak, and the overarching goal of the Indonesian government is to increase domestic coal demand. Yuliani (2017) similarly highlights the problem of corruption in issuing mining permits. Ordonez et al. (2021) stress that lasting and effective changes in the Indonesian institutional environment can only be achieved in combination with reforms aimed at reducing corruption and increasing the capacity of regulatory agencies to oversee Indonesia's energy and coal sector and its energy policies. In addition, clarifying and reducing the complexity of the regulatory framework around energy and mining policies could increase the attractiveness of the Indonesian energy market to foreign investors (Dutu, 2016).

Lastly, various researchers highlight the need for adaptive management in policy-making, where policies are revised and re-evaluated continuously (see Biber et al., 2017; Caldecott et al., 2017; Gawel et al., 2017). However, due to the limited scope of this thesis and the emerging complexities and

uncertainties from policymaking in the political economy of coal in Indonesia, this thesis focuses primarily on institutional interventions with a short- to medium-time span. Possible long-term adaptions to proposed institutional interventions would have to be further investigated in future research.

The following chapters will address possible institutional interventions proposed from literature and structured according to the levels of the Williamson framework.

5.1.3 Interventions on the Embeddedness Level

This chapter addresses possible interventions on the embeddedness level (L1) of the Williamson framework. These include changes in customs, traditions, and norms. The first aspects that this chapter addresses are the perspectives, customs, traditions, and norms around coal in Indonesia. Firstly, Ordonez et al. (2021) identified that the Indonesian government is framing their expansion of CFFP as part of the overarching goal of providing public infrastructure. They argue that this framing justifies the expansion of CFFP in view of the Indonesian government and might distort the potential impact of coal mining and CFFP (Ordonez et al., 2021).

Furthermore, the Indonesian government seems to justify to use of coal for ensuring energy security and alleviating energy poverty (Gunningham, 2013) and reducing dependency on fluctuations in international commodity markets (Climate Analytics, 2019a). Coal is framed as an abundantly available national capital intended to drive economic growth (Jakob & Steckel, 2022). Affordable energy supply from coal and ensuring energy security, framed as reliable energy supply and import independence, are often the main objectives in the political economy of coal (Jakob & Steckel, 2022). At the same time, RES are mostly considered for off-grid electricity systems but not for large-scale systems providing base load capacity (Marquardt, 2014).

How can changes in the embeddedness level be realised? More specifically, how can the customs, traditions, and norms around coal in Indonesia be influenced to enable the coal transition? From the perspective of NIE and the Williamson framework, L1 is influenced by lower levels of institutions through feedback loops. According to Williamson (2000), formal rules can influence informal ones. Similarly, research on political economy suggests that laws (formal rules) can shape social norms (Biber & Ruhl, 2014).

Further, Biber et al. (2017) emphasise that changes in social norms might be more effective for changing the behaviour of actors and that these changes might even influence the political feasibility of other legal changes for decarbonisation. Jakob et al. (2020) argue on the same line that the demand for climate policies can be increased by changing public attitudes. In general, Meadowcroft (2009) also emphasises that political ideologies heavily influence sustainability transitions.

Changing the framing of the expansion of CFPP as part of infrastructure expansion to the provision of *sustainable* or *green* public infrastructure might aid in enabling the coal transition. Yudha et al. (2021) conclude that the existence of national development plans and targets embedded in an institutional framework is a key enabler for the transition to an energy system largely based on RES. However, this might be challenging since Lamb and Minx (2020) stress that interest groups from fossil fuel industries might influence public discourses revolving around climate action and decarbonisation (see also Brauers & Oei, 2020). Furthermore, in the case of Indonesia, Atteridge et al. (2018) stress that there seems to be no open dialogue revolving around the possibility of declining coal markets and phasing-out coal. Providing information to the public surrounding the social costs of coal use could aid in phasing-out coal (Jakob & Steckel, 2022).

Further, increasing concerns from the public over pollution from coal could aid in changing the perspective of political leaders supporting coal (Bridle et al., 2018), especially when resistance occurs

towards specific projects (Jakob & Steckel, 2022). Resistance to mining projects and coal has already occurred in East Kalimantan (see Brown & Spiegel, 2017; Fünfgeld, 2016). However, public awareness of the impacts of coal mining operations with regard to climate change and local pollution is limited, and concerns are marginally addressed in the media or the political opposition (Ordonez et al., 2021). In Indonesia, only 38% of people seem to be aware of climate change (Lamb & Minx, 2020), and representatives from ministries in Indonesia have confirmed that the energy sector is not even regarded as the main component of climate change mitigation (Ordonez et al., 2021).

Ordonez et al. (2021) stress that the empowerment of affected communities could aid in phasing-out coal and shifting towards more sustainable energy sources. However, affected communities and environmental advocates do not have much political influence (Atteridge et al., 2018). Setyowati and Quist (2022) highlight that the inclusion of the public in decision-making surrounding energy planning could further aid in accelerating energy transitions. They further highlight the importance of political leadership in facilitating Indonesia's energy transition.

Kalkuhl et al. (2019) argue that decision-makers responsible for coal transitions should adopt a more comprehensive view of sustainable development and not focus too narrowly on increasing energy access or the expansion of RES as part of the coal transition. However, they also emphasise that this is politically challenging due to the fragmented responsibilities of ministries and the often existing lack of coordination between ministries (Kalkuhl et al., 2019). At the same time, the coal industry is highly connected to the political system, and coal is being used to fund local politicians, as discussed previously. For the case of Poland, Brauers and Oei (2020) stress that the belief has to change that an affordable and secure energy supply is only possible with coal. From the perspective of political economy, North (1994) argues similarly that the "belief systems must change for successful reform since it is the mental models of [political] actors that will shape choices" (p.366). Hajer (1996) states, in line with this reasoning, that for influencing policy discourses around environmental problems in politics, the "cognitive frames within which problems [...] [are] perceived [have to change]" (p.131).

Maulidia et al. (2019) argue that Indonesia has a rather short-term view on energy policies, which does not take depleting fossil fuel resources into account and neglects long-term environmental benefits and aspects of energy security. Gunningham (2013) also states that changing norms occurs at the national and international levels, which can be driven by international organisations, such as the United Nations Environment Program. Gunningham further stresses that the IEA has done much to change the international energy narrative for changing norms.

Biber et al. (2017) further argue that the perspective of interest groups can be influenced most effectively by shaping the investments these interest groups make. Ordonez et al. (2021) highlight that declining costs for RES could also change the government's perspective on delivering affordable electricity, developing infrastructure, and ensuring environmental protection and climate change mitigation. Caldecott et al. (2017) indicate that in the case of the coal transition in Limburg in the Netherlands, an *unusual* consensus from different actors on the need for a coal transition emerged out of the realisation that a new energy source arrived (natural gas), which fundamentally would change the *rules of the game*. The consensus between the different involved actors, such as unions, companies, and the government, significantly accelerated the coal transition.

In summary, changing the norms, traditions, and customs around coal use in Indonesia seems difficult. External pressure from international organisations like the UNEP or the IEA could foster changes. Furthermore, internal pressure from the public emerging from discontent and social and environmental damages from mining operations leading to conflict could change the perspective of the political system towards coal. This could be strengthened by fostering education and increasing awareness of climate

change and the impacts of mining operations. Increased participation of the public in decision-making could be fostered.

Furthermore, research suggests that the social and economic costs of being unprepared for collapsing coal markets are high and disruptive. Atteridge et al. (2018) stress that costs for coal mining are increasing in Indonesia, reserves are being depleted, reserve sterilisation might occur, coal prices are decreasing, and a coal transition in East and South Kalimantan seems inevitable. Early planning and anticipation of coal transitions could provide long-term growth and prosperity if managed and executed correctly. Politicians could use these prospects to justify the coal transition. This is especially important taking the democratic voting system of Indonesia into account. The framing of coal as an abundantly available engine of economic growth and the public discourse surrounding infrastructure provision through CFPP would have to be changed. Lastly, the feasibility of these suggestions remains unclear. In the expert interviews, it will be further analysed whether these proposed changes are feasible.

5.1.4 Interventions in the Institutional Environment

This chapter addresses proposed interventions for formal rules on L2 of the Williamson framework, such as laws and regulations. Several authors emphasise the importance of policies and regulations as key enablers for energy transitions (see Diluiso et al., 2021; Yudha et al., 2021).

5.1.4.1 International Agreements and Climate Targets

External pressure for advancing coal transitions regarding political economy constraints seems necessary (Brauers & Oei, 2020). Jakob and Steckel (2022) hereby argue that countries might be incentivised to adopt climate measures to increase their international reputation and possibly gain additional benefits, such as membership in trading blocks. The international community could also support reforms in Indonesia to address the energy trilemma, providing energy security, addressing energy poverty, and mitigating climate change (Gunningham, 2013).

Vogt-Schilb and Hallegatte (2017) emphasise that intended Nationally Determined Contributions (NDCs) from the countries which were agreed upon as part of the Paris Agreement need to be implemented in a politically and socially acceptable manner. They highlight that this can be done in view of political economy aspects by designing policies to contribute to objectives not necessarily related to climate targets. They emphasise that this can foster support from different coalitions. The revenues from carbon taxes could, for example, be used for investments in infrastructure or social assistance (Vogt-Schilb & Hallegatte, 2017).

However, implementing climate and environmental policies regarding energy matters in Indonesia seems quite difficult since climate policies are the responsibility of the MOEF, whereas energy policy-related matters are decided by the MEMR (Jakob & Steckel, 2022). The implementation of stricter climate targets for the energy sector seems challenging. Their feasibility will be further explored in the expert interviews.

5.1.4.2 Implementing an Independent Regulator

A further proposed institutional intervention in literature from the political economy of decarbonisation and energy transitions is the implementation of an independent regulator. Biber et al. (2017) hereby emphasise that the role of an independent regulator for decarbonisation depends on the nature of the independence and the support of the regulator for decarbonisation. They emphasise that an independent regulator could facilitate decarbonisation and phasing-out of coal with adequate regulatory powers and authority. On the other hand, they argue that independent regulators could also harm decarbonisation efforts if the regulator is hostile toward decarbonisation (Biber et al., 2017). Lamb and Minx (2020)

further emphasise that interest groups from the fossil fuel industry might even 'capture' the regulatory agencies, which could include either bribing or even taking offices and working in favour of fossil fuel industries. An independent regulator could also be tasked with facilitating the permit process and handling subsidies for RES development (Yuliani, 2017).

This raises the question of whether an independent regulator in Indonesia would drive the phasing-out of coal if the implementation of an independent regulator would be politically feasible and how it can be ensured that the regulator remains independent. This will be further explored in the expert interviews.

5.1.4.3 Implementing stricter Environmental Regulation

Diluiso et al. (2021) indicate that environmental regulations, especially regulations aimed at improving air quality, have been a major instrument to enable or accelerate coal transitions. Wehnert et al. (2019) stress the importance of strengthening environmental regulations for a coal transition in Indonesia. Further, Biber et al. (2017) emphasise that green industrial policies provide incentives for investments in renewable energy, which also fosters the emergence of interest groups in favour of decarbonisation and that existing interest groups are incentivised to shift their business models. They further indicate that these policies can lay the political foundation for further implementing more progressive carbon-pricing systems. This raises the question of whether environmental regulations to improve air quality might be implemented in Indonesia and how likely this is. This will be further explored in the expert interviews.

Another important aspect which needs to be considered in connection with environmental regulations and coal transitions is the restoration of coal mining sites. Caldecott et al. (2017) emphasise that in previous coal transitions, mining sites were often not restored, or funding was not provided for the restoration. This can be seen in Indonesia by the problems with the restoration of mining sites and the lack of oversight, as discussed in Chapter 4.4.3.2. Atteridge et al. (2018) stress that mining restorations should be addressed in an early stage of phasing-out coal, while coal companies are still profitable before the restoration could become financially unfeasible. Another proposed measure for environmental protection would be to better control illegal mining activities (Dutu, 2016).

Also, mining permits are often granted without following through with the required Environmental Impact Assessments (EIA), which stems from lacking supervision at regional levels (Yudha et al., 2018). As discussed previously, since land rent payments are based on land area and directly paid to districts, local officials are incentivised to maximise the use of the land area for mining operations. This could be changed to merely receive revenues from the profit or productivity of mining operations. Fighting corruption and the incentivised granting of mining permits could also aid in decreasing the risk of resource sterilisation, as discussed previously. This raises the question of how environmental regulations could be implemented, the restoration of mining sites be ensured, and illegal mining reduced. This will be further explored in the expert interviews.

5.1.4.4 Allocation of Mining Permits - Centralization vs Decentralization

As discussed in Chapter 4.4.21.1, several researchers argue that the decentralised allocation of mining permits as part of the broader decentralisation agenda of the Indonesian government led to the rapid expansion of mining sites. This was because local politicians were financially incentivised to approve mining operations due to the expected rents and revenues, which could generate revenues for the provinces. The decentralisation of mining permits and the subsequent increase of overissued permits could indicate corruption at the regional level and seems to hinder coal transitions (Arinaldo & Adiatma, 2019). In general, the decentralisation process in Indonesia seems to be perceived rather negatively (Marquardt, 2014). Faisal (2015) argues that the government would have to establish accountability and

reinforce their monitoring mechanisms for decentralised permit allocation to reduce corrupt practices in the mining sector.

However, as Setyowati and Quist (2022) indicate, the introduction of Job Creation Law No. 11 in 2020. which shifted more authority for energy governance to the national government agencies, could indicate that the regional and provincial autonomy laws will be reformed. They further stress that reforms for regional autonomy would have to be complemented with clear accountability measures.

This raises several questions. Firstly, would it be better, and if so, politically feasible, to centralise the allocation of mining sites? Secondly, if the allocation of mining permits remains decentralised, how can it be ensured that local politicians are not incentivised to grant more mining permits? Thirdly, how can it be ensured that illegal mining or granting of faulty applications for mining permits are reduced by ensuring accountability or strengthening monitoring mechanisms? These questions will be further explored in the expert interviews.

5.1.5 Interventions on the Governance Level - Compensation schemes

This chapter addresses possible governance interventions from L3 of the Williamson scheme. These include especially contracts between different parties. The main focus of this chapter is the aspect of compensation schemes, which are essentially contracts between affected parties from a coal transition.

As discussed in Chapter 2.1.2, compensation could be paid to different affected groups, such as coal regions, workers, and the coal industry. Rentier et al. (2019) highlight the importance of compensation for affected parties in countries where the coal industry is heavily regulated and owned by the governments. Jakob et al. (2020) argue similarly that compensation schemes could be used to *buy in* interest groups which would be negatively affected by policies related to phasing-out coal. Ordonez et al. (2021) further stress the importance of compensation schemes given the high investment costs for renewable energy projects in Indonesia. Caldecott et al. (2017) emphasise the importance of compensating affected workers. They stress that this is especially important since unemployment after mining closures from historical coal transition was high. They indicate that redundancy payments - payments of several months of usual payment - could be paid to workers in the coal industry. However, they stress that a key lesson from previous coal transitions was that these did not offer adequate support to help workers transition from the coal industry to other forms of work. They provide evidence that workers in coal transitions who received less redundancy payments, but additional support for transitioning to other forms of work (paid training or relocation), were better off in the long-term. However, they also indicate that workers often preferred higher redundancy payments in the Polish coal transition. In addition, Caldecott et al. indicate that relocation packages as part of managed retreat strategies might be suitable for workers in regions which are heavily dependent on coal and where alternative forms of employment are not within commutable distance option. However, they also emphasise that the loss of professional identity combined with the loss of social networks can pose a significant barrier for workers to consider relocation and that little research has been conducted to examine the connected challenges or whether relocation has worked in previous coal transitions (Caldecott et al., 2017).

These considerations highlight the importance of considering compensation for affected stakeholders in South Kalimantan. The expert interviews will further explore the possibility of compensating affected stakeholders from a coal transition in South Kalimantan.

5.1.6 Interventions for Resource Allocation and Employment

This chapter addresses possible institutional interventions L4 from the Williamson framework, which relates to market structures, specifically resource allocation and employment.

5.1.6.1 Providing alternative forms for Economic Development

As discussed in Chapter 2.1.2, the shift of economic development based on coal to alternative means for economic development poses the biggest challenge to coal transitions (Brauers et al., 2020; Diluiso et al., 2021). Coal transitions have been historically accompanied by job losses, which also poses a significant political barrier to coal transitions (Jewell et al., 2022). Diluiso et al. (2021) stress that coal transitions also involve creating new identities for regions which are heavily involved with coal. The provision of alternative forms of economic development, social identity, and employment opportunities need to be addressed by institutional interventions for coal transitions to be successful (see also Brauers & Oei, 2020; Wehnert et al., 2019).

Caldecott et al. (2017) argue that the geographic concentration of mining sites and the relative share of coal in the region's economy are important factors influencing the ability of the region to absorb the economic shock from declining coal operations. They stress that if the distances to other locations of economic opportunity are too far or if these are lacking, *managed retreat* might be the most realistic option for these regions. These long-term and forward-looking economic restructuring or regional regeneration considerations might involve direct funds to local governments, investments by central governments to regions, or cost exemptions for regions. In the Netherlands, this was conducted, for example, by creating demand for workers in affected regions by moving government offices to regions or creating universities in the regions. Education of the next generation of mining families in affected regions is also an important strategy to foster alternative employment opportunities. Caldecott et al. further emphasise that economic restructuring ideally should occur on multiple dimensions, such as health, environment, transport, and social protection. Transport infrastructure investments are seen as promising since they can create demand for labour, increase connectivity, and are generally supported by different sectors and companies (Caldecott et al., 2017). The renewable energy sector that could emerge from the coal transition could also be viable for future employment opportunities (Oei et al., 2020). Further options could be the production of green hydrogen or fostering the co-development of cost-competitive RES and energy-intensive industries in affected regions (Jakob & Steckel, 2022). Merdekawati et al. (2022) stress that policymakers responsible for the transition of the workforce from coal companies should address the development of relevant skills, protect workers' rights, and ensure inclusive growth.

As discussed in Chapter 5.1.2, various researchers emphasise the need for close collaboration between different governance levels. Arinaldo and Adiatma (2019) stress that building alternative pathways for economic development in Indonesia requires collaboration between ministries, provincial, and district governments. They emphasise that the MEMR, the Ministry of Home Affairs, and the MoF, *at the very least*, would have to collaborate to establish and implement policies to create alternatives for economic development in Indonesia.

In South Kalimantan's case, providing alternative means of development seems crucially important due to its high economic dependency on coal (see Setyowati & Quist, 2022). A big part of South Kalimantan lives in rural areas with few connections to infrastructure. Infrastructure development could therefore be a viable option. Further, the most suitable options for developing alternative energy sources in South Kalimantan would be solar, wind, and natural gas (Riva & Vestarchi, 2019). Especially the expansion of solar and wind could create employment opportunities in the region. Creating a manufacturing industry around these sources could create further economic growth. Other energy-intensive industries

could also be created, utilising local mineral resources while being supplied with low-cost renewable energy from solar and wind. Green hydrogen production facilities could be created, utilising oversupply from solar and wind, and the green hydrogen exported to neighbouring countries. Universities could be created in the region to improve education and foster long-term growth. However, these measures would require high investments. The question of financing the general coal transition and the involved measures will be further explored in the expert interviews.

5.1.6.2 Market Regulation, Liberalisation, or Privatisation

Maulidia et al. (2019) suggest market restructuring or market liberalisation to advance the energy transition in Indonesia by reducing the monopolistic structure of the energy market dominated by PLN. Diluiso et al. (2021) emphasise that market regulation in relation to coal transitions can occur through nationalisation or privatisation of the coal industry, public and private partnerships, industrial regulation, or the liberalisation of electricity and coal markets. They further found, based on their literature review on coal transitions, that historical coal transitions were often accompanied by the privatisation of the coal industry. Jakob and Steckel (2022) argue that the choice of which energy source is used to generate electricity seems to be heavily influenced by the structure of energy markets. They further argue that in liberalised markets, coal has been historically replaced by cheaper energy sources, such as natural gas and RES, whereas in countries with regulated energy markets with vertically integrated SOE, coal has persisted due to the existence of vested interests. They highlight that deregulation seems to reduce the influence of vested interests on the energy market and fosters the emergence of cost-competitive alternatives.

However, some challenges exist related to energy market restructuring. Caldecott et al. (2017) stress that privatisation of SOE given coal transitions have led to governments recapitalising the newly privatised companies which borrowed funds and thus became highly indebted and forced them to pay interest rates on the funds to governments providing the funds. They emphasise that the high indebtedness often has led to bankruptcies of these companies. Biber et al. (2017) highlight the difficulties of deregulating electricity markets through privatisation of SOE or vertically disintegrating generation, transmission, and distribution. On the one hand, they emphasise that deregulation might foster the emergence of interest groups for RES, but this depends on how deregulation is pursued. In California in the 1990s, the deregulation of the electricity sector forced previous SOEs to sell or dismantle some of their electricity generation assets, which often included fossil fuel assets. This appears to have increased the support for generation from RES (Biber et al., 2017). However, Kim et al. (2016) indicate that even though deregulation of electricity sectors is often packaged politically with policies for the expansion of RES, the deregulation in the US between 1991 and 2012 had no impact on the expansion of RES. They further argue that deregulation requires concessions to actors favouring RES. This suggests that deregulation needs to go hand in hand with policies favouring RES, which are targeted at interest groups capable of utilising these concessions. In addition, Jakob et al. (2020) argue that liberalisation might decrease the political power of regime incumbents and foster the entry of new market players.

Biber et al. (2017) argue that regulated electricity systems may increase the regulatory entry barriers for RES. They emphasise that especially countries with large amounts of fossil fuel electricity generation where the generation is publicly owned might be more reluctant towards policies favouring RES since governments could have intrinsic interests in fossil fuels due to their public utility. However, they conclude that current research does not show a strong link between deregulated electricity systems and increased usage of RES or an increased amount of IPPs.

In Indonesia, an attempt to liberalise the electricity market has been made, which the Supreme Court, however, annulled due to its violation of the constitution (see Maulidia et al., 2019; Setyowati & Quist,

2022). Furthermore, as discussed in Chapter 4.4.2., PLN, the regulated SOE, is required based on MEMR Decree 12/2017 to purchase renewable electricity from IPPs, where the price is capped at 85% of the local generation cost. This makes entry for IPPs selling renewable electricity easier. However, PLN is still heavily subsidised by the MoF, and the government seems to have intrinsic interests in the coal industry, making fossil fuel use more attractive. Deregulation could therefore increase the competitiveness of RES by reducing subsidies and increasing costs for coal.

Privatisation of PLN might be an option to break the resistance of PLN towards coal transitions. However, the ministries regulating and overseeing PLN might resist these measures (Ordonez et al., 2021). Ordonez et al. (2021) emphasise that the MoF and the MOEF would have to be consolidated with the ministries overseeing PLN (MSOE) to successfully reform PLN. It could otherwise be necessary to change the incentive system of PLN to make RES more attractive or even ensure that PLN implements policies favouring RES, even if these are against the interests of PLN (Ordonez et al., 2021; see also Bridle et al., 2017). These policies could include, for example, the requirement to diversify the company's portfolio of energy sources (Brauers & Oei, 2020).

Furthermore, several researchers stress that PLN seems reluctant toward any changes and has vast influences on policy-making and that they justify using CFPP to provide energy security (Jakob et al., 2020; Ordonez et al., 2021). As the grid operator, PLN aims to choose energy sources that do not threaten grid stability, such as CFPP (Ialnazov & Keeley, 2020). Furthermore, due to failures in PLN's responsibility to maximise revenues to the state, several officials from PLN are facing charges or are already in prison because of losses to the state (Harrington, 2017). These circumstances further increase pressure on PLN to favour low-cost energy sources. In general, due to the high emission reduction PLN could be expected to pursue, close cooperation between the government and PLN should be ensured (Siagian et al., 2017).

These considerations raise the question of whether a reform of the electricity system, which is achieved through liberalisation, privatisation, or deregulation, would increase the capacity of RES and decrease the usage of coal and whether this would be politically feasible. These questions will be further explored in the expert interviews.

5.1.6.3 Economic measures - Carbon Pricing, Subsidies & Taxes,

The literature provides ample suggestions for economic instruments for coal transitions in general. Diluiso et al.(2021) indicate that their literature review on coal transitions revealed that the economic measures with the highest occurrence included subsidies and taxes. The tax category includes, for example, emission trading schemes or carbon taxes (Diluiso et al., 2021). Dissanayake et al. (2020) stress that the effectiveness of these instruments for emissions mitigations is highly case-specific and needs to be analysed for each country separately. The effectiveness of these instruments for Indonesia will be analysed in the following.

Carbon-pricing

One economic instrument is carbon pricing, either through carbon taxes or through Emission Trading Schemes (ETS) (Dissanayake et al., 2020). The Indonesian government announced introducing a carbon tax of US$2.10 per ton of CO_2 as of July 2022, which shall also serve as a basis for carbon trading (Christi, 2022). However, news from June 23rd, 2022, stated that the carbon tax implementation could be delayed again (Suroyo & Sulaiman, 2022).

In the literature on political economy, it is suggested that implementing carbon pricing mechanisms remains challenging (Jenkins & Karplus, 2017; see Biber et al., 2017; Gawel et al., 2017). Biber et al. (2017) emphasise that carbon pricing mechanisms seem politically difficult to implement in

governments intertwined with fossil fuels interests. They argue that policies which are not in favour of existing and powerful interest groups tend to be less effective and more difficult to implement than policies aimed at supporting decarbonisation. They stress that, for example, subsidies aimed at the development of RES would face less resistance from regime incumbents than carbon pricing mechanisms. They conclude that carbon pricing in fossil fuel-dependent economies "may ultimately be ineffectual" (p.616). They lastly argue that an initially weak carbon pricing mechanism could be preceded by a continuously increasing one but that this would require the emergence of new interest groups in favour of decarbonisation and changes in the political landscape (Biber et al., 2017). Ordonez et al. (2021) provide a different perspective. They argue that PLN might show resistance towards any measures which would result in higher electricity prices and exert influence on political decision-makers. However, they also stress that the MoF could support carbon pricing since the revenues could be used to compensate for losses from coal rents and revenues. They further highlight that these revenues could be used to restructure coal-dependent regions. The revenues from carbon pricing could also be used to increase the overall tax revenue from countries (Kalkuhl et al., 2019) or to alleviate energy poverty (Gunningham, 2013).

Dissanayake et al. (2020) conclude from their study that a carbon tax of US$36 per tonne of CO_2 would be required to meet the Indonesian emission targets. They further highlight that this carbon tax would reduce economic growth by 0.11%. However, they also emphasise that a carbon tax versus a fuel tax would result in lower inflation, fewer effects on welfare loss, employment loss, and wage decline. They also highlight that a carbon tax of this amount would increase the price of coal by 113-117%, likely increasing the tendency towards RES. The authors further highlight the possibility of introducing an Emission Trading Scheme (ETS) in Indonesia. However, they stress that it seems unlikely that the Indonesian government would implement an ETS due to political resistance. They conclude that a carbon tax would be politically more feasible to implement than an ETS. However, views on this are divergent. Brauers and Oei (2020) argue that implementing carbon taxes seems unrealistic for the political economy of coal. Jenkins and Karplus (2017) argue that the difficulties of implementing carbon taxes in this regard stem from the distributional impacts of carbon taxes on producers and consumers.

In summary, the current level of the proposed carbon tax seems to be lower than the required level to meet the Indonesian emission targets (see Christi, 2022; Dissanayake et al., 2020). In addition, as of July 2022, it seems unclear when the carbon tax will be implemented. Furthermore, it seems unclear whether the carbon tax will be effective for phasing-out coal. This will be further explored in the interviews.

Subsidies

Several authors highlight the need to reduce subsidies for fossil fuels in Indonesia (Bridle et al., 2018; Erdiwansyah et al., 2019; Gunningham, 2013; Wehnert et al., 2019). Skovgaard and van Asselt (2019) conclude in their study that there exist several principles for successfully reforming fossil fuel subsidies, which include: getting the timing right for introducing new subsidies aimed at RES and reducing subsidies of fossil fuels; involving a variety of affected stakeholders and different parts of the government at an early stage; communicating to the public on how current subsidies are directed to which purposes, and how these subsidies can be redirected to alternative purposes; and lastly, the need to implement additional complementary measures to counteract the effect of the reform. Phasing out subsidies for fossil fuels can also aid in making RES more competitive (Bridle et al., 2018). However, the view on this is conflicting. Jewell et al. (2018) conclude that removing subsidies would not significantly impact the expansion of RES and would not decrease global GHGE significantly. However, even though fossil fuel subsidies can also aid in ensuring energy security, a reduction could substantially reduce GHGE (Gunningham, 2013).

In the case of Indonesia, subsidies for coal are significantly higher than subsidies for RES (Attwood et al., 2017). Further, there have been attempts to remove subsidies for fossil fuels. However, these have often been followed by a re-introduction of these subsidies. The initially successful removal of subsidies was enabled through political leadership for reform. This was accompanied by strategic communication of these policies and by providing social assistance due to increasing electricity prices (Chelminski, 2018). Reducing fossil fuel subsidies in Indonesia seems challenging from a political economy perspective due to vested interests, corruption, and dependency on fossil fuels (Gunningham, 2013; see also Chelminski, 2018). However, the MoF seems to be also reluctant to increase subsidies to PLN (Bridle et al., 2018).

This raises the question of whether increasing subsidies for RES or decreasing subsidies for coal could be implemented in Indonesia. This will be further explored in the expert interviews.

Taxes

There exist several ways in which taxes can be used to either incentivise or disincentivise coal operations or the coal transition. Kalkuhl et al. (2019) argue that an *upstream tax* for the extraction or the import of fossil fuels, such as coal, could be implemented. They emphasise that this form of tax would be difficult to avoid, and this is especially suitable for informal economies that often do not have the capacity to effectively oversee, regulate, and enforce taxes on industrial or economic activities. However, in the case of Indonesia, it seems rather difficult to implement upstream taxes since this would reduce the profitability of mining operations where powerful actors have financial interests. This is especially relevant since the profitability of the coal mining sector depends heavily on fuel prices since diesel remains the largest share of operating expenses (Atteridge et al., 2018). Nevertheless, Dissanayake et al. (2020) indicate that a fuel tax could lead to 0.29% economic growth in Indonesia.

Caldecott et al. (2017) indicate that governments can employ tax incentives in various ways. For example, governments could create tax incentives for businesses to relocate to certain areas. However, this seems rather ineffective since tax incentives would often not be the single variable influencing the relocation decision of companies. Rather, these incentives could strengthen an already made decision for relocation.

Gunningham (2013) argues that another option could be carbon border taxes. This instrument would have to be adopted by other countries, which would tax goods from countries which do not have adequate climate change mitigation measures. This measure could bring about the required pressure to enact emission reduction targets, but the implementation seems challenging due to expected disagreements between countries, especially between rich and poor countries (Gunningham, 2013). This raises the question of whether taxes could be implemented in Indonesia and how this could be achieved. This question will be further explored in the expert interviews.

Financial Support

Caldecott et al. (2017) further indicate that governments can provide financial support to affected companies by, for example, reducing liabilities of companies related to mining site restorations. However, the authors emphasise that this form of financial aid brings about the risk of moral hazard. Mining companies could be incentivised to pursue mining operations with the implicit knowledge that their costs for restoration would be held by governments, thereby externalising their *true costs* for mining operations. The question of financial support to affected stakeholders from a coal transition will be further explored in the expert interviews.

5.1.6.4 Expanding Share of Renewable Energy Sources

Phasing-out coal needs to be accompanied by strategies for increasing the use of RES (Brauers & Oei, 2020; Yanguas Parra et al., 2019). Several studies stress the need to expand the share of RES in Indonesia (Bridle et al., 2018; Dutu, 2016; Erdiwansyah et al., 2019; Langer et al., 2021).

Indonesia has vast potential for different RES, such as solar energy, hydropower, geothermal, wind-, bio, and ocean energy (Langer et al., 2021; Yudha et al., 2021). The cost for RES has been dropping over the last year, and the LCOE of some sources is already within the range of fossil fuels or even cheaper for some projects (Yanguas Parra et al., 2019), which could help accelerate the expansion of RES, especially since it seems that coal transitions occurred in countries where coal was not economically viable anymore (Jakob & Steckel, 2022). Langer et al. (2021) conclude in their study that the electricity demand of Indonesia could technically be met by 100% RES. According to Bridle et al. (2018), the price paid to generators of RES is the most important factor influencing the viability of renewable energy projects. In interviews conducted by Ordonez et al. (2021), one interviewee stated that PLN would consider RES if the costs were lower. Declining costs of RES could also contribute to meeting the demand of some actors for affordable energy supply (Jakob et al., 2020). The development of RES could also aid in providing alternative means for economic development (Yanguas Parra et al., 2019).

The first topic this chapter addresses is which source of renewable energy would be the most suitable to compensate for the declining share of CFFP. Several authors emphasise solar energy's important role in the Indonesian energy transition (Reyseliani & Purwanto, 2021; Yudha et al., 2021). Yudha et al. highlight that solar energy has vast potential for generating renewable electricity, especially in Indonesia. They also emphasise that solar energy could be more suitable for households due to its intermittent nature. This could be a viable option for rural areas with no access to the electricity grid. However, the authors stress that solar energy development depends highly on government funding due to its high costs (Yudha et al., 2021). Solar PV is most suitable for decentralised rooftop generation, and the need for funding and investments poses another challenge. Kennedy (2018) argues that foreign investments into solar energy in Indonesia mainly foster the development of large-scale centralised solar generation in Sumatra and Sulawesi and that local ownership is thereby neglected. Setyowati (2021) argues that this is especially important for energy justice and highlights the need to address this issue for archipelago islands and decentralised energy solutions in Indonesia. Bridle et al. (2018) hereby emphasise the importance of ensuring the use of the *lowest-cost technologies* for decentralised off-grid projects. They further highlight that identifying appropriate sites for the development of renewable energy projects with expected high yields should be supported to ensure prices fall below wholesale electricity prices.

Several authors highlight that geothermal energy seems to be the most feasible and suitable source for Indonesia (Yudha et al., 2021; see also Dutu, 2016; Gunningham, 2013). Indonesia is expected to hold 40% of the world's geothermal energy potential due to being located in the *Ring of Fire* (Yuliani, 2017). Further renewable energy sources could also be viable, such as hydropower (Yudha et al., 2021) or micro-hydro power for remote areas (Harrington, 2017). However, research suggests that many hydropower projects have led to similar environmental and social damages as coal mining and operations, such as the relocation of local populations (Roy & Schaffartzik, 2021). Biomass production could be another option for decentralised electricity generation, especially in rural areas (Dutu, 2016; Li et al., 2021). Decentralised electricity generation is suggested as a promising opportunity for phasing-out coal (Roy & Schaffartzik, 2021).

For South Kalimantan, it is expected that coal will still dominate the electricity mix in the medium- and long term, but that solar, wind and natural gas are considered to be the best options to complement coal for electricity generation. The potential for solar energy in South Kalimantan amounts to approximately

6,030 MW, followed by wind with 1,400 MW and biomass with a potential of 1,266 MW (Riva & Vestarchi, 2019).

Most of the investments in Indonesia into renewable energy projects in Indonesia have been made in hydro and geothermal, whereas solar and wind investments are marginal (Bridle et al., 2018). Further investments into solar and wind, as viable RES for South Kalimantan, would be required. Burke et al. (2019) hereby propose various ways to increase solar and wind adoption in Indonesia, which include: political commitment, limiting regulatory requirements, reducing fossil fuel subsidies, introducing carbon pricing, removing protectionist barriers, introducing reverse auction processes, implementing purchase obligations for RES, and improving grid management. However, as discussed in previous chapters, some of these measures could face resistance due to political economic constraints. In addition, Simanjuntak (2021) highlights that significant institutional changes need to be made in Indonesia to increase wind energy deployment. Simanjuntak suggests developing a detailed design for institutional changes to deploy wind energy at the regional or national level in Indonesia (Simanjuntak, 2021). The development and deployment of biomass have been hindered in Indonesia by a lack of national coordination efforts and a lack of learning across different projects (Wong, 2021).

The second aspect that this chapter addresses is the market instruments for accelerating the expansion of RES. Diluiso et al. (2021) highlight that emission and renewable portfolio standards have especially played a role in driving coal transitions. Biber et al. (2017) stress that renewable portfolio standards have been implemented in countries with decarbonisation agendas, especially because they tend to be more politically feasible. Feed-in tariffs (FiT) have also played a role in accelerating the adoption of RES, according to the authors. They emphasise that FiTs generally benefit decentralised generation more, such as rooftop PV, whereas renewable portfolio standards tend to favour large, centralised generation more. FiTs could also be used to incentivise companies to support the development of RES (Ordonez et al., 2021). However, as discussed in Chapter 4.4.2, FiTs have been already implemented in Indonesia and were subsequently abolished in 2017 (Jakob et al., 2020).

Yuliani (2017) hereby argues that implementing FiTs in Indonesia was rather unsuccessful in improving the deployment of RES. He argues that FiTs must be implemented in careful consideration of other efforts. He emphasises that the complexity of governance structures needs to be reduced, knowledge on the community level of RES increased, and coordination between related organisations increased to successfully expand RES by FiTs. Ordonez et al. (2021) state similarly that the main barrier for IPPs to participate in the energy market is the nature of the constantly changing regulations. Further, setting FiT at an adequate right rate for providing fair returns but not excessive profits for generators remains a challenge (Bridle et al., 2018). Lastly, Ordonez et al. (2021) argue that implementing FiTs could face resistance due to reduced rents and revenues from influential actors with interests in the coal industry and that these actors might have to be compensated to ensure their political support.

Biber et al. (2017) offer interesting insights from the political economy perspective. They emphasise that different types of RES may impact the political economy of states differently. They argue that RES, which are typically produced in larger, centralised plants, like wind turbines, might be politically easier to integrate than more decentralised units, such as rooftop solar energy. This is because decentralised solutions could threaten the current business models of electricity companies operating large, centralised units. However, policies aimed at developing solar PV might lead to the emergence of new coalitions in favour of decarbonisation (Biber et al., 2017).

Furthermore, Burke and Stephens (2018) argue that decentralised politics, as enacted through the decentralisation agenda in Indonesia, may foster the development of decentralised and distributed energy systems. They stress that concentrated power may hinder the deployment of RES. Geels (2014) argues similarly that the deployment of RES is hindered by the resistance of regime incumbents.

Similarly, technological advancements may make it easier to overcome institutional lock-ins since they might make alternative options more attractive (Rentier et al., 2019). Investing in the expansion of RES could also offer the opportunity to create alternative forms of economic development and employment opportunities for affected regions (Oei et al., 2020). Biber et al. (2017) also argue that in economies which do not have strong industrial capabilities and manufacturing companies which could support policies in favour of RES, other actors might be more important future interest groups for green policies, such as farmers, homeowners, project developers, and installers. This seems especially important for South Kalimantan, which is mostly invested in agricultural activities. Policies aimed at these actors might therefore be more beneficial to advancing the expansion of RES.

The expansion of RES is met with several barriers. A multi-level governance approach might be required to increase the share of RES (Marquardt, 2014). Marquardt (2014) hereby emphasises the need to involve various actors, also on the local level, at an early stage of planning. He further emphasises that lacking awareness of RES on a local level can often lead to uncoordinated activities and delays in the process. He argues that, especially in Indonesia, the development of RES is mainly coordinated in a top-down process and that bottom-up development should be ensured during policy formulation. Bridle et al. (2018) also emphasise the importance of removing regulatory barriers, maintaining policy stability, and making processes for permission and consent for renewable energy projects easier (see also Harrington, 2017). Bridle et al. (2018) further stress that the most important barrier to the expansion of RES stems from the introduction of Regulations 12/2017 and 50/2017, which cap the electricity price paid to renewable electricity generators at 85% of the local average generation costs, as discussed in Chapter 4.4.2.2, which makes investment recoveries difficult. They also emphasise that this pricing system does not recognise any environmental benefits from RES, thus indirectly favouring coal.

A further barrier to the further expansion of RES in Indonesia is the concern over the integration of intermittent RES into the electricity grid (Arinaldo & Adiatma, 2019; Gawel et al., 2017; Jakob & Steckel, 2022). Burke et al. (2019) stress the need to improve grid management capacities. Arinaldo and Adiatma (2019) highlight that demand response policies could reduce the cost of integrating RES, such as volatile price policies. Demand response policies could be an option in South Kalimantan, especially since South Kalimantan does not have many large industrial consumers, as discussed in Chapter 4.1.2. Electricity from RES, such as solar PV generated throughout the day, could be immediately used. Storage option could be another option to reduce the costs of system integration. Arinaldo and Adiatma (2019) emphasise that storage is especially relevant for Indonesia due to its specific geographical constraints. They stress that decentralised energy systems would be the only option for some regions due to the remoteness of some regions and the vast amount of different regions. They emphasise that pumped hydro storage could be an option but stress that this would be region-specific and that the reservoirs require large areas. They further suggest Li-Ion batteries but highlight the high costs associated with these. Jakob and Steckel (2022) emphasise that technical and financial assistance could be required to facilitate system integration of RES.

In summary, FiTs have been introduced and subsequently abolished in Indonesia. However, their implementation was not accompanied by additional needed efforts. Carefully considering complementary measures could aid in successfully establishing FiTs. This would be especially suitable since FiTs tend to benefit decentralised RES, like solar, which would be suitable for South Kalimantan. Capping the price for electricity from RES seems to hinder the further deployment of RES since it limits the recovery of investments. Removing regulatory barriers and ensuring policy stability in the electricity sector could ease market entries for RES. Financial and technical assistance for facilitating system integration of RES could aid in accelerating the expansion of RES.

5.1.6.5 Investments in other Technological Solutions

Yanguas Parra et al. (2019) highlight that the investments currently planned for the expansion of CFPP could be redirected to other technologies to ensure that the growing energy demand in Indonesia is met while providing affordable and sustainable energy. Further, several researchers highlight the need for required investments to advance the energy transition in Indonesia (Dutu, 2016; Gunningham, 2013). In the following, several different technological innovations which could enable or accelerate the coal transition in South Kalimantan are elaborated upon.

Natural Gas

Investments in natural gas projects have been associated with coal transitions (Diluiso et al., 2021). Natural gas for use in gas-fired power plants could be an option for reducing the use of coal in CFPP while maintaining the electricity supply in Indonesia (Dutu, 2016; Jakob & Steckel, 2022; Kurniawan et al., 2020). Atteridge et al. (2018) highlight that gas-fired power plants are faster to build, smaller, cheaper, and easier to finance than CFPP. They argue that although natural gas has not played a major role in Indonesia, other countries that phased-out coal have transitioned to using gas-fired power plants, such as the United States. They further highlight that natural gas could be imported from neighbouring Australia, which is the world's largest exporter of liquefied natural gas (LNG) (Atteridge et al., 2018). However, this would be against the aim of the Indonesian government to become energy independent (Climate Analytics, 2019a). Nevertheless, gas is considered by the MEMR as a transition technology, especially for rural electrification (Bridle et al., 2018).

Malahayati and Masui (2021) argue that natural gas could play a dominant role in the energy transition in Indonesia if emission reduction targets were introduced before RES became dominant in the energy mix. However, Jewell et al. (2022) argue that even though natural gas is often considered a transition technology, it still is a fossil fuel, and its role in energy transitions remains contested.

Nuclear

Yudha et al. (2021) highlight that nuclear energy is still classified as a viable option for the energy transition in Indonesia, given the advancements in technology and safety concerns. This view is shared by other researchers (Reyseliani & Purwanto, 2021; see also Permana et al., 2021).

Clean Coal Technologies

Yudha et al. (2018) emphasise that Clean Coal Technologies (CCT) could aid in reducing the harmful environmental impacts of coal use in CFPP. CCT include several different technologies for the different stages in processing coal, such as pre-combustion, combustion, post-combustion, and conversion. CCT could aid in fulfilling the rising energy demand while not compromising the current business models of coal companies with vast influence on the political economy of coal in Indonesia. It seems eminent to invest in CCT to mitigate GHGE from CFPP.

Improving energy efficiency for CFPP

Improving energy efficiency is also seen as a measure to ensure fuel savings and reduce GHGE from CFPP. Investments into energy efficiency measures or technologies could aid in further utilising coal while limiting its emissions (Kurniawan et al., 2020; Li et al., 2021; Malahayati & Masui, 2021).

Carbon Capture and Storage

Carbon Capture and Storage (CCS) could be another option for reducing GHGE from CFPP. Yanguas Parra et al. (2019) indicate that retrofitting existing CFPP with CCS could be viable for some plants. However, they also highlight that this scenario is rather unlikely due to the high costs of CCS and

because CCS is currently not considered for use in CFPP. They further argue that investing in CCS could deliver the wrong signals to stakeholders for further investing in the use of coal. Meadowcroft (2009) stresses that investing in CCS could further foster *lock-ins* into fossil fuel infrastructures which could increase the difficulties of phasing-out coal. However, Meadowcroft also argues that CCS could be a viable option to gain political support from the powerful and influential fossil fuel industry, especially in countries that are heavily invested in producing and consuming fossil fuels.

5.1.6.6 Rationing, Bans, Moratoria & Plant Closures

Diluiso et al. (2021) indicate that possible instruments for coal transitions could include quotas on the production or consumption of coal, banning the sale of coal entirely, or implementing moratoria (i.e., temporality prohibiting activities) on coal mines or CFPP. Roy and Schaffartzik (2021) conclude similarly that phasing-out coal entirely would have to include the decision to completely halt the extraction of coal, even if the extraction would still be economically viable. The report by Carbon Trust (2021) concludes similarly that plans for the retirement of CFPP have to be made for a coal transition in Indonesia to be successful.

These measures seem to be difficult to implement in Indonesia due to the expected resistance from powerful political actors who receive rents and revenues from coal use (Ordonez et al., 2021; see also Brauers & Oei, 2020). Further, as discussed previously, a moratorium on limiting new mining licences was announced by the Governor of East Kalimantan but never actually implemented (Bell, 2015; see also Arinaldo & Adiatma, 2019; Atteridge et al., 2018). Further, as Biber et al. (2017) argue, implementing policies that harm fossil fuel companies in fossil fuel-dependent economies seems politically challenging.

Furthermore, the authors emphasise that the political economy of fossil fuels might also depend on whether the source is primarily exported or consumed within the state. In Indonesia in 2018, 80% of the coal was exported (Arinaldo & Adiatma, 2019). However, as discussed in Chapter 4.2.1, it is expected that Indonesia will reduce exports and increase its domestic use of coal. However, the MoF could be reluctant to limit exports due to decreased revenues from export duties and foreign earnings (Atteridge et al., 2018). However, PLN recently announced to halt the construction of a coal plant in Java as part of their plan to teach net-zero by 2060 (see Karyza, 2022). This could indicate growing momentum to phase-out coal.

In summary, it seems unlikely that measures for rationing or even introducing moratoria could be implemented in South Kalimantan in isolation. Additional interventions, such as compensation, would be required.

5.1.6.7 Emergence of New Market Entrants, Actors & Civil Society Engagement

Various researchers argue that new actors could affect the power balance in the existing fossil fuel regimes (see Jakob et al., 2020; Geels, 2014; Meadowcroft, 2009). Jakob et al. (2020) emphasise that the emergence of *green industries* could lead to changes in the political environment, exerting pressure to advance more sustainable climate or energy policies. They stress that policymakers can facilitate the emergence of these industries either by regulations or by subsidies. Meadowcroft (2009) argues similarly that political engagement could lead to the formation of new coalitions aiming at policy reforms, which could alter power dynamics in the political environment. Geels (2014) even argues that "politically inspired regime destabilization may be necessary to create opportunities for the wider diffusion of renewables" (p.37).

Setyowati and Quist (2022) stress the importance of public involvement in public discussions or even decision-making and argue that this could influence policymaking (see also Jakob et al., 2020; Sarrica et al., 2018). They further highlight an existing absence of citizen engagement in the energy planning

process in Indonesia. However, they also find that new possibilities for citizen engagement might emerge despite the limiting regulatory and institutional constraints. Nevertheless, in the case of South Kalimantan, they found that the engagement of local actors, such as civil societies and private sectors, is limited in energy planning and that these groups tend to be in less favourable conditions against coal lobbies and powerful actors in the political economy of coal.

In summary, fostering the emergence of new actors and fostering civil society engagement could aid in advancing a coal transition in South Kalimantan.

5.1.7 Financing a coal transition

This chapter addresses the aspect of financing a coal transition in South Kalimantan. Caldecott et al. (2017) highlight that central and regional governments ultimately bore the costs for coal transitions in many historical coal transitions. These costs can include financial aid to affected companies, liability payments to workers, and investments for affected regions to stimulate alternative forms of economic growth.

However, as discussed in Chapter 1, at the COP26 meeting in Glasgow in 2021, Indonesia did not sign clause 3 of the "Global Coal to Clean Power Transition Statement" and stated that "to reach net zero by 2060 [...], Indonesia will consider accelerating coal phase out into the 2040s, conditional on agreeing additional international financial and technical assistance" (UNFCCC, 2021, Section: Statement supported by:). This statement seems to suggest that, in the long-term, Indonesia would consider reducing CFPP, but on the condition that the international community provides technical and especially financial assistance. Various studies emphasise that international finance is required to either expand the deployment of RES (see Bridle et al., 2017; Burke et al., 2019; Harrington, 2017; Jewell et al., 2018; OECD, 2021) or phase out coal (Ordonez et al., 2021). Gunningham (2013) highlights that the World Bank or the UNDP could play a role in these investments.

In the literature on climate ethics, various researchers also highlight the ethical responsibility of developed nations to pay for climate change mitigation and adaptation in less developed states since the more developed states have mostly benefitted from the extraction and exploitation of fossil fuels, such as coal, but the burden of this exploitation lies mostly with less developed states primarily in the Global South (see Posner & Sunstein, 2008; Shue, 1999; Singer, 2010).

However, Atteridge et al. (2018) highlight that a perceived policy instability limits international finance toward Indonesia. Increasing policy stability by a steady course of the Indonesian government on a coal transition could potentially attract more foreign investments. In addition, further challenges exist related to incoming international investment. Posner and Sunstein (2008) emphasise that foreign aid to the government is often redistributed by corrupt politicians for their benefit. Measures would need to be ensured to prevent misuse of foreign investments and redistribution to other purposes not intended.

This raises the question of how a coal transition can be financed. This question will be further explored in the expert interviews.

5.1.8 Summary of Proposed Institutional Interventions from Literature

Table 5 provides a summary of the proposed institutional interventions from Chapter 5.1.3 to Chapter 5.1.6.7. The aspects and sources provided in the summarizing table 5 are by no means exhaustive.

Level of Institutions	Proposed Institutional Intervention from Literature
L1	• Establishment of national development plans (Yudha et al., 2021) • Increasing public discussion around declining coal markets (Jakob & Steckel, 2022) • Increasing awareness on health impacts of coal operations (Bridle et al., 2018) • Empowering affected communities (Ordonez et al., 2021) • Inclusion of the public in decision-making (Setyowati & Quist, 2022) • Political leadership towards a coal transition (Setyowati & Quist, 2022) • Declining costs of RES changing the governments perspective on coal and energy investments (Ordonez et al., 2021)
L2	**International Agreements and Climate Targets** • External pressure from international community (Brauers & Oei, 2020) • Stricter implementation of Nationally Determined Contributions (Vogt-Schilb & Hallegatte, 2017)
	Implementing an Independent Regulator (Biber et al., 2017; Yuliani, 2017)
	Implementing stricter Environmental Regulations • Improving Air Quality (Diluiso et al., 2021) • Fostering green industrial policies (Biber et al. 2021) • Restoration of coal mining sites (Atteridge et al., 2018; Caldecott et al., 2017) • More effective control of illegal mining (Dutu, 2016) • Increasing adherence to Environmental Impact Assessments (Yudha et al. 2018)
	Allocation of Mining Permits • Decentralisation seems to hinder coal transitions (Arinaldo & Adiatma, 2019) • Establish accountability (Setyowati & Quist, 2022) and reinforce monitoring mechanisms (Faisal, 2015)
L3	**Compensation Schemes** • Compensation to affected stakeholders of coal transition (Caldecott et al., 2017; Rentier et al., 2019) • Compensation to ensure buy-in of regime incumbents (Jakob et al., 2020) • Compensation for high investments costs of renewable energy projects (Ordonez et al., 2021)
L4	**Providing alternative forms for Economic Development** • Providing economic development opportunities, employment opportunities, and creating new social identities in affected regions (Brauers et al., 2020; Diluiso et al., 2021; Setyowati & Quist, 2022) • Managed retreat, economic restructuring, regional regeneration (Caldecott et al., 2017) • Provide employees development trainings (Merdekawati et al., 2022) • Increasing collaboration ministries, provincial, and district governments (Arinaldo & Adiatma, 2019)
	Market Regulation, Liberalization, or Privatization • Nationalisation or privatisation of the coal industry, public and private partnerships, industrial regulation, or liberalisation of electricity and coal markets (Diluiso et al., 2021) • Market liberalisation of the Indonesian electricity market (Maulidia et al., 2019) • Deregulation to reduce influence of vested interests and increase market competitiveness (Jakob & Steckel, 2022) • Consolidation of responsible ministries to reform PLN (Ordonez et al., 2021)
	Economic Instruments • Carbon Pricing: carbon taxes or an Emission Trading Scheme (Diluiso et al., 2021; Dissanayake et al., 2020) • Reducing coal subsidies (Bridle et al., 2018; Erdiwansyah et al., 2019; Wehnert et al., 2019) • Increasing subsidies for RES (Attwood et al., 2017; Bridle et al., 2018) • Increasing upstream taxes for the for the extraction or the import of coal (Kalkuhl et al. 2019), increasing fuel taxes (Dissanayake et al., 2020), providing tax incentives (Caldecott et al. 2017), or carbon border taxes (Gunningham, 2013) • Provision of financial support to affected companies (Caldecott et al., 2017)
	Expanding Share of Renewable Energy Sources • Phasing-out coal in accompany with strategies for increasing RES (Brauers & Oei, 2020; Yanguas Parra et al., 2019) • Fostering decentralised electricity for phasing-out coal (Roy & Schaffartzik, 2021) • Increasing solar PV, wind, and biomass in South Kalimantan (Riva & Vestarchi, 2019) • Implementing Emission- or Renewable Portfolio Standards (Diluiso et al., 2021) • Implementing Feed-in Tariffs in Indonesia (Ordonez et al., 2021; Yuliani, 2017) • Improve Grid Management (Burke et al., 2019), introduce demand response, and increase storage capacities in Indonesia (Arinaldo & Adiatma, 2019)

	Further investments in other Technological solutions • Investments in Natural gas (Dutu, 2016; Jakob & Steckel, 2022; Kurniawan et al., 2020) • Investments in nuclear energy (Permana et al., 2021; Reyseliani & Purwanto, 2021; Yudha et al., 2018) • Investments in Clean Coal Technologies (Yudha et al., 2018) • Improving energy efficiency of coal plants (Kurniawan et al., 2020; Li et al., 2021; Malahayati & Masui, 2021) • Utilizing Carbon Capture and Storage (Yanguas Parra et al., 2019; Meadowcroft, 2009)
	Rationing, Bans, Moratoria & Plant Closures • Quotas on coal, banning the sale of coal, or implementing moratoria on coal mines or coal plants (Diluiso et al., 2021) • Retirement of coal plants (Carbon Trust, 2021)
	Emergence of New Market Entrants, Actors & Civil Society Engagement • Fostering *green industries* (Jakob et al., 2020) • Fostering formation of new coalitions by political engagements (Meadowcroft, 2009) • Public Involvement in discussions or decision-making (Setyowati & Quist, 2022)

Table 5: Summary of Proposed Institutional Interventions from Literature

5.2 Results from Expert Interviews

This chapter presents the results of the interviews. As discussed in Chapter 3.2.2., an interview protocol was developed based on the insights from Chapter 5.1. The interview protocol is presented in Appendix D. The expert interviews shall provide insights on the feasibility and effectiveness of the possible institutional interventions presented in Chapter 5.1. Table 6, which is presented at the end of this chapter, provides a summarizing overview of the results from the interviews. In the following, the results from the interviews are presented, according to the structure of the interview protocol.

In general, all the questioned interviewees believe South Kalimantan should prepare for or aim for a coal transition (e1-e11). Interviewees stated that the international coal markets and global coal demand are expected to decline in the future and that South Kalimantan should prepare for this (e3, e6, e7). Several interviewees also stated the need to phase out coal regarding the related emissions and climate change mitigation (e7, e9, e10, e11). E4 stated that the cost of postponing the transition would be higher in the future than the cost of preparing it now and that Indonesia should learn from other counties where this has happened. Interviewees similarly stated that preparations and strategies for providing alternative economic development should be made now to be prepared for collapsing coal markets and subsequently decreased economic competitiveness (e5, e11). Of the questioned interviewees, no one believed that South Kalimantan should not prepare or aim for a coal transition.

The interviewees presented several drivers which have led to the current dominance of coal in the Indonesian market and the region of South Kalimantan. These include the natural abundance of coal reserves and the possibility to exploit these (e3, e6, e7, e9, e10), the demand for coal as a cheap and abundantly available energy source (e1, e3, e4, e6, e7), the provision of cheap energy access for the Indonesian population (e4, e6, e10), the possibility of maintaining cheap electricity prices for political support (e4), the demand for coal as an export commodity (e1, e6, e8, e9), international demand for coal (e8, e11), Indonesia's geographical location close to demand centres (e9), the export of coal for counteracting the negative trade balance of Indonesia (e4, e5, e10), coal as a source of public revenue through royalties and other payments (e1, e3, e4, e5, e8, e9, e10, e11), employment opportunities in the coal sector (e6, e7, e9), the overissuing of mining permits (e1, e4), the decentralization process in the coal sector which has increased coal mining (e3, e4, e5, e7, e8, e11), vested interests of powerful actors (e1, e3, e6, e8, e11), corrupt practices fostering coal mining (e3, e11), the history of resource extraction in Indonesia (e3, e11), the existence of CCOWs and the associated lock-in (e5), targets imposed by the MoF to the MEMR for coal royalties which drives coal production (e3), the take-or-pay contracts with IPPs which creates an economic lock-in for CFPP (e3), the structure of the PLN as a SOE (e3), resource

nationalism (e3), limited awareness of climate change (e4), limited knowledge of policymakers to implement decarbonisation strategies (e4), the support of local population of coal extraction to attract workers for driving the local economy (e5), and the COVID-19 pandemic and the war in Ukraine mixing up the international coal market (e6).

This section addresses aspects of power that interviewees mentioned in relation to the current dominance of coal in Indonesia. Several interviewees emphasised that vested interests of political and economic actors influence the coal sector in Indonesia (e1, e3, e6, e8, e11). E11 stated that elite control, the power of corrupt officials over resources, and corruption are the *root causes* for the increased coal production in Indonesia. E1 stated that coal is part of a well-connected network which supports the political machine. E7 also highlighted that political actors are often directly involved in the coal economy. E3 highlighted that the national policies related to coal and the energy sector are mainly driven by the national government around the president and not much influenced by local governments. E3 also stressed that the local governments are heavily incentivised to support coal extraction for generating revenue streams.

Further, the coal mining companies contribute significantly to regional development and thus influence regional political processes (e7). The financial and technological lock-in of PLN was also mentioned as a driving factor for PLN to lobby for CFPP (e3). The powerful role of the MSOE as the main shareholder of PLN was also mentioned as a factor influencing policymaking (e3). E4 also highlighted that the perspective of powerful stakeholders would need to be changed for a coal phase-out to be effective.

Further barriers to the expansion of RES and, therefore, indirect contributors to coal include the belief that RES cannot provide a safe and reliable energy supply (e3, e7), the already existing know-how and ease of operating CFPPs (e4), the high investments associated with storage options for RES or gas-fired power plants as alternatives (e3, e6), the challenge of integrating RES reliably into the grid (e8), or institutional barriers such as complicated permitting and administrative procedures (e3). Another problem which e3 has stated is that the expected decreasing price of RES in the future could make coal uncompetitive, which could lead to an oversupply of cheap coal which then floods the market.

The interviewees presented several drivers which could accelerate or enable a coal transition. These include international pressure and international climate agreements (e1, e2, e4, e6), divestments from fossil fuels from major financial institutions, such as the World Bank or the ADB (e1), the investment trend towards RES (e10), increasing public awareness related to climate change and environmental issues (e1, e3, e4), increasing market shares of RES (e2, e4), declining costs of RES (e2, e3, e4, e10), expected reduced international demand for coal (e3, e5, e6, e7), low capacity factors of current CFPP in Indonesia (e3), and social and economic benefits of phasing-out coal (e2). Especially market forces were deemed influential in phasing-out coal (e2, e3, e4, e10). E4 highlighted that the awareness of key stakeholders in Indonesia for the need for decarbonisation is rather low. E11 highlighted that the plans to move the Indonesian capital to Kalimantan could spur a debate on how coal-dependent regions in Kalimantan can change into more thriving urban centres.

This part addresses institutional interventions on the embeddedness level (L1) and presents results from the interviews on which factors could influence the national and provincial governments to change their current course on coal mining and the expansion of CFPP. These include: an increased awareness of the policymakers and key stakeholders for the need to decarbonize the Indonesian economy (e4, e6, e10), increased awareness of the local population for the environmental issues (e4, e8, e10), provision of education on climate change (e4), increased knowledge of RES (e9), the influence of voters on politics (e4, e10), citizen participation using social media to bring environmental issues to public debate (e4), provision of sufficient employment opportunities from industries revolving around RES (e2),

support from the international community (e4, e5, e6, e10), pressure from the international community (e4, e10, e11), the flow of international finance to retire CFPP or to invest in RES (e7, e8), market dynamics such as declining international coal demand and resulting declining exports (e4), strong political leadership advocating decarbonisation (e4, e8), political commitment (e4), an increased capacity and human resources to develop decarbonization strategies (e5), or a big external shock, such as a massive decline in demand (e9). Further, E5 stated that local governments in Kalimantan have growing concerns about the coal market's future and that they already realised that they should prepare for a coal transition. Further, e5 stated that the MEMR has a keen interest in phasing out coal and wants to realise a coal transition. However, e4 stated that people from coal-producing regions on Kalimantan decided to try to understand the need for a coal transition, but that they did not see the urgency because of the current and expected future demand for coal (e4). E9 stated that a political narrative around diversification strategies could foster a coal transition.

This part presents results from interviews associated with L2 of the Williamson scheme at the institutional level. The first topic addressed is the possibility of implementing an independent regulator responsible for the coal or electricity sector. E3 stated that an independent regulator could enable a level playing field for the electricity sector and could potentially reduce the number of barriers that developers of renewable energy face. Only a few interviewees stated that implementing an independent regulator might be feasible (e1), whereas e9 stated that the political feasibility is rather low. Several barriers and challenges exist regarding the implementation of an independent regulator. E1 stated that the independent regulator would require political legitimacy to operate independently and efficiently and that this could pose an obstacle to the implementation since the ministries already have rather unclear but still defined authorities and responsibilities. Similarly, the lack of clarity regarding institutional responsibilities could pose a barrier to the implementation (e10). Interviewees stated that an independent regulator's effectiveness in enabling a coal transition would depend on its design, including its roles, responsibilities, autonomy and scope of authority (e2, e8). Similarly, interviewees stated that it seems unlikely that the independent regulator would be fully independent and that the regulator probably would include members from ministries of coal associations (e7, e9). E10 highlighted the risk of just multiplying responsible organisations without clear mandates. E4 stated that an independent regulator would not be effective in advancing a coal transition. Further, e4 stated that discussions about climate change and related decarbonisation activities in Indonesia are always made by a "climate mafia" (the same group of people influencing these activities) and that these could influence policymaking despite an independent regulator. E4 and e5 stated that a dedicated task force for a coal transition would be more effective in this regard.

The interviewees stated differing views on the effectiveness and political feasibility of environmental regulations. Only one interviewee stated that environmental regulations could help to phase-out coal (e8). Several interviewees argue that environmental regulations would not be effective (e3, e4, e7, e9). Interviewees stated that Indonesia has a large number of regulations but that these are often not implemented or laws broken (e3, e7). Further, e3 stated that local pollution is not necessarily perceived by civil society as a big issue and is not addressed comprehensively by politics in public debates. E3 argues that the low momentum to introduce environmental regulations to reduce pollution would be outweighed by the benefits of having abundant and cheap electricity from CFPP. Interviewees argue that lobbying efforts often weaken environmental regulations (e3, e7). Several interviewees argue that law enforcement should be strengthened instead of introducing more environmental regulations (e4, e9). E5 argues that transparency and monitoring of complying with regulations should be increased. However, interviewees stated that local governments do not have the resources to monitor or enforce environmental regulations (e5, e7). E11 states in this regard that civil society could contribute to monitoring adherence to regulations. E6 stated that an increasingly informed and active society could contribute to demanding more stricter environmental regulations or even demanding legal persecution.

E9 stated similarly that civil society organisations could demand stricter environmental regulations, but in other countries, this was only possible through fierce opposition, which has come with enormous risks to the organisations. E10 stated that in other parts of Indonesia, concerns and strong local resistance from local citizens over the construction of new CFPP are increasing. However, e11 highlighted that the civil society in Indonesia is weak and that they often feel threatened, which is exacerbated by local armed forces which protect coal mining operations and which threaten citizens when they voice their concerns or protest against coal operations. E11 stresses that the government could play a role in protecting civil society to make them feel more secure in voicing their concerns.

The interviewees had differing views on reducing illegal mining. Several interviewees emphasised that illegal mining could be reduced by increasing transparency and strengthening regulation of the mining licensing procedure (e1, e2, e11). E1 emphasised that decentralised licensing poses a difficulty for effectively controlling the licensing process. Increased law enforcement could also reduce illegal mining (e2, e3, e6). Interviewees highlighted that illegal mining could be reduced by offering alternatives for economic development (e6, e7, e11). E2 suggests increasing cooperation between employers, mining workers, and the government. E2 argues that these interest groups could have an interest in reducing illegal mining since it would be in their interest. Employers lose potential revenues from illegal mining, workers are often not treated well in illegal mining operations, and governments lose revenue from illegal mining companies which do not pay coal royalties or taxes (e2). E4 similarly states that increased awareness of the negative consequences of illegal mining could aid in its reduction. However, e4 emphasises the difficulty in reducing illegal mining since actors who could drive efforts to reduce it often benefit from it. Further, e8 stresses that increased monitoring of illegal mining seems rather unfeasible due to the number of monitoring stations which would be required.

Regarding the reduction of corruption in the mining sector, interviewees stated that increasing transparency (e1, e2), law enforcement (e2), and the quality of the legal institutions (e3) could aid in its reduction. However, several interviewees stated that corruption is deeply rooted in some sectors. For example, interviewees stated that corruption has started especially during the dictatorship and that these practices have *culturalized* (e5), that the *culture* still exists (e4), and that corruption is *entrenched* (e11). E4 and e5 stated that there has been progress in reducing corruption, especially due to the work from the Corruption Eradication Commission, but that further progress is needed. E9 stressed that these kinds of organisations need to be empowered further. E4 also stated that the decentralisation process transferred the corrupt practices from the central to the regional or provincial level. E8 highlights that as long as coal generates value, corruption will always exist in the sector. E8 also highlights that different organisations have tried to reduce corruption by *publicly naming and shaming* corrupt behaviour, but that this has not made any difference and that these organisations were often sued for their actions. E9 argues that the only thing that could *mildly help* to reduce corruption would be pressure from the public society and public opinion. However, e11 stated that there is much risk involved for civil society groups and NGOs, and that they are *risking their lives* to highlight corruption and that they are even threatened at home by armed militia groups in some parts of Indonesia.

The interviewees largely agreed that the fiscal and administrative decentralisation process has also led to increased coal production in Indonesia and the province of South Kalimantan (e1, e7, e8). The decentralisation process incentivised the regions and provinces to support coal for increased revenues (e3) and has shifted corrupt practices to the regional or provincial level (e4, e7, e8). E4 stated that the decentralisation does not necessarily hinder a coal transition, but that much depends on the local leadership and the commitment to environmental issues.

This part now addresses L3 of the Williamson scheme, especially the aspect of compensation. The interviewees have different views on compensation, who should be compensated and who could pay for this. The interviewees generally agree that compensation should be paid (e1-e4, e7-e10). Potential

stakeholders which could be compensated are coal mining workers (e1, e,2, e3, e7), employees in CFFP (e2, e5), owners of CFPP (e2, e5, e7, e10), local communities (e2, e3, e4, e7), coal mining companies (e1), or low-income households which could be affected by increasing electricity prices (e3). E2 even states that the social aspect of a coal transition is the most pressing one and that affected workers should be compensated. However, e6 also highlights that compensation could remain *wishful thinking* as long as public society does not have the power to demand these measures. Further, e8 highlights the difficulty of compensating informal workers who do not have formal connections to coal companies. E3 emphasises that especially given political economy aspects, compensation should be paid to ensure the feasibility of a coal transition by incentivising powerful actors who could otherwise oppose reforms. E6 and e9 similarly argue that compensation can reduce resistance against phasing-out coal. However, e8 also highlights the challenge of dealing with *free-riders*, who would only provide support in exchange for financial support. E9 similarly highlights that coal mining companies or operators of CFPP could postpone decisions on plant and mine closures by anticipating compensation or financial support.

Interviewees argue that the aspect of compensating coal mining companies remains difficult and questionable (e3, e6, e7, e9). E3 hereby specifies that, on the one hand, large coal mining companies often have CCOWs which legally give them the right to mine coal, which could entitle them to compensation. On the other hand, from an environmental justice perspective, these coal mining companies contributed to the environmental damage from their operations, and they did not pay the true costs of their operations (their externalities), and it remains questionable if these companies should then be compensated. However, interviewees argue that coal mining companies might need compensation from a political economy perspective to ensure their political buy-in (e3, e6). E5 highlights similarly that IPPs often have take-or-pay contracts with PLN, where PLN has to pay the IPPs for the electricity they supply, which is often contracted over 25-30 years and ensured by the MoF. This means that IPPs have a legal right to get paid for their electricity supply from CFFP. If CFPP would decrease, IPPs would have the legal right to be compensated for that (e5). However, e7 also states that compensation to owners of CFPP should be dependent on the lifetime of the power plants and whether these are already paid off.

The aspect of which compensation measures could be implemented was also answered by interviewees differently. Compensation could not only be paid by financial support but also by promoting employment development training (e2, e4, e8, e11). The respondent stated that the finance for the compensation could be either paid by redirecting funds from fossil fuel subsidies (e2) or by offering coal companies incentive schemes and favourable conditions in PPAs for the deployment of RES (e3) or directly by the government (e3). E11 also highlighted the psychological impact which a coal phase-out could incur on coal workers and that these issues might also need to be addressed as part of compensation measures.

In line with compensation, several interviewees also provided insights on alternative forms of economic development and highlighted the need for these measures in affected coal regions (e1, e2, e5-e9, e11). E9 stressed that coal regions must diversify their economy but that the risk exists that these regions try to diversify their economies by looking for upstream or downstream linkages in the value chain of coal, which only increases the dependency on coal. E9 also highlighted the need to transition the informal economy around coal, which exists around mining regions. E11 further stressed that people often move away from regions where the coal sector declined, which leaves regions economically depleted. E2 stated that if the renewable energy market would provide sufficient jobs and opportunities for economic development, a tipping point could be reached for phasing-out coal. Interviewees further emphasised that alternative forms of economic development could come from different sectors, such as transport, manufacturing, or mining for minerals required for RES (e2), or also from the technology sector, ecotourism, or game reserves (e11). E2 stressed that local governments in Indonesia on the provincial

and municipal levels often do not have the capacity and knowledge to develop strategies for alternative forms of economic development. E11 highlights that the national government needs to play an active role in facilitating alternative forms of economic development in the affected coal regions.

The aspect of deregulating, liberalising, or privatising the electricity sector was also answered by interviewees differently. Several interviewees stated that a liberalised market could ensure a level playing field, increase the competitiveness of renewables (e3, e4, e6, e10, e11), and attract more international investors (e10). However, e3 also argued that a liberalised market would not necessarily ensure a level playing field and drive a coal transition since this would also depend on the extent of prevalent fossil fuel subsidies. Further, e6 stressed that a liberalised market would not necessarily benefit local communities since companies in the electricity sector would not necessarily have the incentive to, for example, connect small islands to the grid or to provide cheap electricity there. E2 was unsure whether liberalisation of the electricity sector would drive a coal transition. E3 emphasised that the current dominant market position of PLN and its position as a SOE makes it very powerful and enables PLN to influence policymaking. E4 stated that PLN would only support a coal transition if they would benefit from it. Several interviewees stated that it would be difficult to liberalise or privatise the electricity market. Most importantly, several interviewees stated that liberalising or privatising the electricity sector would be very difficult in Indonesia due to the Indonesian constitution stating that natural resources and electricity as a common good should be under the control of the government (e1, e3, e5, e7, 38). Furthermore, liberalisation of the electricity sector in Indonesia is also hindered by political economic factors and vested interests (e3), and PLN, as a powerful actor, could oppose this (e4, e8). However, several interviewees stated that the electricity sector could be restructured partially. E1 emphasises that the electricity generation market is slowly opening up to IPPs. Furthermore, e5 highlights that the MEMR is considering partially separating the responsibilities of PLN by creating separate entities responsible for generation, transmission, and distribution. E5 states that this would not directly liberalise the market but could increase transparency. E8 stated that currently, different organisations are discussing with the PLN the possibility of reforming PLN to some degree. E10 similarly states that deregulation or liberalisation is slowly gaining more interest in Indonesia.

Several interviewees believed that carbon pricing, as another possible institutional intervention, could be feasible in Indonesia (e1, e2, e3, e5, e8) and could drive a coal transition (e8, 10). Some interviewees stated that the currently planned carbon tax is too low (e7). Several interviewees stated that the monopolistic structure of the electricity market could render carbon pricing ineffectual (e6, e7, e9). Some interviewees stated that the MoF seems relatively open to carbon pricing (e1, e3). E1 states that resistance from the industry can be expected due to expected increased production costs. E3 highlighted that the resistance from PLN and potential lobbying could keep carbon prices at a low and ineffective level. Furthermore, e3 stated that the political difficulties of raising electricity prices in Indonesia might pose a strong barrier to implementing carbon prices. However, e2 emphasised that the revenues from carbon pricing to the government could be redirected to social programs, such as employee development programs, and that transparency about the distribution of the revenues from carbon pricing is key to ensuring support. E9 further highlighted the huge bureaucratic effort involved with carbon pricing and the opportunity for corrupt practices. E11 highlighted that an effective tax revenue collecting system would need to be established with a strong institutional foundation for collecting carbon taxes. Lastly, e5 highlighted that a pilot project for a cap-and-trade mechanism was introduced for selected coal plants and that the pilot was deemed successful by the government.

The aspect of subsidies, either decreasing subsidies for fossil fuels or increasing subsidies for RES, was perceived differently by the interviewees. On the aspect of decreasing fossil fuel subsidies, interviewees highlighted the need for decreased fossil fuel subsidies but also associated difficulties due to increasing electricity prices and associated political interest (e3), the entrenchment of subsidies and associated

vested interests (e9), increased costs for households (e1), the reliance of the current electricity infrastructure on subsidies (e5, e6), and past demonstrations in Indonesia from attempts to reduce subsidies (e4). Several interviewees highlighted the need to gradually remove fossil fuel subsidies (e1, e2) and the need to compensate affected and vulnerable groups (e2, e4). E7 stated that it seems very unlikely that coal subsidies in Indonesia would be lifted.

Regarding increasing subsidies for RES, e7 emphasised that this could be possible and feasible in Indonesia. More specifically, FiTs, as a certain form of subsidies for RES, were perceived by some interviewees as effective for accelerating the expansion of RES and could be feasible in Indonesia (e1, e2, e3). FiTs for the expansion of rooftop PV in Indonesia could be effective (e6). E1 highlighted that FiTs are being currently discussed for regulations and that these might be implemented. Interviewees stressed that the design and the level of FiTs are important for their effectiveness (e2, e9). E3 stressed that changing regulations regarding FiTs in Indonesia and the associated risk and uncertainty pose a barrier for IPPs. The uncertainty over the costs which FiTs might incur poses another barrier to their implementation in Indonesia (e10). E2 highlighted that subsidies for RES also distort the market and that subsidy reforms must be carefully designed.

Only a few interviewees commented on emission or renewable portfolio standards. E9 stated that they could generally work to increase the share of RES. E7 highlighted that these standards would probably be implemented, but their effectiveness depends on their design and how they will be governed. Interviewees highlighted the problem that these standards could not be adhered to and that these only help if they are implemented and enforced (e6, e11). Similarly, e9 stated that emission standards are especially prone to not being adhered to. E5 highlighted that the current draft for the renewable energy law includes renewable portfolio standards. However, e5 stressed that the current phrasing of the draft states *new energy* and that currently, efforts are being conducted to rephrase the term to renewable energy since *new energy* could also include alternative fossil fuels.

The need for increased communication and cooperation between actors was mentioned by several interviewees (e4, e5). E4 identified the lack of communication between ministries as a barrier to decarbonisation in general. E5 highlighted that the discussion of phasing-out coal on the national level is unstructured, has many ministries involved, and seems to lack clear leadership. E5 further stressed that the local and national governments seem to have different perspectives on phasing-out coal and that increased communication could be required to make the national government more aware of the local perspectives. Implementing a task force for increasing communication and cooperation between ministries and other organisations was suggested (e4, e5).

The interviewees presented differing views regarding the feasibility of a coal transition in the near future. Most interviewees stated that a coal transition would not be feasible in the near future (e1, e2, e3, e4, e6, e7, e10, e11) but might be feasible in the long term (e1, e2, e3, e4). Several interviewees stated that the next 5 to 10 years could lead to changing market dynamics (e2, e3, e4). E4 stated that stakeholders in South Kalimantan do not seem to see the urgency of preparing for a coal transition since they believe that coal will be a good commodity for the next 5 to 10 years. E3 highlighted that a global decline in the demand for coal in the next ten years could lead to an oversupply of coal, leading to decreased prices and a resurfacing demand if there is no global carbon price in place. E4 further stated that unforeseen events and circumstances, such as wars, could set back efforts for phasing-out coal. E5 highlighted that the feasibility depends on the smoothness of negotiations and adequate compensation schemes.

This section addresses the issue of financing a coal transition. E3 highlights that the government and taxpayers would pay for a coal transition. Several interviewees stated that the international community could financially support the coal transition in South Kalimantan (e2, e3, e4, e6), especially by more

developed states (e2, e3). However, several interviewees highlighted the difficulty in achieving this (e3, e6). E6 highlighted that international finance could likely flow to projects creating the largest revenue and not to projects which might benefit the local society the most. E4 emphasised that from a polluter pays principle, the coal mining companies and operators of CFPP should pay for the transition. However, E3 argued that from a political economy perspective, it is unlikely that coal companies or coal oligarchs would pay for a transition, even though these benefitted from coal over the last years and have not paid any externalities. A further possibility for financing the transition could be to lower interest rates by providing institutional certainty and thereby reducing risks (e3). Stable and trustable markets could further attract international investments (e6). E3 highlights the importance of considering the least cost principle, whereby economic efficiency is achieved when an environmental target can be achieved at the least cost. E3 argues that international finance could focus on reducing global GHGE at low costs by providing financial support to Indonesia for phasing-out coal. E10 highlights the need to convince banks to divest from coal projects and to focus on renewable energy projects. E6 further highlighted the need for standards and requirements for investments in renewable energy projects. Lastly, E8 highlights the need to establish an *energy transition fund* that pools financial resources.

This last section addresses the aspect of international assistance, both through financial and technical support. Several interviewees highlighted the importance of international support for phasing-out coal (e1-e9). E1 highlighted that international technical and financial support is currently being provided for retiring plants for CFFP. Further support is provided by technical assistance for designing policy reforms (e1). Financial support could also be provided to support a coal transition (e2, e3, e4, e9, e11). Interviewees highlighted that international support in knowledge and capacity building for enabling a transition could also play a role (e4, e9, e11). E6 thereby highlighted that capacity building at the local level is much more important than providing technical assistance. This is especially important since capacities at the local level in Kalimantan seem to be limited (e8). Support could also come in data provision, statistics, personnel training, raising awareness (e4), or research and provision of academic findings (e5). E4 even stated that provincial or local governments in Indonesia actually expect support from the international community to facilitate a coal transition. International support could also be provided for handling larger shares of RES in the electricity grid (e9), for reskilling coal workers, or by providing education (e11). E5 stated that the MEMR has a keen interest in phasing-out coal and that international support could facilitate decision-making and strengthen decision-makers confidence to pursue a coal transition. Several interviewees stated that international support by developed states is a moral responsibility (e6, e10, e11).

Lastly, the interviewees suggested further interventions or instruments which could enable a coal transition in South Kalimantan. E7 mentioned that when coal plants are shut down, some of the existing infrastructure could be used for renewable energy projects. E7 further mentioned that existing coal plants could potentially be retrofitted to utilise biomass, natural gas, or hydrogen. E8 further stresses that the regulated electricity tariff for PLN poses a significant barrier to changing their strategy on CFPP. E11 highlighted that the land use in Indonesia needs to be monitored more effectively to understand how and where land is used for coal mining and emphasises that digital tools could enable this. Further, e11 argues that the capacity of the corruption eradication commission needs to be strengthened and that citizen groups could be included to monitor corruption at the local level. However, these citizen groups would also have to be protected by the corruption eradication commission (e11).

As stated at the beginning of this chapter, Table 6, which is presented below, provides a summary of the results from the interviews. Table 6 focuses on the responses by interviewees to the proposed institutional interventions and highlights the expected political feasibility and effectiveness of the proposed institutional interventions.

Level of Insti-tutions	Proposed Institutional Interventions in Interviews	Further responses by interviewees regarding proposed institutional interventions	Expected Political Feasibility & Effectiveness of proposed institutional interventions
L1	Changes on the Embeddedness Level	• Increasing awareness for needed decarbonization, local pollution, and environmental issues • Providing education on climate change • Increasing knowledge of RES • Fostering citizen participation • Providing alternative employment opportunities • Increasing international pressure • Strong influence of market dynamics • Strong political leadership required	• Low awareness of key stakeholders for needed decarbonization • Relocation of Indonesia capital could spur debate around economic restructuring in Kalimantan
L2	Implementing an Independent Regulator	• Opportunity to create a level playing field • Possible reduction of barriers for RES • Implementing a task force might be more effective than an independent regulator	• Low political feasibility • Requires political legitimacy and independence • Effectiveness dependant on roles, responsibility, autonomy, and scope of authority
	Implementing stricter Environmental Regulations	• Increasing law enforcement • Increasing transparency and monitoring of compliance • Monitoring of compliance by civil society • Facilitating protection of civil society for increasing citizen participation	• Low / no effectiveness due to non-adherence and lobbying efforts
	Allocation of Mining Permits	• Strengthening regulations and increasing transparency to reduce illegal mining • Local leadership required to foster a coal transition if decentralized mining allocation remains	• Decentralized mining permit allocation has shifted corrupt practices to the provincial level, posing a greater barrier to a coal transition
	Corruption Reduction	• Increasing transparency, law enforcement, and the quality of the legal institutions • Increasing public pressure	• Difficult to reduce due to entrenched and culturalized corrupt practices
	Reduction of illegal mining	• Reduction by providing alternative forms of economic development • Increasing cooperation between stakeholders • Increasing awareness of negative consequences of illegal mining	• Rather low feasibility of increased monitoring • Difficult to reduce illegal mining due to vested interest
L3	Compensation Schemes	• Compensation measures required for a successful coal transition • Differing views on who should be compensated • Compensation to reduce resistance of regime incumbents • Compensation could be legally required for CCOWs or take-or-pay contracts • Provision of employment development training	• Compensation as w*ishful thinking* if no empowerment of public society • Difficulty compensating informal workers • Problem of potential free riders
L4	Providing alternative forms of economic development	• Provision of alternative forms of economic development in affected regions • Diversification of coal dependent economies • Transitioning informal coal economy • Fostering renewable energy markets	• Limited local capacity and knowledge for developing development strategies • National government to facilitate alternative forms of economic development
	Market Regulation,	• Partial restructuring of the electricity market possible	• Difficult to liberalise or privatize electricity market

	Liberalisation, Privatisation	• Creation of separate entities of PLN responsible for generation, transmission, and distribution to increase transparency • Market slowly opening to IPPs and liberalisation or deregulation is slowly gaining more interest	• Indonesian constitution as main barrier for liberalisation • Differing views on effectiveness • Prevalent fossil fuel subsidies still extort market • Risk of neglect of local communities and small islands • Influence of PLN on policymaking due to dominant market position of PLN • Vested interests hinder liberalisation
	Economic measures - Carbon Pricing, Subsidies & Taxes	• Redirecting revenues from carbon prices • Increase transparency of distribution of revenues • Establishing a tax revenue collecting system • Gradually removing fossil fuel subsidies • Compensation of affected and vulnerable groups from decreased fossil fuel subsidies • FiTs effective for fostering rooftop PV • Design and level of FiTs seems crucial • Careful design and governance of emission or renewable portfolio standards required	• Carbon pricing seems feasible but current level seems too low • Pilot project for a cap-and-trade mechanism was deemed successful by government • Monopolistic market structure, resistance from PLN and industry, and lobbying could render carbon pricing ineffectual • Political difficulty of raising electricity prices and reducing fossil fuel subsidies • FiTs seem feasible, but uncertainty over costs as barrier • Possible non-adherence to emission or renewable portfolio standards
General	Increased communication and cooperation	• Increased vertical and horizontal communication and cooperation between ministries, local, and national governments • Implementation of a task force	• Lack of communication between ministries hindering a coal transition
	Finance	• International community to financially support coal transition • Lowering interest rates by providing institutional certainty • International finance for following a least cost principle for reducing GHGE • Fostering divestments from coal projects • Implementing standards and requirements for investments in renewable energy projects • Establish an energy transition fund	• Flow of finance to most profitable, and not most socially beneficial projects • Unlikely to implement a polluter-pays-principle
	International assistance	• Support for retiring coal plants • Support for designing policy reforms • Support for knowledge and capacity building • Further technical support required	• International support expected by provincial and local governments • Interest of MEMR to phase-out coal, but international support could foster decision-making
	Further interventions / instruments	• Use of existing infrastructure for development of renewable energy • Retrofitting of coal plants • Changing PLN's regulation of electricity tariffs • More effective monitoring of land use • Strengthen capacity of corruption eradication commission • Protection of citizen groups for increasing citizen monitoring of local corruption	-

Table 6: Summary of Results from Interviews

6 Discussion

This chapter discusses the results of the expert interviews and embeds them in the broader scientific literature presented in the previous chapters. This is conducted by discussing the implications for practice and, subsequently, the implications for research and theory. The societal relevance of the findings is discussed, research limitations addressed, and recommendations are provided for further research.

6.1 Implications for Practice

This chapter discusses the implications for practice of this research. As discussed in Chapter 1.1, the problem that this research addresses is the resistance of powerful actors in the political economy of coal in Indonesia towards a coal transition in South Kalimantan. The research question of this research is: *How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy of coal through institutional interventions?*

As discussed in Chapter 5.1.1, this research adopts the view that institutional interventions should be pursued which are politically feasible and that the social optimum should merely serve as a benchmark (see Biber et al., 2017; Brauers & Oei, 2020; Jakob et al., 2020). In the political economy of coal in Indonesia, which is marked by a high degree of vested interests, those interventions are likely to be adopted which serve the interests of the most powerful actors and do not harm the interests of powerful actors (see Jakob et al., 2020; Ordonez et al., 2021; Yudha et al., 2018).

Furthermore, as discussed previously, Atteridge et al. (2018) conclude in their study on the political economy of coal in Indonesia that "[t]he fundamental structures of the system that triggered such rapid growth in coal production over the last decade remain relatively unchanged" (p.25). They further highlight that corruption is widespread, politicians have vested and financial interests in mining activities, mining management and oversight are weak, and the overarching goal of the Indonesian government is to increase domestic coal demand.

As discussed in Chapter 2.2.6, insights from the study of complex systems, systems thinking, and especially systems archetypes can provide valuable insights for intervening in complex systems, such as the political economy of coal. In addition, the study of institutions can be seen as a form of delineating systems into subsystems and identifying relationships between elements of systems and other systems. Three systems archetypes were presented in Chapter 2.2.6. Policy resistance occurs when actors resist policies which could harm their interests. A solution to this situation is to seek ways to realise the actors' goals in a mutually satisfactory way. Given the theoretical assumption from NIE, as discussed in Chapter 2.2.5., that individuals aim to maximise their utility and that institutions structure the interaction of individuals (see North, 1986, Williamson, 2000), it seems that mutually satisfactory results for actors can be expected when their aim of maximising their utility is fulfilled, or at least not harmed. The *Tragedy of the Commons*, the second archetype, could be overcome by educating the resource users to enhance their understanding of potentially negative consequences, privatising the resource, or regulating access. The third archetype, rule beating, which can be seen in corrupt practices in the Indonesian coal sector, could be overcome by ensuring that the consequences of the rule beating serve the purpose of the rule itself.

In the following, the results of the expert interviews will be discussed, embedded into the scientific literature, and complemented with insights from NIE and systems thinking. In general, the interviews' results complement the scientific literature findings on the drivers for the current dominance of coal in Indonesia, which were presented in Chapter 4.4.3. The aspect of vested interests and the influence on

the coal sector was also stated by interviewees, which complements the findings from the literature, and provides further justification for the scope of this research.

Further barriers to the expansion of RES largely complemented the findings from the literature. However, one aspect not mentioned previously was the issue that decreasing prices of RES in the future could make coal uncompetitive, which could lead to an oversupply of cheap coal which then floods the market. As suggested by one interviewee, an international carbon price would be required to prevent this.

The expert interviews provided valuable insights into potential factors which could influence the current course of the Indonesian government for coal mining and the expansion of CFPP. Most importantly, market forces were deemed influential, especially related to declining costs of RES and reduced international coal demand. In addition, several interviewees stated that increased awareness of both the public and key decision-makers of climate change and environmental damage from coal-related practices could drive a coal transition. This closely aligns with results from the interviews for possibilities to intervene on the embeddedness level (L1) of the Williamson framework. Increasing awareness, providing education on climate change, citizen engagement, the influence of voters on political processes, and strong political leadership could exert influence on the political economy of coal. Interviewees suggested international pressure and international financial and technical support for enabling this. This could be conducted by international organisations, such as the UNDP, the World Bank, or the ADB, by firstly assisting but also by divesting from coal projects. NGOs could further aid in raising awareness and providing education in South Kalimantan on climate change and environmental impacts. However, as presented in Chapter 5.1.3, coal is framed in the narrative of the Indonesian coal sector as an abundantly available and cheap national capital to alleviate poverty, provide public infrastructure, and provide energy security and energy access. Electricity from RES is mostly considered for off-grid systems. This highlights the need to support the deployment of cheap, reliable, and secure RES to provide alternative forms of energy for meeting the demand and for providing energy access and -security. International organisations could further aid in this by providing financial and also technical assistance since especially capacities and knowledge on the local level are limited. However, from the perspective of NIE, institutions on L1 change slowly and often non-calculative (see Williamson, 2000). Changes in these beliefs can either be realised through internal or external pressure. External pressure could come from international organisations or climate agreements, such as COP26 or the Powering Past Coal Alliance. Importantly, Indonesia declared in the COP26 statement that Indonesia would "consider accelerating coal phase out into the 2040s, conditional on agreeing additional international financial and technical assistance" (UNFCCC, 2021, Section: Statement supported by:), as discussed in Chapter 1. This further emphasises the results from the expert interviews that some actors in provincial or local governments in Indonesia expect support from the international community to facilitate a coal transition.

In conclusion, international support in terms of financial and technical assistance for managing a coal transition seems vital for changing institutions on the embeddedness level. Further influence can be exerted by educational programs and by raising awareness in affected regions. International organisations can play a vital role in facilitating this in South Kalimantan. In addition, from a systems thinking perspective, education of the local population regarding the consequences of coal extractions, especially illegal mining, could aid in counteracting the Tragedy of the Commons. Furthermore, increasing awareness at the public level might even strengthen the feedback loop between the public and the political system. When politicians realise that climate and environmental issues are gaining importance to the electorate, changes in political practices might occur, or new political parties might emerge that challenge the existing regime. The international community can further influence the coal transition in Indonesia by interventions aimed at reducing global costs of RES, such as supporting

research and development, providing subsidies, or by other regulations to support the deployment of RES. This would reduce global costs, which could influence the energy market in Indonesia and South Kalimantan.

Results from the interviews regarding institutional interventions on L2 of the Williamson scheme complement findings from literature but also provide additional insights. The feasibility of implementing an independent regulator seems rather low. Different responsibilities of already existing ministries and their boundaries seem to make the implementation of an independent regulator difficult. Challenges associated with ensuring legitimacy, defining its roles, responsibilities, and scope of authority exist. These challenges complement the findings from Chapter 5.1.4.2 (see Biber et al., 2017; Lamb & Minx, 2020). The risk of the *climate mafia* in Indonesia taking control of the independent regulator seems given. A dedicated task force dealing with issues of coal transitions might be more suitable. However, similar challenges exist regarding the implementation of a task force. In conclusion, the political feasibility and effectiveness of implementing an independent regulator for advancing a coal transition seem rather low. Implementing a task force could be advisable, but independence and legitimacy would have to be ensured.

Similarly, the results from the interviews suggest that implementing further environmental regulations seems rather ineffective. Lobbying could reduce the scope of regulations, proposed regulations are often not implemented, or regulations are simply circumvented. Instead, strengthening law enforcement, increasing transparency, and enabling adequate monitoring of practices in the coal sector seem more effective. However, capacities for these measures are rather low at the local level. National support from the Indonesian government or support from international organisations could improve capacities for implementing these measures at the provincial level in South Kalimantan. Furthermore, an increasingly informed and active society could exert pressure on politics or even monitor environmental regulation adherence. However, due to existing risks and threats from armed forces for voicing opinions related to coal mining operations or corruption, governmental support for promoting a secure environment for citizen engagement would need to be ensured.

These measures could also enable improved mining site restorations. Politicians could be incentivised to increase mining site restorations due to increasing concerns over these issues from the local population in Kalimantan, as discussed in Chapter 4.4.3, which could otherwise negatively affect political popularity.

The interviews' results complement the literature findings that the fiscal and administrative decentralisation process has led to a rapid increase in coal mining. As interviewees stated, the decentralisation process does not necessarily hinder a coal transition, but much depends on the local leadership and the commitment to environmental issues. Findings from the literature further suggest establishing accountability and reinforcing monitoring mechanisms for decentralised permit allocation to reduce corrupt practices in the mining sector (see Faisal, 2015).

Results from the interviews suggested similarly that corrupt practices and illegal mining could be reduced by increasing transparency, increasing law enforcement, increasing cooperation between affected stakeholders to foster an understanding of the negative impacts of these practices, and increasing awareness of these issues. Importantly, providing alternative means for economic development could further reduce illegal mining. However, difficulties arise from the deeply rooted and *entrenched* practices of corruption which have trickled down from the dictatorship and have become *culturalized* in certain areas, as interviewees stated. Efforts by the Corruption Eradication Commission could be enhanced to fight corruption in South Kalimantan. In addition, pressure from the public society and public opinion could help to reduce corruption. However, threats by armed militia increase the risk

of publicly denouncing corruption. Strong political leadership and the provision of a more secure environment could aid in fostering broader civil engagement to reduce corruption.

Systems Thinking and the systems archetypes of *Policy Resistance* and *Rule Beating* can provide valuable insights in this regard. From the perspective of policy resistance, institutional interventions would have to be defined which serve the actors' interests in a mutually satisfactory way. One way this could be achieved in the coal mining sector in South Kalimantan would be to provide alternative forms of economic development. This could be, for example, in the transportation or manufacturing sector. Especially manufacturing of products for RES could provide employment opportunities and generate provincial and local economic development opportunities. Actors in the associated coal industries could be less resistant to institutional interventions when their interest in maximising or satisfying their utility is fulfilled. The same could be applied to the system archetype of rule beating. If the economy in South Kalimantan would move toward a non-fossil fuel-based economy, the creative energy of rule beating and corruption (see Meadows, 2008) could be shifted to a non-fossil fuel-based economy. Corruption would likely still exist, but its occurrence could still contribute to the overarching goal of reducing GHGE by reducing coal consumption.

This section addresses L3 of the Williamson scheme, which deals with compensation. Firstly, following the logic of the systems archetypes, compensation to affected actors from a coal transition could provide a way to reduce the expected policy resistance. This also aligns with insights from the literature on political economy, as discussed in Chapter 5.1.5. In addition, the results from the interview suggest that compensation should be paid in the context of a coal transition in South Kalimantan. Compensation could be paid to employees in the coal sector, owners of CFPP, coal mining companies, local communities, and low-income households. The compensation of coal mining companies and owners of CFPP remains disputable in terms of environmental justice and from a polluter pays principle, but seems to be required in terms of political economy aspects for ensuring buy-in and support of powerful actors in the coal sector. Especially CCOWs for coal mining companies and take-or-pay contracts with IPPs could provide a legal entitlement for compensation in case of a coal transition. Compensation does not necessarily have to be provided monetarily to affected workers but could also be provided in terms of employee development training. This complements findings from Caldecott et al. (2017) on coal transitions, as discussed in Chapter 5.1.5, whereby former coal workers might be in a more favourable situation after development training than merely receiving financial compensation. However, the authors also highlight that coal workers often prefer direct financial payments. Therefore, it seems important for compensation schemes to consider these aspects and find ways to convince coal workers that employee development training for other forms of work might be more favourable. Considerations of a managed retreat whereby workers are relocated to different regions in closer proximity to alternative forms of employment, as discussed in Chapter 5.1.5, were not mentioned by interviewees and are deemed unfeasible for South Kalimantan due to the loss of social identity and expected resistance from stakeholders in South Kalimantan.

The provision of alternative forms of economic development closely aligns with the aspect of compensation. The findings from the literature suggest that this poses one of the biggest challenges for coal transitions (see Brauers et al., 2020; Diluiso et al., 2021). As discussed in Chapter 5.1.6.1, the provision of transport infrastructure, the establishment of a renewable energy sector, including solar, wind, and potentially green hydrogen or also natural gas (even though not deemed a RES), the co-development of RES and energy-intensive industries provision, and the provision of educational opportunities, such as universities, could provide alternative forms of economic development. Interviewees suggested that alternative means for economic development could also come from ecotourism or the establishment of game reserves. These measures would require close collaboration between ministries, provincial, and district governments in Indonesia (see Arinaldo & Adiatma, 2019).

The results from the interviews suggest similarly that the aspect of providing alternative forms of economic development is of crucial importance for affected regions. Interestingly, one interviewee stated that provincial and municipal governments often do not have the capacity and knowledge to develop strategies for alternative forms of economic development. This indicates that further support from the national government or the international community could support developing strategies for creating alternative forms of economic development.

The interviews and the literature findings indicate that deregulation, liberalisation, or privatisation of the electricity sector could reduce the influence of vested interests, increase the competitiveness of RES, and accelerate a coal transition. However, it seems unlikely that the electricity sector would be fully liberalised or privatised due to the narrow interpretation of the constitution. Partial steps could be taken, as already seen in the generation of electricity, or separate entities of PLN could be created to increase transparency. Findings from literature further suggest that the MoF and the MOEF would have to be consolidated with the MSOE to successfully reform PLN or that the incentive system of PLN would have to be changed to make RES more attractive (Ordonez et al., 2021; see also Bridle et al., 2018). In addition, the powerful influence which PLN exerts on policymaking makes these steps rather unrealistic. However, interviewees suggest that the possibility of reforming PLN is gaining interest or that PLN is already considering reforming itself.

In conclusion, it seems unlikely that the electricity sector could be fully liberalised or privatised. Creating separate entities of PLN responsible for generation, transmission, and distribution could increase transparency. Partial reform could be gaining momentum. However, for coal to be phased-out successfully, further interventions would be required to make RES more competitive for the generation of electricity. Challenges would still exist since the entities responsible for transmission and distribution would be interested in receiving energy sources from the generation that do not threaten grid stability (see Ialnazov & Keeley, 2020). Further measures would be required to ensure grid stability, such as grid interconnection with East- or Central Kalimantan, improving grid management or increasing storage capacities for intermittent RES.

The introduction of carbon pricing seems likely in Indonesia and is already underway. However, carbon pricing seems rather ineffective in combination with the monopolistic structure of the electricity sector to phase-out coal. The interviews have shown that resistance from industry, PLN, and households can be expected, which complements the findings from the literature. Compensating these actors could ensure support, but lobbying efforts could reduce the effectiveness of carbon pricing. However, an initially low carbon tax could also be steadily increased (see Biber et al., 2017).

The results from the interviews suggest that decreasing fossil fuel subsidies remains challenging and unlikely, especially due to the political difficulty of raising electricity prices and existing vested interests. Increasing subsidies for RES, such as FiTs, seems likely and could drive the expansion of RES. Findings from the literature on FiTs provide valuable additional insights. Research has shown that FiTs might be a more suitable option for supporting decentralised electricity generation, such as rooftop solar PV. Setting FiTs at an adequate rate remains challenging and must be carefully designed (see Bridle et al., 2018). FiTs could be met by resistance by actors with a vested interest in coal, which might need to be compensated (see Ordonez et al. 2021). Further issues which would need to be addressed, which include: reducing the complexity of governance structures, increasing knowledge on the community level of RES, increasing coordination between related organisations (see Yuliani, 2017), and providing institutional certainty (see Ordonez et al., 2021).

The findings from the literature provide ample recommendations for expanding the share of RES in Indonesia, more specifically in South Kalimantan. General measures include: reducing regulatory requirements, removing protectionist barriers, and introducing reverse auction processes and other

market instruments, such as introducing carbon pricing or subsidy reform. For the case of South Kalimantan, solar PV, wind, and biomass were identified as suitable options for RES (see Riva & Vestarchi, 2019). Investments, foreign and domestic, could be directed to support these energy sources. Additional support can be provided for identifying appropriate sites for developing renewable energy projects with expected high yields (see Bridle et al., 2017). In addition, renewable portfolio standards tend to favour large, centralised generation (see Biber et al., 2017). Renewable portfolio standards could therefore play a role in expanding wind power in South Kalimantan. The results from the interviews have shown that renewable portfolio standards are currently included in the planning process, which indicates that this intervention could be implemented. However, the phrasing from *new energy* to *renewable energy* would have to be ensured. Furthermore, interviewees believed that emission standards are especially prone to non-adherence.

The interviews' results complement the literature findings that increased cooperation and a multi-level governance approach would be required to facilitate a coal transition in South Kalimantan. Especially actors at the provincial or local level in South Kalimantan should be included in energy planning, and a bottom-up approach should be facilitated (Setyowati & Quist, 2022; see also Caldecott et al., 2017; Marquardt, 2014). Increased cooperation between ministries would also be required. Implementing a task force responsible for coordinating a coal transition could be required to bridge communication. Especially civil engagement could aid in creating support and momentum, but civil engagement of local actors in South Kalimantan is limited in energy planning (see Setyowati & Quist, 2022). International organisations and NGOs could facilitate broader engagement of civil society.

Further investments into other technological solutions were covered in Chapter 5.1.6.5. Investments in natural gas or nuclear energy, even though not RES, could facilitate phasing-out coal with lower GHGE. Investments into CCT would be required to reduce GHGE from CFPP and present a viable and feasible intermediate solution. Additionally, investments for improving the energy efficiency of CFPP and investments in CCS could further reduce GHGE.

The issue of rationing, bans, or moratoria was not discussed in the expert interviews. However, as discussed in Chapter 5.1.6.6, the Indonesian government has made many announcements, such as moratoria or production caps, but these were often not implemented as intended or codified into regulation (see Atteridge et al., 2017). This indicates that more political commitment would be required to pursue these institutional interventions further. Without political commitment and further compensatory measures, these interventions seem politically unfeasible.

This section addresses the aspect of financing. Experts stated that the source of finance could be from the government, the international community, coal mining companies, or operators of CFPP. From a polluter pays principle and environmental justice perspective, making coal mining companies or operators of CFPP pay for part of the transition could make sense. However, from a political economy perspective, this seems unfeasible in Indonesia. The results from the expert interviews largely complement the findings from the literature. The aspect of financing seems to be of crucial importance to bear the costs of a coal transition. The results, in general, indicate that the international community can contribute greatly through financial support. This could even be an economically efficient way to reduce global GHGE. From an ethical perspective, as discussed in Chapter 5.1.7., more developed states could have an ethical responsibility to support climate change mitigation in less developed states. However, in practice, this seems challenging. In addition, some mechanisms would be potentially required to ensure that international finance is directed to the dedicated purposes and is not redirected by corrupt politicians. As one interviewee suggested, establishing a dedicated fund for a coal transition would be advisable.

6.2 Implications for Theory and Research

This chapter discusses the implications for theory of this research. This thesis aims to contribute to the understanding of how institutions influence the behaviour of actors, and institutional interventions could influence actors towards enabling a coal transition. This research thereby used the theory of NIE and the Williamson framework as a theoretical framework. The four levels of the Williamson framework provided structure and guidance for possible institutional interventions. In addition, the Williamson framework fostered the understanding of the dependencies of institutional interventions, their relationship, and their frequency of change. In addition, to the best of the knowledge of the responsible researchers, the Williamson framework seems to have not been used for the analysis of coal transitions before. This thesis thereby contributed to a further understanding of the role of institutions and institutional development in the research field of coal transitions. The research has shown that the Williamson framework alone does not suffice in exploring possible institutional interventions for coal transitions. As stated above, the Williamson framework only provides structure, guidance, and an enhanced understanding of institutional dependencies for possible institutional interventions. For an in-depth and comprehensive identification of possible institutional interventions, further insights from different sources must be considered. The additional sources for this research included academic articles related to coal transitions, the political economy of coal- and energy transitions, and context-specific information regarding the political economy of coal in South Kalimantan and Indonesia. This research thereby contributes to the theory of NIE by demonstrating the usefulness of the Williamson framework for the analysis of institutions. Furthermore, this research highlighted the importance of changing L1 institutions. The research has shown that, especially in the case of political economy considerations, the norms, beliefs, and values of responsible decision-makers for changing institutions must change, before lower levels of institutions can be effectively altered. This is especially relevant for cases in which strong vested interest influence decision-making.

As discussed in Chapter 2.2.5, NIE applied to politics is synonymous with Political Economy. However, the application of NIE to politics is not straightforward. As stated above, for identifying possible, and more importantly, politically feasible, institutional interventions, context-specific information regarding the political economy of the sector under investigation is necessary for an in-depth and comprehensive understanding. The 'Analytical Framework for Understanding the Political Economy of Sectors and Policy Arenas' from Field Moncrieffe and Luttrell (2005) provided useful guidance for identifying relevant factors influencing the political economy of coal for this research. This thesis, therefore, contributes to the scientific community by providing the first study combining the analytical framework from Moncrieffe and Luttrell (2005) with the Williamson framework (Williamson, 2000) - to the best of the knowledge of the responsible researcher. In addition, combining these frameworks seems to enable an in-depth and comprehensive political economic analysis of sectors, with the subsequent identification of possible institutional interventions.

Furthermore, the results of this thesis confirm the need to focus on politically feasible institutional interventions, as argued by Jakob et al. (2020), Ordonez et al. (2021), Biber et al. (2017), and Brauers and Oei (2020). As argued by Ordonez et al. (2021), the effectiveness of interventions in the energy sector depends on the extent to which the influence of the coal lobby can be reduced or to which extent interventions harm public and private actors with interests in the political economy of coal. The results of this research confirm this and highlight the need to take the reality of the political economy of sectors into account for any intended interventions.

In addition, this research provides further insights into the field of transition theory. In particular, the results from the interviews and the findings from the literature emphasise the validity of the MLP from Geels & Schot (2007). The changes on the embeddedness level (L1) of the Williamson framework closely align with the concept of sociotechnical landscape changes from the MLP. These landscape

pressures could be achieved by increasing public awareness and providing education related to climate change and environmental issues. According to the MLP, the landscape could exert pressure on the sociotechnical regime to advance transitions. In addition, the results of the interviews also confirm the importance of niche innovations, as proclaimed in the MLP, to drive transitions. Even though it can be argued that RES are not necessarily regarded as niche innovations in most developed countries, they seem to be rather neglected in Indonesia and mostly seen as off-grid solutions (see Marquardt, 2014). This research further contributes to studies expanding on the MLP by including aspects of political economy into the regime level, addressing actors, power distribution, economics, politics, culture, and discourses (see Avelino & Rotmans, 2009; Avelino & Wittmayer, 2016; Geels, 2014; Sovacool & Brisbois, 2019). This research highlights the importance of acknowledging power dynamics and vested interests and proposes that interventions should focus on political feasibility and that the political economy of sectors must be carefully analysed for proposing interventions. The political reality of sectors must be acknowledged for transitions to occur.

6.3 Reflection on Societal Relevance

This chapter addresses the societal relevance of this research. The need to mitigate climate change by mitigating the emission of GHG is eminent. Especially for Indonesia, which is expected to become the fourth-largest economy in the world by 2050 (IEA, 2021a), continuing population growth, economic growth, and structural changes toward more energy-intensive industries pose a significant challenge for meeting a continually increasing energy demand. Further planned investments and expansion of CFPP undermine the announced ambitions to achieve net-zero by 2060 and could result in an exacerbated structural and institutional lock-in of the existing coal-dependent electricity sector. The archipelago of Indonesia is expected to be especially affected by climate change due to rising sea levels.

The strong dependence of South Kalimantan on coal poses a significant challenge to a coal transition. The coal sector was responsible for 18.8% of the provincial GDP in 2017 (Arinaldo & Adiatma, 2019). Any efforts to phase-out coal must therefore be accompanied by structural changes in South Kalimantan to provide alternative forms of economic development to provide long-term well-being and prosperity. This thesis highlighted the need to take these considerations into account and provided suggestions to achieve a *just transition*.

Furthermore, this thesis highlighted the need for additional investments and stressed the ethical responsibilities which lie with more developed states to provide financial aid to Indonesia to enable a coal transition in South Kalimantan. This is especially apparent since the more developed states have mostly benefitted from the extraction and exploitation of fossil fuels, such as coal, but the burden of this exploitation lies mostly with less developed states, primarily in the Global South.

In conclusion, this research is of significant societal relevance due to the possibility of its results contributing to the mitigation of climate change, ensuring a just transition, and highlighting global inequalities and the need for more developed states to meet their ethical responsibilities towards less developed states who face challenges with climate change mitigation and adaptation.

6.4 Research Limitations

This chapter addresses the main research limitations of this thesis. Firstly, the most eminent research limitation is the limited scope of available literature on the topic in English or German. More research could have already been conducted on the topic in different languages, which the author of this thesis does not speak or can read. Especially literature in Bahasar Indonesia could have already covered the topic from similar perspectives. In addition, the data collected from the literature review and desk study for the political economic analysis may not sufficiently give insights into informal knowledge and information regarding the political economy of coal in South Kalimantan. Further informal knowledge

could have been collected by expert interviews for the analysis part of this research. However, it could have been difficult to extract this informal knowledge from expert interviews due to the topic's sensitivity. In addition, as discussed in Chapter 2.3., research has already been conducted on the political economy of coal in Indonesia with extensive expert interviews covering these aspects (see Jakob et al., 2020; Ordonez et al., 2021). Nevertheless, further expert interviews, especially with actors from South Kalimantan, could provide further insights into the political economy of coal in South Kalimantan.

The second research limitation lies in the recommendations for institutional interventions. The responsible researcher of this thesis does not have an in-depth understanding of the situation in the different responsible organisations where the institutional interventions would have to be implemented. However, the extent of this research limitation was reduced by conducting expert interviews with a wide range of interviewees from different backgrounds and with a more comprehensive understanding of the real-life situation in South Kalimantan and Indonesia. Furthermore, the institutional interventions merely provide indications of possible interventions. A more comprehensive design and evaluation of the proposed institutional interventions is required.

The third research limitation refers to the focus on institutional interventions. As Ostrom (2005) states, institutions are only one factor influencing human behaviour, and there are further factors influencing how humans interact in given situations, such as biological features and genes. However, as discussed in Chapter 2.2.5, the theory of institutions, especially NIE, aims to understand how different rules affect human behaviour. This is especially relevant for this thesis since coal transitions, as discussed in Chapter 2.1.2., are heavily driven by policies. This thesis adopts the view that policies are part of institutions. This thesis aims to provide explanations of how a coal transition can be enabled by institutions. However, as stated, further factors could influence coal transitions.

A further research limitation is that the institutional interventions are mostly developed for the short- to medium-term future. Further considerations on how these institutional interventions would have to be adapted over time are not within this thesis's scope.

6.5 Further Research

This chapter provides suggestions for further research. Firstly, as addressed in the previous chapter, this thesis mainly explored and developed recommendations for institutional interventions for the short- to medium-term future. Several researchers emphasise the need for adaptive management in the case of policies (see Biber et al., 2017; Caldecott et al., 2017; Gawel et al., 2017). Further research would need to address implications which could arise from the proposed institutional interventions and how these might be addressed in the future. For example, Biber et al. (2017) highlight that FiTs could become too costly at some point and do not deliver the efficient expansion of RES as intended. They emphasise that the introduction of FiTs might even lead to the emergence of new interest groups, now in favour of maintaining FiTs for their interests. This could even lead to similar lock-in problems as currently experienced with the coal industry and infrastructure (see also Gawel et al., 2017). Further research is therefore vital to consider the long-term implications of institutional interventions and to explore how these can be adapted to new circumstances.

As Caldecott et al. (2017) indicate, further research in the context of coal transitions should explore how *key actors* can be convinced of the importance of anticipating and preparing for coal transitions. This is especially relevant for the political economy of coal in South Kalimantan and Indonesia more broadly. Furthermore, this seems especially challenging given the decentralised decision-making process in Indonesia, where multiple actors influence decision-making.

Further research could also investigate the required investments accompanying the proposed institutional interventions. What are the associated costs for the coal transition? How can these costs be

distributed? How can it be ensured that investments for specific purposes are used for the intended purposes? How can it be ensured that these investments are not redirected to corrupt individuals? These questions are of vital interest for future developments in South Kalimantan.

Similarly, more research would need to be conducted to explore alternative pathways for economic development in South Kalimantan. As discussed in Chapter 2.1.2, the dependency of regions on coal acts as one of the main barriers to coal transitions. This thesis has briefly touched upon alternative pathways for economic development, but further research would have to be conducted to assess the suitability and feasibility of different pathways. This research could also address the most suitable way to aid the workforce transitioning to new employment opportunities, in the sense of possible training, financial aid, or further education opportunities. Further research would also need to be conducted to address ways to deal with free-riders which could emerge from compensation measures and companies postponing decisions on plant and mine closures by anticipating compensation or for financial support.

Further research could also be conducted to model the proposed institutional interventions. Ostrom (2005) suggests using models, such as experimentation and simulation, game theory, or mathematical models.

7 Conclusion

This chapter presents the conclusion of this research and answers the research questions. The SRQs are presented first before answering the main research question. Recommendations for institutional interventions are given, and an outlook is presented.

7.1 Answers to the Research Questions

7.1.1 Answer to the first Sub Research Question

The first SRQ aims to explore *how historical and foundational factors influence the political economy of coal in South Kalimantan, Indonesia.* The results from the expert interviews complement the findings from the literature. Several historical factors influence the coal sector in South Kalimantan, such as the colonial influence and interest in the extraction of coal, the re-allocation of property rights for local resources from local communities to the central government and the establishment of licensing requirements, a possible emergence of coal nationalism as part of a postcolonial identity, the introduction of law No. 11/1967 in the 1960s under President Suharto which allowed foreign investments in mining, and the fiscal and administrative decentralisation of the licensing process which has led to a drastic increase of coal mining. In addition, interviewees stated that corrupt practices have *culturalized* after the dictatorship in Indonesia. Several foundational factors also influence the coal sector in South Kalimantan, such as the natural abundance of coal in South Kalimantan and other provinces, the decentralised nature of the coal licensing process, which has led to rampant corruption, the vast size of Indonesia and its population with its different geographies and legislative environments which could make phasing-out coal more difficult, the economic dependency of South Kalimantan on coal, the social identity of communities dependent on coal, the limited awareness of Indonesia's population on climate change and environmental issues, and the monopolistic market structure of the electricity sector. In conclusion, historical and foundational factors strongly influence the coal sector in South Kalimantan and make a coal transition extremely challenging. These factors created a strong technological and institutional lock-in, which fostered the emergence of a political economy with vested interest aimed at continuing the status quo for economic and political interests.

7.1.2 Answer to the second Sub Research Question

The second SRQ aims to explore *how relevant actors and institutions influence the political economy of coal in South Kalimantan, Indonesia?* The case study has revealed that relevant actors have different relationships and influence the coal sector to a varying degree. The greatest influence lies within the presidency and the parliament, which seem to have a political interest in maintaining low electricity prices, providing public infrastructure, providing energy access and -security, and increasing the state budget. Research suggests that vested interest in parliament and close ties to the fossil fuel industry exist, and RES are generally less supported by the parliament. PLN has a strong position and seems to influence policymaking significantly. The different ministries involved in energy planning and existing institutions influence the political economy of coal to a varying degree. PLN has a strong interest in coal and the monopolistic position of PLN is regarded as a main barrier to the development of RES. The coal industry has an interest in coal extraction for economic gains and poses as a powerful actor, influencing policymaking through lobbying or financially supporting election campaigns. The coal industry is further closely linked to provincial and regional actors by providing economic opportunities. Communities, development partners, and NGOs do not carry much political influence, but growing environmental concerns and associated political conflicts could indicate that some local community views on coal are changing due to efforts from development partners and NGOs. In general, strong ties

and vested interests exist between actors in the political economy of coal, which strongly influence policymaking and could hinder a coal transition.

The second part of the second SRQ aims at exploring the influence of institutions on the coal sector in South Kalimantan. Important formal institutions include the constitution, CCOWs, the Mining Law of 2009, Domestic Market Obligations, highly regulated electricity tariffs, the price cap for coal, and higher interest rates for renewable energy projects. Informal institutions include the framing of coal as a national development capital, the possible emergence of a postcolonial identity, the aim to establish energy independence, the framing of the energy sector as not being important for climate change mitigation, and *symbolic* targets for RES. Informal corrupt practices are widespread, especially in the coal mining sector in Kalimantan, which further drives coal extraction. In conclusion, the institutional environment in the coal mining and electricity sector created a strong institutional lock-in which is exacerbated by the political narrative of coal being a national development capital and the emergence of a coal nationalism. This seems especially evident in the province of South Kalimantan due to the strong contribution of coal to the provincial GDP.

7.1.3 Answer to the third Sub Research Question

The third SRQ aims at exploring *what institutional interventions could influence the political economy of coal to enable a coal transition in South Kalimantan, Indonesia.* This SRQ was answered by conducting a literature review on several topics, including coal transitions, the political economy of coal transitions and decarbonisation, and the energy and coal transition in Indonesia and South Kalimantan. In addition, the expert interviews provided further input for possible interventions which could enable a coal transition. Possible formal institutional interventions include international climate agreements, the creation of an independent regulator, environmental regulations, changing the allocation of mining permits, providing compensation schemes, providing alternative means for economic development, restructuring the electricity market, introducing carbon pricing, reforming energy subsidies, introducing emission or renewable portfolio standards, (re)introducing FiTs, attracting investments into other technological solutions, implementing measures for rationing or banning, or introducing moratoria. Informal institutional interventions could include increasing awareness of climate change and environmental issues among key stakeholders and the local population in South Kalimantan, increasing citizen engagement, fostering the emergence of new actors aimed at disrupting the current regime, fostering the influence of voters on political processes, and fostering strong political leadership.

7.1.4 Answer to the Main Research Question

Lastly, this section aims to answer the main research question by synthesising the findings from the research. The main research question is: *How can a coal transition in South Kalimantan, Indonesia, be enabled by influencing actors in the Indonesian political economy through institutional interventions?* The first aspect which needs to be considered is that this research aims to develop institutional interventions that are politically feasible given the current political economy of coal in South Kalimantan. Several of the above-mentioned possible institutional interventions for enabling a coal transition would simply not be politically feasible. Any institutional intervention must consider the reality of vested interests, power dynamics, economic dependency, and technological and institutional lock-in of coal mining and CFPP.

Based on the theory of NIE, institutions emerge from the interaction between different levels of institutions. The Williamson framework serves as a theoretical framework to conceptualise different levels of institutions and their interaction. L1 institutions, such as norms, beliefs, and traditions around

coal, must change to effectively change institutions on lower levels. How can this be realised? Changes on this level must derive from an understanding of the reality of global developments and their impact on Indonesia. The threat of climate change, expected stronger international mitigation efforts, expected declining international coal demand, decreasing costs of RES, reduced international investment efforts into coal, and increasing awareness of citizens of climate change may increase the risk of further investing in coal mining and CFPP. Several studies have shown that the economic, social, and environmental costs of not being prepared for collapsing coal markets are high and the impact disruptive and that preparing for energy and coal transitions in advance could reduce social and economic costs (see Caldecott et al., 2017; Malahayati & Masui, 2021). Furthermore, as discussed in Chapter 2.1.2, research indicates that the economic and monetary benefit of limiting climate change by mitigation efforts can outweigh the cost of adaption (see Krupnick et al., 2000; Maddison, 1995). In addition, political conflict was already caused in East Kalimantan by the negative impacts of mining operations. This suggests a growing awareness of local communities of the detrimental impact of coal mining operations and highlights the need for politicians to consider these considerations. Results from interviews suggest that local opposition to coal projects in other regions of Indonesia is also increasing.

Which institutional interventions could influence the values, beliefs, and norms in the political economy of coal? Most importantly, results from the expert interviews suggest that market forces can play a vital role in this regard, either by decreased demand for coal, increasing costs for the extraction and combustion of coal, or decreasing costs for RES. Institutional interventions could therefore aim at influencing these forces by, for example, increasing research and development or subsidies into RES to reduce costs, countries reducing the import of coal to reduce the profitability of coal mining, countries increasing carbon pricing to increase the price for coal for further reducing demand or by increasing the costs of fuel for heavy machinery (since fuel costs make up the highest share of operating costs for coal mining). These institutional interventions for influencing market forces can directly be influenced by the international community. It must be highlighted, though, that some of these measures would be difficult to implement in some countries since measures, such as increasing carbon pricing, could also negatively influence the domestic economy of those countries. Results from the research have also shown that increased awareness of the public and key decision-makers of climate change and environmental damage from coal-related practices could drive a coal transition. Institutional interventions aimed at increasing awareness of the public could include providing further education on climate change or conducting campaigns for increasing awareness at the local level. International organisations, such as the UNDP, and other NGOs, especially local NGOs, could aid in these measures. Increasing public awareness can further influence political processes by creating a feedback loop through the process of elections in the democratic system of Indonesia. In addition, providing education on the negative impacts of coal mining is also seen as a solution to counteract the systems archetype of the *Tragedy of the Commons* (see Meadows, 2008). Raising awareness of the negative impacts of illegal mining, such as resource sterilisation which makes mining increasingly unprofitable and limits access to deeper coal reserves, could especially help reduce illegal coal mining. Increasing citizen engagement in public discussions surrounding coal mining and energy planning in South Kalimantan could further help to increase capacities at the provincial level to deal with the region's economic restructuring and aid in changing beliefs surrounding coal. However, civil engagement of local actors in South Kalimantan is limited in energy planning (see Setyowati & Quist, 2022). International organisations and NGOs could facilitate broader engagement of the civil society. As one interviewee stated, providing information to coal mining companies about expected declining international coal demand could further aid in changing their strategies. Educating decision-makers on the technical issues surrounding RES and the required measures to change the electricity system from CFPP to a system based on RES is required. In general, international technical assistance by relevant organisations can aid in many of these tasks. Especially since Indonesia declared in the COP26 statement that they would be Indonesia will "consider accelerating coal phase out into the 2040s, conditional on agreeing additional

international financial and technical assistance" (UNFCCC, 2021, Section: Statement supported by:), as discussed in Chapter 1.

The changing L1 institutions can enable the implementation of institutional interventions on L2 of the Williamson framework. Implementing an independent regulator seems unfeasible and ineffective. Further environmental regulations seem rather ineffective. Instead, other measures seem more effective, such as strengthening law enforcement, increasing transparency, and enabling adequate monitoring of practices in the coal sector. However, provincial capacities in South Kalimantan would need to be increased, either by international organisations or by national support. In addition, governmental support for promoting a secure environment for citizen engagement would need to be ensured to foster citizen engagement which could exert pressure on politics or even actively monitor adherence to environmental regulations.

The allocation of mining permits needs to be regulated more strictly by establishing accountability and reinforcing monitoring mechanisms. Increased awareness at the provincial level of the impact of unhinged mining practices on the environment and resource sterilisation and the impact on prospects can aid in reducing illegal mining and corrupt practices and potentially increasing political commitment to law enforcement. However, corrupt practices seem to be extremely difficult to eradicate, especially since these seem to have culturalized to some extent. Increased efforts by the Corruption Eradication Commission are required to fight corruption in South Kalimantan's coal mining sector. Civil engagement, backed by governmental support and strong political leadership, could exert public pressure to reduce corruption. Providing alternative means of economic development could reduce illegal mining and shift corruption to a non-fossil fuel-based economy, which could contribute to the overarching goal of climate change mitigation.

If laws are implemented on L2, and sufficient momentum is created through changes in L1 institutions, L3 institutional interventions can be more easily realised. These institutions refer mainly to contracts, specifically compensation contracts for affected stakeholders of the coal transition. Compensation can reduce policy resistance and can ensure the buy-in of influential actors who could otherwise oppose a coal transition. Compensation could be legally required for CCOWs or take-or-pay contracts between PLN and IPPs. Compensation to coal mining workers in terms of development training or education could be more beneficial for prospects than financial compensation. This also aligns with insights from the literature that coal transitions in CMEs might only be able to occur through extensively compensating for sunk assets and job losses (see Rentier et al., 2019).

Fostering alternative forms of economic development is crucial for South Kalimantan regarding a coal transition. Providing alternative forms of economic development could also aid in counteracting the systems archetype of Rule Beating by redirecting the creative energy of corrupt and lawless individuals towards the goal of climate change mitigation. This also aligns with the insight that institutional lock-ins can be overcome by shifting the lock-in to alternative modes of favouring powerful actors (see Seto et al., 2016). However, the capacity for coal exit and economic development strategies is limited in South Kalimantan and would require international and national support.

Complete liberalisation of the electricity sector seems unfeasible, but the creation of separate entities of SOEs responsible for generation, transmission, and distribution could increase transparency and could accelerate the deployment of RES. Interviewees suggest that the possibility of reforming PLN might be gaining momentum. For South Kalimantan, solar PV, either in large, centralised units or in rooftop PV, wind turbines, or biomass, would be the most suitable option for the development of RES. Especially, centralised units could reduce resistance from PLN since decentralised solutions, such as rooftop PV, could threaten their business models. However, rooftop PV would be ideally suited for rural areas in South Kalimantan. Further large-scale investments would be required to ensure grid

stability with higher shares of RES, such as grid interconnection with East- or Central Kalimantan, improving grid management or increasing storage capacities for intermittent RES. Further investments could also be made into CCT, CCS, and for increasing the efficiency of CFPP. Investments could come from international organisations since financial assistance for a coal transition in South Kalimantan could be an economically efficient solution to reduce GHGE.

Several market instruments, such as carbon pricing, subsidy reform, renewable portfolio standards, or FiTs, seem feasible and are already partially considered in current energy planning processes. However, their effectiveness remains questioned, especially with regard to lobbying efforts to keep carbon prices low and with regard to the market structure of the electricity market, whereby currently, competition is weak or even non-existent due to the monopolistic position of PLN. In addition, corruption and non-adherence to regulations could render these market instruments ineffectual. These instruments are expected to be met with resistance from powerful actors. Compensation, as discussed above, could ensure the support of these actors. These measures would have to be complemented with partial reform of the electricity market, in particular the monopolistic structure of PLN, to increase competition and to create a level-playing field for RES. However, recent news about a construction halt of a coal plant by PLN could indicate an increasing interest in phasing-down coal and increasing the share of RES (see Karyza, 2022).

In general, increased cooperation between relevant actors and organisations and a multi-level governance approach is required to facilitate a coal transition in South Kalimantan. A task force could be created for this matter. Reducing the complexity of governance structures, increasing knowledge and capacities on the provincial level, and providing institutional certainty could further aid in advancing a coal transition.

In conclusion, to answer the main research question concisely, enabling a coal transition in South Kalimantan would have to arise from a shared understanding of the current and expected market dynamics and the need to prepare for collapsing coal markets and stricter climate targets. Increasing awareness at the provincial level, providing financial and technical assistance, and fostering citizen engagement could facilitate a bottom-up approach for influencing the political spectrum through the electorate. Strong political leadership would be required to align the interests of powerful and influential actors, to reduce the extent of vested interests, and to reduce corruption to enable a coal transition. A *democratic symbiosis* of a bottom-up and a top-down approach is required since political leadership is required to facilitate citizen engagement, and citizen engagement is required to foster the emergence of new political actors favouring reforms or to create pressure on the current regime. However, any efforts to enable a coal transition would have to consider the current political economic reality. Especially the overarching goals of the Indonesian government for providing public infrastructure, ensuring energy access and security, and maintaining low electricity prices, would have to be acknowledged. Compensation measures and providing alternative means for economic development are crucial in this regard. Reduced costs for RES could aid in providing affordable and reliable energy access by simultaneously providing infrastructure development and employment opportunities. Pressure from international climate agreements can exert influence on the current regime to accelerate a coal transition. International financial and technical support is crucial for enabling a coal transition in South Kalimantan. International financial support might be an economically efficient way to reduce GHGE and might be normatively required based on the ethical obligations of more developed states towards less developed states. From a systems thinking perspective, systems archetypes can be overcome by: (1) increasing awareness and increasing coal mining regulations to reduce the *Tragedy of the Commons*; (2) providing alternative means for economic development for redirecting *Rule Beating* and for reducing *Policy Resistance.* Financing the provision of alternative means of economic development could be partly enabled by redirecting investments from coal projects to renewable energy projects,

reforming subsidies, or by revenues from carbon pricing; (3) Compensation for affected stakeholders might also reduce the archetype of *Policy Resistance*. These measures are required to overcome the prevalent systems archetypes and to intervene in the complex system of the political economy of coal to enable a coal transition in South Kalimantan, Indonesia.

7.2 Outlook

Lastly, this thesis provides an outlook. None of the interviewed experts for this research believed that phasing-out coal in the near future would be feasible. However, current research on climate change suggests that CFPP needs to be phased out quickly and urgently to meet the targets of the Paris Agreement. Geels (2014) concludes that increasing deployment of RES might not be sufficient in view of the resistance of coal incumbents and that "politically inspired regime destabilization may be necessary to create opportunities for the wider diffusion of renewables" (p.37). Seto et al. (2016) argue similarly that institutional lock-ins might be overcome "through bursts of disruption as a result of swift social, political or technological changes, that make it unfeasible for veto-players to still block decarbonisation" (p.446). Similarly, Williamson (2000) argues that changes in L2 institutions are difficult to implement due to rigid government structures but that certain defining moments can produce the opportunity for sharp breaks and drastic change. These include civil wars due to massive discontent, wars, military coups, or financial crises. The threat of climate change, which is eminent in Indonesia due to the risk of rising sea levels, or the threat of collapsing coal markets and subsequent civil discontent in coal-dependent regions, might result in enough momentum for a coal transition to occur. This momentum is urgently required to mitigate climate change and prevent widespread misery in South Kalimantan, in Indonesia, and beyond. The Indonesian government must act quickly and decisively to prevent this scenario. This research serves as a call toward the Indonesian government to overcome vested interests and corrupt practices and to facilitate sustainable development, ensuring long-term prosperity and well-being and preventing further environmental degradation.

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Appendix A - Basic Country Analysis Indonesia

People, Culture, and Society

The following information is taken from Legge et al. (2022). Indonesia has a highly diverse environment and society, which is nevertheless united under a centralized government and a national language (Bahasa Indonesia). The diversity of the Indonesian country emerged from the convergence of different people, cultures, and languages. More than 300 ethnic groups and more than 600 distinct languages exist. Even though many different religions are practiced, the Islamic religion is predominant. The natural landscape of Indonesia with its mountain ranges and dense forests has led to the preservation of many traditions. This is especially eminent in rural areas, where differences in traditions and culture can even occur between neighbouring villages.

Almost half of the Indonesian population lives in rural areas. Due to the soil enriching characteristics of volcanic activity, many agricultural activities coincide with a dense population around volcanic areas. The level of urbanization in Indonesia is comparatively low compared to other countries with similar economic growth. However, urbanization is occurring rapidly across Indonesia. Yet, urbanization has not been accompanied with industrialization, in most parts of Indonesia, and many settlements around major cities are comparable to urban villages (kampongs), where rural traditions are maintained.

In urban areas there exists some sort of social hierarchy - a three-tiered hierarchy. Government officials, business leaders, and military officials, inter alia, make up the upper class. There is a growing middle class, and a large share from the lower-class, who are usually unskilled labour and lowly educated, and who often have strong ties to their villages. This three-tiered hierarchy also closely resembles an economic structure, which is characterized by formal and informal business conducts, and government opportunities.

Economy of Indonesia

Indonesia had played a rather minor role in the world economy until recently, despite its size, geographic location, and its resources. Indonesia is a big exporter of natural gas, and crude petroleum, and a main supplier, of coffee, cocoa, palm oil, rubber, and other commodities, such as tea, tobacco, sugar, and spices. The exploration of oil and other minerals in large-scale projects has contributed substantially to overall development. The country shifted throughout the last decades from primary industry (mostly agricultural self-sufficiency), to secondary, and tertiary industries, such as manufacturing, services, and trade. The overall share of agriculture in the countries' GDP was surpassed by manufacturing in the early 1990s and has remained the largest component of the country since then.

Several five-year plans were initiated in the time from 1969 to 1998 to develop economic infrastructure. The government played a major role in developing areas which were not considered by private endeavours. The SOE Pertamina responsible for oil in Indonesia emerged out of these initiatives. The private sector expanded continuously since the mid 90s. Prior to that, economic growth in the private sector was mainly generated by few conglomerates, which benefitted from government initiatives.

Foreign investments into Indonesia declined after the Asian economic crisis in 1997. The economy recovered by in 2003 and the country was freed from the economic reform program which was initiated by the International Monetary Fund (IMF). Thereafter, a development plan was initiated aimed at establishing self-sufficiency (swasembada) for Indonesia in the 21st century. Part of this was the plan for liberalization of some areas and reducing foreign ownership in economic assets.

Resources and Power

Indonesia has a vast amount of natural resources and mineral deposits. Roughly 10% of the country's GDP can be attributed to mining of oil and natural gas. Fossil fuels, such as petroleum, natural gas, and coal, are a main source of revenue. Exploitation and mining occur mainly in Kalimantan and Sumatra, and in offshore sites in the South China seas and along Java. The mining of coal has increased significantly in the last decades of the 20th century and Indonesia has emerged as one of the main global coal exporters. The sale of LNG is also increasingly gaining importance.

Most of the Indonesia electricity is generated from fossil fuels. In the late 20th century, most of the electricity was generated from oil or gas, until the domestic use of coal was expanded. Few hydro- or geothermal plants were providing electricity by the beginning of the 21st century.

Government and Political System

Indonesia was formerly a Dutch colony as known as the Dutch (or Netherlands) East Indies. In 1945, Indonesia declared its independence, thereby declaring itself as *The Republic of Indonesia,* which was officially recognized by the Netherlands in 1949. In 1945, the constitution of Indonesia was drafted.

The constitution grants most of the power to the executive branch, especially to the president. The president is assisted by a cabinet and a vice-president. From 2004 onwards, the president and vice president are elected directly, and their presidency is limited to two five-year terms. The ministers of the cabinet are directly appointed by the president. The ministries manage different areas, and their responsibilities depend on assignments by the president. The president has the authority to issue regulations, issue bills, and implement acts.

The legislative branch of the government is the MPR (Majelis Permusyawaratan Rakyat, or People's Consultative Assembly). Their primary role is to interpret the constitution and the state policies. The legislators are directly elected and serve for five years.

Indonesia consists of roughly 30 provinces (propinsi or provinsi). The boundaries of these provinces were largely defined by geographic features, but also to simplify cultural and traditional divisions. The decentralization agenda at the beginning of the 21st century led to the creation of further provinces. There exist more than 300 regencies (second-order subdivsions), which are governed by governor (bupati), who has local legislative powers. Further, there are over 5000 districts (third-order subdivisions), and several cities (kota) which have obtained autonomy. District and city leaders are directly elected. Villages (kampung), establish a link between the people and the government on the district level.

The judicial system of Indonesia, the third branch of the government, will not be discussed in this thesis, due to the lack of relevance.

Indonesia political history was turbulent in the 20th century. Sukarno, the first president of Indonesia, introduced a new concept, the Guided Democracy, and dissolved the elected assembly. In 1965, a coup d'état was initiated which led to the downfall of Sukarno. Suharto, the successor, initiated a new political era, called the New Order. At the beginning of this era, the political process was primarily guided by the government. However, this soon changed and most of the political power was transferred to the president, thereby leading Indonesia into authoritarianism. The end of this era in 1998 caused a major transformation in the political system. The first election in 1999 after Suharto's reign was a milestone. Out of these elections, three main parties emerged which remained strong positions. Several other parties have also gained popularity. (Legge et al., 2022).

According to Bland (2019), the current presidency of Joko Widodo, known as Jokowi, is accompanied with various allegations and has undermined democratic principles, with extensive evidence. For example, Jokowi's administration has undermined efforts to fight corruption, has increased the prosecution of government critics through illiberal laws, and has fostered the emergence of identity politics through criminalizing hard-line Muslim critics and conservatives. Bland argues that Jokowi is pursuing vested interests, while following short-term goals over long-term political change. Jokowi surrounded himself with former generals from the military, has made compromises with corrupt politicians, and during his presidency, the rule of law, the protection of minorities and human rights have suffered. Opposition in the Indonesian democratic system is weak, since many political leaders position themselves behind the current president to maintain power by either hoping for seats in the cabinet, seeking patronage, or protecting themselves from prosecution from former corruption. Fundamentally, Bland concludes that the future of Indonesia and its ability to overcome growing challenges, will depend on the *next generation of leaders,* who aim for reformation and fighting the decline of democratic norms (Bland, 2019).

Appendix B - Basic Province Analysis - South Kalimantan

The following information is derived from Britannica (2019b), Britannica (2019a), and Britannica (2021). South Kalimantan is a province of Indonesia on the island of Borneo (Kalimantan in Indonesian), the third largest island in the world. The island of Borneo is divided into three countries, namely Malaysia, Brunei, and Indonesia. The Indonesian part of Borneo will henceforth be called Kalimantan. Kalimantan is divided into five provinces: Central-, West-, North, East, and South Kalimantan. The neighbouring provinces of South Kalimantan are Central- and East Kalimantan. South Kalimantan is further surrounded on the east by the Makassar Strait and by the Java sea on the south. Large parts of Kalimantan are covered by dense rainforest and large mountain ranges, The island is spun by navigable rivers, which often represent the only means for trade and commerce in Kalimantan.

The capital of South Kalimantan is Banjarmasin, which is linked to most of the larger cities in South Kalimantan by road. Banjarmasin is located next to the Barito river, which serves as the means for transporting and exporting goods from the harbour in Banjarmasin. Coal is being transported to Banjarmasin from nearby Pengaron. Most of the houses in Banjarmasin are raised on pillars and waterways are mostly used for travel rather than roads, since the tides from Barito river are influenced by the Java sea.

Most of the population in South Kalimantan is engaged in agriculture of rice, corn, and cassava for subsistence. The manufacturing sector entails the production of chemicals, rubber goods, furniture, processed food and beverages. Coal, iron ore, gold and diamonds, are mined in South Kalimantan. In general, Borneo is rather poor in mineral resources, since most of the resources have already been exploited since the beginning of the 19th century. The soils on Borneo are also rather poor, with exceptions from fertile volcanic areas.

Appendix C - Actor Analysis

Presidency

Bridle et al. provide an analysis of the role which the president plays in advancing RES. The current president, Joko Widodo, known as Jokowi, has been president since 2014. Jokowi's main objectives seem to be to ensure prosperity and domestic growth. The president has the highest influence on policymaking and has the power to revoke regulations from different ministries. Bridle et al. further stress that support towards RES remains limited, stemming from the need to balance competing interests, such as ensuring economic growth, maintaining low electricity prices, and providing infrastructure development. Jokowi seems to be heavily interested in the impact of energy policies on *ordinary Indonesian's*. Bridle et al further suggest that the officials surrounding the president do not seem to believe that certain types of RES, such as solar, is economically viable regions in close proximity to CFPP. (Bridle et al., 2018). Jakob et al. (2020) emphasize that the pledge to remain low electricity prices seems to be a part of election campaign strategies in Indonesia.

Bridle et al. highlight that the president has the responsibility to define the KEN (National Energy Strategy) and to approve the RUEN (General National Energy Plan). The current plans suggest that the president is supportive of RES. However, Bridle et al. also stress that the energy sector is primarily seen as a means to ensure economic growth by providing infrastructure development, and that the choice of energy source is secondary to the overarching goal of economic growth. In relation to RES, Jokowi seems to focus on ensuring energy security, ensuring access to electricity, and maintaining low electricity prices. (Bridle et al., 2018)

As already discussed in Chapter 4.1.1., the president Jokowi has also been surrounded by various allegations and seems to have undermined democratic principles. Efforts to fight corruption have diminished, prosecution of government critics have increased, and the emergence of identity politics seems to have been fostered. Jokowi seems to also pursue vested interests and seems to favour short-term goals (see Bland, 2019).

Indonesian Parliament

Bridle et al. indicate that the Indonesian parliament (Dewan Perwakilan Rakyat, DPR) is responsible for the legislative act of defining frameworks for the development of RES and for approving budgets for ministries and for PLN. Bridle et al. highlight that there exists a wide discrepancy of views towards the energy sector within the DPR. Whereas some of the 560 parliamentarians favour RES, some have close connection to the fossil fuel industry, and especially the coal sector. They argue that the decision to not support subsidies to PLN for the development of RES is indicative for the lack of support for RES. Further, they stress that the effect of energy policies on electricity prices on regions and constituents seems to play a major role for parliamentarians. In addition, it seems that many parliamentarians do not have extensive knowledge of the energy sector, and that they seem to be heavily motivated to keep electricity prices low and ensuring energy security for regions and for potential voters.

Bridle et al. highlight that several interviewees from their study indicated that the development of RES is hindered by the political process for decision-making for energy policies due to uncertainty and a lack of transparency surrounding choices made in the DPR.

In summary, it seems that the DPR has vast influence on policymaking surrounding the energy sector. Further, the DPR seems to be not too supportive of RES and they seem to be involved and influenced by the coal sector (Bridle et al., 2018).

Ministry of Energy and Mineral Resources

Since 1978, the Ministry of Energy and Mineral Resources (MEMR) deals with both matters, energy and natural resources, which has fostered the co-development of energy policies driven by coal and other natural resources (Atteridge et al., 2018), and thereby acts as the regulatory body for the electricity and mining sector (Jakob & Steckel, 2022).

Bridle et al. indicate that the MEMR has substantial power over energy policies. They also highlight that the course of the MEMR towards different energy sources heavily depends on the minister in charge. They indicate the Sudiman Said, a former minister, was in favour of RES and issued Feed-in Tariffs (FiT), whereas Jonan Ignasius, Said's successor, seems to be more reluctant towards RES and seems to be in close cooperation with PLN.

Furthermore, Bridle et al. also highlight the role of different Directorate Generals in the ministries. They indicate that the Directorate responsible for RES, the EBKTE, was responsible for drafting regulations in favour of RES. However, under the minister Ignasius, the EBKTE seems to have been circumvented and regulations for RES have been issues by the Directorate General for Electricity. Furthermore, interviewees from their study suggested that regulations were even directly drafted by PLN. However, the view on RES by Ignasius seems to have changed. Bridle et al. suggest that this stems from declining costs of RES. They conclude that the MEMR is not reluctant towards the development of RES, but that these should be developed at low costs.

The stance of the MEMR towards coal can also be seen by their regulation that a certain amount of coal should be kept by coal producers for domestic use. This regulation was aimed ensuring energy security and independence (Yudha et al., 2018), emphasizing these concerns as their objectives in energy policies.

However, Atteridge et al. (2018) indicate that in 2016 the MEMR opened the market for IPPs in six regions across Indonesia with low electrification rates, which could be perceived as a signal that the government is planning to open and diversify the electricity sector.

Ministry of Finance

The Ministry of Finance (MoF) is responsible for managing the government’s budget and thereby is also responsible for determining financial support in the energy sector (Jakob et al., 2020). Bridle et al. indicate that one primary objective of the MoF is to keep subsidies in the energy sector low. This influences the support for the development of RES. The MoF is thereby reluctant to increase subsidies to PLN for expanding the use of RES. The MoF is further concerned with the financial status of the energy sector and has raised concerns over the high indebtedness of PLN. The MoF seems to also favor increasing electricity tariffs, as the only branch of the government, since this would reduce the amount of subsidies needed to be paid to PLN (Bridle et al., 2018).

Ordonez et al. (2021), stress that, from the perspective of coal, the MoF has incentives to foster and encourage the extraction and use of coal due to the rents and revenues from the coal sector contributing to the government’s budget. Furthermore, the Directorate General of Customs and Excise which is under the responsibility of the MoF, issued a decree to impose export taxes on coal to reduce coal exports and to increase domestic use. (Yudha et al., 2018).

In conclusion, the MoF seems to have deep interests in the coal sector due to its financial contributions to the government's budget.

Ministry of State-Owned Enterprises

Another ministry influencing policymaking around the energy sector is the Ministry of State-Owned Enterprises (MSOE). The MSOE's aim is to develop public infrastructure through SOE as part of the presidential agenda. This involves the expansion of CFPP as part of the 35,000 MW Program1. The MSOE is therefore incentivized to promote the extraction and use of coal (Ordonez et al., 2021).

Ministry of Environment and Forestry

The Ministry of Environment and Forestry (MOEF) was established in 2015 when the Ministry of Environment and the Ministry of Forest were merged. The merger also led to the creation of the Directorate General of Climate Change Mitigation. However, Ordonez et al. (2021) indicate that a questioned interviewee from their study that the MOEF does not exert any influence on policymaking in the energy sector, since the MOEF is not part of the ministries responsible for overseeing PLN. Furthermore, they stress that climate protection is framed in Indonesia as being a land-use and forestry issue, and that the energy sector is therefore not considered for climate change mitigation.

Electricity Companies - PLN and IPPs

The state-owned enterprise (SOE) PT Perusahaan Negara (PLN) is the only electricity company in Indonesia and has significant influence on energy policies and on the political economy of coal (Atteridge et al., 2018). Bridle et al. (2018) indicate that the vast influence of PLN on policymaking is due to the scope and scale of their operations, which involves generation, transmission, distribution, grid development, supplying fuel to generators, and acting as the single buyer for electricity. They stress that these responsibilities lead to conflicts of interest.

PLN creates the majority of electricity in Indonesia and has a monopoly on the transmission grids in Indonesia. Independent Power Producers (IPPs) can sell electricity to PLN by entering into Power Purchase Agreements (PPAs). However, PLN's monopoly position enables them to either refuse the PPAs or to negotiate favourable conditions (Harington, 2017, Jakob & Steckel, 2022).

The powerful position which PLN holds has been expressed by interviewees in a study conducted by Jakob et al. (2020), stating that, for example, PLN is even more powerful than the MEMR, and that it is protected by the MSOE. Harrington (2017) argues that the monopoly positions of PLN remains the main barrier for the development of RES in Indonesia.

Atteridge et al. (2018) argue that PLN faces the unique challenge that they are required by regulation to return profits to the government. Due to the regulatory pressure to be profitable, the energy portfolio PLN is centred around the operating costs of energy sources. However, Harrington (2017) hereby stresses that PLN is a loss-making entity, selling electricity below production costs and can only operate through government subsidies. Further, some PLN officials are in prison or are facing charges for losses to the governemt from PLNs loss-making operations (Harrington, 2017). The implementation of more expensive RES into the portfolio is therefore met with much resistance from PLN. The electricity tariff which PLN can charge to consumers and the subsidies which PLN receives by MoF are heavily regulated (Susanto, 2017).

In general, PLN seems to favour coal usage in their electricity mix due to low costs associated with subsidies for coal from the MoF (Arinaldo & Adiatma, 2019; Ordonez et al., 2021). In the business plan in which PLN sets its targets for their electricity mix (RUPTL 2019-2028), they set their targets for coal to contribute 54.4% to the mix and electricity from RES to 12.2% by 2027. This plan has lower targets for RES than the previous plan, which aimed for a 20% contribution of RES (Climate Analytics, 2019a). However, PLN recently announced zero emission targets for 2060 (Merdekawati et al., 2022).

PLN seems reluctant towards RES. The reasons for this are manifold. Firstly, due to the role of PLN as the grid operator with the responsibility to maintain grid stability, PLN is reluctant towards intermittent

RES which might threaten the grid stability (Bridle et al., 2018 ; Ialnazov & Keeley, 2020). Bridle et al. further stress that possible increased costs from RES could further worsen the financial situation of PLN which is already reliant on subsidies form the MoF. Furthermore, PLN owns and operates a large fleet of CFPP, which would become stranded assets when increasing the share of RES and phasing-out coal. Bridle et al. hereby conclude that the reluctance of PLN towards further deployment of RES could only be overcome by some mechanism which would directly incentivize PLN (Bridle et al., 2018).

Atterdige et al. emphasize that there are ongoing discussions in Indonesia whether to change the role of PLN, by for example only being responsible for the transmission of electricity. Interviewees in the study conducted by the authors emphasize that opening the electricity market to more players could accelerate the transition to RES (Atteridge et al., 2018).

Coal Industry

Bridle et al. highlight that the coal industry is a main actor in the political economy of coal in Indonesia. They highlight that the coal industry contributes significantly to the economy and the government's budget by royalty payments from mining operations. The authors also highlight the difficulties which the coal industry is facing, due to declining global demand and concerns regarding pollution and environmental damage. They stress that the coal industry also significantly influences policymaking due the impact which energy policies could have on their business models (Bridle et al., 2018). Jakob et al. (2020) further highlight the strong connection between the coal industry and responsible regulators, arguing that this might explain why CFPPs are more favoured by regulators over alternative energy sources.

According to Down to Earth (2010), the three biggest coal companies in South Kalimantan are PD Baramarta, PT Arutmin Indonesia, and PT Adaro, which together hold concession contracts for over 112,000 ha and produced over 57.5 million tonnes of coal in 2008. Form the produced coal in South Kalimantan, 73% is exported, whereas the remainder is used for electricity generation or for industrial purposes.

Bridle et al. indicate that the coal industry exerts influence on policymaking and has strong ties to influential political actors, which might explain difficulties with phasing-out coal in Indonesia, and specifically in South Kalimantan. They further tend to have a negative or neutral attitude towards RES. The coal industry would further be one of the main negatively affected actors from phasing-out coal (Bridle et al., 2018)

Province of South Kalimantan

The provinces in Indonesia also play an important role in the political economy of coal, especially since the decentralization process in Indonesia (Jakob et al., 2020). Ordonez et al. (2021) highlight that regions and provinces are incentivized to extract coal for economic growth and to generate revenues. They further stress that corruption and a lack of law enforcement at the local level further drive coal extraction.

Marquardt (2014) stresses that the decentralization in Indonesia has led to a vertical fragmentation of responsibilities, where the local regencies and cities within a province are responsible for energy related issues, such as planning, development and implementation of energy projects, and the provision of licences and permits for mining activities.

As discusses in Chapter 4.1.2., South Kalimantan has vast resources of coal, illegal mining is widespread, and coal constitutes a main part of the provincial GDP. The province of South Kalimantan therefore poses a strong actor in the political economy of coal, possibly being reluctant towards phasing-out coal.

Communities

The view which communities can play in the political economy of coal is diverse. As discussed in Chapter 2.1.2., the influence of phasing-out coal on affected regions and the need to shift to alternative means of economic development poses the greatest challenge to coal transitions. Affected communities might fear loss of employment opportunities, loss if income, and possibly even a loss of social identity (see Caldecott et al., 2017).

On the contrary, Atteridge et al. (2018) highlight that affected communities might the main opponents of increased mining activities due to environmental damage in Indonesia. However, they also stress that communities often do not carry much political influence. It seems that in Indonesia concerns about the environmental and social damage of coal mining activities is increasing, having led to increased political conflict in East Kalimantan (see Brown and Spiegel, 2017; Iskander et al., 2021). Brown and Spiegel (2017) further highlight that coal reserves in Kalimantan are mainly located in the forests of Kalimantan in the interior of the island, where Dayak communities are located, which has led to controversies surrounding territorial aspects.

Development Partners & NGOs

Bridle et al. highlight that development partners, such as The World Bank, the Asian Development Bank (ADB), or other countries, have played a role for advancing the energy transition in Indonesia by providing technical and financial support to projects for renewable energy. Environmental NGOs have also played a role in fostering public engagement, raising awareness for coal related impacts on the environment and the climate. However, even though their support for RES and their advocacy against coal, their political influence remains rather low (Bridle et al., 2018; see also Jakob et al., 2020; Ordonez et al. 2021).

Appendix D - Interview Protocol

Semi-structured Interview Questionnaire, by Kieron P. Funk

Introduction (5 min)

- Thank you for availability
- Explanation of research project, goal of interview and study
- Focus on politically feasible solutions
- Explanation of duration and structure of the interview
- Request for recording and automatic transcription
- Assurance of anonymity, not being published, only available to research staff, and planned deletion of recordings
- Assurance that no question must be answered if the interviewee feels uncomfortable for any reason
- Feedback and contact information of the interviewer

Introductory Questions: (10 min)

1. Could you please share your current position and explain your role and expertise in the energy or coal sector and experiences with Indonesia and with decarbonization in general?
2. Do you believe that Indonesia, in particular South Kalimantan, should aim for or prepare for phasing-out coal and how does this relate to your own work?
3. In your opinion, how did the dominance of coal in Indonesia and in South Kalimantan develop and what were the main drivers for this?
4. In your opinion, what are the main aspects and issues which would need to be addressed to enable a coal transition in South Kalimantan, Indonesia?

Part 1: Institutional Interventions on Embeddedness Level (3 min)

5. Do you believe that the Indonesian government could change its course on continuing coal mining and expanding coal-fired power production due to internal or external pressure, such as public concerns over environmental damage from mining operations, rising climate awareness, or international efforts for climate change mitigation by phasing-out coal? If yes, or no, please explain why.

Part 2: Interventions on the Institutional Level - Laws, Regulations, etc. (15 min)

6. Do you believe that an independent regulator, responsible for the coal industry and the electricity sector, should be implemented in Indonesia? If yes, do you believe that this is politically feasible and that it would accelerate a coal transition or hinder it? If no, please explain why.
7. How could effective and politically feasible environmental regulations for improving air quality or for conducting mining restoration be implemented?
8. In your opinion, how can illegal mining in South Kalimantan be effectively reduced?
9. How could corrupt practices in the coal mining sector be reduced?

10. To what extent do you think that the fiscal and administrative decentralization in Indonesia is hindering or promoting coal production or a coal transition in South Kalimantan?

Part 3: Interventions on the Governance Level (2 min)

11. If a coal transition would occur, do you think compensation should be paid to affected stakeholders? If yes or no, please explain why, which stakeholders should be compensated, and who should pay for this.

Interventions on the Market Level - Resource Allocation and Employment (15 min)

12. To what extent do you think deregulation, liberalization, or privatization of the electricity sector would be advisable or even possible given the current situation in Indonesia?
13. Do you believe that carbon pricing, either through a carbon tax or through an Emission Trading Scheme can be implemented effectively, and how could this be achieved politically?
14. Do you believe that reducing fossil fuel subsidies or increasing subsidies for renewable energy in Indonesia would be politically feasible and how do you think could this be implemented?
15. Do you believe that emission or renewable portfolio standards could be implemented in Indonesia? If yes or no, please explain why.
16. Feed-in tariffs were abolished in Indonesia in 2017. Do you believe that it would be politically feasible and advisable to introduce them again, and if so, do you believe that these could accelerate the deployment of renewable energy sources?

Part 5: General Questions? (10 min)

17. To what extent do you think that financial and technical assistance by the international community should be provided to help phasing-out coal?
18. To what extent do you think that phasing-out coal in Indonesia in the near future would be feasible?
19. Would you know any other interventions or instrument that could support/enable phasing out coal?
20. Do you have any other remarks for this interview?
21. Who would you recommend interviewing further for this research?

Part 6: End

- Thank you for your participation and your support
- For any further questions, feel free to contact me, under the following e-mail: k.p.funk@student.tudelft.nl

Appendix E - Interview Consent Form

Delft University of Technology
HUMAN RESEARCH ETHICS
INFORMED CONSENT

Dear Sir or Madam,

You are being invited to participate in an interview for a research study titled "Political Economic Analysis and Development of Institutional Interventions for enabling a Coal Transition in South Kalimantan, Indonesia", because you have been suggested as a key expert on this topic. This study is being conducted by Kieron Patrick Funk from the TU Delft in collaboration with Dr. Jaco Quist, Dr. Thomas Hoppe, and formerly Dr. Abidah Setyowati.

The purpose of this research study is to develop institutional interventions (e.g. norms, laws, policies, regulations, contracts, market structures etc.) for enabling the phasing-out of coal in South Kalimantan, Indonesia. The interview will take approximately *60* minutes. The data will be used for the master thesis of Mr. Funk and as potential input for research being conducted for the research project "Regional Development Planning and Ideal Lifestyle of Future Indonesia - By Utilizing Advance Green Energy Technology and Trans/Inter-disciplinary Approaches" by the Indonesian Ministry of Research and Technology and the Dutch Research Council (NWO). The interview consists of open-ended questions in an audio-recorded semi-structured interview on how the phasing-out of coal in Indonesia can be initiated and managed by institutional interventions.

Your personal information and your answers in this study will remain confidential, unless otherwise agreed upon. We will minimize any risks by completely anonymising the interviews in the thesis. Personal data (name, e-mail address, occupation) will only be collected for purposes related to the thesis (e.g., informing supervisor of the study). The data will safely be stored on the personal TU Delft OneDrive of Mr. Funk and the transcription of the interview anonymised. The interview would be audio-recorded, given your permission, and automatically transcribed using either Microsoft Teams or Zoom. The automatic transcription will be manually adjusted by Mr. Funk to match the originally spoken words. The transcripts of the interviews will only be made available to the supervisor of the thesis and will not be published elsewhere. The audio-recording of the interview will be stored on the personal account of Mr. Funk on the TU Delft OneDrive and deleted 1 month after the thesis project has been finished around September 2022. Your participation in this study is entirely voluntary and you can withdraw at any time. You are free to omit any questions.

Below you can find the informed consent form for this research. Please tick the appropriate boxes to indicate your consent, or alternatively we can record your answers during the interview.

If you have any questions, please feel free to contact me at k.p.funk@student.tudelft.nl.
The Contact details of the Responsible Researcher/Supervisor of the thesis are:

Dr. ir. Jaco Quist
e-mail: J.N.Quist@tudelft.nl

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICPANT TASKS AND VOLUNTARY PARTICIPATION		
1. I have read and understood the study information dated 01.06.2022, or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.		
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.		
3. I understand that taking part in the study involves: • an audio-recorded interview which will either be conducted via Microsoft Teams or Zoom • the interview will be a semi-structured interview with open-ended questions • the audio-recording will be transcribed as a text directly from Microsoft Teams or Zoom; the text will be edited by the researcher to eliminate any mistakes from the automatic transcription; this will be conducted by listening to the recording of the interview and adjusting the written transcription to the originally spoken text • the recording of the interview will be stored on the personal account of Mr. Funk on the TU Delft OneDrive of the researcher and will be destroyed after the research has been completed		
4. I understand that I will not be financially compensated for my participation.		
5. I understand that the study is anticipated to end by September 2022.		
B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)		
6. I understand that taking part in the study involves the following risks. • The risk of leaked information • The risk of reputation damage from leaked information I understand that these will be mitigated by complete anonymisation of the interviews and the interviewees. The transcripts of the interviews will not be made public and are only made available for the supervisor of the thesis. No personal data will be published or made available to anyone not involved in the research. The personal data will be stored on the TU Delft OneDrive of Mr. Funk and deleted after the research has been conducted. The interview will consist of open-ended questions. The interviewees can decide how to answer to the question and can omit to answer any question. The interviewees are free to stop the interview at any time.		
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII) (name, contact data, occupation) and associated personally identifiable research data (PIRD) with the potential risk of		

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
my identity being revealed with the risk of re-identification and following risk of affecting public or professional reputation.		
8. I understand that some of this PIRD is considered as sensitive data within GDPR legislation, specifically political and religious views.		
9. I understand that the following steps will be taken to minimise the threat of a data breach and protect my identity in the event of such a breach. The interviews will be completely anonymised. No personal data will be published or made available to anyone not involved in the research. The personal data will be deleted after the research has been conducted.		
10. I understand that personal information collected about me that can identify me, such as my name or contact details, will not be shared beyond the study team.		
11. I understand that the (identifiable) personal data I provide will be destroyed after the research has ended. This will be conducted 1 month after the graduation of the researcher, which is anticipated to be around September 2022.		
C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION		
12. I understand that after the research study the de-identified information I provide will be used for the following reasons. The master thesis and the results of the interviews will be made publicly available at the TU Delft Repository (https://repository.tudelft.nl/). An external appendix of the master thesis will include the anonymised transcripts of the interviews, which will not be published and only made available to the supervisors of the thesis. Further, the master thesis is part of a research project. The results from the study may be used for purposes in the research project by academic staff of the TU Delft involved in the research project. Further, the results of the study could potentially lead to a scientific publication.		
13. I agree that my responses, views or other input can be quoted anonymously in research outputs.		
D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE		
14. I give permission for the de-identified data and the results of the interviews to be included in the thesis which will be archived in the TU Delft repository (https://repository.tudelft.nl/). The transcribed interviews will be included in an external appendix and not made available to the public or stored on the TU Delft repository.		
15. I understand that access to the repository where the master thesis is stored is openly available on the internet.		

Signatures

_____ _____

Name of participant [printed] Signature Date

If you do not wish to sign this, we can also go through the informed consent at the beginning of the interview verbally, and you can agree to these terms verbally.

I, as researcher, have accurately provided or read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

Kieron Patrick Funk _____ _____

Researcher name [printed] Signature Date

Study contact details for further information:

Kieron Patrick Funk

Back to text