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How Climate Change is Altering Energy Finance and Governance in China and the United Arab Emirates

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HOW CLIMATE CHANGE IS ALTERING ENERGY FINANCE AND GOVERNANCE IN CHINA AND THE UNITED ARAB EMIRATES

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HOW CLIMATE CHANGE IS ALTERING ENERGY FINANCE AND THE POLITICAL ECONOMIES OF CHINA AND THE UNITED ARAB EMIRATES

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ABSTRACT

Climate change is an environmental problem with catastrophic ecological, economic, social, and political impacts. The dramatic scale of the problem has appropriately earned it the name of "climate crisis." As a protracted crisis, climate change will dominate national and international agendas while transforming institutional politics. Conflicts within policy communities, new interest alignments, social pressure on governments, and ecological collapse could conceivably transform the norms and institutions through which economics, policy, and politics are conducted. Nowhere is this clearer than the energy sector, which is responsible for most greenhouse gas emissions and wherein massive institutional shifts are just beginning to occur. This research project begins and concludes with the notion that the climate crisis is one of the primary transformations of our time. As countries central to global energy politics, China and the United Arab Emirates offer insight into how various regimes may respond to the energy-climate imperatives of the twenty-first century.

Chapter 1: Introduction

Different terms have been offered up to describe today's pivotal environmental moment: "climate change," "global warming," and "the greenhouse gas effect." These phrases represent scientific and geological ideas. Another term reflects a political perspective: "the climate crisis." The term binds science and politics by emphasizing the political immediacy of environmental problems. The climate crisis will define policy problems for decades to come. As our planet heats and its weather patterns become increasingly unpredictable, public problems that may appear unrelated will be underscored by climate change. Human migration, food systems, investment, trade, transportation, and public health will be affected by climate change. In this paper, I aim to take the notion of climate change as a transformative phenomenon further by arguing that both climate change *and* state responses to the climate crisis are politically transformative events.

This paper explores the political transformation of climate change by examining institutional shifts in two case studies: China and the United Arab Emirates. Political and economic ideas, enhanced by scientific environmental perspectives, can help make sense of institutional responses to climate change. This approach requires first identifying the country-specific impacts of climate change and then examining recent policy changes to the specified challenges before forecasting trends in the policy frameworks and development constraints.

Although climate change reaches into the heart of many issues, the crisis is especially linked to global energy policies. The global economy's persistent reliance on fossil fuels is the primary cause of climate change. Limiting the scope to the political economies of energy in the two case studies offers valuable insight into one of the most urgent policy domains related to the climate crisis. Energy is also central to state security, development, and political priorities. As

such, energy policy reflects a country's broader institutional frameworks and development goals. Developed countries fueled their industrial revolutions with fossil fuels like coal, natural gas, and oil. Even today, these fossil fuels influence international security, global economics, and domestic policy in developed countries. In some contexts, like in the United Arab Emirates, this dependency is supercharged and takes a unique form. The importance of energy, both as a prerequisite to commerce and as an industry itself, is linked to the imperatives introduced by climate change.

A widespread dependency on fossil fuels threatens to foil development and cause immense harm. Burning hydrocarbons to produce energy may produce short-term gains, but it sacrifices long-term ecological stability which provides the conditions for human prosperity and stability as we know it today. Action on climate change, economic growth, and development each constitute a major objective for international institutions and individual countries. Maintaining progress in all three requires major governance changes in the form of policy and decision-making procedures themselves. Energy is an inherently political commodity, one riddled with economic tradeoffs that affect countless stakeholders.

My research utilizes political settlement theory as an analytical framework to trace the trajectory of the dynamic political economy of energy. The epistemological origins of political settlement theory will be summarized in Chapter 2, along with a more extended justification of its relevance to this topic. Said briefly, political settlement theory argues that a state maintains legitimacy and prevents conflict through institutions that act as stabilizing norms (Khan, 2010). By establishing the rules, relationships, and patterns of a political system, these institutions form a political settlement. Whereas existing literature applies the idea of a political settlement to peace and conflict research, this paper utilizes a political settlement framework to explore the

energy sector. A political settlement approach locates the balances of power, highlights policy capacities, and considers political attitudes toward tradeoffs that drive energy-related decisions. Previous research, largely confined to security studies, explores the risk-multiplier effect which conceptualizes climate change as a crisis that can exacerbate the intensity of existing security crises (Goodman & Baudu, 2023). The logic of risk multiplication ought to be applied beyond security studies because climate change exacerbates crises that are not directly security related. How will the climate crisis expose existing political vulnerabilities? How does climate change further problematize a state's existing economic problems? How will political-economic institutions evolve as states govern through an unprecedented period? Answering these questions should begin by acknowledging differences in how different societies experience climate crises. A political settlement approach examines the conflicts, forces, and interests that influence climate-related decisions, including those surrounding the future of energy policy. In doing so, this research aims to provide clarity on the constraints affecting the energy transitions in China and the United Arab Emirates.

Independent of their relationship, China and the United Arab Emirates each present compelling insights on the global energy transition. China will feel the effects of climate change more acutely than any prominent economic power due to high infrastructure exposure to rising sea levels, the spreading of disease, and potential disruptions to agricultural yields. Simultaneously, China's rapid development has required large quantities of energy and emissions. As the world's second most populous and largest economy, China's energy sector is comprised of a vast collection of stakeholders competing for space as economic growth plateaus. The United Arab Emirates (UAE), on the other hand, is a petro-state. Its reliance on fossil fuel exports poses unique questions about its relationship with future energy markets. Conversely,

petrostates like the UAE yield outsized geopolitical influence precisely because of its centrality to the economics and politics of global energy.

Together, the two case studies represent comparable, yet distinct political settlements, Both China and the UAE can be described as state-capitalist systems, in which the state acts as an economic planner and market participant. Still, major institutional differences in the institutions and relationships that govern decision-making in China and the UAE result in different energy-related outcomes. Later chapters will remark on the differences that distinguish the state capitalist political settlements in China and the UAE. In doing so, this research offers insights into the patterns that two specific state-capitalist societies display as they govern through a quagmire of unique economic, environmental, and energy problems.

Crises are not only short-term challenges that require careful choices, but also phenomena that can reshape society in the long run. Observing institutional shifts and fluctuating balances of power is a crucial first step toward understanding how exactly climate change will redirect the course of development, growth, and society. My thesis research aims to trace the trajectory of change in two state-capitalist countries as climate change upends certain political ecosystems. Although both countries can be classified as state-capitalist, differences in their current political settlement will likely cause differences in terms of their exposure to economic and social costs of climate change as well as their responses to them.

Chapter 2: A Political Settlement Framework for the Climate-Energy Dilemma

Climate change is an ever-escalating global crisis. Its consequences will be felt far and wide in the coming years, but the impacts of climate change are not uniform. In fact, they are highly varied. This chapter reviews climate change's disproportionate effects on vulnerable regions. Further, this chapter relies on the scientific consensus that fossil fuels are the chief driver of impending catastrophe. As policymakers at every level seek to mitigate and adapt to the present crisis, it is imperative to highlight this interplay between fossil fuel consumption and a rapidly changing climate. In doing so, this chapter places two ideas in conversation; the idea that today's energy systems cause climate change and climate change incites political movement.

Political economy, which emphasizes the marriage of political and economic structures, is extremely relevant to energy transitions. The balance and/or exercise of power in any society reflects an underlying network of social values, economic imperatives, and political constraints. Just as the discipline of political economy highlights the linkages between politics and economics, I argue that climate change instigates considerable shifts in the regimes that define political systems. In other words, climate-energy dilemmas act as catalysts for institutional changes. To support this hypothesis, the following chapters will highlight the country-specific changes that accompany the energy transition, such as the jurisdiction of provincial governments, utility rights, infrastructure priorities, and the state's role in markets.

2.1 Climate Change and Energy are Catalysts for Change

Climate change is a global problem. Earth's environment should not be considered a compilation of unconnected ecosystems. What happens in one hemisphere may have serious

consequences for the rest of the world. Take the pollution of chlorofluorocarbons (CFCs) and halons (bromine-containing gases) throughout the 1970s and 1980s. These pollutants originated from aerosol and refrigeration use, primarily in richer countries across North America and Europe (European Space Agency, 2023). The cumulative impact of these gases was devastating. The UK Air Information Resource explains that normal atmospheric cycles pushed those pollutants over Antarctica, ripping a hole into the ozone layer above the continent. Typically, the ozone layer reflects UV radiation from the sun. Without the ozone's obstruction, radiation is extremely harmful to life (European Space Agency, 2023). Although anecdotal, this episode demonstrates an important principle of climate governance: alterations to the climate in one place can lead to complex and unpredictable changes elsewhere. After learning of pollution's impact on the ozone, world leaders signed the multilateral Montreal Accords of 1987, which phased out the use of chlorofluorocarbons. Since then, every UN country has joined. The global nature of the climate crisis should emphasize the need for effective climate diplomacy.

As stated earlier, climate change is experienced differently between the Global North and South. Despite contributing less to emissions, the Global South suffers first and most severely from the effects of climate change. Twenty-three wealthy countries, representing only twelve percent of the global population, are responsible for half of all historical CO2 emissions. The remaining half originates from the eighty-eight percent of the world's population that resides in developing countries (Popovich and Plumer, 2021). Wealthier nations are disproportionately responsible for the greenhouse gas effect, which warms the planet by trapping heat.

Developing countries will experience the effects of climate change more acutely than most developed countries for three main reasons. First, geographic features such as small islands, low-lying coastal areas, water scarcity, and other environmental factors expose some regions in

the Global South to greater devastation (Christensen et al., 2007). Second, developing countries tend to be more economically reliant on natural resource extraction and agriculture (Mertz et al., 2009). Natural disasters and more erratic weather patterns will cause further economic instability by thwarting agricultural yields, disrupting livelihoods, and heightening food insecurity. As key resources become depleted and/or global demand patterns shift, these nations may be more exposed to economic hardship. Some experts have argued that climate change will increase the frequency of armed conflict by heightening resource-related tensions, especially in economically deprived contexts (Mertz et al., 2009) The United Nations Framework Convention on Climate Change (2022) partially attributes Syria's civil war to heightened tensions tied to climate change-induced water stress. The third reason developing countries are uniquely impacted by climate change is that developing economies are less technically and financially equipped to manage the effects of climate change. Together, these three factors demonstrate a differentiated climate crisis. This insight calls for analytical approaches to the climate crisis that examine the country-specific climate imperatives underscoring the link between climate change and development. Additionally, these factors point to the multifaceted nature of climate change's impacts. The environmental shifts instigated by climate change are political, economic, and diplomatic. Consequently, environmental, political, economic, and diplomatic perspectives can inform a more holistic understanding of sustainable development.

The Union of Concerned Scientists, a premier authority on climate science, has stated that "climate change cannot be stopped." Instead, we can only adapt and mitigate its effects. These scientific proclamations demonstrate the protracted nature of the climate crisis. In other words, the world is stuck with the effects of climate change far into the foreseeable future. Each year of insufficient action or paralysis only worsens the problem. As climate change's effects

become more damaging to development goals, human well-being, growth, and stability, pressures to act are likely to increase. Those pressures may include, but are by no means limited to, unrest, economic damages, security risks, and geopolitical tension.

Although cliche, the saying "pressure makes diamonds from coal," summarizes an important lesson about the political economy of climate change. Apart from the notion of making coal a commodity of the past, this idiom reminds analysts that climate change is a transformative phenomenon. I argue that the political, economic, security, and geopolitical pressures of climate change will transform the status quo. Climate change is arguably a force for political realignment, a force that will thrust new challenges to the forefront of governance agendas. How will governments respond to climate change? How will today's decisions constrain future development? What conflicts emerge among policy stakeholders and how will those conflicts be resolved? These uncertainties are at the heart of climate change governance and require further research. Our dependence on fossil fuels exploited from the Earth's crust to power the rest of the economy is as persistent as it is precarious.

Energy policy is at the center of climate discourse because of the emissions produced by fossil fuels. Climate change is primarily caused by the prolific use of fossil fuels, accounting for seventy-five percent of global greenhouse gas emissions (United Nations, n.d.). Deforestation and agriculture account for most of the remaining twenty-five percent. While alternative power sources such as solar, wind, nuclear, and hydropower have entered the global energy mix, fossil fuels like coal, natural gas, and petroleum still account for eighty percent of total global energy consumption (Ritchie et al., 2022). The direct causal relationship between fossil fuel emissions and global warming highlights the need to transition away from dirty energy toward more sustainable practices.

Studying the energy transition is not an exclusively scientific endeavor. Energy paradigms are inherently political. Energy economics undergird every industrial sector and make many forms of social activity possible. The study of energy transitions must engage with the discipline of political economy. The remainder of this chapter will further elaborate on the relevance of political economy to energy paradigms while introducing the analytical framework that guides the case study approach.

2.2 Introducing Political Settlement Theory

Political settlement theory emphasizes the relationship between political institutions and economic activity, in part, by arguing that economic rents[1] are a type of institution factored into a larger political settlement (Khan, 2010). In other words, building political constituencies requires an appeal to a set of stakeholders' economic interests. These stakeholders may include industrial leaders, cultural figures, and groups of citizens. Conversely, forwarding economic policies tend to require a coalition of support among such stakeholders. This section will explore political settlement theory in greater depth while justifying its relevance to energy transitions, partially by referencing this chapter's earlier analysis.

As the commodity that underscores all economic activity, states have an intense stake in the health of energy exchanges. Securing a steady supply of energy is a core function of modern governments. Particularly, two factors place the burden of solution-finding on states. First,

[1] Benefits often refers to rents. In political economy, "rents" are the payments received by "rent-seekers." These rents are often distributed by the state through public policies: subsidies, tax credits, civil property rights, and procurement contracts.

markets cannot consider environmental externalities in energy exchanges without government interference. In other words, energy pricing in a pure market only reflects the balance between available supply and current demand. External costs, such as the previously discussed environmental and health harms, are excluded from pricing equations. Accounting for such externalities likely involves some form of government intervention. Second, totally unfettered markets do not move at an appropriate pace. The urgency of the climate crisis requires a speedy transition away from dirty fossil fuels. Arguably, governments tend to be well-equipped to accelerate the energy transition as entities that utilize public policy tools to influence markets, set national goals, reform public utilities, negotiate international agreements, regulate energy use, and redistribute income (Henderson & Sen, 2021).

Although there is a growing global consensus that the impacts of climate change threaten economic stability, development, security, and human wellness, there is no uniformity on what an effective response looks like. Debates range from technical disagreements over which energy alternatives to embrace to existential questions about the boundaries that ought to determine the roles of states and markets. The scope of policy debates also differs between countries. The United Arab Emirates does not occupy the same geopolitical position as China, nor do they share an identical political system, energy needs, or constraints. It reasonably follows that the political classes of the two countries debate different priorities and opt for different energy planning strategies. Consequently, a framework rooted in the logic of case-by-case analysis is needed to properly address the institutional and contextual differences between countries that incite distinct energy transitions. In other terms, the use of case studies, synthesized by analytical frameworks that acknowledge contextual differences helps clarify the relationship between the climate crisis and institutional changes in the energy sector. The school of thought known as “New

institutional economics" presents a compelling set of ideas connecting stakeholders, institutions, and crises.

2.3 Why Should "Institutions" Matter to Economics?

"New institutional economics" refers to a branch of political economy that attempts to understand the role of institutions in directing social and economic activity. Institutions refer to the rules that define rights and regulate society. Douglass North contributed to early new institutional economics by forwarding the notion that institutions matter because they make certain social activities possible. In doing so, North claims that no single organization or individual holds a monopoly on violence. Instead, his work claims that violence or coercion between different groups is an inevitable feature of human organization (North et al., 2012).

According to North and colleagues (2012), two different types of states form in response to the never fully absent possibility of violence. First, limited access orders feature powerful elites that restrict civic participation and rights to prevent the formation of internal threats to the ruling class's legitimacy. On the other hand, open access orders rely on market competition, liberal political institutions, and strong checks on elites (Gray, 2016). North and colleagues argue that open access orders facilitate smoother development than limited access orders by allowing for greater private competition. Limited access orders, on the other hand, tend to hinder development by limiting private enterprise and exposing elites to political unrest. In North's view, limited access order regimes may develop, but only as they transition to open access orders. North explains that limited access orders tend to make this shift once economic growth incentivizes elites to observe formal rules and allow private organizations to participate in production.

Access theorists like North argue that development, peace, and democratization occur through economic growth via formal and free markets, leading North and colleagues (2012) to judge the strength of institutions by their liberal and capitalist tendencies. According to this logic, the strength and purity of these institutions determine development outcomes.

Formal institutions, alone, are incapable of explaining the entire scope of economic development. Access theory champions the role played by formal institutions in economic outcomes and peace. Other factors, such as social norms, historical narratives, and identities, are excluded from such formal explanations. Mushtaq Khan (2010), an influential new institutional economist, argues that formal institutions cannot explain the two following puzzles. First, similar institutions, such as liberalized markets, yield different political and economic outcomes in different countries. Development is more complicated than strict formulas can describe. Additionally, it appears inappropriate to typologize all countries into just two kinds of states. The second puzzle is that very different institutions have solved similar problems in different contexts. Future perspectives on institutional economics would supplement the notion of formal institutions.

Later contributions to new institutional economics ventured into quandaries around the so-called “informal institutions.” Khan explains that these economists hoped to explain development discrepancies between states with similar policies and/or political traits. These scholars thought that norms and values could direct certain forms of social activity without the assistance of formal institutions. If true, informal institutions could explain why similar formal institutions implemented in different countries result in different outcomes. This logic maintains that cultural values may obstruct the infallible nature of copy-paste formal institutions. For

example, one of these scholars may argue that a society's collectivist tendencies precluded the formation of democratic rule.

Khan (2010) critiques these ideas on two grounds. First, empirical assessments of dramatic path changes throughout history cannot be explained by cultural or values-based shifts. Confucianist values were associated with stagnation in China before the 1970s, but after China began to develop rapidly, Confucianism became associated with high productivity levels. How could a philosophical tradition as rich and culturally embedded as Confucianism change in a few short decades? How could these changes trigger such sweeping economic changes? It seems more likely that China's changed economy could be more accurately interpreted. Over-emphasizing the role of culture in determining development outcomes risks misidentifying the true cause of path changes. Second, viewing economic outcomes as the result of cognitive or cultural variables can reinforce bias and assumptive generalizations. Such explanations are determinist and caricature certain groups as exceptional. If we primarily attribute developmental failures to culture alone, research risks framing those practices as the problem. Before resorting to such explanations, scholars should seek more plausible explanations that do not over-emphasize culture. Still, Khan (2010) leaves room for historical and cultural narratives that form political identities. Khan argues that cultural perspectives have a place in institutional economics so long as those forces are framed in relation to formal institutions.

2.4 Khan's Political Settlement Framework

Khan's theory of political settlements falls at the intersection of formal and informal institutional analysis. Khan (2010) defines a political settlement as a network of stakeholders bound together through institutions, producing a unique political system capable of reproducing

itself over time. To persist, a political settlement must maintain a stable power balance to successfully reproduce its constitutive elements over time. Khan's analysis of political settlements takes particular interest in (1) how elites organize themselves and (2) the ruling class's relationship to production.

A political settlement is the framework that defines a society's balance of power and grants authority to the state. Khan (2010) argues that a successful political settlement emerges when the distribution of benefits converges with the distribution of power. In other words, a political settlement is composed of relationships between stakeholders such as political leaders, rent-seekers, industry, groups of citizens, and the state. These relationships are made possible by the institutions that facilitate economic and political activity: rights, rents, and public-private partnerships. Political settlements rely on both formal and informal institutions to durably bind stakeholders in times of crisis. How is wealth created and distributed? What values drive political decision-making? How is political leadership selected? A political settlement must identify and progress toward national goals compatible with the interests of multiple influential groups. Setting national goals and making progress must also sufficiently engage those participating in the existing political settlement. If a political settlement does not adequately consider the interests of key stakeholders, alternative notions of legitimacy may emerge from the aggrieved groups.[2] These political challenges often come in the form of civil war and political unrest; both inhibit the political settlement's ability to reproduce.

[2] Threats to a political settlement depend on its characteristic features and the circumstances pressing its survival. For example, oligarchs might interfere with a political settlement in country x if their rents are jeopardized while a historically oppressed group seeking self-determination organizes against the state in country y.

Khan's political settlement theory is distinct from North's access order theory in two crucial ways. First, political settlement theory challenges many of the neoclassical assumptions inherent in the idea that formal institutions (namely, free markets) are chiefly responsible for positive economic and peace outcomes (Gray, 2016). Instead, Khan acknowledges that similar formal institutions applied to different contexts can result in vastly different outcomes. In this vein, Khan's approach is more heterogeneous than North's. Political settlement theory opens itself to historical, material, and political factors that refute the direct cause-effect relationship between formal institutions and economic outcomes.

Secondly, Khan's use of informal institutions serves the broader spirit of political settlement by arguing that informal institutions enhance the enforcement capabilities of formal ones. A political settlement prioritizes values that construct a cohesive narrative about the political system's legitimacy. This pattern is evident in modern American politics. Notions of "American exceptionalism," "the American dream," and the US' status as "the leader of the free world" establish values-based justifications of public policies. A closely held belief that the US should protect global freedom permits military spending and intervention, arguably promoting US economic interests abroad. Clearly, formal and informal institutions do not exist in separate vacuums. Instead, they are often mutually reinforced. Together, they help form a political settlement. This pattern between formal and informal institutions appears particularly evident in China's balance between ideological frameworks and pragmatic planning, which will be explored in Chapter 3.

Political settlement theory's central goal, when applied to case studies, is to explain how states negotiate competing interests amid crises, especially during armed conflict. In fact, political settlement theory has been almost exclusively applied to armed conflict because it is a

specific type of crisis that redefines how countries consolidate power. The UK's Department for International Development (2010) furthers this understanding by explaining that political settlements possess the unique capacity to redefine how power is organized in a political system. The nature of civil war strikes especially deep into the heart of political settlement theory because political violence tests the institutions that must remain durable for a system to reproduce itself (Roy, 2017).

More specifically, political settlement frameworks have been used to analyze resolutions to armed conflict, rules of engagement, and other agreements governing warfare (Weldegiorgis et al., 2017; Goodhand & Walton, 2022; Lewis & Sagnayeva, 2020; Usman, 2020; Roy, 2017). A political settlement framework appropriately applies to armed conflicts for two reasons. First, political violence represents an existential struggle between stakeholders and the simultaneous failure of peace-keeping institutions. Conceptually, violent conflict is a deliberation around central political questions. What should institutions look like? How should power be distributed? What values should drive politics? Political settlements carried out through power-sharing agreements transform society. Violent conflict also reshapes informal institutions, affecting historical narratives, political identities, and social objectives (Khan, 2010). As a particularly high-stakes type of crisis, political violence can act as a watershed for institutional adjustments, formal and informal. Second, the emergence of armed conflict may represent a failure of a country's political settlement. An aristocratic state that demonstrates no interest in fulfilling the public's basic needs may experience class-based political violence.

Political settlement theory has not yet been applied to energy policy, except when energy governance is an essential factor in armed conflict (Sefa-Nyarko, 2022; Mohan & Asante, 2015;

Bofin et al., 2020). This paper's approach is distinct from these methodologies because it applies a political settlement framework to energy policy despite the absence of armed conflict.

2.5 Why is a Political Settlements Framework Applicable to Energy-Climate Dilemmas?

A political settlements framework offers insight into energy-climate challenges because armed conflict and climate change introduce conceptually similar imperatives. Armed conflict and climate change are similar in two ways; both problems involve competing interests and result in transformation.

The first conceptual parallel between armed conflict and climate change deals with competing interests among stakeholders. Low-carbon energy transitions conflict with existing political settlements. Path dependence, the idea that past decisions constrain future ones by establishing precedents, offers insight (Oosterlynick, 2012) The logic of path dependence can be observed in the energy sector, in which transmission infrastructure, vehicles, political relationships, and economic constituencies tend to favor fossil fuels. Each of these factors reinforces fossil fuel dependency and reflects past policy decisions and/or market forces.

Khan's (2010) original goal was to explain path *changes* in developing countries. When applied to the energy transition, Khan's theory of political settlement aims to explore the political conflict and realignments that occur because of climate change and the ensuing need for an energy transition. Conflicting proposals regarding the future of energy reflect the opposing interests and values of the stakeholders involved in energy-related decision-making. Influential fossil fuel companies, emergent green-energy markets, young people, political figures, and energy-producing countries all have a stake in energy policies. Like in the case of armed conflict, energy transitions involve negotiating these competing ambitions into a new political settlement.

The second conceptual parallel between armed conflict and the energy-climate problem reflects the comparable magnitude of the two crises. Although energy transitions might appear less explosive than armed conflict, energy is a distinctly important commodity. Every light switch and cargo ship requires energy. Most of the world's living standards depend on a reliable and affordable energy supply. Every economic exchange, every country's national security, and most of the world's living standards depend on a price-stable and reliable energy supply. Simultaneously, greenhouse gas emissions threaten billions of lives, livelihoods, and countless communities. How will states maintain an affordable and steady energy supply without destroying the climate? Climate change will test global security objectives, devastate infrastructure, threaten food security, worsen natural disasters, exacerbate poverty, steepen inequality, and cause mass death. The severity of these effects depends on the energy transition. Negotiations of such magnitude involve core questions about the role and shape of the state, along with the entitlements of various classes. Any resolution to the energy-based power struggle requires mediation, negotiation, and likely some form of compromise. In other words, a political settlement.

Some states' existing settlements may be exceptionally prepared to weather the storms of climate change. At least intuitively, states that can effectively mobilize various stakeholders (utility companies, industry, the public, and political elite) around clear and desirable objectives may experience less severe instability. In these cases, a political settlement approach is still relevant because the theory may help explain a country's successful climate governance.

So far, this section has justified political settlement theory's application to climate change by describing the conceptual parallels between the two types of crises. I also maintain that political violence and climate change are not entirely distinct phenomena. In fact, the two are

causally bound. The previous chapter briefly explored the role of water scarcity in escalating Syrian unrest before the civil war's outbreak. Syria's civil war exemplifies a larger pattern identified by research that addresses the intersection of climate studies and security studies. A white paper published by The Center on Climate and Security labels climate change as a "threat multiplier" (Goodman & Baudu, 2023). According to the report, framing climate change as a "threat multiplier" improves the literature's understanding of climate change's imperatives in three ways.

First, the term better describes the systemic effects of climate change by framing risks as emanating not from climate change necessarily but aggravating other environmental, economic, social, and political stressors. The threat multiplier concept rejects siloed approaches that impose arbitrary distinctions between interconnected phenomena such as climate change and civil war. Instead, this framing burdens states with the task of integrating climate change's effects into all security-related decision-making areas: defense, diplomacy, and development. Indeed, the proliferation of the term in security studies encouraged dialogue between climate experts and military strategists in the United States. Insofar as some states view climate change as a security challenge itself, policies intended to bolster climate resiliency also serve other military, security, and development objectives.

The overlap between political instability and climate change is significant. The United Nations Environmental Programme (2021) states that seventy percent of the world's most climate-vulnerable countries are also among the world's most "politically fragile." These states may already be grappling with food insecurity, resource scarcity, and natural disasters that put political systems in precarious positions. More severe and widespread resource scarcity will only worsen inequality and desperation, making political violence more acceptable for aggrieved

factions. Climate change will worsen the conditions that incite armed conflicts, increasing the number of failed states (Goodman & Baudu, 2023). This emergent shift further justifies a political settlement approach to energy policy. A political settlement's main purpose is to consolidate legitimacy by effectively managing threats to its political system. As states fold climate change into their manifold priorities, a political settlement approach to energy policy bridges an important literature gap.

In summary, armed conflict and climate change are conceptually similar in that each problem involves negotiating competing interests. Additionally, the possible magnitude of public frustration, economic shock, security threats, and international intervention accompany both armed conflicts as well as climate change. Given that the climate crisis threatens to destabilize political systems, a political settlement framework ought to be applied to energy-related trade-offs. Additionally, the causal relationship between climate change and peace rebuffs rigid distinctions between energy policy and conflict prevention. Political settlement theory examines how power configurations and changing circumstances shape institutions and practices. As an analytical framework, it offers a basis to consider how competing interests surrounding climate change will resolve themselves into a new political economy of energy.

Applying political settlement theory to climate issues represents an important and novel contribution to the literature surrounding climate policy and politics. The theory enables a heterodox approach to case studies with distinct domestic power orderings. Political settlement theory is flexible because it makes no assumptions about the ways power is distributed or exercised in a particular case study. Nor does political settlement theory limit its applications by making neoclassical assumptions about the state's role in responding to climate change. Instead,

the theory privileges heterogeneity by treating each case study as worthy of institutional and relational analysis.

These ideas should not be confined to academic research. Conceptualizing climate change as a transformational phenomenon may enable more effective policy and climate diplomacy. International engagement on climate issues requires a comprehensive and charitable understanding of the interlocutor's changing internal political economy. Additionally, relating political settlements and climate change clarifies the need to reform our economic paradigms, political relationships, and ecological dependency.

What role do security objectives play in determining energy policy? To whom are new energy rents distributed? Where is power concentrated? How do different political systems endure, adapt, and respond to the climate crisis? This thesis project uses a political settlement framework to achieve one specific aim: to analyze how environmental vulnerabilities and political settlements influence the energy transitions of two countries. Conversely, this paper will examine the extent to which energy-climate problems instigate changes in the political settlements of China and the United Arab Emirates.

Chapter 3 | Tightening the Birdcage: China's Energy Response to Climate Change and its New Economic Normal

After the collapse of the Soviet Union, the Cold War was brought to an end. Francis Fukuyama famously argued that history was also brought to an end. The "end of history," as Fukuyama puts it, "[is] the end point of mankind's ideological evolution and the universalization of Western liberal democracy as the final form of human government" (Fukuyama, 1989). Ten policy reforms, collectively known as the Washington Consensus, heralded this new and "final" world order (Irwin & Ward, 2021). The thrust of this framework aimed to privatize markets, liberalize trade, democratize government, and globalize the economy.

Although not as ideologically rigid as the Soviet Union, China presents a crucial case study that counters Fukuyama's hypothesis. Deng Xiaoping, China's Paramount Leader from 1978-1989, bridged the gap between socialist principles and a liberalizing world through a series of economic reforms. These policy shifts utilize neoliberal logic by "opening up" to investment and trade, despite China's resistance to democratization. Instead, the country is a one-party state, ruled by the Community Party of China (CPC). Different schools of thought offer different typological descriptions of China's approach to development, but one thing is clear: it is distinct from the Western-style liberal democracies that were thought to be the final form of human government.

This chapter will review China's governance shifts since the 1980s, describing policy creation, institutions, and implementation. A historical lens provides essential background on the national interests, actors, and constraints affecting energy governance. Beyond historical review, this chapter contextualizes China's planning paradigm, including its early response to the

interwoven climate, economic, and energy dilemmas. Crucially, this chapter will also highlight the specific environmental challenges affecting China. Together, historical, environmental, and developmental insights bring an important perspective on the dynamic political settlement of China's energy sector.

3.1 Historicizing Chinese Political Economy

Current policymaking reflects historical events in two different ways. First, the structures and institutions in place today have been shaped by eras of revolution, reformation, and responses to crises. Once again, path dependence appears relevant. Theories of path dependence emphasize the constraints and strengths affecting current political settlements imposed by past regimes. The second justification deals with the enduring legacies of past regimes that shape the perspectives of China's ruling class. President Xi echoes the theories championed by his predecessors. Xi's approach will be discussed later, as it would be inappropriate to enter a conversation about the future without understanding the past and current forces that shape China's political economy.

After the 1949 revolution, CPC Chairman Mao implemented a strict and totalitarian regime guided by Marxist-Leninist principles (Pei, 2021). The newly formed People's Republic of China underwent the first Five-Year Plan, which tested Mao's aspirations toward collectivization in rural areas and industrialization in urban areas. Shortly after the first Five-Year Plan, China's overall economy had expanded nearly 9 percent each year with agricultural yields growing by 4 percent annually and industrial output reaching close to nineteen percent per year. Life expectancy also increased by twenty years between 1949 and 1957 (Brown, 2012)

Mao's second Five Year Plan was more ambitious and impatient. The Great Leap Forward sought to rapidly transform China from an agrarian society to a socialist society through large-scale rural collectivization. At the time, most of the population resided in rural areas. Mao dramatically expanded the size and scope of collectivization, building massive "cooperatives" throughout the countryside which eventually incorporated 99.1 percent of rural China (Yang, 1996). These cooperatives were governed by local bureaucrats tasked by the CPC to increase agricultural production, often through inefficient or counterproductive mechanisms (Brown, 2012). A combination of fierce loyalty to Mao, wild optimism, unfettered competition among communes, and a prohibition on dissent caused massive over projections in China's production capacity (He & Sun, 2016; Yang et al., 2014). Great Leap policies, inflated production projections and an urban-biased food distribution policy resulted in a devastating famine mainly affecting rural China (Lin & Yang, 2000). During the famine, the party-state utilized political purges to stifle criticism of its policy objectives or planning strategy. Oftentimes, these killings were justified by deeming victims as "rightists," regardless of the veracity of such accusations (Vidal, 2016; Chung, 2011).

After Mao, Deng Xiaoping became the Paramount Leader in 1978 during a period of global liberalization and significantly diverged from Maoist governance. Deng became the first reformist leader of China, breaking from the early revolutionary governments of Mao and Hua Guofeng. Although Deng was an integral part of Mao's administration, he recognized the negative effects of totalitarian and insular economic planning (He, 2001). Deng's administration theorized and strove toward a new economic philosophy of "socialism with Chinese characteristics." Deng's theory acts as a policy framework still relevant today. Socialism with Chinese characteristics did not entirely abandon Mao's ideas. Instead, Deng's doctrine

modernized the party-state's economic planning strategies while appealing to Mao's enduring popularity (Chow, 2004; Naughton, 1993; Nathan, 1997). Specifically, Deng's reforms aimed to accelerate economic growth by allowing some private economic activity, opening trade abroad, and permitting foreign investment. These reforms rapidly accelerated China's rise as a global economic hegemon but allowed China to remain distinct from Western liberal democracy and capitalism. The World Bank's (n.d.) interpretation of Deng's reform emphasizes that "GDP growth has averaged over 9 percent each year, and more than 800 million people have lifted themselves out of poverty."

Scholarship around the political economy of China during the administrations of Deng Xiaoping (1981-1989), Jiang Zemin (1989-2004), and Hu Jintao (2002-2012) emphasizes the enduring legacy of socialism with Chinese characteristics. From a political settlement perspective, these reforms ushered in a new set of institutions, stakeholders, and ideological frameworks.

This section will explore three of the constitutive elements of the reformist political settlement in contemporary China. First, the reforms foregrounded the importance of globalization and foreign investment to China's development and growth. These sweeping reforms opened China's economy to foreign investment which helped Chinese firms secure capital and technology-sharing agreements (Qian et al., 2023; Lo & Tian, 2005). China's ascension to the World Trade Organization in 2001 demonstrates its aspirations toward global economic integration. Apart from inviting international economic partnerships, Deng further integrated China into the global economy by inaugurating the practice of establishing special economic zones. These zones represent a spatial element in Chinese development planning (Lim, 2013), wherein capital is focused, and regulations protect specific key industries. In a review of

China's economic model, Breslin (2011) argues that China utilizes protectionist policies such as exchange rate adjustments, industrial subsidies, and state ownership of key industries while supervising domestic competition. In other words, the CPC allows for competition between a few Chinese firms, but the state's primary focus is enabling Chinese firms to outcompete foreign companies by selecting national champions. These reforms facilitated China's remarkable growth by reaping the benefits of mediated domestic competition and protectionist industrial policies. Deng's reforms attracted foreign investment and rapidly expanded China's exports (Lim, 2013; Breslin, 2011).

While the private sector was introduced and played an important role in China's economic development and geopolitical rise, it does not operate independently of the party apparatus. Central party leaders control the financial system and have been cautious about liberalizing their banks (Breslin, 2011). Deng Xiaoping sought to retain the state's role as a central economic planner, using private markets to enhance the state's overall capacity. In other words, the new political settlement retained the party-state's central position through economic decentralization (Lim, 2013).

Deng's successors have added to his ideas, rather than reject them. Jiang Zemin's approach to economic growth highlighted the "Three Represents," which argues that the state's interests ought to respond to the needs of industry, workers, and culture/intellectualism. It is worth noting that by cultivating stronger relationships between the private modes of production and the party, the state establishes influential patron-client networks. Empirical studies show that Chinese entrepreneurs with political connections are more likely to succeed (Guo et al., 2014). These studies argue that well-connected entrepreneurs may be more likely to secure favorable loans from state-run banks. This policy had two simultaneous effects. First, it helped incorporate

the private sector into state jurisdiction through economic incentives and social networks. Second, it created opportunities for corruption between bureaucrats and entrepreneurs. Overall, the notion that China liberalized through its market reforms only tells half the story. Instead, Lim's (2011) notion that the party-state co-opted the private sector into its orbit more accurately generalizes China's political settlement.

Chen Yun, a revolutionary leader and architect of Deng's reforms, summarized China's relationship with the free market with an allegory of a bird and its cage. The cage represents the state while the bird represents the market. If the cage is too small, restricting the bird's movement, it will eventually suffocate. China will not develop. If there is no cage, the bird will fly away, leaving the Maoist aspirations of the revolution far behind (Brødsgaard, 1991; Li et al., 2010).

After regulated privatization and opening, the second constitutive element of China's post-Deng political settlement regards the role of sub-national governments (Breslin, 2011). In China, the provincial-level governments play a crucial role in the country's administrative hierarchy, serving as a bridge between the central government and local governments. There are 23 provinces, five autonomous regions, and four direct-controlled municipalities, each headed by a governor or party secretary. These provincial-level governments have considerable autonomy in economic, social, and cultural affairs albeit within the framework of national policies set by the central government.

Provincial-level officials are responsible for implementing central policies, economic development plans, and maintaining social stability in their respective regions. Provinces vary widely in terms of economic development, resources, and demographics, so the provincial governments play a crucial role in tailoring policy frameworks to meet the specific needs of their

regions through targeted implementation. For this reason, the political settlements of different provinces look different. Breslin (2013) explains that "the political economy of Zhejiang, where small-scale private industry dominates, is somewhat different from the mercantile political economies of Chongqing and Shanxi, which are different again from the social norms in Henan that have some links with China's Marxist/Maoist past."

Intuitively, utilizing diverse models of implementation is necessary for such a large and vast country. Different provinces have different factor endowments, political cultures, geography, development priorities, industrial centers, and advantages. Reformists argue that a model of central planning for a country of China's size works more effectively if provincial-level governments can make decisions based on more intimate understandings of their region (Breslin, 2011). Like the markets, however, provincial governments do not have free reign. Instead, sub-national governments may experiment within the boundaries established by national party leadership.

Another key takeaway speaks to the experimental approach to policy crafting and implementation. Breslin (2013) argues that experimentation is the "single most important feature" of China's political-economic model. One key benefit of diverse provincial approaches to policy planning is the number of theories and strategies tested. Additionally, provincial officials file reports to their superiors in Beijing, which allows for constant evaluation. After assessing provincial-level policy outcomes and making judgments, national party leaders choose to elevate effective planning strategies, policy mixes, and individuals (Heilmann, 2009). This strategy enables China to distribute risk, while creatively managing uncertainty through unconventional policy implementation.

Finally, even after Deng's reforms, the Communist Party of China still maintains a strong presence at all levels of government. Provincial-level governments and local officials are often party members. Promotional opportunities and the possibility of receiving recognition from superiors act as strong incentives to remain loyal to national goals through the effective implementation of party directives. Additionally, Lim (2011) argues that the national party resists a totally hands-off approach to provincial objectives and targets. Instead, the CPC embraces a broad view of planning. Deng's specialized economic zones, for example, attracted investment and capital to centrally designated urban areas that planners believed could utilize capital most effectively. These coastal areas experienced rapid growth and development, while more rural areas developed slower and had fewer economic opportunities available (Lim, 2011. Deng acknowledged uneven development as a necessary effect of China's national development and urged the interior to accept it. To ameliorate the effects of uneven development, especially political instability, Deng redistributed income from industrialized urban areas to countryside provinces in Central and Western China (Lim, 2011).

In summary, China's reforms opened the economy to "caged markets," allowed for provincial-level experimentation, and retained the CPC's role as the chief economic planner. This shift from Maoist thought represents a strong preference for pragmatism over Maoism among China's policy circles (Cao, 2005). This approach, inaugurated by Deng's administration in the 1980's, has persisted up to Xi's present administration, albeit with variations. For example, Hu Jintao's theory of a "Scientific Outlook on Development" reflects the pragmatic attitude towards reforms, governance, hierarchy, and delegating. Hu presented his theory of a coordinated approach to comprehensive development by highlighting economic, social, political, and security challenges (Chen & Luo, 2009). At times, scientific development's concept of

"development as a science" clashes with the ideological attitudes espoused by Maoist thought. In this regard, scientific development names an important trend in China's development. In many ways, the notion of identifying long-term policy priorities and coordinating planning strategies also reflects China's devolved state-led experimentation strategy wherein central planners identify big-picture and long-term needs and delegate implementation duties to provincial governments. From this point, the central planners observe progress toward their pre-described goals, implement successful policies elsewhere, adjust resource flows, and promote the most competent provincial planners.

The political settlement that defines China's political economy is one of never-ending adjustments, wherein the state relies on hierarchy, provincial experimentation, central evaluation, and effective implementation to respond to ever-changing development imperatives (Cao, 2005; Heilmann, 2009; Breslin 2013; Lim 2011). These eternal reforms reflect China's willingness to embrace policy change in response to fluctuations while carrying on the legacy of Mao's vision for a central party-state.

3.2 China's Economic and Environmental Problems

China's political settlement since Deng has involved several actors and interests, but under the firm oversight of the Communist Party of China. In its approach to governance, the party-state has a history of welcoming reasonable changes to its internal political orderings if these changes are executed well and address the state's immediate and long-term development priorities. So far, this literature review of China's political settlement and policy regimes have explored up to 2012, thus begging the question: If China's political settlement is essentially

unfixed, then what have post-2012 fluctuations looked like and why is that relevant to the country's energy transition?

I argue that many things have changed in China's political settlement since Xi Jinping's ascension to the position of Paramount Leader in 2012. Xi stands out from his predecessors for several reasons, including his status as the first Paramount leader to remain in power beyond two five-year terms since Mao after the National People's Congress abolished term limits. For this reason alone, he is arguably the most powerful Chinese leader since Mao. Perhaps more consequentially, Xi has navigated a series of new challenges during his extended tenure at the helm of the CPC. First, the country's booming economy reached a new stage after hitting China's "new normal," the inflection points at which China's economic growth began to slow. China's GDP grew by just six percent in 2019, its lowest rate since 1990 (Center for Strategic and International Studies, 2022)

Xi must also govern through the imperatives of climate change and great power conflict. Together, these challenges form new sectors of strategic interest. In other words, China's political settlement is at a turning point where political power is shifting as new economic, environmental, and security crises reframe state priorities and move the goalposts of Chinese development. This section lays out the implications of China's new economic normal and the political effects of environmental damage along with Xi's new approach to governance in China. The next section will apply these developments to the energy sector to identify and describe the political settlement of China's energy transition without missing the bigger picture of a changing China.

3.2.1 China's New Economic Outlook and Constraints

China’s new normal represents a forced, although strategic, shift towards a more sustainable growth model. This concept, acknowledged by Xi’s administration in 2014, reflects a shift in the Chinese economy, prioritizing the quality over quantity of growth. It maps onto theories of development that chart a path for developing nations: agrarian to industrial to service-based economies. While the new normal introduced demographic headwinds and the need for economic rebalancing, it also opens up opportunities for innovation and a more balanced development path (Yifu & Wang, 2022). The government's role in steering this transition is crucial, as it involves significant questions. Understanding these changes is vital for comprehending China's future trajectory. How does China develop when growth slows? After three decades of growth and gradually opening markets, what happens to the cage?

China’s new normal presents a multitude of risks, opportunities, and uncertainties. First, China must restructure its economy. After decades of sustained industrial growth, China became the world’s leading manufacturer of goods and led the world in terms of the manufacturing sector’s share of national output (West & Lansang, 2018). As China plots its development course into the coming decades, it seeks more advanced modes of production that reap higher profits.

Folded into this imperative is President Xi’s new outlook on Chinese development; the Dual Circulation Development Paradigm in which international economic circulation supports the primary form of circulation, domestic production and consumption (Yifu & Wang, 2022). This policy framework emphasizes the need for China to become a more self-reliant economy by

enhancing domestic consumption[3]. This pivot inward reflects growing tensions, especially with the United States as the two powers enter conflict over economic, military, and political hegemony. Growing discourse around decoupling the world's two largest economies and a trade war pushed China's economic planners to reduce its dependence on ties to US markets. Additionally, recent efforts towards self-reliance have emphasized the need to develop indigenous technologies, especially in key sectors such as semiconductors, artificial intelligence, quantum computing, and green technologies (García-Herrero, 2021; Shmarlouskaya et al., 2023). Each of these sectors serves a strategic purpose for the CPC's long-term security or environmental priorities.

Apart from the need to restructure its economy, China's new normal is the result of financial risk and debt. High levels of debt, particularly in the private sector, pose significant risks to the economy. The government's efforts to de-leverage and reduce financial risks constrain growth. President Xi's reforms to the financial sector act on the policy priorities forwarded by the dual circulation strategy described above, especially the idea that the state should restrict foreign investment and the private sector (Tran, 2021). At the outset of his first term, President Xi originally articulated his vision for a more liberalized and open China. Over time, Xi's financial reforms have aggressively reasserted the role of the state over financial regulations, negotiations, and agreements (Lockett, 2022). The state's intervention on initial public offerings (IPOs) for certain companies in strategic sectors, such as green technology,

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[3] China's push for a more self-reliant economy does not imply that it intends to indiscriminately reject new trade partnerships. Instead, China is choosing to enhance its partnerships with emerging markets in developing countries through the Belt and Road Initiative.

represents a major maneuver to reign in foreign capital and the private sector. These interventions have been led by government guidance funds that direct foreign and domestic capital to sectors that serve the political interests of the CPC. In total, these funds have raised nearly a trillion dollars in the last ten years and received approval from regulators to bring in more than double that amount soon (Lockett, 2022). These financial reforms create favorable investment conditions for specific sectors and firms which makes investors more willing to contribute. In effect, the state has leveraged its role as a central planner to build public and private sector momentum behind strategically significant national champions, directing investments into certain sectors.

At the same time, President Xi is utilizing anti-corruption campaigns to investigate suspicious relationships between the state-run financial system and the private sector (Wei, 2021). Regulators have warned that corruption in the financial sector could pose immense risk to the Chinese economy if banks take unsound financial risks. Additionally, the “Three Red Lines" policy places restrictions on which property developers can accept new loans following the collapse of Evergrande, one of China’s largest real estate developers. Evergrande’s collapse caused a financial crisis in the property development sector, raising concerns within the party that financial transactions lack proper oversight (Tran, 2021; Lockett, 2022). This crackdown on financial markets represents a shift in tone from the “Three Represents” which normalized rent-seeking activity on behalf of the private sector. Instead, the CPC’s new priorities involve constraining the unsustainable, unbalanced, and unstable growth fueled through corporate debt. China’s dual circulation strategy also serves another purpose beyond restructuring China’s economy for self-reliance. As heavy industries, China’s manufacturing and heavy industries are

damaging to the environment (Zheng & Kahn, 2017). Xi's dual circulation development strategy is a response to both slowed growth as well as environmental threats.

3.2.2 China's New Environmental Challenges

China's new normal and President Xi's Dual Circulation Development Paradigm also reflect growing environmental pressures and threats. Before identifying the overlapping domains of economic and environmental shifts, along with the synergies of financial and environmental reforms, this section will preface a discussion of the economics and politics of climate change with a clear explanation of China's exposure to climate change.

China's vulnerability to climate change demonstrates the overlapping domains of climate resiliency and development, which underscore the emergent shifts within China's political settlement. Identifying the impacts of climate change in China, specifically, can imply an early understanding of how China may transform in the coming decades. Although the impacts of climate change are manifold, unpredictable, and too complex to describe entirely in this chapter, the literature emphasizes four themes; urban infrastructure, air pollution, agricultural yields, and public health.

Urban infrastructure: A recent study of 2,600 regions around the world found that China's built environments[4] stand to lose the most of any country to climate change by 2050[5].

[4] Referring to infrastructure and other human-made surroundings that provide the setting for human activity.

[5] The study ranks sub-national regions such as states and provinces by financial damages resulting from the effects of climate change (extreme weather events, rising sea levels, etc.).

The study identified twenty of the most risk-prone regions in the world, sixteen of which are Chinese provinces (Cross Dependency Initiative, 2023). Some of China's most economically vital provinces are especially prone to climate risk. For example, the industrialized coastal province of Jiangsu, which accounts for a tenth of China's GDP, was ranked the world's most vulnerable territory. Neighboring Shandong, the major steel production base of Hebei, was ranked second. The flood-prone central province of Henan was fourth (Stanway, 2023).

Urban areas in China are at especially high risk. Rising sea levels could damage critical infrastructure used for the production and transportation of goods, significantly harming China's ability to trade domestically and internationally (Lewis, 2009; Saeed, 2010). Rising sea levels would also take a considerable toll on human life. China's urban areas have also incurred steep costs due to extreme weather events. In 2006, China incurred $25 billion in losses due to extreme weather events (Lewis, 2009). In the first nine months of 2023, that number grew to $42 billion (Orr & Li, 2023). As the impacts of climate change continue to worsen, so too will this price tag.

Air pollution: Urban air pollution is a prominent environmental challenge and contributes to social strife. The costs of air pollution are manifold. The most direct cost is to human life, with particulate matter causing premature death (Kan, 2009; Zheng & Kahn, 2017). The causal link between air pollution and premature death has been well documented by public health research (Pope et al., 1995; Pope et al., 2004). Some research disaggregates health impacts by examining specific groups, such as children (Beatty & Shimshack, 2014). Other research locates the effects of pollution spatially, focusing on specific regions including China's urban areas (Venners et al.,

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Because this study examines financial damages, economic centers tend to rank higher because of the concentration of built environments exposed to climate risk.

2003). The World Health Organization (n.d.) estimates that air pollution is responsible for approximately 2 million annual deaths in China, just shy of twenty percent of all deaths. Half of these deaths are due to ambient air pollution while the other half is a result of household air pollution (World Health Organization, n.d.). According to Matus and colleagues (2012), the ozone and particulate matter concentrations beyond background levels have led to a loss of $16 billion to $69 billion in consumption (or 7 to 23 percent) in 2005. In another study, Kan and Chen (2004) find that the total economic cost of health impacts due to particulate air pollution in Shanghai in 2001 was approximately $625 million in US dollars, accounting for 1 percent of the gross domestic product of the city. Wang and Mauzerall (2006) estimate that the health costs due to year 2000 anthropogenic emissions in Zaozhuang, a city in eastern China heavily dependent on coal, are 10 percent of that city's GDP" (Zheng & Kahn, 2017).

Other scholars suggest that air pollution influences politics and power by shaping urban policy agendas and deepening social frustrations (Shao & Chou, 2023; Shen and Xie, 2017). The World Health Organization report cited earlier attributes air pollution to transportation emissions and prolific coal combustion to meet high urban energy demand, and heavy industry. The health and economic implications of air pollution demonstrate the spillover effects of emissions tied to heavy-industry and fossil fuels. Investments in clean energy and electric vehicles have been a centerpiece of China's war on pollution, which officially began in 2014.

Agricultural yields: Rural areas are also affected by climate change, although their risks are understated by studies of financial risk because agricultural provinces are less developed.

Several different changes including variegated precipitation rates[6], heatwaves, pest-friendly conditions, desertification of cultivable land, and glacial melting in Tibet will likely reduce agricultural yields (Lewis, 2009; Saeed, 2010; Kang et al., 2009; Wei et al., 2014). Disruptions to reliable agricultural output in China poses immense risk to domestic and international food security, since China produces one-fourth of the world's grain and feeds one-fifth of the world's population (Liu, 2023).

Disease transmission and public health: Public health is threatened by more than just air pollution in urban industrial centers. Heatwaves have also been linked to worsened infectious disease transmission, a worrying prospect for a post-Covid China. Higher temperatures over time could increase the occurrence and the transmission of infectious diseases, including malaria and dengue fever. Malaria is still one of the most significant vector-borne diseases in parts of southern China, and climate change could expand its geographical range into the temperate and arid parts of the country (Lewis, 2009; World Health Organization, 2003).

The economic hegemon's record of growth has already entered a new normal. These economic constraints are supercharged by China's climate crisis. The climate risks that spill over to political and economic domains have made climate change a primary focus issue among the CPC's domestic policy reforms and international engagements. Given the emergence of entirely new types of environmental uncertainty and the simultaneous transition into a new economic normal, China's energy policy regime is undergoing important reformations.

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[6] Some regions may receive excessive rain, leading to flooding while others may experience drought. Heatwaves can cause complex and unpredictable changes in precipitation cycles.

3.3 China's Modern Energy Framework

Slowed growth, economic restructuring, and the political-economic implications of climate change have begun to reshape the direction of China's energy regulation. In the past, China's energy economy has evolved alongside its gradual opening during the Deng administration. Throughout the 1980s, China transformed its energy economy from a Soviet-style central planning model to one where state-owned enterprises compete as market participants (Nakano & Wu, 2016). Additionally, China's economy has expanded so rapidly over the last four decades that it has had to import more energy than it exports, losing its status as a net-oil exporter in 1993 and its status as a net-coal exporter more recently in 2009 (Figure 1; (Nakano & Wu, 2016)

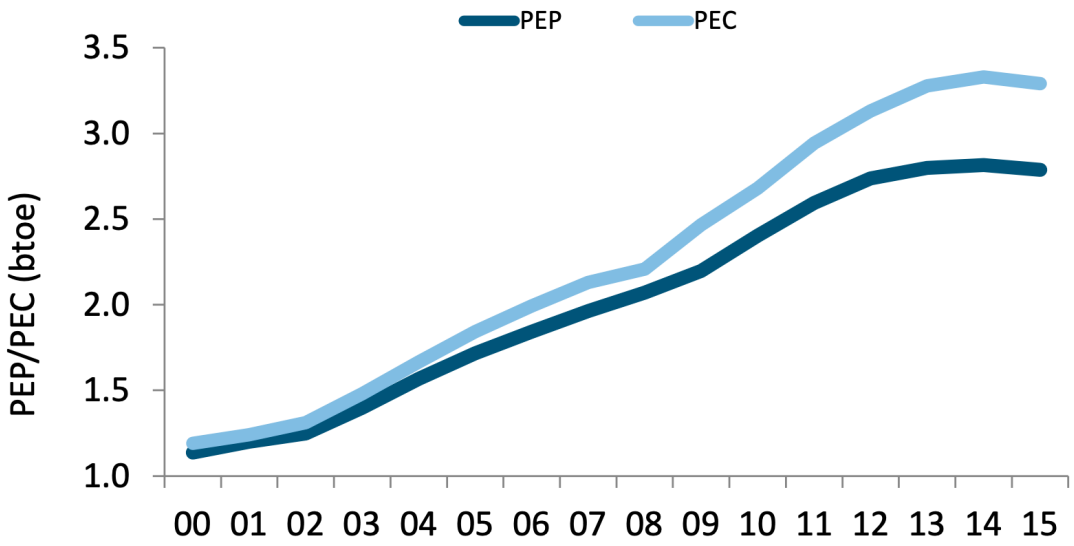

Figure 1: Change in Primary Energy Production (PEP) and Primary Energy Consumption (PEC)

China's energy markets are changing in terms of both supply and demand. On the supply side, China has made attempts to accelerate a low-carbon transition by developing new energy technologies, increasing renewable capacity, and integrating low-carbon electricity into existing energy infrastructure. On the demand side, regulators have attempted to increase energy efficiency to contain energy consumption. Energy demand is further affected by China's slowed growth and its economic restructuring away from energy-intensive and heavy industries, towards a service-based economy characterized by technological independence. These factors introduce economic shifts in the energy supply which have highlighted political tensions among various stakeholders.

In 2005, the Renewable Energy Law was introduced by the State Council when the renewable energy sector was not as established as it is today. The law acts as a guiding framework for future energy policies by laying out the general conditions for renewable energy to become a meaningful contributor to China's energy mix (International Energy Agency, 2021). Although the law does not acknowledge the need to transition beyond fossil fuels, it does give low-carbon energy preferential treatment. The law introduced four mechanisms to promote green energy development including a national renewable energy target, a feed-in tariff system, a mandatory connection and purchase policy, and cost-sharing provisions (Schuman, 2010). The law also explicitly required the central government's approval for the largest wind-power projects while smaller-scale projects were designated to provincial governments (Ministry of Commerce, 2013). At this point, China's renewable energy sector resembled a more traditional model of top-down growth, driven by central state policy targets (Schmitz, 2017).

Since the Renewable Energy Law's introduction in 2005, the low-carbon industry has become more established, accumulating resources and institutional power. As the alternative

energy industry has emerged, so has a policy community that helps shape the regulatory interventions that "cage" energy markets (Shen, 2017). Prominent within this policy community are corporations such as state-owned electricity utility companies, major investors in wind and solar parks, and leading wind turbine or solar module manufacturers. Thus, Shen (2017) argues that a shift has occurred in state-industrial relations in the energy sector since 2005. China's renewable energy industry is composed of various interests distributed across different bureaucratic and industrial segments. Together, these stakeholders form policy networks characterized by intensive day-to-day alliance building. In other words, China's modern energy sector is composed of a configuration of factions rather than being unilaterally controlled by top policymakers. This trend began after the 2005 renewable energy law, which may provide some directional insight into the energy sector's near-to-long-term political settlement. Crucially, similar scholars (Weiss, 1998; Chen et al., 2015; Jordan & Maloney, 1997) argue that state-market relations are not zero-sum. Said differently, the growth of private-sector influence does not necessarily undermine the autonomy and goals of the state. Instead, the state can utilize non-coercive[7] measures such as mutual exchange with the private sector to achieve shared policy goals. In doing so, both parties can expand their capacities alongside one another.

One example of state-corporate cooperation in China's energy sector is the exchange of information. Shen (2017) interviewed corporate and regulatory figures. This research revealed that the rapidly changing nature of renewable energy markets often creates an information imbalance, where regulators can be unsure about the consequences of policies without the input of leading corporations. As industrial actors, these companies can mobilize resources and

[7] Non-coercive in the sense that the state achieves its policy goals by cooperating with private actors rather than subverting corporations or forcing them to behave in specific ways.

influence markets. Key energy regulators in China rely on corporate market analyses, trend forecasting, and operational data to craft and implement effective policies. The state's tendency to involve private markets in decision-making is entrenched by competition between regulators[8] in different markets, which establishes an individual-level incentive for regulators to welcome information exchanges with corporations to ensure their expansion targets are met. As mentioned earlier, meeting expansion targets may be rewarded with promotions and recognition.

On the other hand, corporations benefit from information exchanges in several ways. First, corporations must predict regulatory decisions to preemptively adapt and survive. Effective adaptation can help secure a company's long-term future in an increasingly competitive market. Corporations also stand to gain from their role as informants. Corporate actors view information sharing as an opportunity to advocate for their interests before an audience of decisionmakers. Thus, policymaking in China's renewable energy sector is relationally driven. Regulators and corporations both play an important role in policy development and are bound by a shared interest in the continual growth of the industry.

At the same time, the number of actors involved in the policy community has shrunk. Before 2012, over 200 enterprises formed a highly dispersed solar PV market (Shen, 2017). Over time, regulators have selected backbone enterprises that have grown in their share of the market. For example, China's solar panel manufacturing sector has traditionally been export-driven, with 80% of its panels being shipped abroad. After anti-dumping and anti-subsidy investigations were initiated against China in the European Union in 2012, the industry became increasingly consolidated via mergers and economic restructuring (Lewis, 2014). To rescue the industry,

[8] Competition occurs between regulators in different sectors (i.e., wind vs. solar) and different provinces whose market performances will be compared by party leadership.

regulators showed favoritism to certain corporations while allowing smaller companies to die off or be absorbed (Shen, 2017). Notably, China's renewable strategy since 2012 has been to cultivate more reliable domestic demand for solar panels.

Other considerable changes have characterized China's modern energy sector. Prior to 2014, renewable energy sectors and fossil fuels did not openly conflict with each other. During China's high-growth period, energy demand grew so rapidly that expansion in the fossil fuel and renewable sectors could not keep up, hence the reliance on imports. As the growth in energy demand tapers, however, competition between energy firms and sources has intensified. Another reason for limited conflict between the two sectors is that many stakeholders involved in fossil fuels were also key players in the development of solar and wind. In what they describe as the "peaceful rise of renewables," Shen & Xie (2018) explain that large state-owned utilities, grid companies, and provincial leaders viewed wind and solar developments as new businesses opportunities, rather than as a substitute to their long-held stake in the coal industry. Shen & Xie (2018) further explain that both fossil fuels and renewable energy sources have expanded dramatically and simultaneously. Prior to 2014, solar and wind were not seen as a major threat to the entrenched dominance of coal, oil, and gas.

A dramatic shift occurred in the energy sector once Chinese officials began adapting to the new normal of slowed economic growth. Energy demand rose by less than 1 percent in 2015 while the total newly installed capacity increased by 9.4 percent (National Statistics Bureau of PRC, 2016). As production expansion outpaces demand growth, competition within the energy sector is becoming more pronounced. China's energy consumption seems to be hitting a ceiling, which means energy providers must compete for increasingly scarce oxygen, so to speak. The

shifting markets have caused a realignment of interests, especially among the central and local energy stakeholders (Shen & Xie, 2018).

As energy demand edges closer to a metaphorical ceiling, fossil fuel industries are seeking to further entrench their dominance. At the same time, renewables and other low-carbon energy sources compete among themselves and against fossil fuels for increasingly scarce demand in an increasingly overcrowded market, albeit with the endorsement of state leaders. Stakes are rising in China's domestic energy markets, highlighting conflicts within China's broader political settlement and demonstrating important economic and environmental policy tradeoffs.

This dynamic is most evident in national-provincial relations. As discussed at the front of this chapter, China's central planners have endowed provincial-level governments with enough autonomy to experiment. Now, tensions between provincial and national regulators have risen to the fore. One of the major disagreements between provincial leaders and the National Energy Administration (NEA)9 revolves around the pace of capacity expansion. In a broad sense, national level policymakers at the NEA are concerned with long-term priorities while provincial leaders often focus on immediate priorities in hopes of receiving recognition and promotion. As mentioned earlier concerning the property sector, planners are concerned with overheating markets through financial speculation, over-investment, and insufficient oversight. Thus, provincial leaders seek to rapidly expand energy capacity to stand out among their peers while the NEA has identified a mandate to manage growth, referencing evidence of overheating in the energy market (Shen & Xie, 2018; NEA, 2013, 2014, 2015). To enforce expansion caps and temper renewable energy markets, for example, the NEA prohibits the development of solar

[9] The leading energy regulatory agency.

projects exceeding specific limits in each region by utilizing subsidies and denying permits for projects above the prescribed construction scale.

Disagreements between provinces and national agencies extend beyond the pace at which renewables ought to be installed. The recent decline in year-to-year demand growth has enhanced competition between energy sources which has split some provincial and national policymakers. The new level of competition between fossil fuels and low-carbon energy sources has also permeated state-provincial relations. As the supply crisis becomes more acute, regulators have adopted new outlooks on renewable energy. When faced with a more direct trade-off between renewables and fossil fuels, some provincial officers have shown a bias toward traditional energy sources. Shen and Xie (2018) surveyed participants in this decision-making process including officials and industry stakeholders, finding that provincial officials favor fossil fuel projects that provide jobs and tax revenue. In more extreme cases of favoritism, some provincial officers have threatened to remove renewable projects' access to the grid unless the renewable company allows the province to redistribute its profits to fossil fuel competitors (Shen and Xie, 2018). This emergent pattern appears to defy the Renewable Energy Law and guidance from the State Council, which vigorously legitimizes the active prioritization of renewable energy (NEA, 2017; State Council, 2014).

Conflicts of interest and competing priorities between various actors in China's energy sector raise an important question about the way China balances power in its policy regime. When immediate provincial interests conflict with long-term national priorities, will China continue its province-led experimentation strategy which relies on the input of industrial corporations, or will it move to a stricter top-down policy approach? The literature offers competing perspectives. For example, two papers cited throughout this section debate the

likelihood of a liberalizing energy sector. Nakano and Wu (2016) argue that China is likely to continue its gradual opening of the energy sector, while Shen & Xie (2018) claim that China's way forward lies in a values-based coalition of different actors which can override short-term decision making. Nakono and Wu (2016) depict a vision of China's energy-political economy, without considering the impacts of climate change. Instead, Nakono and Wu (2016) focus almost exclusively on the political economy of fossil fuels. Shen and Xie (2018) expand the scope of their argument to consider a broader selection of energy actors and interests. Shen and Xie (2018) offer a normative conclusion, suggesting a "values-based" approach to energy policy as opposed to an exclusively "interest-based" approach. However, a political settlement perspective emphasizes the interest-based nature of institutions. Policy regimes must balance the interests of competing factions to maintain political-economic stability *or* rely on a coalition of interests that can override those of another group (Khan, 2011). In essence, a political settlement may construct values or deploy values-based justifications, but it is unlikely that values-driven policy can override the interests of a critical mass of stakeholders.

3.4 Speculating China's Next Energy Political Settlement

As argued earlier, China's overall policy paradigm is one of eternal reforms. As conditions change, so will the measures deployed by the state. In some cases, the state itself will transform in response to political, economic, security, and social challenges. Given the immense scale of climate impacts in China, I argue that climate change will instigate further changes to the structures and relationships that determine energy policy, along with broader development frameworks such as the Dual Circulation Development Paradigm. Before articulating a possible

direction for China's changing political settlement surrounding energy policy, the following table briefly summarizes the variables that inform my speculation (Table 1).

Table 1: Synthesizing Chapter 3's Descriptions of Broad Imperatives and Changes in the Energy Sector into a New Political Settlement for China's Energy Sector

Broad Imperatives	Energy Sector	Synthesizing into a New Political Settlement for China's Energy Sector
1. China's new economic normal slowed energy demand. 2. President Xi's Dual Circulation Development Paradigm prioritizes a. Domestic consumption b. Technological independence, especially in green energy c. Reduced dependence on the West. 3. Climate change poses immense risk. 4. President Xi has consolidated more power than previous Chinese leaders.	1. The rise of renewables cultivated new policy communities consisting of regulators and corporations. 2. China's renewable energy markets have become larger, with fewer competitors. 3. The end of the peaceful rise of renewable energy. 4. The state has become more willing to manipulate capital markets in favor of low-carbon energy, although some regulators are weary of overheating.	1. Tension between provincial and central regulators will force higher-level regulators to become more assertive. 2. Fears of overheating the renewable energy market will increase the mandate for more centralized planning. 3. Oligopolistic policy communities will evolve into a more centralized political settlement. 4. China's pursuit of techno-economic independence and more restrictive growth will cause China to invest more in low-carbon energy.

3.4.1 A More Centralized Policy

The first outcome I have identified argues that a more centralized political settlement will emerge from a confluence of factors. Chief among them is the tension between provincial-level administrators and central regulatory agencies like the NEA. These tensions pose clear risks to the economic agenda of central planners who have identified overheating the renewable markets as a key threat to the long-term economic viability of low-carbon ventures. These regulators are met with resistance from provincial officers who pursue unfettered growth of renewables. In other cases, the open defiance of the Renewable Energy Law represents social disunity which challenges the legitimacy of central planners while delaying the deployment of crucial low-carbon energy projects. Without greater restrictions on provincial experimentation and deviation from central goals, such conflict is likely to continue. These tensions are taking an economic, environmental, and social toll on China's political system.

Given that President Xi has gradually centralized planning under his office, it seems improbable that high-level regulators will continue to defer to provincial-level judgments on sensitive economic and climate issues such as renewable expansion. This trend is already evident in the changes to capital markets described earlier, where the CPC is taking a more active role as an overseer and facilitator of investment flows in key sectors like real estate. Central regulators may view a more centralized strategy as the best way to manage the risks of overheating energy markets.

While provincial-level governments may lose energy-related decision-making power in the coming years, corporations are unlikely to see a significant decline in their role. Central planners have a vested interest in maintaining existing policy communities that promote the exchange of information. The trend towards renewable energy oligopolies indicates that the

number of corporations involved in information flows will shrink, but the influence of the corporate policy communities themselves will not be diminished. To maintain renewable expansion in the face of possible overheating and limited demand growth, central planners at the NEA may still benefit from corporate operational data, market analyses, and trend forecasts. If anything, as expansion targets become more precise, public-private coordination in the form of information flows will become more essential.

3.4.2 A More Domestic Energy Mix

For many of the same reasons that lead China toward a more centralized energy policy paradigm, China's regulatory strategy might also reduce the country's reliance on energy imports. During the era of high growth, especially in heavy industries, energy demand rose faster than production could satisfy which pushed China to import energy. Despite rising concerns over energy security, China is a net importer of coal and natural gas. Dependence on foreign energy sources can be problematic if changing geopolitical conditions inflict price fluctuations.

Additionally, President Xi's Dual Circulation Development Paradigm also seems in line with a more self-reliant energy economy. With an increasingly overcrowded market, energy imports may become less vital to China's energy mix, especially as China seeks to promote its own companies. This speculation draws support from two underpinning principles of Chinese industrial policy described earlier ion this chapter. First, China uses protectionist policies to enable national favorites to outcompete foreign firms. Cutting into energy imports may reserve growth opportunities for China's overcrowded energy markets. Second, Xi's Dual Circulation Development Paradigm aims to increase self-reliance. Xi's broader push for technological self-reliance and the cultivation of more sophisticated modes of production is compatible with the

interests of domestic low-carbon energy companies who face limited growth opportunities, partially due to China's reliance on foreign oil and gas. Reducing the effects of slowed growth in energy demand would also help reduce the provincial-national political tensions by allowing for more ambitious installation of renewables at the provincial level. Each of these potential routes for change relies on case-specific analysis, demonstrating the tendency for climate change to amplify and influence existing challenges.

Chapter 4 | A Financialized Rentier Settlement: What the UAE's Nuclear Energy Program Reveals about the Political Economy of the New Rentier State

A petrostate is a country whose economy heavily depends on the extraction and export of oil and natural gas. As gatekeepers to the world's energy supply, petrostates yield outsized political influence on a global scale. Following the United States' approval of a two-billion-dollar aid package for Israel during the 1973 Arab-Israeli War, the Organization of Arab Petroleum Exporting Countries (OAPEC) placed an oil embargo on the United States (Painter, 2014). Energy prices dramatically rose across the United States, resulting in inflation and higher costs globally. This effect was felt most acutely by countries with strong economic ties to the US. The energy crisis of the 1970s demonstrated the political dimensions of energy economics, especially in petrostates.

Although petrostates will be at the center of energy-related decision making, today's energy crisis is fundamentally different than the 1970s. In the 1970's the energy crisis was the direct result of security-related disputes. Now, climate change is the instigator. Petrostates are uniquely situated as energy-dominant states with vested interests in the continuity of fossil fuels. A decline in global fossil fuel demand could wreak economic and political havoc in the states that most acutely depend on fossil fuels. For this reason alone, the coming energy crisis will remain a focal point of Arab politics. At first glance, few states have more to lose in the event of a transition away from fossil fuels than the petrostates of the Middle East. As climate change rises to the fore of international agendas, new questions must be raised about the prolonged stature of oil economies. Rapid shifts in energy imperatives are forcing petrostates to change with the times. The United Arab Emirates (UAE) has assumed a leading role in this task. The

UAE has stood out among other petrostates as a model for economic diversification and planning. To this end, the UAE is the first of the Gulf Cooperation Council members to introduce nuclear power into its energy mix. An unprecedented shift in the energy economics of petrostates raises questions about their future governance and political settlements.

This chapter will explore the methods the UAE deployed to become the most recent state to incorporate nuclear power into its energy mix. This chapter will closely examine many of those policies and planning strategies, along with the motives that compelled the UAE to pursue nuclear energy in the post-Fukushima era. Additionally, this chapter will analyze the scope and shape of the energy transition, eventually applying a political settlement framework to the nuclear energy transition.

Before articulating the content and strategy of the policy decisions defining the UAE's nuclear energy efforts, I will review the UAE's political system. Prefacing the country's energy transition with a summary of the UAE's decision-making mechanisms introduces essential context. Additionally, classifying the UAE's political settlement and disaggregating its components before discussing the energy transition sets up a rich contrast explored near the end of this chapter.

4.1 Early Rentier State Theory's Approximation of the UAE's Political Settlement

Extensive literature within the discipline of political economy surrounds the inner workings, vulnerabilities, and institutional strengths of rentier states like the UAE. These perspectives deconstruct state-society relations in the UAE, which paves the way for a political settlement framework. Only by examining these broader themes can the consequences and lessons of the UAE's regional nuclear energy leadership be understood appropriately.

Rentier State Theory (RST) was first established as an explanation for why resource-rich countries did not "evolve" toward democratization as predicted by the neoclassical theorists of the early 1970s (Walker, 2023). In early RST literature, a rentier state was conceptualized as one that derives power and legitimacy from lucrative external rents, often in the form of royalties or payments for resource extraction and export (Beblawi, 1990). A tiny share of citizens comprises a selective class of elites, well-connected individuals and families. Early RST argues that elites organize themselves into patron-client networks. These networks define and draw strength from the exchange of material and non-material trades (Veenendaal, 2017). In rentier states, the bulk of these trades take the form of monetary rents derived from fossil fuel exploitation. To borrow Mushtaq Khan's language around political settlements, patron-client networks characterize the organizational schemas of the elite and their relationship to production.

As argued in Chapter 3, states must cultivate political legitimacy by engaging more than a single constituency. While rentier governments attend to the interests of extensively networked elites, they must also appeal to non-elites. As such, citizens of rentier states are an essential part of the rentier political settlements, according to early RST. Early RST scholars argue that the state's executive function is to redistribute a share of rent-based income through social expenditures and create artificial employment opportunities (Puranen and Widenfalk, 2007). Toledo (2013) describes this type of political settlement as a social contract between the state and society wherein citizenship is rewarded with rents but not political rights. In turn, the state imposes minimal tax burdens on its citizens, if any at all.

Early Rentier State Theory identifies this social contract as the thrust behind authoritarianism's persistence throughout resource-rich countries, especially in the Middle East and North Africa. In one of the most influential RST publications to date, Michael Ross (2001)

contributes three effects of rents that he argues sustain or prolong undemocratic governments in oil-rich states. First is the "rentier effect," where limited or absent tax rates and high social spending weaken democratic pressures by tempering public frustration. Even without the enthusiastic support of their people, these governments often gain the acquiescent tolerance of citizens. Second, the "repression effect" refers to the state's use of rent-generated wealth to enhance the capacities of repressive institutions, such as surveillance and policing, to stave off civil disobedience or other challenges to the regime. Finally, the political stability derived from the allocative state model stifles incentives for the state to put forth socio-political reforms, robust development plans, or economic policies. Rather than allow diverse modes of wealth creation through liberalization, early RST argues that these states face incentives to limit economic production to resource extraction. The theory argues that controlling the mechanisms for wealth creation allows elites to maintain their enclosed networks of patronage. Consequently, the allocative state remains in a stagnant equilibrium as long as fossil fuel rents remain steady. For the wealthy elite, this exchange is stable and self-enriching. Among citizens, there is limited appetite for dramatic change so long as the state meets their needs through its allocative function. Ross calls this final feature of early rentier states the "modernization effect."

4.2 Departing from Early RST: Reviewing the UAE's Recent Policy Changes

As a petrostate, the United Arab Emirates' decision to pursue nuclear energy appears paradoxical to much of early rentier state theory. The UAE defies the conventions set by early RST in two ways. First, RST claims that the ruling classes of rentier states consolidate wealth and legitimacy from rent-seeking and allocation. In this vein, Ross's "modernization effect" discounts incentives for rentier states to modernize. The UAE's peaceful nuclear energy program

clashes with the tenets of Ross' modernization effect as a highly innovative endeavor intended to establish the country's scientific reputation, diversify its economy, and strengthen international relationships (Mason, 2020). Nuclear energy also sets the UAE apart from most energy mixes in developing countries. Nuclear energy is mostly confined to larger or highly developed states.[10]

Second, the nuclear energy initiative is highly complex in its organization. Nuclear energy production requires multi-layered international cooperation agreements along with public-private power sharing. These initiatives represent a far more dynamic approach to economic governance than implied by early RST and the ideas championed by its contemporaries, Ross included. The UAE's pursuit of economic diversification and innovation amplifies the disconnect between early RST and reality (Davidson, 2009). Despite the UAE's evident departure from early RST with its nuclear energy pursuits, the modernization effect retains currency among Rentier State Theory scholars today (Gray, 2011).

It is worth noting that nuclear energy is only part of the UAE's broader initiative to diversify and modernize its economy. Analyzing the larger-scale economic shifts in UAE state planning provides crucial context for energy diversification via nuclear energy. In recent years, "The Miracle in the Desert" has made active attempts at diversification across various sectors. A few key factors push the state to modernize its economy and embrace innovation. Most directly, petroleum dependency ties the domestic economy and, by extension, the allocative state's legitimacy to a single commodity.

[10] With some notable exceptions including small Eastern European states who inherited nuclear power plants after the dissolution of the Soviet Union along.

Dependency on a single export is problematic because it exposes the national economy to risk and flux for two reasons. First, the price of oil is unfixed. Without a diversified economy to absorb shocks to oil prices, petrostates are left without a firm economic foundation in times of crisis. Diversification became a priority for the UAE after repeated exposure of periodic economic busts throughout the early 1970s and 1980s; the Global Financial Crisis of the 2000s; the oil glut in the 2010s; and the reduced demand for oil during the Coronavirus pandemic (Jeong, 2020; Kabbani & Ben Mimoune, 2021). Second, unlike nuclear energy and renewables, fossil fuels are not inexhaustible energy sources. Although estimates vary on when regional oil reserves will be fully depleted, the event is inevitable. National income and the political system upheld by that income would be severely threatened without preemptive diversification.

Petrostates also incur other disadvantages besides periodic oil busts. The United Arab Emirates, for example, has historically experienced unhealthy trade imbalances and dramatic inflation. Abu Dhabi, the country's largest emirate by far, lacks a non-oil manufacturing base, with imports exceeding non-oil exports by about fifty-fold (Davidson, 2009). The emirate is burdened with extreme excess liquidity due to a dearth of domestic non-oil economic activity and investment opportunities. Davidson explains that the "UAE has been suffering from very high levels of inflation" for the five to six years before his study.[11] The UAE Central Bank is

[11] The World Bank officially began publishing UAE inflation data in 2008 when inflation reached 12.3%. Since diversification efforts were initiated in 2008, the UAE has not demonstrated unusual deviations from global averages. Although diversification has occurred in the periods since 2008, a causal link cannot be established here.

unable to set its own exchange rates because the national currency is pegged to the US dollar (Bechri, 2022). The UAE has limited control over inflation (Davidson, 2009).

Rather than setting interest rates, the UAE has attempted to ameliorate inflation by expanding domestic production. Increased domestic activity provides a destination for the excess liquidity held by elites in rentier states such as the UAE along with new streams of incomes for investors and employment opportunities for workers. The Emirates Investment Authority highlights three economic vision plans put forth by the state: UAE Vision 2021, Dubai Industrial Strategy 2030, and Abu Dhabi Economic Vision 2030. As part of a three-hundred-billion-dollar effort to stimulate and diversify, these plans aim to double industrial manufacturing's contribution to the national GDP by 2031. Beyond manufacturing, the UAE has utilized its immense financial resources to cultivate technologically advanced industries once thought to operate exclusively in highly developed economies, such as artificial intelligence, renewable energy, electronics manufacturing, aerospace engineering, and, of course, energy innovation (Davidson, 2009; Griffiths and Sovacool, 2020; Emirates Investment Authority; UAE Space Agency). The UAE has leap-frogged decades of incremental growth through state-led political, financial, and material investment, contradicting Rostow's stages of economic growth.

Apart from providing investment opportunities for petrodollars, these development plans are intended to provide Emiratis with desperately needed employment prospects. An underdeveloped national workforce is one of the prominent challenges to economic development in petrostates. Approximately 91% of the UAE's public sector workforce are expatriates. In the private sector, that number reaches 98% of workers (Al-Ali 2008). As early RST appropriately argues, one of the allocative state's central roles is cultivating employment opportunities for citizens.

Early RST implies a political settlement that does not cleanly align with recent trends in the UAE's economic and political trajectory. Early RST argues that the allocative state faces little pressure from society to develop a positive economic policy because resource rents meet citizens' basic needs, reducing the appetite for political disruption. It further maintains that the ruling class encounters few incentives to decouple from the lucrative rent economy, creating a stagnant and unresponsive state heavily reliant on petroleum rents (Ross, 2001). These assumptions no longer capture rentier realities as yesterday's petrostates seek to diversify, innovate, and punch above their weight.

Hence, Michael Gray's (2011) theory of the late rentier state. In the seminal critique of early rentier state theory, Gray argues that economic diversification in rentier states, exemplified by the UAE, reveals the theory's inadequacy. Specifically, early RST fails to consider the emergence of state capitalism in the Gulf States. Ian Bremmer (2009) explains that state capitalism is an economic model wherein the state is the primary economic actor and uses markets for political and economic benefit. Without naming it "state capitalism," this chapter has already discussed elements of this model. State-led diversification initiatives, sovereign wealth funds, and state-owned enterprises in non-hydrocarbon sectors represent a shift away from the classical rentier state. Still, Gray argues that diversification does not signal a divergence from the rentier model in its entirety. Instead, this repositioning further entrenches the rentier model with seven characteristic adjustments. Gray's (2011) descriptions of these "features" are summarized in Table 2.

Table 2: Characteristics of a Late-Rentier State (Gray, 2011)

Feature 1: A responsive but undemocratic state While rentier states have thus far resisted meaningful democratization, they have demonstrated responsiveness to unemployment pressures and globalization by introducing small reforms. Still, this responsiveness does not welcome transformation. Instead, it strengthens the existing state-society ordering.
Feature 2: Opening up to globalization, but with some protectionism Late rentier states open themselves to selective foreign investment, trade, transport, and tourism. Focus industries tend to be tertiary, intermediary roles in international trade, finance, and investment. Such globalization measures aim to achieve a more diversified rent portfolio instead of moving away from rent-like income entirely.
Feature 3: An active economic and development policy Despite early rentier states lacking "economic policy," late rentier states are competent economic managers with active monetary, fiscal, trade, and labor policies. Additionally, the state seeks new rent-generating activities, particularly through globalization and diversification. The allocative state self-perpetuates as the income is diverted toward development projects meant to prevent political unrest and demonstrate competence.
Feature 4: An "energy-centric" vs. an "energy-driven" economy Early rentier states in the Middle East depend almost entirely on energy export rents. This is an energy-centric economy. Late rentier states combine existing wealth with ongoing rent-generating activity to subsidize other sectors. This is an "energy-driven" economy.

Feature 5: An "entrepreneurial state-capitalist" structure Rentier states have always been state-capitalist, given the degree of state control over economic activity. Late rentier states, however, set ambitious and visionary national goals, hence Gray's term "entrepreneurial." A business-friendly policy paradigm replaces the highly restrictive economic model of the past. Still, these business interests remain subservient to the state's broader political goals.
Feature 6: A state that is long-term in its thinking Late rentier states began to recognize the costs of dependency on oil after periodic price slumps. Income diversification and sovereign wealth funds will help absorb future price shocks and offer a basis for the economic transition to ensure the long-term viability of the rent-based political system.
Feature 7: An active and innovative foreign policy paradigm Early rentier states were thought to operate without significant soft or hard power. Late rentier states, however, welcome foreign investment and embrace strategic partnerships with larger states to safeguard national security and state wealth.

Gray's theory is widely cited among recent rentier state scholarship and addresses many of the inadequacies of older theories. However, his critique makes no mention of energy transitions or climate change. While every country will face pressures to shrink the role of fossil fuels, petrostates face uniquely acute consequences. Any frameworks offering interpretative or predictive analysis on how contemporary rentier systems self-innovate are only approximations if they ignore climate change's impact on global energy exchanges. Questions remain. How will

rentier states draw upon Gray's seven political characteristics to address energy and climate imperatives? Will climate change alter these features or reinforce their veracity?

Still, Gray's theory is useful because it draws from empirical observations to establish broader state objectives and attitudes. These insights can help make sense of the UAE's energy policy decisions by clarifying the motives and limitations of the transition. Gray's theory can be an entry point to some relevant questions. Why has the UAE chosen not to resist alternative energy production? Do new UAE energy policies entrench the rentier political settlement or propel the UAE beyond it? The following sections of this chapter will use Gray's theory of new rentier states to characterize and deconstruct the UAE's leap toward nuclear energy production. Afterward, I will apply a political settlement framework to these findings to answer these questions.

4.3 A New Rentier State Perspective on the UAE's Nuclear Energy Program

While all seven features of Gray's theory of new rentier states can be applied to the UAE's broader economic and planning strategy, energy transitions most tangibly call upon the last three features. The UAE's nuclear program represents an innovative approach to foreign policy and "entrepreneurial" state capitalism described by Gray while referencing the long-term imperatives of climate change. This section applies features one, five, six, and seven of Gray's theory to the motives, forces, and methods driving the nuclear energy program. Although rhetorically inconvenient, this section will not apply the three features in numerical sequence. To effectively convey their relevance to the topic while preserving a coherent narrative about the project, I will discuss the three features, starting with six before five and concluding with seven. Framing the UAE's pursuit of nuclear energy through the new rentier-state theory moves one

step closer to illustrating the intersection of political settlements and changing energy policy in the UAE.

4.3.1 The Role of Citizens: A Responsive but Undemocratic State

Gray's (2011) first feature of a late rentier state examines the changing role of citizens in political decision-making. His theory argues that political decisions will align with the basic needs of rentier state citizens. This echoes the notions of early rentier state theory's description of rentier governments' "allocative" responsibilities. Gray nuances this idea by emphasizing more advanced economic development policies, which Early RST discounts through its constitutive belief that rentier states are not advanced economic planners. Instead, Early RST scholars like Ross (2001) argue that rentier governments face political and financial incentives to restrict income generations to petroleum rents.

Gray (2011) further distinguishes the late rentier states by arguing that rentier states have adopted some political reforms in response to unemployment, Islamist political challenges, and the technological effects of globalization on traditional legitimacy. Changes to media regulation and development agendas shows that a late-stage rentier state acknowledges the need to *appear* open to change, at the very least. In a more concrete sense, the state must *actually* be somewhat responsive to the views or ambitions of the population (Gray, 2011). Still, even Gray acknowledges that the end consequence of reform tends to strengthen patron-client networks and consolidate power among elites by reducing political aggravation.

Gray's analysis offers insight into the UAE's investment and pursuit of domestic nuclear energy. The expressed motives driving the government's pivot towards economic development and industrialization reflect Gray's claim that states must appear responsive to economic issues

affecting the public. Plans like UAE Vision 2021, Dubai Industrial Strategy 2030, and Abu Dhabi Economic Vision 2030 justify an economic agenda tailored to the employment and diversification imperatives described earlier, along with decarbonization goals. Simultaneously, these investment plans provide new investment opportunities to elites, enriching the patron-client networks.

However, the policy priorities of many citizens aren't confined solely to economic and industrial issues. Considerable environmental and energy challenges face non-elite Emiratis. Nuclear energy's rise in the country corresponds to popular support for policy action on climate change, energy diversification, and rising demand for electricity (TradeArabia, 2023; World Nuclear News, 2017). Adding to these economic factors is a water crisis among Gulf Cooperation Council countries[12] (Qureshi, 2020). Public concern about the environmental, energy, and economic consequences of longstanding energy policy may have led policymakers to favor public investments in nuclear energy.

An increasingly efficacious public also may have affected the UAE's decision to pursue nuclear power. The most pressing environmental issue for the Emiratis polled[13], is the impending water crisis (Statista, 2017). Water scarcity challenges development, public health, agriculture, and environmental stability as regional groundwater reserves become depleted. Desalination, a process that makes seawater drinkable, is viewed as a viable mitigation strategy (Alhuzaymi and Alajo, 2016). Policies that favor nuclear energy are popular in the UAE, partially because desalination uses immense amounts of energy, making nuclear power plants a cleaner alternative to coal or gas-powered desalination. Additionally, nuclear energy has the greatest capacity

[12] GCC countries: Bahrain, Kuwait, Qatar, Oman, Saudi Arabia, and the United Arab Emirates.
[13] Future research should disaggregate the Emirati public. Given the UAE's steep class divides, public opinion and political power may complicate surveys of the public as a monolith.

factor, making it the most reliable energy source for energy-intensive projects like seawater desalination.

Many Emiratis also seem to support energy diversification for public health reasons. For example, air pollution is a severe public health issue in the UAE (Li et al., 2010). Greater localized concentration of greenhouse gases negatively affects public health by increasing the risk of cardiovascular disease, respiratory disease, and cancer (Kahn, et al. 2022). In fact, the leading cause of premature death in the UAE is ambient air pollution, roughly 90% of which comes from fossil fuels (Gibson and Farah, 2012; Galey, 2022).

Without energy diversification, rising energy demand in the UAE presents a trade-off with public health (Qureshi, 2020; U.S. Energy Information Administration, n.d.). If the UAE does not expand its energy capacity, growing demand could cause internal strife in the UAE. The country would be forced to import foreign gas or coal to avoid energy shortages which increase prices paid by consumers. Alternatively, the government could reserve its petroleum that would otherwise be exported for domestic consumption. However, sacrificing rents would jeopardize the dominant political settlement by weakening the patron-client networks while limiting the allocative state. To avoid the political costs of public health decline or energy shortages while attending to the interests of elites and acting on its economic vision plans, the UAE plans to diversify its energy mix.

The outcomes of the UAE's nuclear energy initiatives demonstrate that modern rentier states can successfully navigate difficult policy tradeoffs while producing new gains for stakeholders in its political settlement. The Barakah nuclear power plant is seen as a model for other developing countries seeking to inaugurate civilian nuclear power. Nuclear power projects are often criticized for their construction timelines and costs. Experts attribute the project's

successful construction to three strategies: staggering the parallel construction of four reactors, relying on expatriates rather than indigenizing from the beginning, and choosing an experienced builder with a record of delivering on-time (WNA 2023).

The four nuclear reactors at the first nuclear powerplant (NPP), Barakah NPP, will satisfy 25 percent of the UAE's peak electricity demand upon completion of the fourth reactor next year (WNA 2023; Reuters, 2021; International Atomic Energy Agency, 2023). As a carbon-free energy source, these nuclear projects will prevent 22.4 million tons of carbon emissions (American Nuclear Society, 2023). While the UAE has reduced their domestic carbon footprint, the global emissions impact of the UAE's nuclear energy program may be limited. The UAE remains a prominent seller in global petroleum markets and continues to import Qatari natural gas. Once Barakah becomes fully operational and other renewable investments come to fruition, domestic demand for fossil fuels may decrease.

To fulfill the role of the allocative state in the twenty-first century the state must adapt to changing needs that reflect broader ecological and environmental changes. The health impacts of rampant air pollution and an impending regional water crisis demonstrate the political weight of climate change and its capacity to channel public opinion, even in countries where oil drives economic and political activity. Insofar as the climate crisis creates new expectations that citizens place on their governments, scholars attempting to dissect the dynamic political settlements should pay close attention to environmental challenges.

4.3.2 Entrepreneurial State-Capitalism

Gray (2011) also notes that "late" rentier states embrace the role of the government differently than early rentier states. Gray argues that the state is an ambitious actor that adapts its economic engagements beyond hydro-carbon markets. Diversification has become a persistent

goal of UAE domestic and foreign policy, driven by the need to plan for oil shocks once available petroleum reserves deplete and eventually exhaust. However, Gray does not consider the fact that a global shift away from fossil fuels would accelerate these consequences. The International Energy Association predicts that oil demand will peak in 2030 (Plumer, 2023). If the chief authority on global energy economics is correct, oil demand will decrease steadily. A decline in oil's value would pose risks to the economic viability and, by extension, would jeopardize the rents and allocations that sustain the late rentier state.

Sovereign wealth funds have been an important instrument in the state's economic and political activity. Decades of rent payments enabled the UAE's elites to accumulate financial resources that have been pooled into sovereign wealth funds (SWFs). These funds serve as investment vehicles owned and operated by the state (Yi-Chong, 2010). As an extension of the state, sovereign wealth funds are a tool for both economic and political objectives. Because SWFs serve the dynamic interests of the state, they tend to accept higher levels of risk, including investments characterized as capital intensive, low reward, and having a long-term payback period (Cumming and Monteiro, 2023; Young, 2020; Bortolotti et al., 2023). In total, UAE sovereign wealth funds boasted 1.624 trillion dollars in assets at the end of 2021 (Abbas, 2022). Their size enables them to absorb this risk in favor of the state's political objectives (Cuervo-Cazurra et al., 2023).

As the first Gulf Cooperation Council state to build civilian nuclear power reactors, the UAE has deployed SWFs to lead partnerships with international investors and fund significant development projects. These resources have been indispensable in the UAE's diversification initiatives, including the state's nuclear power program. Sheikh Muhammad bin Zayed Al Nahyan, President of the United Arab Emirates, established his flagship Mubadala Development

Corporation in 2002, shortly before he became crown prince. Four years later, the firm established the Abu Dhabi Future Energy Company (ADFEC) subsidiary. With the immense financial resources of one of the country's largest SWFs and the political capital of the head of state, Mubadala has invested heavily in alternative energy projects (Davidson, 2009; Luomi, 2009). Later, I will argue that the uncertainty surrounding the future of fossil fuels has led the UAE to integrate sovereign wealth funds as institutions that bind stakeholders and define the country's changing political settlement.

Mubadala has explained that the company seeks capital-intensive investments in future-facing energy and technology sectors (Mubadala, 2008). Around the same time the fund announced plans to finance the construction of four nuclear reactors at approximately seven billion dollars each (Davidson, 2009). State-owned enterprises, including sovereign wealth funds, have been identified as emergent financial tools in the development of nuclear power projects in the UAE (Barkatullah & Ahmad, 2017).

Beyond SWFs, the state negotiated the contracts and cost-sharing burdens associated with the infant nuclear power plant. These negotiations paved the way for Barakah by engaging international partners, including foreign corporations and governments. A shortage of nuclear expertise and infrastructure within the UAE's borders forced planners to look elsewhere for engineering, construction, fuel, and operation. Choosing to implement nuclear power through contractor services rather than indigenizing the project, the state-led enterprise, Emirates Nuclear Energy Corporation (ENEC) was created to lead the project. ENEC entertained proposals from nine companies before shortening the list to three bids from international nuclear leaders. Officials selected the bid put forth by a Korean consortium led by Korean Electric Power

Company (KEPCO). KEPCO's proposal involves several other joint venture partners including Samsung, Hyundai, Doosan, and Westinghouse (WNA, 2023).

Table 3: Project status of the four Barakah nuclear reactors (IAEA, 2022; Lopez, 2022; American Nuclear Society, 2023)

Reactor Name	Construction Start Date	Project Status	Gross vs. Net Capacity (MW)
Barakah-1	July, 2012	Commercial operation since April, 2021	1417 : 1417
Barakah-2	April, 2013	Commercial operation since March, 2022	1417 : 1345
Barakah-3	September, 2014	Commercial operation since February, 2023	1400 : 1345
Barakah-4	July, 2015	Undergoing readiness testing (expected to commence operations in 2024)	1400 : 1345

The 24.4-billion-dollar financial arrangement was composed of direct loan agreements with ENEC and KEPCO offering 19.6 and 4.7 billion dollars in equity commitments, respectively. The government owned a majority stake (60 percent) in the project while the joint venture partners collectively owned 40 percent. KEPCO later claimed that their bid was chosen, despite heavy competition from French, American, and Japanese firms, due to their high-capacity reactors, low construction cost, and short construction timeline (WNA, 2023).

Losing bidders in the US and France would end up being included in the project in key fuel management and financial roles, demonstrating the international reach of this operation. For example, the UAE reached an agreement with French companies to receive a portion of Barakah's nuclear waste for recycling into reusable fuel (Alhuzaymi and Alajo, 2016). In the same vein, Westinghouse, an American nuclear power producer and losing bidder, sold $2 billion worth of coolant pumps and controls for Barakah (WNA, 2023).

The state's proactive approach to the security risks of nuclear power further demonstrates the entrepreneurial spirit of the late rentier state. Critics of nuclear energy argue that nuclear materials and technology increases the likelihood of arms proliferation in two ways. First, the materials found in spent fuel may be diverted towards more belligerent projects such as weapons manufacturing or export. Second, states may acquire requisite knowledge for weapons proliferation through exposure to fuel-reprocessing technology and procedure. The international community becomes more concerned about proliferation risks when the state in question is perceived as less stable, more autocratic, engaged in state rivalries, or has demonstrated hostility to international oversight. The most prominent reason for skepticism among non-proliferation experts grew from concerns that the UAE was pursuing nuclear arms proliferation under the guise of energy production to counter Iran's nuclear weapons program (Al-Saidi and Haghirian, 2020).

Although the UAE is considered relatively stable, according to the World Bank's Stability indicators, planners preemptively addressed these concerns to solicit international partnerships. The UAE banned the domestic enrichment of uranium. Additionally, the UAE convinced the international community that it was not seeking nuclear technology for weapons programs by articulating many of the economic and environmental imperatives iterated

throughout this chapter. Finally, the UAE submitted to extensive oversight. The UAE's cooperative and open approach to international accountability paved the way for key partnerships which advanced the project through completion (WNA, 2023).

Cooperation with international institutions and partners has effectively advanced the UAE's nuclear energy objectives by expanding access to foreign technology, materials, and capital. Nuclear energy requires strong international accountability mechanisms which undermine national energy sovereignty. Still, it does not appear that the UAE begrudgingly capitulated to global pressures. Instead, the UAE initiated many of these concessions. Additionally, nuclear energy makes the UAE less reliant on Qatari natural gas, implying that energy sovereignty is not uniquely undermined by nuclear energy projects (Sim, 2020).

In the end, Barakah made the UAE's domestic energy consumption cleaner and cheaper. Electricity generated by Barakah will cost only a quarter the cost of that from gas, which the country imports from its neighbor, Qatar (WNA, 2023). These ambitions were explicitly expressed by the UAE's goal to reduce gas' contribution to gross domestic electricity supply from 98 percent to 38 percent between 2012 and 2050 (UAE, 2015). Nuclear energy serves a multi-function role by reducing the UAE's trade deficit, lowering energy costs, enabling the UAE to decouple from a rival state, and progressing toward clean energy goals.

Nuclear energy's rise in the UAE signals an essential dynamic of late rentier state politics. The elites and state are diversifying their political power by utilizing investment and facilitating international agreements. Despite economic reformation and diversification, the state's role has not been diminished. Instead, the state plays an active role in planning and executing economic visions by combining immense financial resources, regulating economic activity, and negotiating with foreign powers.

4.3.3 Thinking in the Long-Term: A Reformed Political Settlement and New Rents

In response to the changing imperatives of the twenty-first century, rentier states have reformed their internal political settlements by shifting from an energy-centric economy to one that is energy-driven. An energy-centric economy reflects the petrostates of Early RST, where diversification and development are hindered by the modernization effect. An energy-driven economy utilizes "oil and gas revenues… for more thoughtful or considered policies that promote economic diversification" (Gray, 2011). Sovereign wealth funds are one of the mechanisms used by the state to diversify, become energy-driven rather than energy-centric, and coalesce interests into a reformed political settlement. SWFs are the oil and gas revenues manifest. Directing petrodollars into strategic investment portfolios may guide how the late rentier state aims to reproduce its political and economic power after global oil demand peaks.

The claim that sovereign wealth funds will supplement declining oil revenues to reproduce the political settlement represents an important institutional shift as global oil demand peaks. Sustaining the rentier political system requires a political settlement capable of sustaining patron-client networks upon which the state relies on for legitimacy while maintaining international relevance despite a decline in oil's value abroad. Additionally, the new political settlement must align with the interests of the UAE's public, including the environmental challenges linked to public health and water availability.

The rise of sovereign wealth funds in resource-rich countries like the UAE fulfills several of these burdens, making them essential to the future of governance and political settlements in petrostates. First, as state-owned investment vehicles, sovereign wealth funds help the state maintain its ties to rent-seeking elites after oil revenues decline. This chapter discussed the

political nature of sovereign wealth funds earlier. Some scholars have criticized this view, arguing that SWFs are more often used for economic gain than political profit (Alhashel, 2015). This view assumes that economics and politics are divorced. Khan's (2010) theory of political settlements advances the notion that economic and political relationships are mutually reinforcing, especially when the state is the arbiter between the two, as is the case in the UAE.

As such, the economic profit made through sovereign wealth funds serves three political purposes. First, the state can redistribute investment returns to the public, carrying on the role of the allocative state. The UAE's nuclear energy investments demonstrate this effect. By investing billions in the Barakah nuclear power plant, the UAE government addresses the environmental and resource challenges facing its citizens. Second, and more importantly, the state uses SWFs to strengthen its relationships with rent-seeking clients of the state, preserving its political power. Sovereign wealth funds unite the interests of the state and the economic elite in petrostates by allowing members of the elite to manage portfolios. Today, the ruling family's most influential member is Abu Dhabi's ruler and president of the UAE, Shaikh Khalifa bin Zayed Al Nahyan. However, the political power in Abu Dhabi is concentrated mainly among the ruler's eighteen brothers, referred to as the Bani Zayed. Particularly, Bani Fatima, a bloc of six full brothers, have collectively gained power and control over diplomatic, financial, and other types of institutions linked to national security (Grigoryan, 2015; Davidson 2006). The Al Nahyan family retains control over all SWFs in Abu Dhabi. Within the Al Nahyan family, Shaikh Khalifa bin Zayed Al Nahyan controls the management of two of the four major SWFs in Abu Dhabi. His half-brother and the Crown Prince of Abu Dhabi, Mohammed, has complete control over Mudabala's investment strategy, and Mansour dominates IPIC. The latter are the most influential brothers from Bani Fatima.

Third, most positions in all SWFs' boards of directors are shared by Al Nahyans' powerful tribal allies such as al-Bu Mahair, Qubaisat, Sudan, Hawamil sections of Bani Yas as well as Dhawahir and Awamir tribes (Grigoryan, 2015). This represents a reformation of existing patron-client networks, where preexisting relationships are financialized, rather than primarily bound by energy-related rents. New forms of rents include management positions which grant decision-making power about the types of investments SWFs pursue and shares in state-owned investment funds. In turn, the financial goals of elites align with those of the state (Sanchez & Lamchek, 2023; Balding, 2012). In engineering a system of mutual profits among citizens, the elite, and the state, sovereign wealth funds constitute an essential part of the emergent political settlements of rentier states.

4.4 Summarizing the Political Settlements of "New Rentier States"

Political settlement theory and Gray's (2011) theory of new rentier states have much to say about the changing imperatives of twenty-first-century governance. Responding to ecological, environmental, and energy challenges requires innovative planning and efficient policy implementation. At the same time, the state must remember to prioritize the interests and needs of the UAE's non-ruling elite. Decades of rent collection have endowed the UAE with immense financial resources. The state, along with key members of the non-ruling elite, have channeled these resources into sovereign wealth funds which serve as financialized instruments of state power. The growth of sovereign wealth funds, and their politicization, may signal a crucial shift in the UAE's planning strategy from an economy dependent on oil, to a financialized economy with diverse revenue streams.

These economic strategies are not guided exclusively by financial gain. Instead, sovereign wealth funds operate as state-owned enterprises that utilize financial resources for both economic and political profit. In addition to investing in solutions to social problems like air pollution, water scarcity, and energy shortages, sovereign wealth funds help maintain existing networks of patronage and rent-seeking. Not only do sovereign wealth funds provide enriching opportunities for elites, but elites are also incentivized to cooperate with the state in exchange for shares in sovereign wealth funds and appointments to fund-management positions. These ties include family members, industrial leaders, and other influential political elites. Once the state rewards rent-seeking behavior with management positions, those individuals merge their personal financial interests with the state by making state-sponsored investments in projects in which they may also have stakes. The financialization of the patron-client networks represents an essential path change in terms of the shape taken by institutions within the UAE's political settlements. The characteristics of the political system may not change drastically because the new institutions (SWF) reinforce the role of rents in appeasing clients of the state in exchange for legitimacy.

In the end, political settlement theory and Late RST advance a common understanding of the role sovereign wealth funds play in diversifying the UAE's economy. However, political settlement theory can change our understanding of twenty-first-century rentier states in ways not articulated by Gray. Gray's rhetoric of the "late" rentier state should be questioned. If the UAE's political settlement is able to adopt new institutions without abandoning the organizing mechanisms of rentierism, the rentier model is not entering some final stage before its eventual obsolescence. Instead, the rentier model is renewing itself in the face of a fundamental challenge. Gray discounts sovereign wealth funds as "retirement plans" for rentier states after oil demand

peaks. By undervaluing the institutionalized role of sovereign wealth funds, Gray undermines his own depiction of rentier states as ambitious and strategic economic actors. A political settlement perspective lends greater credibility to the idea that rentier states will find innovative ways to prolong their global relevance after oil demand peaks while reforming the institutions that preserve the integrity of a rentier political economy. In this sense, the UAE's political settlement, which hinges on the allocative state and an organized network of elites, is more suited to navigate the global energy transition than one might expect at first glance.

Chapter 5 | Concluding Discussion

Together, China and the United Arab Emirates offer a unique and rich comparison. Neither system conforms to the Western liberal mode of governance, yet both play an outsized role in global trade and politics. Each country pursues its distinct iteration of state capitalism while facing the common challenge of climate change. Still, the two countries experience the effects of climate change differently. This chapter will build on the case study analysis to advance an understanding of the ways state capitalism interacts with the various imperatives of climate change. Most crucially, this chapter will discuss how state-capitalist political-economic systems may reproduce their political settlements in the face of energy and environmental challenges.

Political settlement theory aims to understand a country's institutional mechanisms for crafting policies and distributing gains (Khan, 2010). Embedded in this theory is the claim that no two systems are identical. Even a term like "state capitalism" which captures the heart of both China, and the UAE fails to articulate a holistic understanding of the driving forces shaping governance. The intersecting domains of climate change and energy economics highlight clear systemic differences between China and the UAE.

5.1 How Economic Constraints Cause Distinct Environmental Pressures and Policy Responses

The first key difference between the two countries reflects their divergent experiences of the climate crisis itself. China's climate risks are manifold. Public health is threatened by air pollution and the spread of disease into warming regions (Kan, 2009; Zheng & Kahn, 2017; Lewis, 2009; World Health Organization, 2003). Agricultural yields face unpredictable

precipitation patterns and water scarcity (Lewis, 2009; Saeed, 2010; Kang et al., 2009; Wei et al., 2014). Urban infrastructure, the basis of China's economic progression, is poised to incur damages from natural disasters on a scale unparalleled by any other country (Cross Dependency Initiative, 2023). While some of these challenges ring true for the UAE, such as air pollution and water scarcity, the UAE's exposure to climate risks come in the form of shifting demand patterns (Alhuzaymi and Alajo, 2016; et al., 2010; Kahn, et al. 2022; Gibson and Farah, 2012; Galey, 2022; Jeong, 2020; Kabbani & Ben Mimoune, 2021). The UAE must accept the end of oil, either via a planned energy transition or the inevitable depletion of oil reserves in the country. Since the two countries are differently affected by climate change, their mandates to govern through the coming decades also diverge.

In China, policymakers have clearly stated their intentions to expand the capacity for domestically produced low-carbon energy while reaching peak emissions by 2030. Not only does this serve the goal of cultivating a competitive energy industry that will remain globally relevant through the coming decades, but China also faces a strong mandate to curb its emissions. As the world's largest emitter, China is contributing to a crisis that undermines its economic competitiveness, food security, and political satisfaction. While the UAE has shown interest in alternative energy projects, like the Barakah nuclear power plant, the country's leaders pursue such projects for different reasons.

Environmental pressures play a more limited role in the UAE's decision-making calculus than in China's. Rentier states like the UAE are seeking more sophisticated economic models that satisfy their constitutive patron-client networks by preserving the status of politically significant elites. Thus, the current political settlement is seeking to maintain itself in the face of a long-term energy crisis that strikes the core of petro-rentiers. An excess of capital, accumulated

through decades of oil rents, is invested through sovereign wealth funds, which bind economic and political priorities long into the future. In terms of a political settlement, this represents an institution that satisfies the main stakeholders in the pre-existing political settlement. Industrial leaders and political leaders have a continued incentive to cooperate, even if oil becomes a relic of the past. Promotions at sovereign wealth firms and co-ventures perpetuate rent-seeking activity among the industrial elite, which bolsters the legitimacy and relevance of the governing tribe. When channeled into domestic development such as manufacturing and high-tech enterprise, these investments also enable the allocative state model to persist beyond oil by providing jobs, wages, and a higher quality of life for citizens. When invested abroad, sovereign wealth funds provide a new means for the state to influence geopolitics. Investment abroad is treated as political leverage among sovereign wealth funds, which may potentially replace the geopolitical leverage once generated through oil exports.

While this trend toward diversification is being accelerated by imminent changes in energy consumption, diversification is a broader goal of UAE policymakers. In this sense, climate imperatives are folded into other broader development goals. A similar pattern is observed in China, where the "new normal" has brought about slowed economic growth. The effects of this broad economic challenge touch the energy sector by reducing annual growth in energy demand, placing new competitive pressure on energy firms seeking to expand production. In general terms, larger economic challenges have implications for the economic conditions surrounding climate-related imperatives in both the UAE and China. In neither context are climate-related challenges separate from the country's wider economic constraints. Instead, the different case-based manifestations of climate change reflect the broader development roadblocks of each case study –both economic and political.

5.2 Revisiting Political Settlement Theory and Path Dependence

Path dependence theory offers some insight into how changes to a state's political settlement can, in part, be explained by countries' different environmental-economic constraints. Path dependence argues that past decisions establish conditions that constrain today's decisions (Oosterlynick, 2012) I observe the idea of path dependence in each case study. China's new stage of slowed growth instigated a crisis among low-carbon energy firms and fomented new political clashes. In China's case, decades of rapid growth have come to an end. The new economic normal signaled a new set of economic constraints that inform China's development plans, represented by Xi's Dual Circulation Development Paradigm. In the UAE, on the other hand, the forecasted decline of global oil demand further problematized its dependence on fossil fuel rents. In this case, the instability and inevitable decline in oil revenues highlight an existing flaw in the UAE's rentier settlement. Consequently, the UAE is relying more heavily on sovereign wealth funds to establish legitimacy, a testament to how present constraints affect future conditions in the energy transition.

From a path dependence perspective, long-term planning strategies drawn up by China and the UAE differ because the environmental-economic constraints are different. Thus, the case studies corroborate the core claim of path dependence theory. Changes to the two countries' policy paradigms and political settlements reflect the different linkages between economic and climate imperatives in the respective countries. For example, Chinese planners incorporated the logic of Xi's Dual Circulation Development Paradigm into energy markets by more actively overseeing investment, stimulating domestic demand for renewables, and investing in technological independence. At the same time, China is centralizing its political settlement in the

energy sector to resolve provincial-national disagreements. Still, established industrial leaders in the alternative energy sectors are accumulating more influence since the 2005 Renewable Energy Law. These selected national champions embrace state partnerships and influence policy decisions, demonstrating the logic of path dependence.

This pattern of a state-corporate political settlement appears in the UAE's financialized political settlement too. The UAE's broader goal of diversification incorporates elements of a low-carbon energy transition through investment, alternative energy partnerships, and international ties, often financed through state-affiliated sovereign wealth funds. As a result, existing patron-client networks maintain influence in the country's political settlement while cultivating a stronger allocative state to minimize political dissatisfaction.

5.2 Conclusion

China and the UAE reflect two different sets of climate imperatives, two different political systems, with two distinct approaches to the energy transition. Still, the logic of path dependence appears in each of the case studies, as environmental and economic policymaking becomes more co-dependent. As a result, political settlements are undergoing both transformations as well as continuity. Transformation occurs in the sense that political settlements will become oriented around new commodities, such as financial investments and clean energy. In some cases, a political settlement may adopt new sets of institutions, like financialization in the UAE or more centralized state-corporate negotiations in China. Still, the political settlements preserve many constitutive elements. China's central state still plays a major role in setting policy targets. State and party documents reference the logic of Deng's theories and echo Chen Yun's "cage on the markets."

As theories, both path dependence and political settlements maintain that individual nations are distinct in their policy choices and worthy of individualized analysis. The differences between China and the UAE's respective climate crises, development constraints, political relationships, and economic goals lead to different outcomes. A case-study approach affirms these principles and justifies further research on the political settlements and policy communities that make decisions and define a state's politics. Overall, these case studies confirm the notion that climate change is a catalyst for broader institutional changes spanning the financial, energy, trade aspects of governance, as well as the structure of the state apparatus itself.

Future research should seek clarity on how climate change is a catalyst for broader transformation. While it is clear that energy policy will shift with environmental pressure, will new markets for clean energy be dominated by groups with entrenched power today? This line of thought should also approach more normative questions. How can political settlements be cultivated or curated to serve authentic decarbonization? How should institutions accommodate competing interests within the political settlement? My research adds context to these questions by engaging with the positive dimensions of political settlements and energy policy.

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