Unsustainable Development: How Incoherent Governance Stunts Africa's Energy Future

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Submitted to the Graduate Faculty of

The Dietrich School of Arts and Sciences, University of Pittsburgh,

in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2022

UNIVERSITY OF PITTSBURGH

THE DIETRICH SCHOOL OF ARTS AND SCIENCES

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The related goals of developing renewable energy resources and expanding electricity access in Sub-Saharan Africa are understood in academic research and development practice as critical to the region's future. Yet progress towards so-called "sustainable development" has been limited. This dissertation explores the political and economic forces that frustrate sustainable development in African power sectors through a combination of interviews in the field, case studies, and quantitative evidence. I find that successive attempts to reform African power sectors have produced incoherent sets of institutions, or policy regimes, working at cross-purposes rather than in pursuit of common policy goals. Power sector policy regimes formulate constituencies of politicians, bureaucrats, and businesses invested in regime preservation for political and economic reasons. Even when reforms establish statutory entities responsible for growing renewable energy production, they face powerful competition from incumbent coalitions with superior resources and political capital. Dominant approaches to sustainable development rely heavily on market-based mechanisms intended to align capital with social and environmental goals. These strategies are unlikely to work so long as they fail to recruit influential actors from within the policy regime. My findings contribute to theoretical literature on governance by demonstrating the necessity of holist approaches to administrative reform and providing a new analytic framework for doing so. The findings contribute to the policy literature by providing a theoretically motivated, systematic empirical analysis that challenges the assumptions of dominant models of sustainable development. Specifically, I show how politically controlled monopsonies in power sectors relegate market-based mechanisms to the margins of

the industry and show why this is unlikely to change. However, I provide evidence that, under even moderately strong democratic conditions, state-led investment can be a powerful tool for sustainable development goals.

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Acknowledgements

This work would not have been possible without the support of many people.

From my first semester of graduate school, my dissertation advisor, academic and professional mentor Dr. B. Guy Peters provided constant support. Not all doctoral students are lucky enough to find an advisor who understands, appreciates, and cultivates their research interests, curiosities, and passions. Even fewer are fortunate enough to find one that constructively challenges them to better themselves, while consistently providing opportunities to demonstrate their growth. Even less can call that person a friend. I am one of the lucky few.

Alongside sharing my interests in the politics of energy and the environment, and offering excellent feedback and technical expertise, Dr. Michaël Aklin provided that most valuable of lessons for a doctoral student; how to work efficiently and avoid burnout. Dr. Aklin also pushed me to experiment with new techniques, read widely, and reach for professional opportunities even when I thought they were beyond my grasp.

Dr. Louis Picard provided invaluable instruction in the complexity of African politics, and actively encouraged me to go into the field. He provided valuable contacts in Ghana and South Africa, without which my interviews would not have been possible.

No committee is complete without at least a *de facto* opponent, and Dr. Barry Ames embraced this role. The quality of the dissertation was improved dramatically by his thorough feedback at each stage of the work's production.

My teaching experiences were as important a part of my graduate education as my research, and I could not have asked for a better mentor, partner, and friend in those endeavors than Dr. Michael MacKenzie. Further, Dr. MacKenzie helped me maintain connections between my work and the most important questions of political theory that continue to organize and motivate the best work in our discipline. I thank him for our many conversations.

It is an understatement to say that my time spent in Africa was unique. The COVID-19 pandemic struck within six weeks of my arrival, and I found myself stranded on the continent for upwards of a year. This was a happy accident, as I never would have met a number of people who I can now call lifelong friends. My thanks to Lorenda Parker, without whom my fieldwork in Ghana would not have been possible. Special thanks go to Mignon Peens and her family, Johan, Margie, Amy, and Ellen, who took me into their home in South Africa and taught me more about life and the country than could ever be learned in a classroom.

In graduate school, your friends become your family. You rely on them for motivation and feedback, but more importantly, for camaraderie, revitalization of the spirit, and healthy bouts of complaining that amount to group therapy. Many thanks to Louis Wilson, Leonardo Fernandes, and Jacob Otto for all those weekends. Thanks to my cohort, Jacob Schiller, Kelly Morrison, Jose Incio, Minsu Jang, Rian Litchard, and Sara Fox for helping me get through those most challenging first two years.

Finally, I owe this work to my parents, Barbara and Dave. Almost every Phd student experiences a moment of deflation in which the road ahead seems impossibly long. They encouraged me to keep going, and to remember why I was doing this in the first place. They instilled in me the values, work ethic, and confidence without which I never could have imagined getting this far.

I dedicate this work to my grandfather, Chuck Peterson, musician and educator (1931-2022).

Introduction

There is a tension at the heart of the global energy landscape between two great humanitarian challenges: ending energy poverty and averting catastrophic climate change. Energy poverty refers to the inability of human beings to access energy sources for basic needs such as cooking, heating, lighting, and refrigeration, as well as for modern necessities such as mobile phone use, internet access, and transportation. Catastrophic climate change refers to rapidly rising sea levels and temperatures that threaten human life on earth. The tension between these two challenges arises because ending energy poverty requires greater energy production, and greater energy production has historically meant greater greenhouse gas emissions that contribute to climate change. Yet the precise characteristics of energy poverty mean that those who experience it also bear the least responsibility for reducing carbon emissions. Balancing the burden of reducing greenhouse gasses on the shoulders of the world's energy poor is thus not a necessary, sufficient, or morally justifiable method of averting climate catastrophe. Recognition of this reality has led scholars and practitioners of development to converge on the notions of "differentiated responsibility" for states as part of a "just transition" from fossil-fuel dependency, and the rise of a "sustainable development" agenda that links economic growth to patterns of production and consumption with a smaller carbon footprint than that of the developed world. Nowhere on earth are the challenges of energy poverty and the opportunities of sustainable development greater than in Sub-Saharan Africa.

Home to the majority of the world's energy poor, Sub-Saharan Africa also has immense renewable energy potential (IEA 2020). Solar radiation beats down across the vast expanses of desert, savannah, and jungle that comprise the region's geography. Proven thermal energy reserves in the earth's crust lay just beneath East Africa's Rift Valley. The Congo River Basin alone contains 100,000 megawatts of hydroelectric generation potential, a number greater than the installed generation capacity of the rest of the region combined (Lukamba-Muhia 2006). Sub-Saharan Africa's renewable energy potential can deliver its people from energy poverty without placing greater pressure on global carbon sinks. Eliminating energy poverty in Sub-Saharan Africa can stimulate economic growth, help incorporate the innovations, goods, and services of millions of people into the global economy, and bring dignity, security, and opportunity to some of the world's most marginalized people. Yet the current picture of progress is not nearly as bright as the future might be. More than two-thirds of people in Sub-Saharan Africa lack access to electricity, a number which is now increasing as population, economic, and agricultural growth outstrips gains in generation capacity (IEA 2020). Renewable energy development has been marginal almost everywhere in the region, while oil exports to global markets have grown (World Bank 2020). This is all despite enormous improvements in economic growth, democratic development, and billions of dollars in investment by governments and international financial institutions. Why does energy poverty persist in Sub-Saharan Africa, and why is renewable energy not a greater part of the solution? This question is the focus of this work.

Scholars, practitioners, and international development institutions place increasing weight on "good governance" as the missing link in achieving sustainable development in Sub-Saharan Africa (Newiak et al. 2022; Mbaku 2020; World Bank 2020; Gregory & Sovacool 2019; Picard et al. 2015). Governance broadly refers to countries' economic policies, regulatory frameworks, adherence to rule of law, and level of corruption. *Good* governance implies transparency, efficiency, incorruptibility, and democratic accountability (Picard et al. 2015). Based on a historical review of the region's power sectors (see chapter 3), I argue that contemporary power sector governance in sub-Saharan African countries is defined by three policy goals: electricity access, efficiency, and sustainability. In theory, governments should be able to balance these goals according to public preferences while making progress on all three. In practice, however, coexisting policy programs developed and layered upon each other in service of each goal have resulted in sets of institutions and rules, or *policy regimes*, that actively undercut one another and hinder progress on all three goals. *Policy regime incoherence* refers to a phenomenon in which a policy regime contains internal inconsistencies across administrative organization, policy instruments, and incentive structures, resulting in suboptimal outcomes along defined criteria of success. I argue that good governance in the power sector depends on the ability of governments to maintain coherent policy regimes amidst successive waves of external reformatory pressure and the policy feedback loops they produce. Coherence between democratic institutions, government ministries, and bureaucratic and non-state actors responsible for implementation is a key determinant of success in expanding electricity access and developing renewable energy. Rather than promoting energy access, efficiency, or sustainability, accommodating shifting development paradigms has resulted in incoherent policy regimes that make achieving sustainable development goals difficult for most countries in Sub-Saharan Africa.

In cases where Sub-Saharan African countries have made significant progress in expanding electricity access (Ghana, South Africa) and renewable energy (Kenya), it has been through preservation of coherent power sector policy regimes backed by strong state commitments and resistance to faddish policy paradigms. The empirical analyses in this work demonstrate that effective power sector policy regimes are characterized by high levels of vertical coordination between executive ministries charged with setting policy goals and the administrative apparati responsible for implementation. This level of vertical coordination has been achieved by retaining the centralized administrative structures that were the modal form of sector governance across the region until the 1990s. Abandoning this centralization in favor of market-oriented reforms damages the capacity for vertical coordination and accountability between policymakers and the institutions responsible for implementation.

To the extent that the private sector has been involved in successful power sector initiatives to expand electricity access and develop renewable resources, it has primarily been through Public-Private-Partnerships (PPPs) which have accommodated private capital into centralized policy regimes rather than replaced them. Examples of such initiatives include Gabon's concessionaire agreement with a foreign private utility firm to operate its vertically integrated state-owned electric utility, and Kenya's state-owned Geothermal Development Company, which made costly early stage investments in exploration and sovereign guarantees that induced positive policy feedbacks resulting in the establishment of renewable energy as a major source electricity generation. The success of PPPs has been underwritten by costly state policy tools such as exploratory investment and sovereign guarantees. Nowhere on the continent have the closely related prescriptions of liberalization and market-oriented sustainable development models been effectively implemented or contributed significantly to accomplishing their respective goals. Based on the research in this work, I argue that the governments of Sub-Saharan Africa that wish to make good on related democratic commitments to eliminating energy poverty and developing renewable energy sources should stop attempting to implement reform models designed to attract foreign capital that is unlikely to materialize. Instead, they should invest in institutional arrangements that integrate energy and environmental goals into centralized regime structures of the sort that have historically delivered success in expanding electricity access on the continent.

Examples of policy regimes that have been successful in expanding energy access can be found in South Africa and its National Electrification Program, which electrified 2.5 million new homes from 1994 to 2000 (Greenberg 2008), and in Ghana and its National Electrification

Scheme, which brought electricity to 2350 energy impoverished communities from 1989 to 1999 (Kemausuor & Ackom 2017). Kenya's regional leadership on renewable energy is itself a product of strong state commitments and centralized organization that drove geothermal electricity generation to the forefront of the nation's power sector (Godhino & Eberhard 2019). While each case is imperfect in its own way, the common denominators underlying these policy successes have been state commitments and the presence of effective developmental bureaucracies reminiscent of those that developed in East Asia over the latter half of the twentieth century.

To those familiar with the successes of developmentalism (Wade 1990; Leftwich 1995; Johnson 1982), the failure of structural adjustment policies (McCord, Sachs, and Woo 2005), and the importance of "bringing the state back in" to development studies (Schmidt 2007; Wade 2005; Kohli 2004; Skocpol et al 1985), attempting a replication of the "East Asian Economic Miracle" may seem an obvious consideration in solving Sub-Saharan Africa's energy woes. However, this is by no means a commonly shared view amongst the decision makers and institutions focused on the development of African power sectors. To the contrary, an underlying skepticism and dismissal of the role of the African state in power sector development still dominates evaluations and recommendations emerging from the World Bank and International Monetary Fund(IMF). Despite two decades of failed attempts to achieve economic growth through structural-adjustment policies, leading analyses continue to insist upon a particular form of power sector liberalization as essential to sustainable development (Foster & Rana 2020).

Owing in large part to the resurgence of institutional economics, there is a growing recognition of the essential role of state institutions in supporting economic growth (Acemoglu & Robinson 2013). However this recognition primarily reasserts the state's role as conceived in neoclassical economics: providing stability and property rights sufficient to enable markets to grow, *not* for the state's active participation or leadership in that growth (Wade 1990). State economic intervention, especially in the Global South, continues to be perceived as inefficient, distortionary, and bearing risks of corruption and expropriation. Indeed, a history of such behavior in much of the developing world lends some credence to these suspicions. Yet the neoliberalism that motivated the failed era of structural adjustment continues to permeate the dominant policy approaches to development, neglecting any possibility of a constructive role for the state. This skepticism of government persists even in discussions about areas in which, in the developed world, the state has historically played an active and indispensable role, such as the power sector.

Market-led approaches may be appropriate for economic sectors in which organic growth is possible and likely without strong state investment; that is not the focus of this work. What I argue is that market-led development is inappropriate for the power sectors of Sub-Saharan Africa. This is true for four reasons: 1) power sector development requires concentrations of capital that, in SSA, are found almost exclusively in government accounts and donor funds 2) the financial returns on investment in SSA power sectors are insufficient to attract international capital, and 3) these returns are far outweighed by the value African leaders place on the political and strategic returns of the control of power sectors. Moreover, the essential role of energy access to other key development outcomes places an urgency on power sector growth that can no longer wait for market solutions to materialize.

My objective is to identify and understand systematically which governance approaches have effectively expanded electricity access and renewable energy in Sub-Saharan Africa by comparing different periods and countries over time. My second objective is to understand how reform efforts have impacted governance, for better and for worse, so as to diagnose a set of problems that currently frustrate the sustainable development agenda. And, finally, my third objective is to draw conclusions from these analyses about the best ways forward for promoting an energy future that unlocks the region's promise and potential. This work proceeds as follows.

In the remainder of this introductory chapter, I provide an overview of the state of electricity access and renewable energy generation in the power sectors of Sub-Saharan Africa. I then review leading explanations for country-level variation in electricity access and renewable energy growth such as wealth, democracy, and institutional quality. I present data that demonstrate that wealth and democracy are insufficient explanations for energy poverty and sluggish renewable energy growth, and I argue that institutional quality has thus far provided the best explanation. However, analyses that consider institutional quality as an explanation lack clear organizational theories that can explain variation. Such theories are necessary to understand and leverage institutional quality for sustainable development.

The second chapter responds to the demand for stronger organizational theories to explain power sector performance by laying out the policy regime perspective. The policy regime perspective argues that understanding power sector performance requires a comprehensive examination of the ideas, interests, and institutional arrangements that constitute power sectors, and an evaluation of their coherence/incoherence, or the extent to which they work synergistically to fulfill policy goals, or actively undercut each other in forms of negative-sum competition that hinder progress. I present a framework for analyzing policy regimes that brings together thus far disparate contributions from public administration, energy transition studies, and political economy that allows us to understand why some regimes are effective at implementing public policies in the power sector, while others fail.

In the third chapter, I apply the policy regime perspective to a regional history of sub-Saharan African power sectors organized around the evolution of three widely shared policy *goals*:

Energy Access, Efficiency, and Sustainability. Each *policy goal* has been associated with one or more *policy programs* designed and implemented to achieve it. Policy programs differ from goals in that programs refer to specific sets of reforms intended to produce progress towards a goal. For example, power sector liberalization was a *program* intended to meet the *goal* of sector efficiency. I consider each goal and program in light of how interests, ideas, institutions, and actors resulted in its selection, design, and implementation. I consider how each program's implementation interacted with incumbent power sector *policy regimes*, or the set of institutions governing power sectors. To explain these processes, I make use of theoretical concepts from the new institutionalism, including *layering*, *drift*, *replacement*, and *conversion*. I also consider new work on "subversive action" and "regime resistance," which offer a more actor-oriented approach to understanding the political economy of policy reform processes than traditional institutionalist frameworks.

In the fourth through sixth chapters, I analyze variation within Sub-Saharan African policy regimes through a series of case studies of Ghana, South Africa, and Kenya. The case studies illustrate how differences in policy regimes, both over time and cross-nationally, and their various strategies of delay, resistance, and acquiescence to external reformatory pressures, have resulted in different sustainable development outcomes.

In the final chapter, I draw conclusions about the best ways forward based on the findings of the analyses. First, I argue that sustainable development requires a reconceptualization that retreats from the market-led strategies that have underpinned the concept as instrumentalized by the international development community. The sustainable development paradigm sought to integrate renewable energy development and electricity access goals through the alignment of market-incentives. This approach has not worked for reasons made clear in the comparative analysis. Instead, the reconceptualization calls for a policy *integration* approach. Whereas policy *coordination* typically begins during implementation in response to observed needs for policies and institutions to work together, policy integration occurs prior to and during the design stage. Policy integration attempts to promote policy synergy by establishing a decision making body with authority over all components of the policy process at the design stage of policymaking, retaining unified policy goal prominence *across* the policy regime and *through* design and implementation processes. Enacting a policy integration approach will require a committed executive and strong disciplinary oversight actors. A combination of national legislatures and international development institutions would provide ideal oversight actors. However, because legislative capacity remains weak in most countries in the region, development institutions will need to play a stronger oversight role to make policy integration approaches work.

The State of the Problem

Energy Access

Sub-Saharan Africa lags every other world region in electricity access. Less than two-thirds of the region's population have access to electricity (IEA 2020). Figure I below is a density plot of country-level data on electricity access levels for all countries in Sub-Saharan Africa. The Y access represents the density of observations, while the X access represents access levels. As can be seen, the majority of countries have less than 60% electricity access.

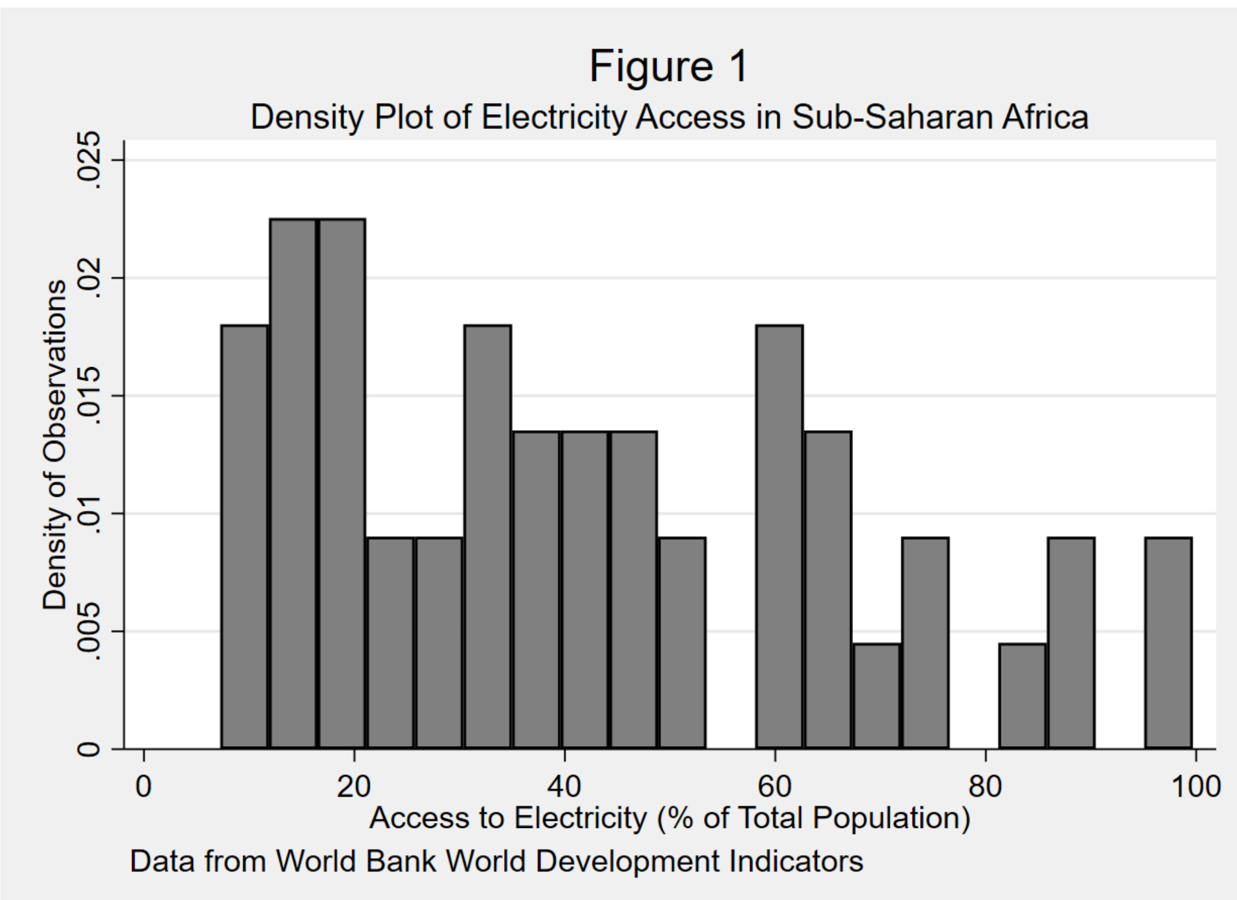

Figure 1: Density Plot of Electricity Access in Sub-Saharan Africa

The picture grows even darker when one focuses on rural areas, which experience far lower rates of electricity access than urban areas. Figure II presents a density plot of rural electricity access for all Sub-Saharan African countries.

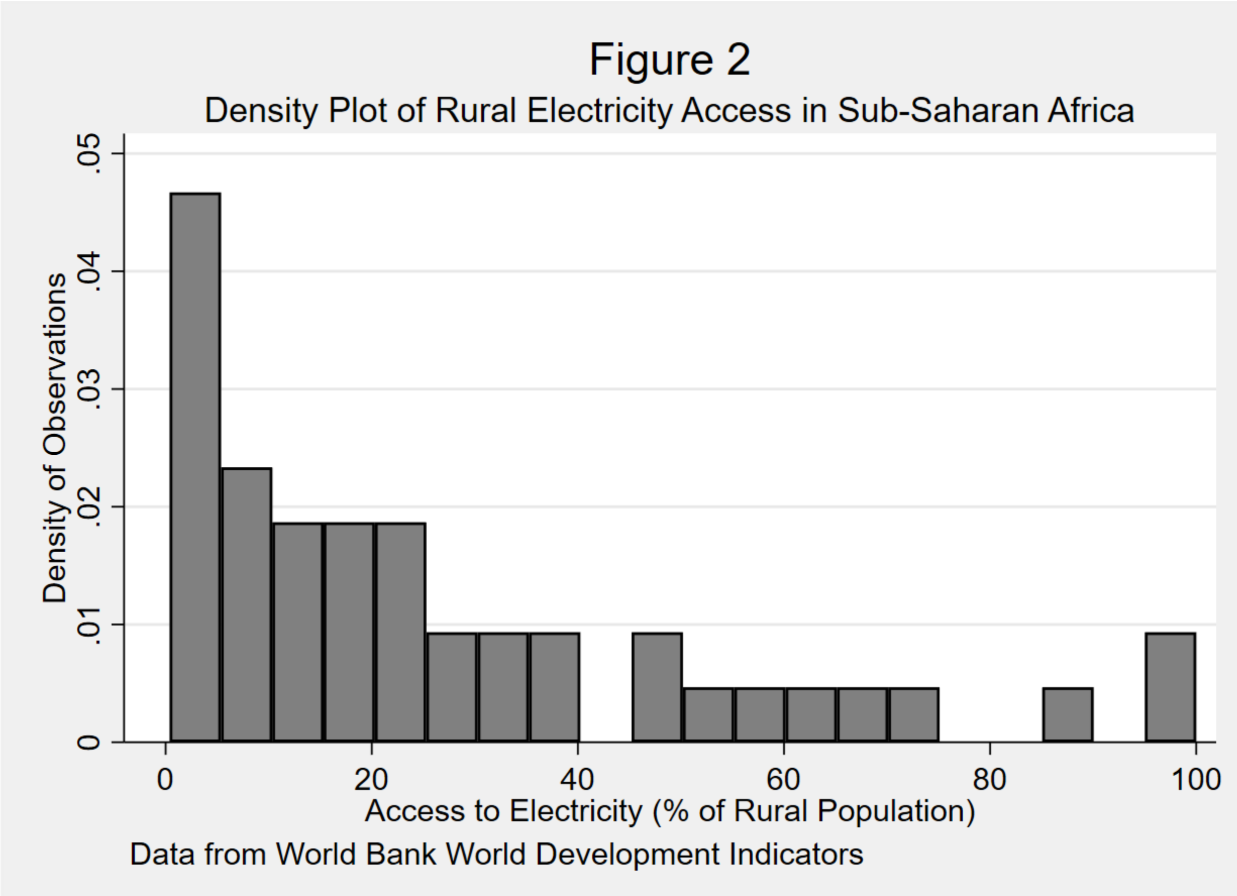

Figure 2: Density Plot of Rural Electricity Access in Sub-Saharna Africa

Electricity access has made its most significant gains in the last three decades. Figure 3 shows the growth in electricity access for a sub-sample of SSA countries since the World Bank began collecting data on this indicator.

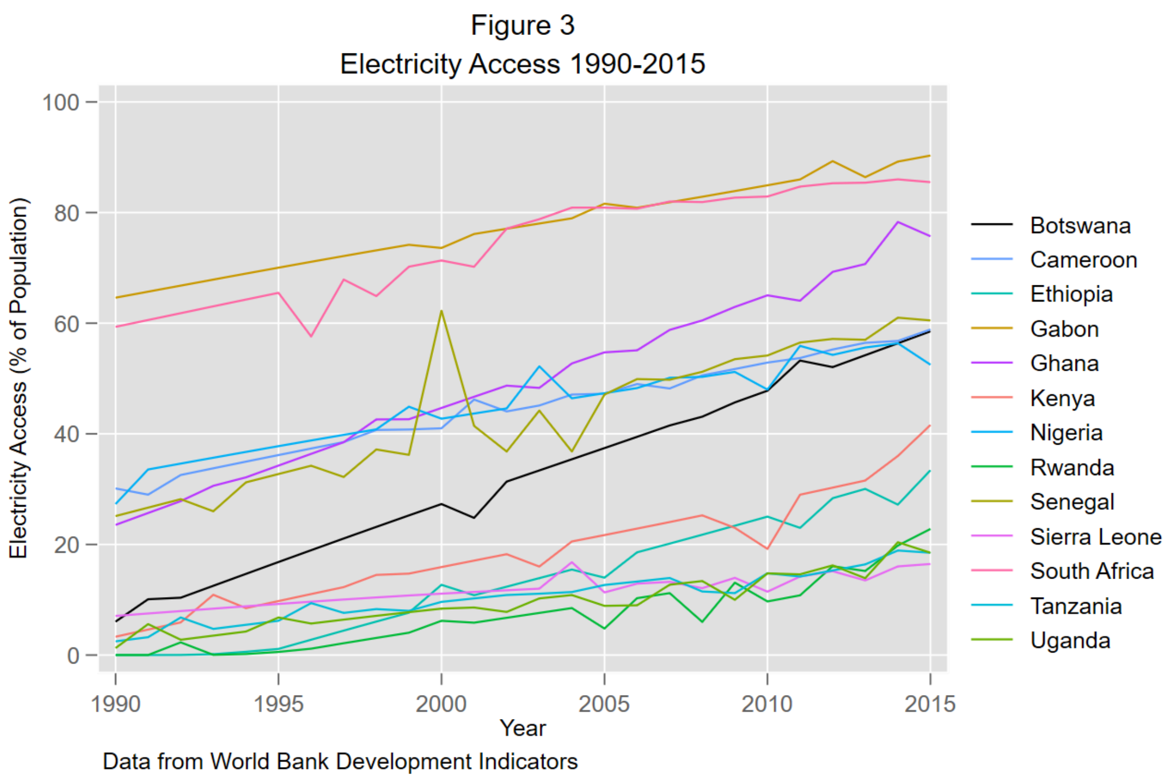

Figure 3: Electricity Access 1990-2015

Figure 3 demonstrates the significant variation in national trajectories towards achieving universal electricity access. South Africa and Gabon started at a much higher level of access than other countries when data collection began, and they achieved steady progress over the period observed. Ghana stands out for beginning alongside most other countries in access rates around 1990 but pulling dramatically above its peers to almost 80% access by 2015. Botswana stands out by having started the period observed at approximately 5% total electricity access and climbing at a steady rate to almost 60% access by 2015.

Supply

Governments' ability to expand electricity access is contingent on access to a sufficient supply of electricity. Unfortunately, because there was no systematic collection of data on electricity access in the region prior to 1990, we cannot directly estimate the relationship between supply and access over the full period for which data on supply was available. However, we can draw some general conclusions about the relationship between the two and place the data on electricity access in context by observing historical patterns of electricity generation.

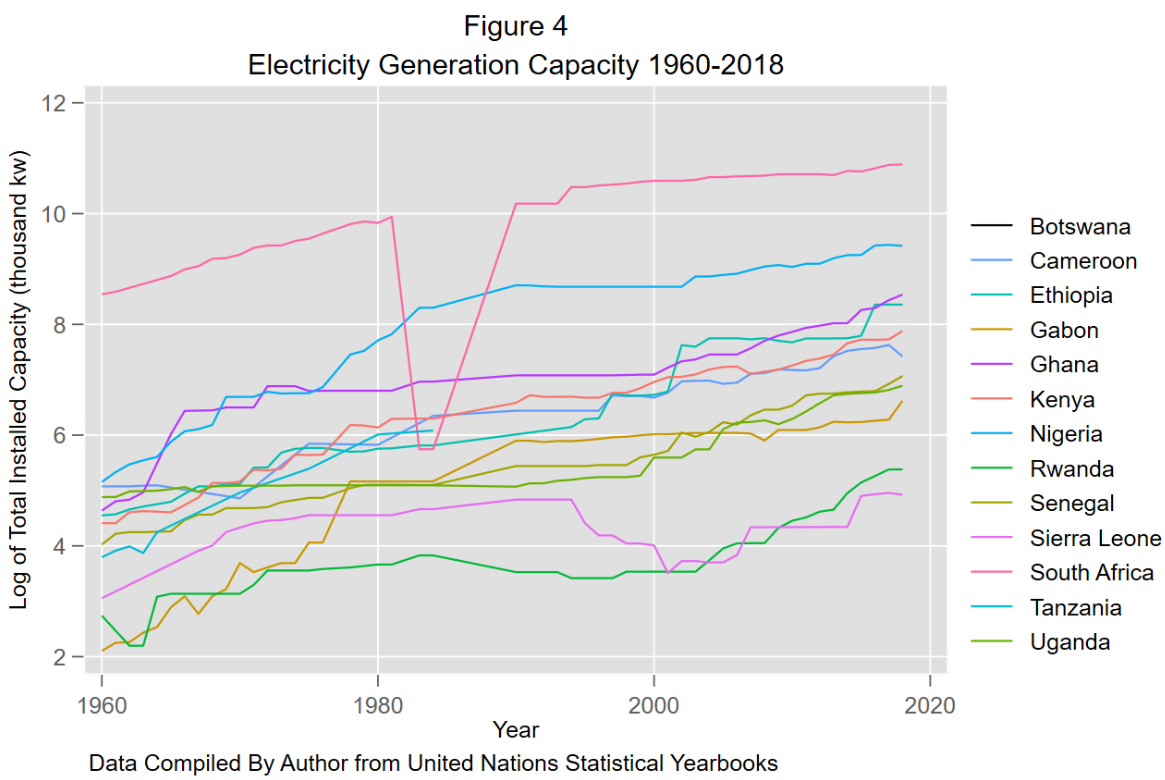

Figure 4: Electricity Generation Capacity 1960-2018

Figure 4 presents the total installed capacity of electricity generation assets for the same subsample of countries as presented in Figure 3, but from 1960-2018. What is immediately clear is that South Africa is in a category of its own for most of the period observed, and its high level of installed capacity seems to account at least in part for its equally distinctive starting position in electricity access rates in Figure 3. What is interesting, however, is how the generation capacities of the other countries in the sample bear a far less clear relationship with their electricity access levels. To be sure, all countries significantly expanding their electricity access from 1990-2015 also performed strongly relative to peer countries in expanding generation capacity from 1960-2018 (South Africa, Ghana, and Gabon). But many countries that expanded their generation capacity at a similar rate and to a relatively equal level to Ghana and Gabon (Cameroon, Ethiopia, Uganda) did not convert those gains into greater electricity access for their citizens.

The difference between countries whose electricity generation capacity translates to higher electricity access may partly be a function of population. Countries that expanded their installed capacity at comparable levels may serve populations of differing sizes, and thus we should not expect similar gains in generation to convert to similar gains in electricity access as a percentage of total population, holding all else equal. A useful way of looking at this is to consider whether total installed capacity per person bears any obvious relationship with electricity access. Figure 5 below presents total installed capacity per person (TIC/population) from 1960-2018.

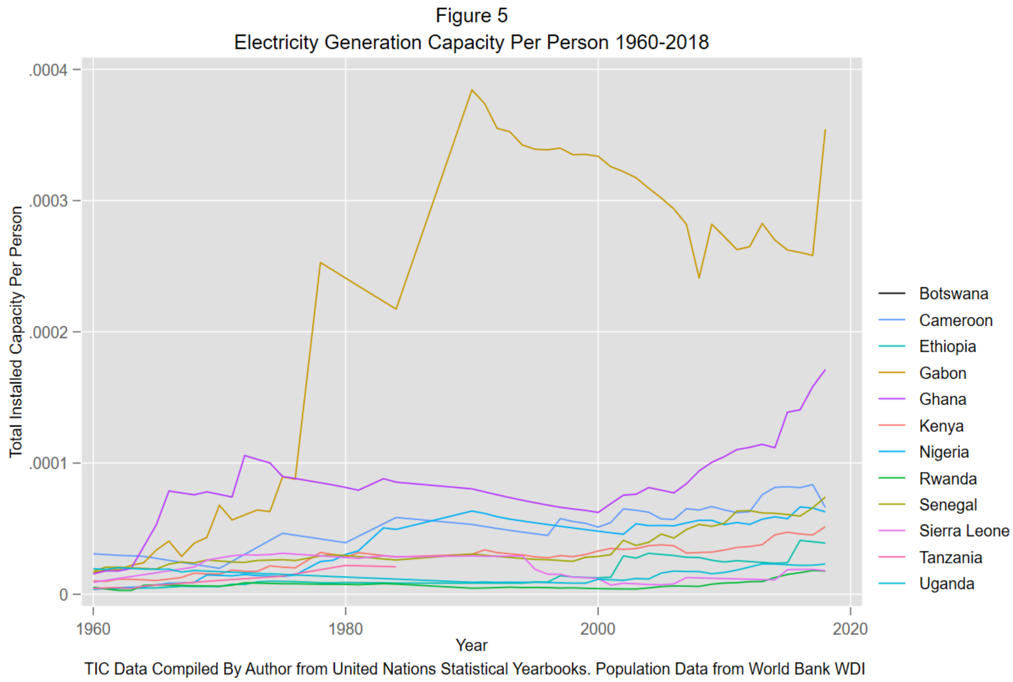

Figure 5: Electricity Generation Capacity Per Person 1960-2018

As figure 5 makes clear, Ghana and Gabon both greatly expanded their electricity production per person over the period observed, and both are leaders in electricity access. Of course, variations in what governments choose to do with electricity supply ultimately accounts for whether or not electricity access rates rise or fall. And the extent of electricity supply reflects government choices about its importance to development. However, for now it is sufficient to point out the fairly intuitive observation that countries that expand their supply at high rates relative to the sizes of their population may more easily expand electricity access. In other words, supply matters.

Renewable Energy Development

Given that increasing electricity supply is an important input in governments' ability to channel electricity access to their citizens, accessing cheap, abundant sources of energy that can be converted to electricity is imperative for governments wishing to accomplish this goal. In Sub-Saharan Africa, hydrocarbon resources (coal, oil, and natural gas) are exogenously distributed by political borders. Some countries such as South Africa, Nigeria, and Angola are richly endowed with hydrocarbon reserves. South Africa's abundance of coal has underwritten the country's cheap electricity production since the early 1900s, while Nigeria and Angola's oil has primarily been a source of export revenue. Meanwhile, countries such as Botswana, Senegal, and Kenya have little to no domestic hydrocarbon reserves. Countries such as Ghana, the DRC, and Ethiopia have massive hydroelectric potential from river basins that fall within their borders. However, what almost all have in common is rich and largely unexploited solar and wind potential, which is roughly equal to 3700 times the current total consumption of electricity (IEA 2020; Schwerhoff & Sy 2019; Gies 2016).

Solar and wind energy achieved cost parity with coal and oil nearly a decade ago, and they have recently become cheaper in many circumstances (IRENA 2020). Further, renewables are not subject to the volatility of global energy markets, and offer a secure, indigenous source of energy. However, renewable energy as a share of total electricity generation accounts for less than two percent of electricity generation portfolios in Sub-Saharan Africa (IEA 2020).

Leading Explanations

Wealth

Electricity Access

A straightforward explanation for variation in electricity access is wealth. Higher levels of wealth can lead to greater government revenues, and thus greater ability to invest in public electricity infrastructure. Higher incomes also mean greater ability of consumers to afford to purchase electricity from public or private utilities, which should in theory command greater investments in generation, transmission, and distribution assets (Susnik & van der Zaag 2017). Figure 6 below presents the relationship between gross national income per capita and electricity access.

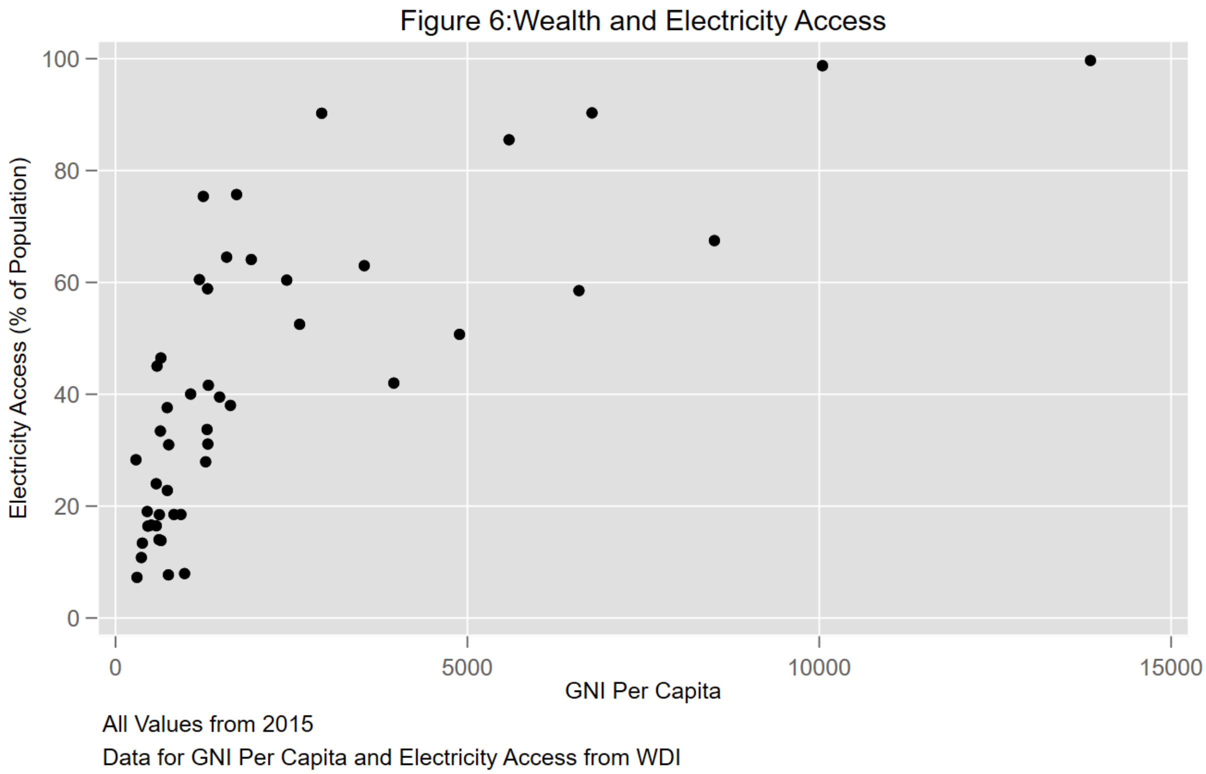

Figure 6: Wealth and Electricity Access

There is a clear curvilinear relationship between wealth and electricity access. Small increases in wealth on the left hand side of the curve correlate with increasingly substantial growth in electricity access. This relationship becomes weaker as one moves rightward along the curve, suggesting that while wealth is an important factor separating countries which have some electricity access from those which have next to none, it is much less important in distinguishing countries which have some (about 50%) electricity access from those approaching universal electricity access. Some other source of variation accounts for the substantial differences between countries higher up on the income spectrum. For example, Nigeria has substantially lower access rates than its poorer neighbor Ghana. Botswana has much lower access rates than somewhat equally wealthy Gabon.

The causal direction of the relationship between wealth and electricity is unclear. Some studies find that economic growth leads to more electricity, while others find electricity leads to more growth (Hancock 2015; Adom 2011). One of the most-cited studies of this topic in an African context, a time series estimation across 17 SSA countries, finds the direction pointing different ways in different countries (Wolde-Rufael 2006). There are sufficient theoretical reasons and empirical evidence to suspect that wealth plays at least some role in countries' ability to grow electricity supply and access, but it is hardly determinative. I do not attempt to resolve the energy-economic growth causality debate; instead, I accept wealth as an enabling or constraining factor in countries' capacity to build electrical infrastructure and attract foreign investment in the power sector.

Renewable Energy

Just as wealth frees up resources to invest in electricity, wealth may also enable greater investment in new energy technologies for electricity production. The relationship between performance of a new technology and the amount of financial resources invested in it is generally known to follow an "S-curve," as early investment produces slow gains in performance, followed by swiftly accelerating performance, and lastly with diminishing growth in performance (Christensen 1992). The same S-curve has been observed in the context of renewable energy, suggesting the performance gains leading to increased uptake requires sustained investment (Rao & Kishore 2010; Schilling & Esmundo 2009). Further, in commercialized power markets higher incomes may suggest greater profits, which may serve as a greater incentive for private sector investment in renewable energy technologies, especially as they become cheaper relative to other generation alternatives (Collier & Venables 2012). There is thus some reason to expect that wealth should positively impact the growth of renewable energy, as countries with greater incomes will be able to sustain investment longer than those with lower incomes. Figure 8 below presents the relationship between wealth and renewable energy as a percentage of total electricity generation.

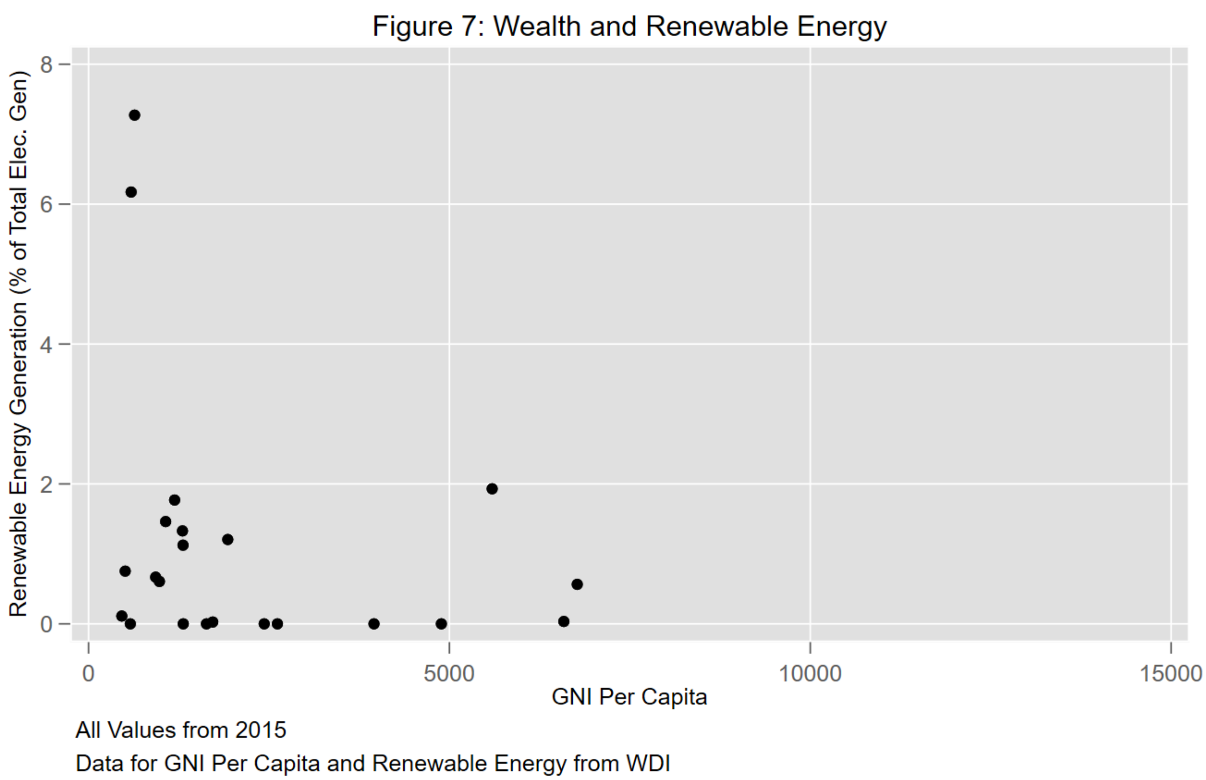

Figure 7: Wealth and Renewable Energy

There is no obvious relationship between wealth and renewable energy production in Sub-Saharan Africa. Rather, what stands out is the ubiquitously low share of renewable energy production across all income levels (the upper limit of the y-axis is 8% of total generation). The glaring exception is Kenya, which is not included in this graph because its share of renewable energy generation (48.2%) is so much greater than the regional average (1%). As with electricity access, it is fair to assume that availability of financial resources plays some role in the incorporation of renewable energy into power sectors. However, it is clearly not determinative, as many of the region's wealthiest countries have little to no incorporation of renewable energy in the power sector (Ghana, South Africa, Nigeria, Botswana).

Democratic Quality

<u>Electricity Access</u>

Another explanation for differences in electricity access rates is the quality of democratic institutions. In higher quality democracies, publics can exert stronger pressure on their governments to provide public services such as electricity. A fairly robust body of empirical evidence has demonstrated a strong, positive relationship between the quality of democratic institutions and electricity access:(Trotter 2016; Min 2015). Figure 8 below shows the relationship between democratic quality and electricity access.

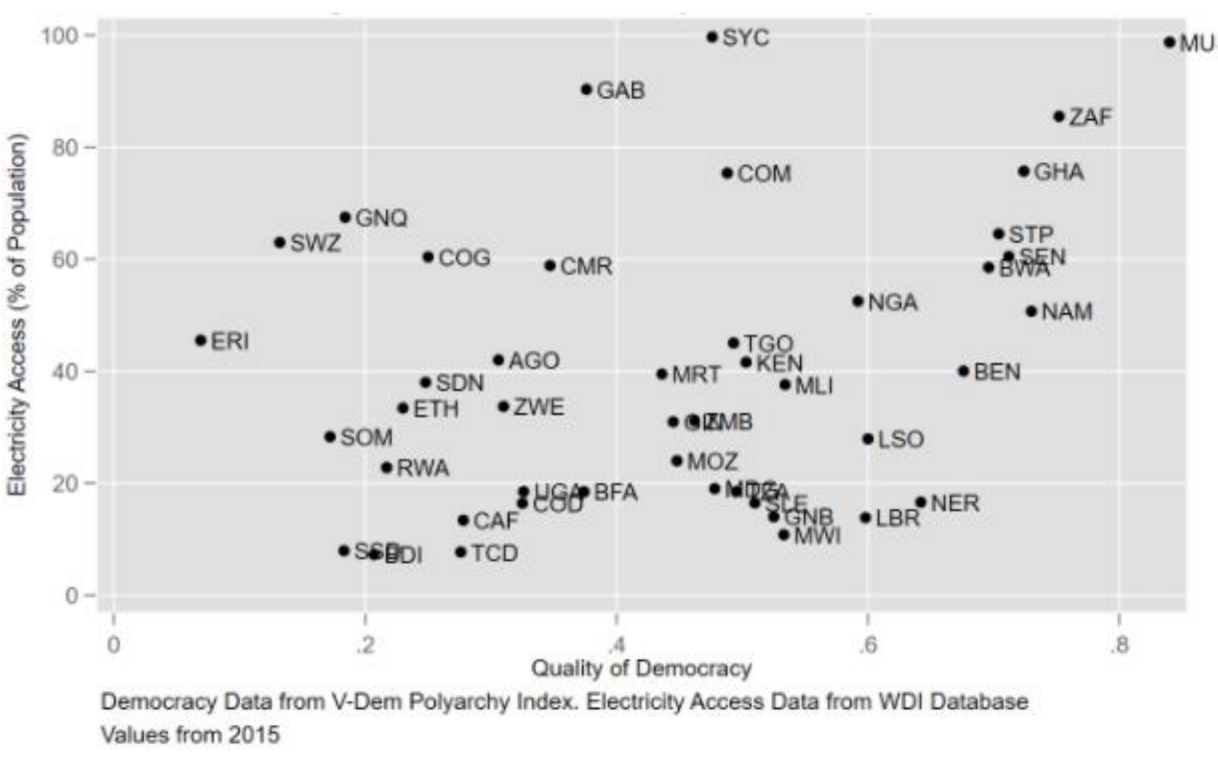

Figure 8: Relationship Between Electricity Access and Democratic Quality

Of the countries in the top two quintiles of electricity access (from 60-100% access), excluding small island nations (Seychelles, Mauritius, Comoros, Sao Tome & Principe) and enclaves (Swaziland), countries with poor democratic credentials (Republic of Congo, Equatorial Guinea, Gabon) equal those with stronger democratic credentials (Ghana, Senegal, and South Africa). What is bracingly clear is that the vast majority of countries fall in the lower three quintiles of electricity access, wherein the quality of democracy varies widely. The only conclusion that can be drawn from this evidence is that some of Sub-Saharan Africa's most democratic countries also have some of its highest rates of electricity access (notably Ghana and South Africa), a phenomenon that will be examined in much greater detail in the case studies featured later in this work.

Consistent with Aklin et al. (2018) and Min (2015), I assume that representative democracy plays an important role in expanding electricity access, but I focus on why and how some democratic countries have been able to expand their electricity access substantially more than others. Democracies can effectively translate citizen preferences into government action. However, the effectiveness of that government action is contingent on its access to a bureaucratic apparatus capable of implementing policies designed to respond to public preferences (Aklin et al. 2018). In this work, I will examine how variations in those bureaucratic apparati, what I call policy regimes, account for differences in electricity access.

Renewable Energy

African citizens generally prefer less pollution, clean water, and support reducing greenhouse emissions (Afrobarometer 2019). It is thus reasonable to expect that since democracies are more responsive to citizen preferences than non-democracies, renewable energy production should be positively related to the quality of democratic institutions. Recent research has indeed shown that strong democratic institutions lead to higher levels of renewable energy consumption (Chen et al. 2021), and deployment of off-grid renewable energy systems (Aklin 2021).

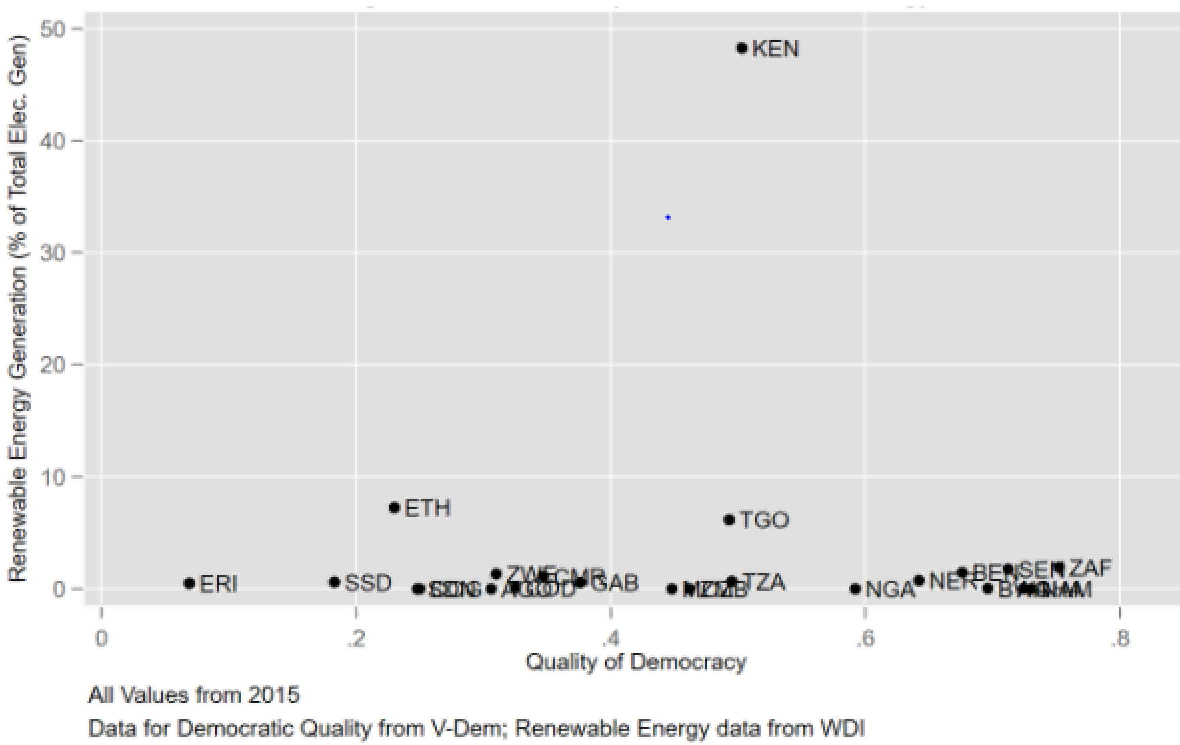

Figure 9: Relationship Between Democratic Quality and Renewable Energy

Figure 9 presents the relationship between democratic quality and renewable energy generation as a percentage of total electricity. There is no clear relationship between the quality of electoral democracy and renewable energy generation. Again, what stands out is the low level of renewable generation across the full range of democratic quality. The generally low level of renewable energy penetration across the region is not sufficient evidence to dismiss the possibility that democratic institutions can play an important role in increasing renewable energy growth, but it should not be assumed that democracy alone will accomplish this goal, even assuming supportive citizen preferences.

Institutional Quality

Electricity Access

Institutional quality is an increasingly cited explanation for many key development outcomes, including electricity access. Broadly, institutional quality refers to “the rules of the game” (North 1971), or the set of factors that together enable and constrain economic behavior. Yet different analyses emphasize different characteristics when considering institutional quality. Ahlborg et al. (2015) measure the impact of the World Bank’s Worldwide Governance Indicators for Rule of Law and Control of Corruption on household electricity consumption, finding a positive relationship. Aklin et al. (2018) find that “institutional capacity,” or “government’s access to an administrative apparatus that is capable of implementing policies in a competent and cost-effective manner,”to be one of three key determinants of eliminating energy poverty (alongside government interest and local accountability). Figure 10 below shows the relationship between the Africa Country Policy and Institutional Assessment (CPIA) indicator of quality of public sector management and institutions and electricity access.

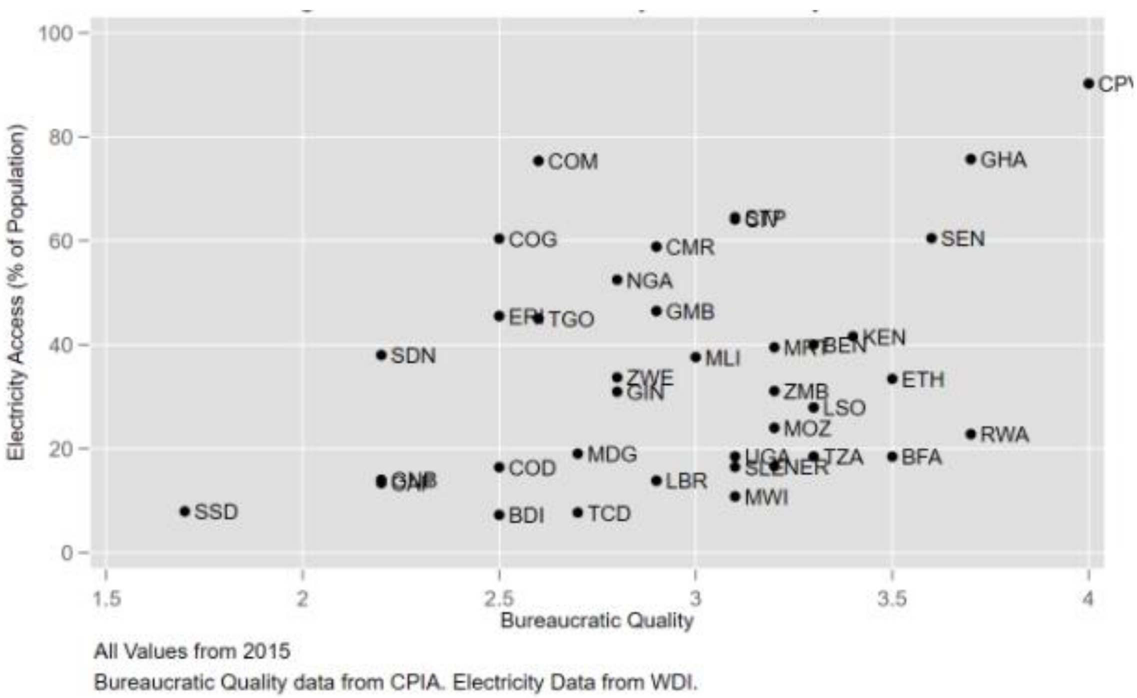

Figure 10: Relationship Between Electricity Access and Bureaucratic Quality

Indeed, there appears to be a positive relationship between levels of electricity access and bureaucratic quality. Unfortunately there is no available quantitative measure that refers specifically to the quality of institutions in the power sector, which might provide a clearer picture of how the quality of public management relates to electricity access.

Renewable Energy

If institutional quality results in improved public service delivery and implementation of government policy, and since developing renewable energy is at least a statutory priority of most Sub-Saharan African governments, we should expect well-managed public sectors to be positively related to renewable energy growth.

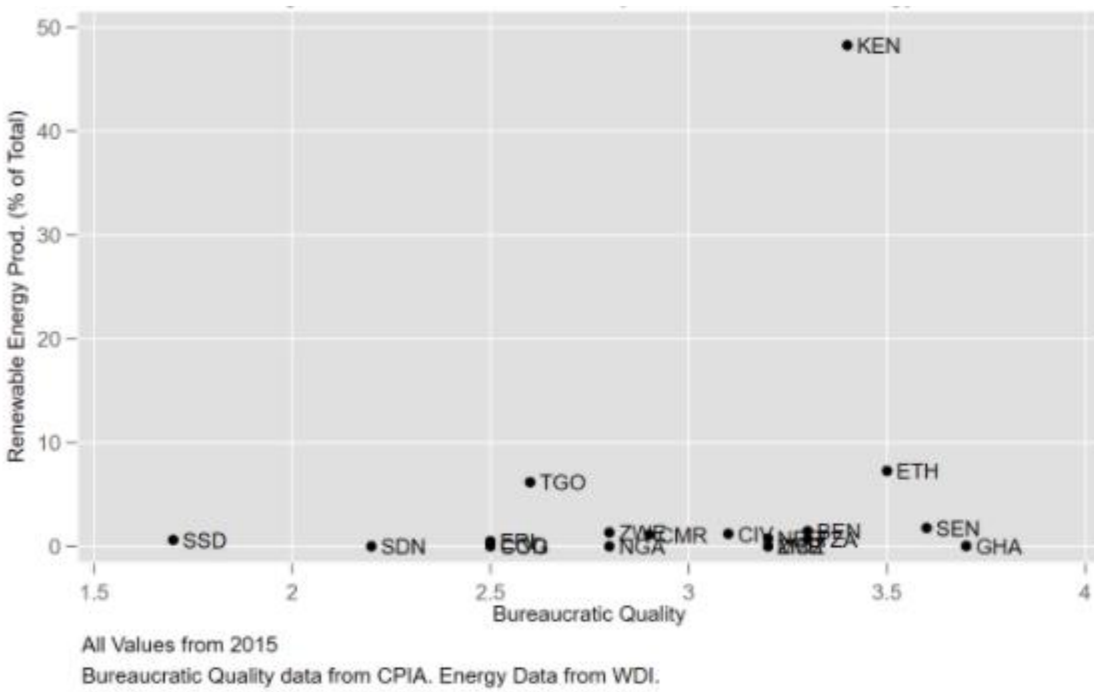

Figure 11: Relationship Between Renewable Energy and Bureaucratic Quality

Figure 11 above depicts the relationship between bureaucratic quality and electricity produced from renewable energy sources. As with every other explanatory factor considered here, bureaucratic quality does not appear to have any bearing on renewable energy production. However, Kenya, the single country that stands out as having incorporated a significant level of renewable energy into its power sector, also stands out in its high quality of public sector management relative to the vast majority of its peers.

Discussion and Evaluation

Three points stand out from this review of the leading explanations for variations in sustainable development amongst Sub-Saharan African power sectors. The first is the relationship between wealth and electricity access, which yields a distinct curvilinear relationship that suggests that small increases in wealth amongst the poorest countries in the region are strongly associated with increases in electricity access. The direction of this relationship is not clear, but it seems sufficiently intuitive and empirically justified to assume that the poorest countries in the world will struggle to provide electricity access no matter what. Some level of financial resources are imperative to enable countries to build the necessary infrastructure to expand electricity access. But it is also clear that, in the presence of greater levels of wealth, not all countries choose or are able to convert those financial gains to greater electricity access.

The second point that stands out is the relationship between bureaucratic quality and electricity access. While not as obvious as the relationship between wealth and access, countries with higher quality public management generally have higher rates of electricity access. The exact strength of this relationship is obscured, to some degree, by the fact that the CPIA data does not exclusively measure the quality of institutions responsible for power sector governance; instead, the CPIA measure assesses the quality of the whole of the public sector.

The third point that stands out is the fact that none of the leading explanations explored appear to have a systematic relationship with renewable energy production. Instead, Kenya is the only country in the region that has incorporated a significant level of renewable energy production, and the reason for this is not immediately clear from the data presented here. However, while Kenya does not stand out for its wealth or its democratic quality, it is distinguished by the quality of its public management relative to the vast majority of its peers. This case study later in this work will explore why Kenya's public sector, and not its wealth or democratic institutions, is in fact a clearer explanation for its distinction in renewable energy growth.

To get a clearer sense of both how the strength of these explanations relate to one another, and to get a stronger estimation of the relationship between bureaucratic quality and electricity access, I conducted a panel-data analysis of the relationship between the set of explanatory variables (wealth, democratic quality, and institutional quality) and the outcome variables (electricity access (total and rural)). Data for wealth (GNP Per Capita), Land Area (sq. km), and Population are from the World Bank World Development Indicators. Data for Bureaucratic Quality are from the CPIA Quality of Public Administration rating, and rate bureaucratic quality on a scale of 1 (worst) to 6 (best). Data for Democratic Quality are from the V-Dem Polyarchy index (ranked from .00 (least electorally competitive) to 1.00 (most competitive). The data cover thirty-six countries from 1990-2013. The results are displayed in Table I below. When evaluating potential explanations against total electricity access, GNP per capita and population are the only statistically significant predictors. However, when evaluating the independent variables' impact on rural electricity access, where the majority of energy poverty in SSA is concentrated, Bureaucratic Quality exhibits a statistically significant effect. Because these variables are of different scales, I standardize them for comparison in order to demonstrate the effects of a single standard deviation (SD) increase in each variable. These values are reported in table II.[1]

[1] In order to compare the effects of differently scaled variables, I standardized the significant variables in each model by multiplying the Standard Deviation of each by its coefficient to produce Δ. I multiplied Δ *100 and divided the result by the SD of the dependent variable *Y* to produce $\boxed{\Delta}$. Δ measures how much *Y* would change if *X* increases by one standard deviation, while $\boxed{\Delta}$ tells us what percentage of a standard deviation of *Y* Δ corresponds to.

Table I: Panel Regression Results.

	(1) Electricity Access (Total)	(2) Electricity Access (Rural)
Bureaucratic Quality	2.008	3.328**
	(1.76)	(2.78)
Democratic Quality	-0.0118	-2.817
	(-0.00)	(-0.58)
GNP Per Capita	0.00530***	0.00312***
	(6.24)	(3.79)
Land Area (sq. km)	-0.00000285	-0.00000627
	(-0.68)	(-1.57)
Population	0.000000480***	0.000000402***
	(7.11)	(5.84)
_Constant	7.904	-3.642
	(1.85)	(-0.83)
N	412	371

t statistics in parentheses
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table II: Standardized Results of Table I

	IV SD	Coefficient	Δ	Δ * 100	DV	DV SD	Δ
Bureaucratic Quality	0.4726165	3.328395	1.573054396	157.3054396	Rural Access	15.19493	10.35249518
GNP Per Capita	706.7228	0.0031171	2.20292564	220.292564	Rural Access	15.19493	14.49776761
Population	3.13E+07	4.02E-07	1.26E+01	1.26E+03	Rural. Access	15.19493	8.28E+01

According to the standardized results, a one SD increase in bureaucratic quality (.47) correlates with a 1.57% increase in rural electricity access, or 10% of an SD in rural electricity access (15%). This is compared to a 2.2% increase for a one SD increase in GNP per capita ($706), or 14% of an SD in rural electricity access, and a 1.26% increase for a one SD increase in population, or about 8.3% of an SD in rural electricity access. GNP Per Capita is the strongest predictor, followed by Bureaucratic Quality, and finally Population.

Overall, while it is important to understand that well-performing bureaucracies contribute to expanding rural electricity access to citizens, this is something of a truism. In places where bureaucracies work well, they work well at providing electricity access. What is important for scholars and practitioners is understanding *why* and *how* bureaucracies work well.

Power Sector Bureaucracies in Africa

In their global comparative study of energy poverty, Aklin et al. (2018) go farther than most studies that focus on institutional quality by providing a set of case studies that examine how different institutional arrangements have been instrumental to expanding electricity access. Several key examples come from Sub-Saharan Africa.

Ghana's creation of the Public Utilities Regulatory Commission (an independent power sector regulator), the National Electrification Scheme (a long-standing government policy plan to extend electricity access) and the Self-Help Electrification Project (a related government policy that asks communities near grids to meet certain requirements in order to be connected) are examples of bureaucratic institutional design and government policies that demonstrate high institutional capacity and have led to impressive growth in rural electricity access. The other three examples from the region show how weak institutional capacity results in low rural electricity access.

A long history of low institutional capacity in Kenya, accounted for by corruption and mismanagement in the state-owned Kenya Power and Lighting Company, responsible for transmission, distribution, and retail of electric power, held the country's electricity access rates back for decades. The authors argue that recent reforms, such as the creation of the Electricity Regulatory Commission (an independent sector regulator), the introduction of private sector investment, and the success of off-grid solar (in spite of the government, rather than because of, the government), may augur a brighter future. However, the country still lags dramatically behind many of its peers in extending electricity access, and these reforms have yet to demonstrate a marked departure in progress from the earlier period of public sector organization.

Given Nigeria's considerable national energy resources, relatively massive economy, and democratic gains, Nigeria would be expected to have outperformed many of its peers in expanding electricity access by now. But Aklin et al (2018) cite Nigeria as a particularly flagrant example of the importance of institutional capacity for governments' ability to expand electricity access. Following decades of mismanagement and corruption under the National Electric Power Authority (NEPA), in 1999 the country undertook significant efforts to improve the function and reach of its power sector through a series of major investments in NEPA. When these failed to result in any notable improvements, the government passed legislation to reorganize the sector in 2005 by unbundling NEPA (separating transmission, generation, and distribution) and privatizing large portions of the power market. These reforms were implemented slowly, and have yet to demonstrate any marked improvements. Despite a high level of government interest and political incentive to expand electricity access, the low institutional capacity of the country's power sector has held back its success in doing so.

Aklin et al. (2018) usefully demonstrate how, even in the presence of representative democracy and strong government interest, institutional capacity is an essential ingredient in a successful power sector. The authors also shed some light on what successful (Ghana) and unsuccessful (Kenya, Nigeria, Senegal) institutional apparati look like. In doing so, they have pointed the literature in a productive direction; while democracy, rule of law, a lack of corruption, and economic growth all enhance the possibilities for governments to expand electricity access, they matter little if the institutional apparatus responsible for sector governance is not up to the task. What the authors do not do is present an organizational theory about what constitutes a successful power sector that provides the institutional capacity required for government interest and local accountability to work together to deliver improvements in electricity generation, transmission, and distribution that satisfy demands for universal access.

Institutional Quality and Power Sector Organization

The question of how to structure power sectors to effectively respond to demands for greater electricity access and renewable energy growth has received increasingly scholarly attention in recent years. This literature falls into two broad camps. The first camp is more limited in scope and is focused on techno-economic considerations intended to attract greater private investment to induce supply growth. This approach is rooted in neoclassical economic assumptions about development and assumes a limited role for government. In this view, the state's primary responsibility is to create stable conditions for the private sector to expand electricity access and develop renewable energy resources. The second camp views power sectors as embedded within political and economic processes that constrain and enable sector reform and policy outcomes. This camp explores questions about how combinations of change in contextual factors as well as sectoral reforms can lead to greater electricity supply, universal electricity access, and renewable energy development.

The Neoclassical Approach

The neoclassical approach to power sector reform is rooted in a set of related assumptions: 1) the primary obstacle in the way of SSA governments achieving greater electricity supply, universal electricity access, and renewable energy development is a lack of private investment, 2) this lack of investment comes from a) the failure of governments to provide sufficiently stable economic conditions b) state interventions that drive distortionary "political" pricing 3) that the role of government is thus to create attractive conditions for investment in the sector and get out of the way of private sector actors. Gregory and Sovacool (2019) refer to this as the "Financial Investment Governance" (FIG) perspective, which characterizes much of the literature attempting to explain the state of electricity access in Sub-Saharan Africa (Pueyo 2018; Labordena et al 2017; Collier & Venables 2012) . Alongside these core assumptions, this perspective makes several other assumptions about the problem of under-investment in SSA power sector development; one involves the FIG perspective's definition of "good governance." From the FIG perspective, "'good' investment governance will entail factors that protect the 'immediate cost' of an investment and then enable the delivery of the 'future rewards' proficiently and with certainty, consistent with the expectations of the investment when it was planned. "Bad" investment governance concerns factors that destroy or remove value from both the 'immediate cost' and the 'future rewards' of the investment." (Gregory & Sovacool 2019, 346-7). This concept of good governance is closely related to that of the World Bank, which, through its Worldwide Governance Indicators, has essentialized business friendly policies and institutions to the prevailing concept of good governance amongst international development institutions (IDIs). This similarity in assumptions, emphases, and reasoning has meant that research from the FIG perspective not only occupies a prominent place in the academic literature, but is also the dominant perspective in the so-called “gray literature” emanating from the IDIs, governments, and think tanks. Gregory & Sovacool specify several conclusions about problems in SSA power sector governance that follow from this perspective, depicted in Table III below (2019).

Table III: The Financial Investment Governance Perspective: Source: Author's creation, from Gregory & Sovacool 2019

Issue	Explanation
Uncertain Property Rights	SSA governments have a history of nationalizing assets that fall within their sovereign control, and this future uncertainty significantly discounts future profitability, perhaps entirely.
Excessive Planning Costs	Changing tender processes and burdensome planning requirements combined with insufficient bureaucratic capacity to administer complex plans raises planning costs and delays projects. This delay reduces the return on investment, especially relative to alternative investment opportunities.
Reallocation of project ownership or control	Shifting bureaucratic landscapes lead to changing oversight bodies with shifting rules and costs, which can change future profitability and increase risk.

Equity dilution, ownership restrictions, and local content procurement	Foreign ownership in SSA ventures is often diluted by local requirements for indigenous ownership and project procurement that aim to keep some share of profits and economic activity from extracting African resources in Africa.
Exchange Rate Convertibility	This concerns investors' ability to repatriate profits from ventures in SSA into their home currency, securing future profitability against the volatility associated with the currencies of developing economies.
Monopoly control of electricity supply	In many SSA countries, there is a single state-owned entity charged with supplying energy to the grid. This poses two problems for investors: 1) it eliminates the market-induced pricing that investors prefer, 2) many SSA SOEs suffer from poor management practices that render them insolvent and unable to meet financial obligations to energy producers. (As will be demonstrated in the case study on Ghana, one way around this has been for government's to enter contracts with power producers that underwrite pricing independent of the SOEs ability to pay).

Uncommercial Tariffs	Most SSA countries have national non-commercial electricity tariffs, ostensibly to make electricity available to their largely poor publics. To grow supply, African countries must attract private investment; in order to attract private investment, tariffs must be raised.
Rule of Law	Investors worry that weak state security capacity may lead to the theft or damage of infrastructure assets.

The governance perspective highlights key policy barriers to private capital investment in power sectors. However, the animating assumption that attracting foreign private capital is essential for the growth of power sectors in the region belies several important points: 1) the main reason why governments distort prices is because they know the vast majority of their citizens cannot afford electricity otherwise, 2) this same fact is the reason why, in a globalized economy with high capital mobility and innumerable high-yield opportunities, there is little private sector interest in investing in the sale of electricity to the world's poorest people, 3) while private investment would undoubtedly help, Sub-Saharan African governments, international development institutions, and bilateral lenders already spend a tremendous amount of money on the production and distribution of energy and electricity in the region. In terms of understanding why power sectors fail to meet key policy objectives, the governance perspectives' perennial focus on attracting investment distracts from an equally if not more important focus on how Sub-Saharan African governments choose to spend what public financial resources they do have, or how these choices impact the political-economic conditions surrounding governance. The need for greater scholarly scrutiny on public energy investment has even been acknowledged by leading scholars from the FIG perspective (Eberhard & Shkaratan 2012). Specifically, the fact that many African governments choose to spend the majority of energy appropriations on institutions to support hydrocarbon extraction, or even on hydrocarbon imports, and in many cases virtually none on growing the power sector or renewable energy, poses a far more immediate challenge to expanding electricity access or developing renewable energy than does attracting foreign capital (IEA 2019; Hafner et al. 2018).

The governance perspective casts SSA energy governance as an essentially uniform technical problem that can be fixed by adjusting SSA institutions to fit the rules of the global capital markets game. As Baker (2014) and Lawhon and Murphy (2011:6) put it, “a more narrow focus on policy management characterizes much of the literature reflecting a ‘tendency towards techno-economic determinism’ amongst practitioners of the approach.” (Baker 2014:797; Lawhon and Murphy 2011:6). This literature’s endemic focus on identifying technically deficient policy formulae led Meadowcroft to call for political scientists to develop politics-oriented literature on sustainability transitions because “behind policy there is always politics” (2011:73). Aklin & Uprelainenen (2018) similarly note that this literature’s line of inquiry “focuses on techno-economic considerations and treats policies and politics as an explanatory factor of secondary importance,” (p. 15-16). The governance literature ignores the *political* mechanisms shaping the power sectors it criticizes, and thus its technical solutions are unlikely to materialize without *political* change.

Clearly, the neoclassical perspective faces some fundamental theoretical challenges that limit its contribution in politico-economic environments that render its policy recommendations non-starters. But to the extent that its recommendations have been implemented in Sub-Saharan Africa, have they worked? The recommendations of this perspective are, as previously noted, closely in line with a package of reforms propagated by the World Bank since the early 1990s. I will focus more closely on this set of reforms, the ideas behind them, and their flaws in implementation in the section on Power Sector Liberalization. But for now, we will examine their relationship with key variables of electricity supply and access in the countries in which they have been implemented.

A small but important literature has developed in recent years to evaluate the impact of power sector liberalization. Erdogdu (2011) compiled a global panel dataset of 92 countries from 1982-2008 documenting the implementation of power sector reforms that represent key aspects of the governance perspective's attempt to reorganize power sectors so as to attract greater private sector investment, maximize efficiency, increase supply, and reduce costs The index documents whether and when countries implemented the following reforms: 1) a liberalization law that permits private sector activity in the power sector 2) corporatization of state-owned utilities 3) creation of an independent sector regulator 4) legalization of independent power producers 5) Unbundling of state-owned utilities into separate enterprises for generation, transmission, and distribution 6) privatization of state-owned utilities 7) the creation of wholesale electricity markets, and 8) consumer freedom of choice of electricity suppliers. Through panel regressions, Erdogdu investigates the impact of countries' "reform score" (a summation of dichotomous variables representing whether or not the above reforms have been implemented) on several sector performance variables and provides results on both the full samples and by geographic region (for some variables/ regions). The analysis yields a weak but positive relationship between reform score and plant load factor (a measure of how closely power plants are meeting their production capacity) for all regions *except* Africa. Importantly, the results also suggest that reforms positively impact transmission losses as a share of total generation for all regions except Asia and Oceania. Further, this positive effect was strongest for African countries in the sample; in other words, reforms harmed transmission efficiency in Africa more than anywhere else. In a subsequent paper, Erdogdu (2014) investigated the impact of electricity market openness (using a regulatory indicator based on data from the EBRD and OECD) on private power sector investment, sector self-sufficiency, and CO_2 emissions. In this work, he finds that power sector openness is actually associated with lower private investment in developing country power sectors, but increased self-sufficiency and lower CO_2 emissions (a finding that appears to be a result of lower generation capacity in more open markets).

Urpelainen & Yang (2019) extend and correct Erdogdu's 2011 data set to index power sector reforms on a broader set of countries from 1982-2013, but they investigate the determinants, rather than the effects of power sector reform. Importantly, however, they find that power sector reforms are least extensively implemented in Sub-Saharan Africa, a result that their analysis suggests is driven by low levels of institutional capacity and democratic consolidation.
Figure 12 below presents the relationship between the extent of power sector reform (using data from Urpelainen & Yang 2019) and electricity access across SSA. There is no obvious relationship between the extent of liberalization and electricity access in the region. It is, however, notable that Ghana and South Africa, two of the countries with the highest levels of electricity access in the region, have also implemented liberalization reforms to far greater extent than most countries in the region. The relationship between these two facts is explored in detail in the case studies later in this work.

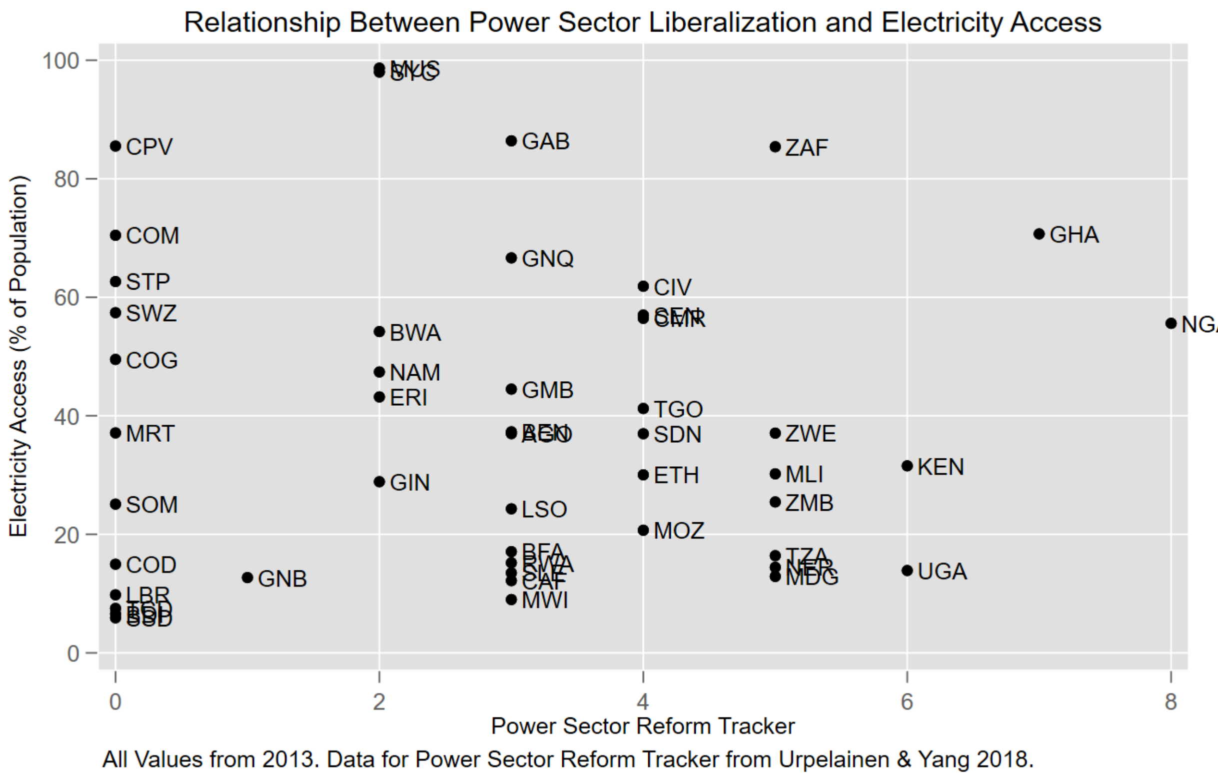

Figure 12: Relationship Between Power Sector Liberalization and Electricity Access

Structural Approaches

A second camp explores how contextual variables (political, economic, and technological) interact with institutions, interest-actors, and the political-economic strategies they employ to advance or resist change in energy sectors. his camp can be cut into three strands of literature, the “socio-technical systems” (STS) approach, the political economy approach, and the policy regime approach. First I briefly review the socio-technical systems and political economy approaches, noting the important contributions of each. I then turn to the policy regime perspective, in which this work is grounded. I argue that the policy regime perspective accommodates a growing convergence of the STS and political economy approaches by adopting the STS literatures’ analytic focus on regimes as well as the political economy literature's emphasis on actor-oriented mechanisms of political action and incumbent resistance. I begin the discussion of the policy regime perspective with the historical roots of "regimes" in political science, its growing use in public administration and governance, and finally the recent convergence around the policy regime approach in the energy transitions literature. I then turn to a development of my own theory of policy regime coherence.

Socio-Technical Systems

The socio-technical systems (STS) approach draws more heavily from sociology, technology studies, and policy science literature than from economics. It focuses on how large technical systems, such as national energy systems, are "deeply embedded in the overall structure of society," (Van de Graad 2016; 18). STS has been methodologically associated with the "multi-level perspective" (MLP), which distinguishes three levels of analysis for understanding technical transitions: niche-innovations, sociotechnical regimes, and sociotechnical landscapes (Rip & Kemp, 1998, Geels, 2002, Geels, 2004, Geels & Schot, 2007). The essential idea is that the adoption of new technologies (such as renewable energy) is not an automatic function of their efficiency or social desirability. Instead, whether or not a technology obtains a level of widespread application depends on how it is mediated through a series of social, political, and economic structures that are already adapted to existing, or incumbent, technologies. These structures, such as research institutions, companies, regulatory agencies and political institutions, can constrain or enable the development and spread of a new technology depending on the extent to which their rules, incentives, and constituent actors are invested in the continuing use of incumbent technologies.

The MLP has been highly generative for transitions studies, leading to many case studies of renewable energy technology adaptation (see Genus and Coles 2008 for a thorough accounting of this literature and the analytical development of the MLP). However, the MLP has faced criticism for its lack of actor agency, operationalization of regimes, and its failure to transcend descriptive analyses (Geels 2011). The MLP has been constructive, however, in directing analytic focus toward how the sets of institutions responsible for energy governance (sociotechnical regimes) interact with policy change and new technology. More recently, Speed (2016) argues that rational-choice and historical institutionalism offer complementary frameworks to the socio-technical school by providing theories of institutional change. Cherp et al (2018) attempt to integrate the socio-technical and political perspectives, arguing that economic development, technological innovation, and policy change are all prominent factors shaping energy transitions, and thus explaining energy transitions must draw from disciplines investigating all of them. Essentially, the energy transitions literature has been working through the classic "structure-agency" debate of historical institutionalism in political science and sociology (Peters 2019; Hay & Wincott 1998), and is now arriving at the same conclusion that both must be accounted for. Appropriately, they now calling for political scientists to contribute (Cherp et al. 2018; Speed 2016).

The Political Economy Perspective

The second strand of the structural literature is more actor than system oriented and focuses on how competition between political-economic interest coalitions in the energy policymaking and implementation process impact policy outcomes related to energy transitions. In contrast to techno-economic approaches that perceive energy transitions as the product of the interaction between technology growth and reduced costs, the political economy perspective sees energy transitions as sites of major political contestation requiring substantial government intervention in order to give rise to new technologies (Stefes 2020; Aklin & Urpelainen 2018; Breetz, Mildenberger and Stokes 2018; Meadowcroft 2011; Unruh 2000).

Hanna Breetz and her colleagues (2018) provide a three-stage model for the political-economic process of energy transitions: in the first stage, renewable energy is significantly more expensive than fossil fuel alternatives. In order to grow, renewable energy requires the support of government programs and subsidies (R&D funding, public procurement, carbon taxes). At this stage, RE does not pose a major threat to incumbent energy actors, and thus the level of political contestation is low. At the second stage, prices for RE have decreased as a result of government intervention, and the industry and its political support coalition (green energy industry groups, environmental interest groups, public support) have become competitive actors that threaten the dominance of energy incumbents. These incumbents become politically active in opposing government supports for RE, and thus this stage is characterized by severe political contestation. At the third and final stage, renewable energy has become cost-competitive in absence of public support, and market forces drive rapid expansion of its deployment across the economy. Political contestation remains, but is less intense than at the second stage.
The strategies of actors at the second stage of Breetz's model have been the subject of a productive line of inquiry within this approach.

Stefes (2020) explores the dynamics of political contestation in the German energy sector, in particular the coal lobby's exploitation of higher pricing induced by renewables, as well as the activation of local political networks resistant to green infrastructure (such as wind turbines) in their municipalities. Aklin and Urpelainen (2013) explore how "green" and "brown" governments exploit exogenous shocks to create positive/negative reinforcement mechanisms (or policy feedbacks) to support renewable or hydrocarbon constituencies. Johnstone, Stirling, and Sovacool (2017) examine different incumbent strategies such as downplaying and externalizing the costs of fossil fuel use, the placement of representatives in government positions and the leveraging of political networks and policy elites to suppress pro-RE policy and "greenwash" the old energy system, and to emphasize national security frames that support existing energy systems.

The political economy perspective is distinguished from the socio-technical systems literature by its more “actor-oriented” approach which emphasizes the incentives and strategies of particular interest-actors (firms, lobbies, public interest groups, and to a lesser extent bureaucratic institutions) within the energy policy domain. These mechanisms fall along a “meso-level” (Stefes 2020) of analysis that can help explain why pro-renewable energy policies succeed in some domains even while they fail in others with similar contextual factors.

To demonstrate how the STS and political economy schools identify different explanations for the same question, it is useful to consider each perspectives’ analysis of the German energy transition, commonly referred to as the *Energiewende*. Derwort et al. (2021) compare the two analytical lenses and outline the different variables each perspective focuses on, and how they lead to different conclusions. The paper has two objectives: first, to demonstrate how both approaches paint incomplete portraits of energy transitions by emphasizing agency at the expense of structure (political economy) or vice versa (STS/MLP), and second, to demonstrate how “cross-fertilizing” these approaches leads to more complete conclusions.

Following a combination of the oil shocks of the 1970s, the Three Mile Island meltdown in the United States in 1979, most importantly the nuclear meltdown in Chernobyl in 1986, public opinion in Germany shifted strongly against fossil fuels and nuclear power and towards the promotion of wind and solar generation. However, the most substantial changes in the country’s electricity generation mix did not take place until 2011, when the Fukushima nuclear meltdown occurred. The political economy and STS/MLP school have two different takes on how this transition occurred and why it happened when it did.

The political economy school emphasizes how, following Chernobyl, a small group of “policy entrepreneurs” from the Christian Democratic and Green Parties began to formulate and advocate for policies promoting small-scale renewable energy production, resulting in the passage of a feed-in-tariff (FiT) in 1991. In the 1990s, as climate change became a more salient political issue, the Green Party began to serve as a critical “problem broker” (Knaggård, 2015), increasingly bringing attention to the importance of a renewable energy transition. The 1998 election of a coalition government of Social Democrats and Greens created a “policy window,” allowing the replacement of the FiT with the Renewable Energy Act and the passage of the Nuclear Energy Phase-Out Act in 2000. Under these laws, renewable energy generation grew significantly, and nuclear energy began to gradually be phased out. However, the most substantial changes occurred following the Fukushima disaster in 2011, after which the Parliament voted in a series of laws that would fundamentally change the energy system and phase out nuclear power by 2022. The Political Economy school focuses on political actors, and argues that they were responsible for the energy transition.

Scholars applying the MLP lens argue that the transition took place in 2011 not because of the political reaction to Fukushima, but because by this time solar and wind technologies had developed sufficiently to replace the generation capacity of nuclear energy. While they do not dispute that parliament’s actions ultimately allowed the transition to occur, they see this choice more as actors reacting to structural changes in the availability of technology. The crucial point in their reasoning is that, had political will been the decisive factor in Germany’s renewable energy transition, it would have occurred over two decades earlier following the Chernobyl disaster, which was much more significant for the German public in both practical and political terms.

Derwort et al. (2021) argue that either lens in isolation offers an incomplete account. The work of the policy entrepreneurs in the 1990s (the FiT) led to the development of renewable technologies such that they were sufficiently advanced to replace nuclear energy by 2011. Paying attention to the interactions between political actions and changes in technology offers a more complete account of the *Energiewende.* The authors helpfully demonstrate the importance of the integration of the political economy and STS perspectives that Cherp et al. (2018) and Speed (2016) are calling for.

Theory: Policy Regime Approaches in Political Science and Public Administration

The term “regime” has a long history of use in political science as a way of conceptualizing sets of institutions, actors, rules, and norms. In studies of democracy and development, Huntington (1968) categorized political regimes by the ratio of public participation in political decision making to institutionalization. Dahl conceptualized regimes as sets of governing institutions (legislative chambers, executive offices), and analyzed their degree of openness to political contestation, ranging from “closed hegemonies” on one side of the spectrum to “polyarchies” on the other. In this sense, regimes are either stable or unstable, subject to staid continuity or revolutionary change (Dahl 1971). International relations began to make use of “regimes” by abstracting Dahl and Huntington’s state-level concept to the international level as a way of understanding the relations between states. Keohane and Nye defined regimes as “sets of governing arrangements” with “networks of rules, norms, and procedures that regularize behavior and control its effects,” (1977;19). Krasner defined regimes as “sets of implicit or explicit principles, norms, and decision-making procedures around which actors’ expectations converge in a given area of international relations,” (1982; 186). Fundamentally, these definitions have all shared the common conceptual core of regimes as sets of institutions, rules, norms, and behaviors that may be formal or informal. The study of regimes has been analytically useful as a way of understanding why actor behaviors converge (or diverge).

More recently, the term “regime” has increasingly been applied in the policy sciences and governance literatures as a way of conceptualizing groups of institutions, actors, and rules operating within a given policy sphere. Bouckaert and Pollitt (2011) consider “politico-administrative regimes” by which they refer to structural, functional, and cultural elements that constitute an administrative system. They define politic-administrative regimes by formal and informal features such as the nature of executive government and legislative governance (majoritarian or consensus), the relationship between political executives and senior civil servants, the administrative culture (i.e. staff expectations about what is considered normal and acceptable within their organization), and the degree of diversity amongst the main channels through which dominant ideas for public management reform come. Howlett’s “nested model of policy selection” (2009; 2019) argues that politics involved in policy regimes shapes policy instrument selection. In this model, abstract policy aims are determined at the governance arrangements level (the constellation of interests and ideas) where particular modes of governance dominate (i.e. legal, corporatist, market, network), which lead to a set of policy regime logics justifying different types of government and/or market action, which then circumscribe the set of appropriate policy instruments for addressing the policy problem.

Another rising use of the term “policy regime” has been in the context of the “policy regime perspective” on understanding implementation (Jochim & May 2012). In contrast to the policy design perspective, which places focus on the considerations, logics, and instruments involved in creating a policy (Peters 2018), and the implementation perspective, which tends to focus on how organizational and communication issues along the administrative chain obstruct or catalyze implementation (Pressman & Wildavsky 1984), the policy regime perspective emphasizes how the relational nature of institutions within a policy domain can account for outcomes across the policy process (from motivation, through design, and into implementation). It examines how small changes in one institution, policy, or instrument can reverberate across the policy regime, altering the behavior of other institutions and actors and exhibiting forms of endogenous change (such as policy feedbacks) that alter policy outcomes.

Understanding endogenous change in public administration and policy thus necessitates a conceptual focus on “policy regimes”, or “the governing arrangements for addressing policy problems.” (May 2014). In this context, Jochim and May clarify that “governing arrangements can be broadly construed to include authoritative actions (executive orders, statues, rules), institutional arrangements, and interest alignments, and shared ideas.” (Jochim & May 2012; 3). Further, the authors note that “as with other constructs in the policy literature… one does not directly observe a policy regime. Instead, one observes its components. These are the ideas, institutional arrangements, and interest alignments that constitute a given policy regime.” (Jochim & May 2012; 3). Jochim and May (2012) connect their policy regime concept to the literature on “policy feedbacks” which suggests that public policy outcomes result in political responses that shape the environment in which public policy gets made. Feedback can thus impact the regime itself, and can do so in ways that can be either advantageous or adverse to the initial policy goals. In the case that such feedback is negative, the impact to the policy regime is dependent on its “strength,” or the “the degree to which a regime reinforces the political commitments made by policymakers in addressing a given problem.” Strength is determined by policy *legitimacy* (“acceptance by the governed of the goals and approach for resolving problems”) , policy *coherence* (“the consistency of actions in addressing a given set of policy problems of target groups”) , and policy *durability* (the sustainability of political commitments over time). (2012).

Recently the policy regime perspective has been combined with various forms of the “new institutionalism” to better understand renewable energy transitions. This work increasingly overlaps with the newest contributions of the STS and political economy schools, but is distinguished by its analytical focus on energy policy regimes rather than the broader structural focus of STS or the more narrow focus on specific interest-actor strategies of the political economy school.

Kern and Howlett (2009) apply the policy regime perspective to analysis of the impacts of reforms on the Dutch energy sector. Specifically, they examine how reforms have resulted in incoherent policy mixes between market-oriented approaches and so-called “transition management” approaches that attempt to accelerate renewable penetration through government assistance. Rather than look at specific interest-actors or policies, the authors examine how the coherence/incoherence of policy mixes, or the “complex arrangements of multiple goals and means,” contribute to the effectiveness of the Dutch energy transition.

Huang and Chen (2021) examine policy regime resistance to energy transitions in East Asia, and how the “electricity iron triangle” of the DPP government, the utility workers’ union, and ENGOs have served as the primary regime actors accelerating the energy transition. This work makes use of the regime perspective by emphasizing how the codependent relationships and cooperation between important institutions in the power sector regime produces change, rather than focusing on specific actors or their strategies. In a similar vein, Baker, Newell, and Phillips (2014) examine the centrality of the “minerals-energy complex” to the South African energy policy regime, and how this constellation of interest-actors constrains reform intended to accelerate energy access and renewable energy development. Meckling (2019) uses the policy regime perspective to understand the role of policy feedbacks in the expansion of pro-RE policy following Germany’s introduction of a Feed-In-Tariff, international cooperation in the creation or the International Renewable Energy Agency, and international competition in the European Union-China solar trade dispute.

There is a clear increase in the use of the policy regime perspective to understand renewable energy transitions, particularly with regard to questions concerning policy feedback effects. However, not all studies draw clear connections between STS, the political economy literature, or the policy regime tradition in public administration and governance (as applied in the works of Jochim and May (2012) or Kern and Howlett (2009)). A series of papers have recently made the explicit attempt to enjoin the STS and political economy perspectives into a framework resembling the policy regime perspective. They have drawn on the rising incorporation of the new institutionalism (as in Kern & Howlett 2009, and in Stefes (2020). Specifically, Lockwood and colleagues (2016) lay out an agenda for studying the politics of sustainable transitions that focuses on socio-technical regimes (STRs) and incorporates tools from the new institutionalism for understanding path-dependency and gradual institutional change (Mahoney & Thelen 2010). Speed (2016) makes a similar case for incorporating tools from rational-choice and historical institutionalism into the study of STRs and energy transitions. Cherp et al. (2018) attempt to combine "techno-economic, socio-technical, and political" perspectives on national energy transitions into a meta-theoretical framework that charts the co-evolution of changes along these dimensions.

This increasing convergence between STS, political economy, public administration, and the tools of the "new institutionalism" is a welcome development for the historically fragmented nature of transitions studies. Recent attempts to reconcile these literatures are also welcome, as they offer a way forward that does not neglect the important contributions of each approach. However, it is my view that each of these attempts (Lockwood et al 2016; Speed 2016; Cherp et al. 2018) falls short in doing so by anchoring their syntheses of the literature to the "socio-technical regime" concept (Rip and Kemp, 1998, Geels, 2002, Geels, 2004, Geels and Schot, 2007) rather than the "policy regime" concept (Jochim & May 2012; Howlett & Rayner 2007; Kern & Howlett 2009). Why does this matter?

The best way forward for energy transition studies is one in which the structural considerations of the socio-technical systems approach and the actor-oriented foci of the political economy approach are both incorporated in order to understand transition outcomes. The socio-technical regime is but one level in a larger "systems" theory that binds together material (technologic, economic, political) and immaterial (normative, discursive) factors. This systems theory has been criticized for the way its attempts at broad comprehension disable any tractable analysis of generalizable causal inference, and thus the "multi-level perspective" methodology commonly employed to understand socio-technical systems has rarely transcended description. A theory's utility ultimately rests on whether it directs analytical focus to a subset of variables and relationships that are more important than others in understanding an outcome of interest (King, Keohane, & Verba 1994).. "Socio-technical regimes," while the most stable element of the STS approach (Lawhon & Murphy 2011), do not even claim to do so.

In contrast to STRs, "policy regimes," are a well-developed theoretical concept emerging from disciplines explicitly focused on modeling political and policy processes (see the review and development of the concept in the previous pages). Policy regimes have clearly defined conceptual boundaries, limiting focus to the sets of institutions, interests, and ideas responsible for setting and implementing policy (in contrast to STRs, which not only comprise institutions and interests regarding policy but also a whole host of institutions related to innovation and education, as well as broad public norms of energy use and consumption). The policy regime perspective has led to clear articulations about how the ordering and sequencing of institutional relations and reform lead to different outcomes (see Jochim & May 2012; Howlett & Rayner 2007; Kern & Howlett 2009 on policy regime coherence and incoherence, and the effects of layering different policy goals, institutions, and rules on top of one another).

Scholars of policy regimes do not deny, as the STR concept contends, that policy processes are embedded in a larger system of techno-economic diffusion. They reject, however, techno-economic determinism. In STR analysis, "socio-technical landscape" pressures, or concomitant shifts in the quality and price of competing technologies, are causally prior to actor behavior (see the earlier discussion of competing perspectives on the German energy transition in Derwort et al. 2021., p.47). Primary analytic focus is thus directed at the "socio-technical landscape" level, which then determines actor behavior in the socio-technical regime. The policy regime approach begins with the assumption that politics and policy are the primary determinants of whether a niche-technology that threatens incumbent actors will diffuse. It strives to understand how variations in regime structures and actor strategies drive distinct outcomes. It does not attempt to model the early-stage processes by which particular technologies are discovered; rather, it picks up analysis when those technologies begin to collect political support. And through a greater incorporation of the political economy literature (Breetz et al. 2018; Aklin & Urpelainen 2018), the policy regime approach can strike a balance in the structure-agency debate that allows us to understand both why 1) a given policy regime structure constrains and expands opportunities for change 2) why even very similar policy regimes can have different outcomes depending on the various strategies regime actors employ to advance or resist change. This is where my theoretical contribution lies: I define policy regimes as the central analytic focus of transition studies, posit a framework for identifying and modeling regime behavior, and account for how actor strategies of resistance and advocacy account for distinct outcomes within relatively similar policy regimes.

The Power Sector As Policy Regime

As with the other types of regimes in political science, we do not directly observe policy regimes, but instead observe their components (Jochim & May 2012). We thus require an analytical framework that identifies and organizes the various institutions responsible for sector governance into policy regimes, allowing us to study the effects of unit-level variation (both within regimes over time and between regimes in different countries) on policy outcomes. In order to draw conclusions about the effects of policy regime variation, it is also necessary to specify the theoretical mechanisms by which different organizational forms exert effects on policy outcomes. It is my contention that *coherence*, or the alignment of ideas, interests, institutional incentives, and policy instruments across a policy regime is the key variable affecting *policy effectiveness*, or the ability of the government to translate preferences about policy into outcomes that reflect those preferences. While it is theoretically possible that policy regimes could remain coherent across a wide variety of organizational forms, this work will extend positive theories about the relationship between organizational structure and coherence. This section proceeds as follows: 1) I lay out an analytical framework that identifies and organizes the components of policy regimes in the power sector 2) I use the framework to make a set of claims about how variations in policy regimes drive coordination costs that increase or decrease coherence 3) I tie the framework and related theoretical claims back to the concept of institutional quality.

Analytical Framework of Policy Regimes

There are three organizational levels in a policy regime: governance arrangements, policy formulation, and implementation. In this section, I lay out the three levels and describe their role in the policy process. This is followed by a "cast of characters," or different institutions and actors that may occupy one or more levels of the regime. The conceptualization is visually represented in Figure 13.

Governance Arrangements Level

Atop policy regimes is the governance arrangements level. This is the set of institutions and officials responsible for setting overarching policy goals such as industrialization, universal electricity access, or renewable energy development. Governance arrangements reflect constellations of the ideas and interests of the institutions and actors at this level. Ideas may refer to ideological commitments (such as a socialism, capitalism, or nationalism) as well as preferences for governance modes(statist, market, corporatist). Multiple modes of governance may coexist within a single policy regime, being appropriated to different policy goals. For example, the implementation of goal A may follow a corporatist mode, while goal B's implementation may follow a market governance structure. The assignment of a particular mode of governance to a given goal may reflect the goal's importance to actors at the governance arrangements level, as well as beliefs about the appropriateness and effectiveness of particular modes of government for accomplishing specific goals.

Interests reflect the set of incentives constituted both by ideological commitments but also by practical demands to respond to political and economic pressures. Actors at the governance arrangements level may feel obligated to satisfy industry groups, international development institutions, mass publics, or networks of patron-client relationships that cement their place in power. They also operate as principals in the regime: they control direct legal and financial power over agents lower down in the state apparatus responsible for meso-level policy decisions and implementation. They may also influence non-state actors such as private corporations and unions, but this is less easily conceptualized as a principal-agent relationship as these influences may work both ways depending on the power of non-state actors vis-a-vis those in government.

Policy Formulation Level

The Policy Formulation level is where the goals following from the ideas and interests at the governance arrangements level are translated into tangible policy programs. The policy formulation level is comprised of one or more cabinet-level government ministries, but may also include technical advisers from international development institutions. Because the leadership of this group is generally appointed by actors at the governance arrangements level, it tends to mirror the ideas and interests of those actors. However, it is possible for cultures and traditions to develop in individual institutions that have their own ideas and incentives that do not align with those at the governance arrangements level.

The policy regime logic that dominates leadership at the policy formulation level is critical in determining the sorts of policy instruments handed down to the implementation level. By policy regime logics I refer to the set of assumptions and beliefs actors have about the diagnosis of a particular policy problem and the appropriate and effective delegation of responsibilities and authorities for solving that problem. Policy regime logics emerge from preferences for particular modes of governance at the governance arrangements level; for example, a corporatist mode of governance would imply policy regime logics that assume shared roles for government and corporations in financing and implementing policy. Actors at the policy formulation level actuate such a logic by devising a set of instruments that respond to what is perceived as a close and constructive relationship between state and market actors such as bilateral contracting or concessionaire agreements. A market mode of governance would portend a different policy regime logic wherein actors understand corporations to be the dominant institutions in deciding the distribution of resources, with the state standing by to place limits on corporate behavior intended to avert market failure. Policy instruments that follow from this logic include subsidies (direct or indirect), licensing, and standardization.

Implementation Level

Beneath the policy formulation level is the implementation level, which is responsible for the execution of policies. Implementers may be assigned some statutory role in the policy making process, although this is primarily limited to selecting from a suite of available policy instruments circumscribed by decisions at higher levels. However, implementers tend to assume a substantial, informal role in the policymaking process by way of the practical decision-making that takes place at this stage. Executives of state-owned enterprises, for example, will generally enjoy considerable statutory discretion in the allocation of resources, the management of human capital, and the steering of their organizations. Through implementation, actors at this level tend to develop practical understandings of the limitations of policy programs and modify their own behavior to reflect these realities. They are also strongly motivated to satisfy principals at higher levels of the policy process, as their ability to command power often depends on it.

Depending on the governance preferences of the government arrangements level, there may be one or two distinct groups of actors at the implementation level that require distinction:

Government Agent-Implementers: The first (and necessary) group of actors are government agent-implementers: agencies, regulators, state-owned enterprises, and other government entities such as “special-purpose vehicles” designed to fulfill specific policy objectives set at the policymaking level. This group is composed entirely of agents who are formally (and typically financially) obligated to principals at the policymaking level. Crucially, depending on governance modes that are actuated from the governance arrangements level and through the policymaking level, these agents may have varying levels of institutional strength and autonomy. In some cases, strength and autonomy may be so great as to render these institutions coequal to actors at the policymaking level and thus in a direct principal-agent relationship with the governance arrangements level (this tends to be the case with historically prominent, monopsonistic state-owned entities with large numbers of employees and informational advantages on the government, such as Eskom in South Africa). Government-agent implementers will often be codependent upon one another to implement policy.

Non-State Implementers: A second group of actors at the implementation level may exist when the state is not entirely responsible for implementation. These actors tend to become prominent under models of “regulatory governance,” in which the role of the state is to “steer” the private sector rather than actuate policy goals itself. Non-state implementers include private corporations and NGOs whose cooperation may be necessary for effective implementation of policies set at the policymaking level. These actors are distinguished from the first group in that they are not agents of the government. While they may act in cooperation with the organs of the state, they are not always legally or financially obligated to implement government policy (although they may be forced to operate within its constraints). This means that they may operate in ways inconsistent with or unrelated to the ideas and interests of the governance arrangements level.

While the model thus far has been unidimensional, there is a dimension of actors outside the principal-agent structures that tie the governance arrangements, policymaking, and implementation levels together. These are political and economic actors outside of government who are affected by and have interests in the policymaking process. They are instrumental in policy feedback effects. When the government makes and implements a policy, they are affected. If this effect is positive, they may act across levels of the regime to entrench the policy. If this effect is negative, they may act across levels of the regime to frustrate or reverse the policy. This includes mass publics, political parties, labor unions, industry groups, as well as the second group of non-state implementing actors.

Actors and Institutions

What follows is a review of the actor and institution types which are incorporated into this analytical framework and thus serve as observational components of a power sector policy regime.

Political

Office of the Executive: The office of the President, Prime Minister, or other national executive will be involved in setting power sector policy at the legislative and bureaucratic levels. At the legislative level, the executive may make legislative proposals to the chamber for passage that include specific policy proposals, or delegate statutory authority to the bureaucracy to fulfill policy goals. The executive also controls, at the highest level, the bureaucratic apparatus responsible for implementing laws intended to govern or reform the power sector. Importantly, the executive generally appoints the minister(s) in charge of the power sector, and may also appoint the CEOs of major SOEs in the sector, as well as the directors or major regulatory agencies. Depending on the number of ministries/departments involved in power sector policy, the national executive may form councils of advisors responsible for coordinating between these various national level bodies. Actors include the executive, as well as their senior advisers on energy and power.

Legislature: A national legislature is responsible for passing laws that affect the resources and policy options available to the rest of the regime. Depending on legislative capacity, legislatures may be more or less involved in the specificities of policymaking. Actors include legislators and their staff. The legislature also generally retains an oversight capacity on policy implementation, and can conduct audits and investigations of the bureaucratic apparatus. They may also provide guidance to the bureaucracy on implementation. Individual legislators, particularly those in leadership positions of committees relative to the power sector will tend to command most of the legislative authority over policymaking and oversight.

Bureaucratic

Government Ministry(ies): One or more government ministries will be responsible for national government oversight of the power sector. In some cases, responsibilities for different aspects of the sector may be divided amongst multiple ministerial portfolios. Ministries are charged with setting and implementing policy in line with relevant laws, executive orders, and the overall priorities, interests, and ideas of the executive. To this end, ministries may have direct implementation capacities such as the ability to build and manage infrastructure. Ministries generally oversee the other state institutions responsible for power sector policymaking and implementation, such as regulatory agencies and state-owned enterprises. Actors include the Minister(s) in charge of the relevant ministry(ies), their management teams, and staff.

Regulatory Agencies: Beneath national government ministries are regulatory agencies which are designed to monitor the behavior of other institutions and actors such as SOEs and private firms involved in generation, transmission, and distribution. Regulatory agencies generally enjoy considerable policymaking power through statutory authority. They are generally formally independent, and thus not subject to direct control by any other actor (although the power of appointment held by Ministers and Executives tends to exert a strong pull over the direction and behavior of regulatory agencies). They are often able to generate their own rules of enforcement and can selectively choose when to engage in coercive behavior. While there may be specific laws that constrain and direct their behavior, they are generally granted substantial discretion in interpreting and applying law. In the power sector, the ability to set consumer tariff prices is generally afforded to an independent regulatory agency (especially in the post-reform era), as well as the authority to approve power purchase agreements between independent power producers (IPPs) and transmission and distribution firms. These two powers alone make regulatory agencies extremely influential actors with the ability to shape the cost and source (hydrocarbon or renewable) of electricity. They are also generally responsible for ensuring the implementation of laws intended to grow renewable energy resources by monitoring the generation portfolios of state-owned utilities. Actors include agency directors, management, and staff.

<u>State-Owned Enterprises:</u> State-owned enterprises are organizations responsible for the administration, operation, and sometimes construction of power sector system assets such power plants, transmission and distribution grids. SOEs control access to such assets via the management of accounts and grids. In this way, SOEs often have some informal discretion over policy, as they can continue to allow consumers access to electricity regardless of payment. SOEs are also generally responsible for arranging terms of purchase from other (state or non-state) power producers. Depending on their market position, SOEs can enjoy considerable influence over shaping the power sector. In most cases in Sub-Saharan Africa, electricity SOEs retain a monopsonistic market position, meaning that they are the final word on whether an IPP can supply electricity to the grid. Over time, SOEs may develop considerable policymaking power through their informational advantages over other state institutions; they tend to hold a monopoly of knowledge of the grid, accounts, and internal processes that makes it difficult for regulators or ministries to coerce behavior without committed cooperation from SOE management. SOEs may given wide statutory authority, particularly under commercialization arrangement, in which they are empowered to elevate financial concerns over the implementation of policy. Ultimately, SOEs answer to the state through the power of appointment and their subjection to regulatory oversight. However, the ability of the state to directly control SOEs can be severely limited in cases where they have come to occupy an

indispensable position in the power sector through informational asymmetries and entrenched political influence. The primary example of such an SOE is Eskom. As the case study in this work will reveal, Eskom has been able to leverage a powerful advocacy network, a monopsonistic market position, and informational asymmetries to thwart reform efforts and participate in large-scale corruption. Actors include the members of the Board of Directors, the Board Chairman, CEO, senior-level management, and staff.

Private and Non-Governmental

Independent Power Producers: Independent Power Producers are non-state corporate entities engaged in the generation of electric power. Depending on regulations, IPPs may sell directly to consumers, or may be restricted to selling directly to SOEs responsible for transmission and distribution. IPPs are profit-motivated and seek to advance their market position by securing large contracts with buyers. IPPs tend to be the vanguard of niche-technologies and can thus represent a threat to SOEs that are engaged in revenue-yielding generation activities. IPPs may be foreign or domestic. In some cases, IPPs are the product of close relationships between entrepreneurs, politicians, and bureaucrats, and thus enjoy a privileged market position unlike traditional competitive firms. These advantages are especially strong in the bilateral (rather than competitive bidding) contracting environments found in many SSA power sectors. IPPs tend to be the beneficiaries of renewable energy laws, which often use market-mechanisms to guarantee premium pricing to IPPs with renewable generation technologies.
Actors include companies Boards of Directors, Board Chairmen, CEO, senior-level management, and staff.

NGOs: Non-governmental organizations such as think tanks and non-profits may be involved in representing constituencies (such as the environment, the poor) and developing policy proposals. In contexts where legislative capacity is weak, NGOs may play a significant role in providing information and technical capacity for power sector policymaking. Actors include Boards of the Directors, Board Chairmen, CEOs/Executive Directors, senior-level management, resident experts, and staff.

Industry Associations: Industry associations represent the interests of a particular industry such as coal, mining, nuclear power, solar, or wind. They may exert significant influence over other elements of the policy regime through their ability to form coalitions and negotiate pricing. One example is the Energy Intensive Users Group (EIUG) in South Africa, which represents a group of companies which purchase large volumes of electricity from the national electricity SOE Eskom. The EIUG can leverage its volume of demand to negotiate special pricing arrangements, and even influence choices about generation, distribution, and transmission. Actors include Association leadership and staff.

Labor Unions: Labor unions represent workers in industries that may be affected by electricity policy. Examples include public sector employees in government ministries, agencies, and SOEs, as well as workers in related industries such as energy (coal, oil, natural gas) and mining. Labor unions may influence policy through their influence and organizing power with political parties, or through their control of labor resources via strikes. Actors include Union leadership and members.

International Organizations: International Organizations (IOs) tend to exert considerable influence over developing country power sectors through their control of financial resources in the forms of concessionary finance and development credits. IOs may tie financial support to the implementation of particular sector reforms. In addition to financial resources, IOs may also influence policy and implementation through the provision of technological resources and technical and management consultants. IOs tend to influence power sectors at the executive level through agreements with the national executive and/or the relevant minister, who are then responsible for crafting and implementing legislation consistent with such agreements. IOs are thus generally included as part of the governance arrangements level, in that they are able to shape priorities and policy preferences. Through their supply of financial resources and technical assistance, they also tend to occupy an important role in the policy formulation level by promoting “best practices,” as well as ideas about appropriate behavior. IOs may also exert a strong influence at the policy formation level through agency capture; that is, some agencies may have received their statutory authority at the recommendation of IOs, and IO staff will have played some important role in early decisions about organization, management, and staffing. Such agencies may come to serve as domestic representatives of IO views on policy issues, expanding influence into the institutional fabric of power sector policy regimes. Actors include senior leadership, regional directors, consultants, and staff.

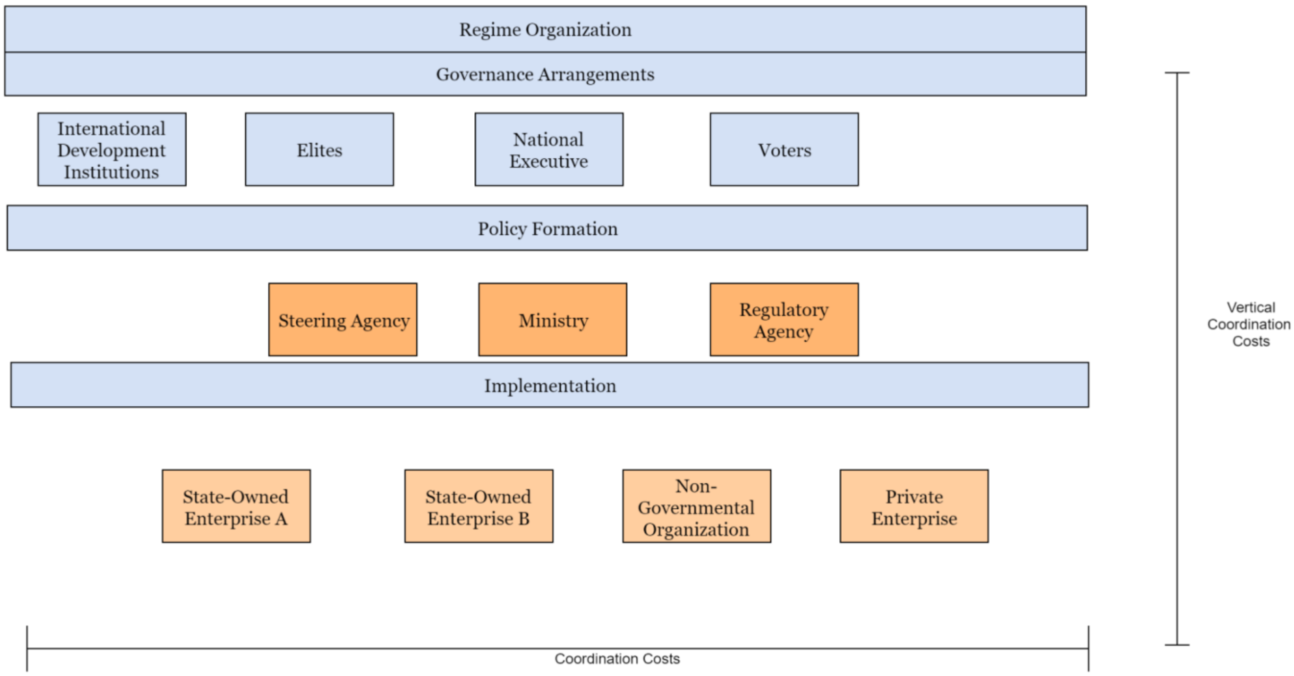

Figure 13: Power Sector Policy Regime Model, illustrated.

The Political Economy of Power Sector Policy Regimes

Policy regimes do not exist in a vacuum but are instead influenced by political-economic factors that frame their creation and influence their evolution. Thus, the coherence of incoherence of a policy regime may not emerge simply because of unforeseen technical inconsistencies between instruments. Instead, incoherence may result from interested actors influencing policy for reasons outside of and potentially adverse to the overarching policy goal for which the regime is to be integrated in order to accomplish. Such actors may come from within or outside of the policy regime.

Inside Actors: Institutions within policy regimes may support policies for ideological or self-interested reasons. For example, regulatory actors may believe that extending the application of certain rules to new classes of regulatees is consistent with their mission. They may also be supported by political constituencies that have an interest in particular forms of regulation (i.e. controlling pricing for certain segments of the population). Alternatively, regulators may lack much political power whatsoever, and thus lack incentives to pursue regulatory action in recognition that it will be rebutted, ignored, or even punished by more powerful interests in government.

State-owned enterprises may have a variety of different institutional incentives. They may believe that their charters implore them to avoid costly investments that are required for the overall policy goal. On the other hand, employees of bureaucratic institutions may feel as if their employment prospects hinge on the continuance of a particular policy, and may thus attempt to subvert reforms that would change it. More cynically, state-owned enterprises involved in electricity production may have incentives for self-enrichment that lead them to protect or expand their market advantages.

The extent to which policy sector regimes have powerful executive agents sitting atop their constituent institutions impacts the extent to which inside actors are able to drive incoherence. Additionally, the extent to which legal institutions empower regulators to act independently may also drive incoherence.

Outside Actors: Political actors may prefer a particular policy because it benefits their electoral position, even if it is counterproductive to the overarching policy goal. These political actors may leverage executive or legislative influence to control policy in ways that serve their electoral interests. Private sector business interests may find that a particular policy and/or its given implementation is profitable, even if it is a source of incoherence requiring recalibration or elimination. They may be able to enlist elements of the regime or influential outside actors such as national political executives to support their position.

Dynamic Effects

Policy regimes are dynamic, not static. Their elements change over time in response to exogenous and endogenous processes of change. Periods of continuity can produce institutional inertia leading to path-dependent qualities; that is, regimes will retain some characteristics even in the face of exogenous changes. However, exogenous changes can also result in either punctuated equilibria, which fundamentally disrupt the effectiveness of existing institutions and lead to the creation of new ones. Further, wholly endogenous processes may lead to gradual change absent any exogenous shock. For example, an institution may develop greater or lesser political or economic power over time because of the long-term effects of its behavior, leading to system change.

In order to understand dynamic effects, this work joins with recent scholars by incorporating the tools of the new institutionalism to understand dynamic effects in policy regime change. Mahoney & Thelen (2010) specify four modes of institutional change: 1) *Displacement*: the removal of existing rules and the introduction of new ones 2) *Layering*: the introduction of new rules on top of or alongside existing ones 3) *Drift*: the changed impact of existing rules due to shifts in the environment 4) *Conversion*: the changed enactment of existing rules due to their strategic redeployment. The mode of institutional change that occurs is defined by an interaction of the veto possibilities in the current political context and the characteristics of the targeted institution. While Mahoney & Thelen's language refers to "rules," these same processes easily refer to administrative institutions and provide a useful method of describing change at the *institutional* level within policy regimes. For example, we can observe how the *layering* of new rules on a given institution within a regime alter its behavior, and then trace the impacts of that behavior across other institutional elements of the regime.

Policy Regime Variation and Policy Outcomes

I focus on three regime-level variables that account for policy effectiveness in the power sector: coherence, coordination costs, and centralization.

Coherence

Perfectly coherent policy regimes are those in which institutional ideas, interests, and incentives are aligned up and down the structure of the policy regime. Coherent regimes are highly effective at implementing policy because the roles and responsibilities of actors and the policy instruments they choose are synergistic, and thus actors pursuing their own interests creates net benefits towards policy goals. Incoherent regimes are ineffective at implementing policy because their roles and policy instruments are antagonistic, and thus actors pursuing their own interests creates net losses through forms of bureaucratic competition. This can manifest in refusal to coordinate, cooperate, or share information and resources.

Coordination Costs

Policy regime coherence is inversely related to coordination costs. Coordination costs are the expenses of interest (in influence, political and monetary capital, communication and information-sharing) that institutions must incur to effectively implement policy. Highly coherent regimes have low coordination costs because policy can be implemented effectively simply by institutional actors maximizing their own interests. Incoherent regimes have high coordination costs because institutions must make sacrifices to effectively cooperate in order to implement policy.

The level of coordination costs and coherence vary along vertical and horizontal regime axes. Vertical coherence/incoherence means ideas and interests are aligned/misaligned up and down the policy regime, from the governance arrangements level to the implementation level. Low/high vertical coordination costs imply minimal/maximal costs to interests from cooperation between the three regime levels. Horizontal coherence/incoherence implies a strong alignment of ideas and interests within each regime level. Low/high horizontal coordination costs imply minimal/maximal costs to interests from cooperation between actors within each regime. Non-state actors on the second dimension of the model may operate along each level of the regime, and thus their alignment/non-alignment with the ideas and interests of each level and the extent to which each level depends on them for implementation raises or lowers the coherence and coordination costs of each level.

<u>Centralization</u>

Centralization refers to the dispersion of authority and resources across the policy regime. Highly centralized policy regimes have a narrow dispersion of authority concentrated in one or a small set of decisionmakers typically located at high levels in the national ministerial apparatus. These decisionmakers exert almost complete control over policy design, and at least in principle have a high level of oversight and control over implementation responsibilities. In decentralized policy regimes, dispersion of authority is spread widely across the regime. Such decentralization can occur in two ways; systems can decentralize authority in a federated way, with local geographic administrative units receiving a high level of autonomy over policy design and implementation. However, policy regimes may also decentralize by spreading control of different vertical responsibilities (i.e. electricity generation, transmission, and distribution) across a range of highly autonomous national-level actors. Regimes can theoretically maximize decentralization by engaging both of these forms, federating authority while cleaving apart local authority into separate, local verticals.

There are intuitive reasons to expect that vertical and horizontal decentralization will both lead to greater coordination costs and regime incoherence. The vertical or horizontal dispersion of authority implies greater need for cross-organizational coordination, and a greater possibility of the development of distinct sets of ideas and interests. In general, such increases in costs and decreases in coherence may not always be guaranteed, as there may not be much demand for coordination in the first place, and thus the costs of doing so are not particularly high. However, given the physically integrated nature of power sectors, in which geographically separated power plants supply a national transmission grid which then feeds into local distribution systems, and the parity between production and consumption of electric power must be closely monitored to avoid system losses, it is this works expectation that the demands for coordination in the power sector are high and thus decentralization will generally raise coordination costs and decrease regime coherence.

There are other elements of policy regimes beyond the physical grid infrastructure in which the decentralization of responsibility may induce coordination costs and reduce coherence. For example, the vertical dispersion of authority between purely operational organizations (state-owned utilities) charged with grid management and national ministries charged with setting policy can lead to split incentives, raised coordination costs, and reduced coherence. Ministerial policies may put pressure on SOUs to implement costly policies that affect their ability to meet operational costs. SOUs may resist implementation of such policies, raising coordination costs and incoherence.

Advocates of public sector decentralization tend to argue that it can democratize service provision and lead to greater efficiency. Decentralization may democratize service provision by bringing administration closer to local needs. In doing so it may also promote efficiency by eliminating waste on national programs that are inconsistent with local interests. A third benefit of decentralization associated with the New Public Management school is that it affords administrators greater autonomy to experiment with managerial styles that may lead to the discovery of best practices that can be shared across the public sector, and that it may also induce competition amongst administrators to do so. While there is some evidence for the first two benefits in other areas of public service provision, it is unclear whether they would manifest under conditions in which the preferences of consumers are fairly symmetric (people and businesses want cheap electric power) and in which it is difficult to afford decentralized units a high level of genuine operational autonomy given the physical constraints of grid operations. As for the third benefit, there is little evidence to suggest such positive sum competition has taken place even in the world's most advanced public sectors, and virtually none to support this phenomenon in the developing world.

Mechanisms of Policy Regime Change

Policy regimes change in response to both exogenous and endogenous inputs. In the following paragraphs, I lay out a few mechanisms that can result in regime change, and I describe how these changes relate to coordination costs and coherence.

Exogenous Shocks: Exogenous shocks are swift changes in macroeconomic, geopolitical, or environmental conditions that change the meaning and impact of institutions within a policy regime. The impacts of such shocks on policy regimes can be sorted into two categories: resource changes, and ideational changes.

Resource Changes: Exogenous shocks such as global spikes in energy prices may place strain on national power sectors that render it impossible for certain institutions to continue functioning as intended (i.e. generation sectors dependent on imports may no longer be able to purchase adequate supply). Other examples include the end of the Cold War, which slowly brought to an end many conflicts that had made it difficult for institutions to function effectively, but also previously served as a justification for strategic financial support from Western countries that subsequently halted. Finally global macroeconomic shocks that constrained export consumption often dried up government revenues, resulting in diminished resources for state-owned institutions within the power sector. To the extent that regime actors are codependent upon one another for resource flows, swift changes in resource availability can lead to increased coordination costs and reduced coherence as institutions struggle to move towards shared policy goals without being able to rely on traditional sources of material support. In order to continue to perform their function, actors may turn to new sources of material support that alter their incentives and principals.

Ideational Changes: Exogenous shocks may also result in powerful effects on the ideas of certain actors and institutions about appropriate behavior, leading to redefinitions of interest that may not be shared across the regime. This can also result in incoherence, as incumbent actors continue to function based on incumbent ideas and interests while actors with reconstituted ideas and interests attempt to forge new pathways forward. For example, the oil shocks of the 1970s contributed, in part, to a fundamental change in the way development institutions and Western government thought about macroeconomics. The emergence of the Washington Consensus resulted in key ideational changes amongst development institutions that traditionally played a fundamental financial role in infrastructure growth in Sub-Saharan Africa. This subsequently resulted in scarcer resource availability for African leaders in the 1980s, as well as pressure to restructure public sectors (including power sectors) to conform to changing global norms.

Policy Feedbacks: Policy Feedback effects occur when a policy leads to the creation of some interest-coalition that either reinforces (positive feedback) or detracts from (negative feedback) its durability. This generally happens because a policy results in the distribution of some gain or loss to a given group of actors sufficient to prime mobilization in favor/against it. The power sector is ripe with policies that shift gains and losses amongst interested actors; electricity subsidies provide a valuable benefit to public and/or private consumers who may lobby to protect or grow their provision. Renewable energy subsidies may induce losses amongst hydrocarbon generation suppliers, motivating powerful opposition coalitions (but may also provide sufficient benefits to form powerful RE coalitions).

After policies yield gains or losses to groups of actors and create support or opposition coalitions, they will mobilize to advance, protect, or eliminate the given policy. Depending on the actor's strength, they may be able to force a change in the policy, altering the policy regime. The changes in the distribution of gains/losses from a feedback effect may contribute to heightened coordination costs and reduced coherence between actors within the regime, reducing policy effectiveness.

A Regional History of Power Sector Development and Policy Regimes

In this section I review three eras of regional power sector governance in sub-Saharan Africa: developmentalism, liberalization, and sustainable development. I discuss the ideas and interests behind each era of governance, and how external reformatory pressures and new institutions interacted with incumbent regime structures. I focus the review around the following questions: did power sectors more successfully fulfill their objectives under highly centralized, state-led, policy regimes, or under more decentralized, market-oriented varieties? How did each era of reform interact with incumbent policy regimes, ideationally and materially? As the dispersion of authority expanded, did different actors in the power sector retain shared understandings about goals, or did they diverge? Finally, did the liberalization of power sectors accelerate sustainable development, or hinder it? The descriptive portion of the review is intended to provide a detailed portrait of the transition of the region's policy regimes from their post-colonial structure to their modern, hybrid variant. I then evaluate the effects of different reform agendas empirically through a regional dataset encompassing new panel data on regulatory interventions and sector outcomes. This section is followed by case-level analyses of a number of countries that provide a clearer, unit level picture of some of the causal processes by which policy regimes changed (exogenous shocks and policy feedbacks).

Developmental Governance 1960-1990

Background

By the time decolonization began in the 1960s, most countries in the developed world had already achieved universal electricity access, an infrastructural development that laid the basis for robust consumer economies driven by technological innovation and dynamic manufacturing industries. The patterns of economic activity and high quality of life associated with this level of electricity access became synonymous with prevailing conceptions of modernity, and set the template for what the nations of the developing world might aspire to. And while the social, economic, and industrial gains of expanding electricity access spoke for themselves, they fit into a larger paradigm of development that took hold among prominent academics and political figures in the independence era known as "Modernization Theory."

A reasonable starting place for situating the power sector's role in modernization theory is W.W. Rostow's classic work "The Stages of Economic Growth." (1960). Rostow argued that economic development occurred over five stages: "the traditional society, the preconditions for take-off, the take-off, the drive to maturity, and the age of high mass-consumption." Rostow considered most African countries to be in a "transitional period," emerging from the traditional period and establishing the preconditions for economic take-off towards maturity, during which new industries would expand rapidly and yield profit margins sufficient for reinvestment and further expansion. In an article in *Africa Today*, Rostow maps our four pre-conditions for African states' take-off that he viewed as essential policy priorities for the 1960s: 1) increases in skill and education of the labor force, 2) growth in agricultural productivity, 3) the construction of overhead capital to bind its sources of production and consumption through efficient communications and transportation, and 4) foreign trade. Rostow explicitly places energy as an essential component of overhead capital: “ Aside from transport, social, and overhead capital includes another essential foundation for industrialization: the development of new sources of power. Industry requires not merely cheap transport for its raw materials and its products, but increased energy. A high proportion of investment in Africa in the 1960s will have to create these sources of energy. And Africa contains, as we all know, some exceedingly promising natural resources in this respect.” (1960; 7).

A central theoretical aspect of modernization theory was the “big push model,” originally articulated by Paul Rosenstein-Rodan (1943). The big push model argued that underdeveloped countries require large investments in infrastructure and industrialization to transcend a low-level equilibrium in which individuals had no effective inducements to invest. This absence of inducements results from of a lack of confidence in both the ability to access markets for potential products and for the other economic conditions to be in place to make those products desirable; Bhagwati’s interpretation of this problem is illustrative; “ the entrepreneur investing in shoes was not sure about selling the shoes unless others invested simultaneously in textiles etc. This dilemma would, of course, disappear if the country faced constant terms of trade at which these entrepreneurs could atomistically sell what they wished.” (Bhagwati 1985, p.299).

While modernization economists generally shared the view that some sort of major investment was necessary to kick-start the maturation of African economies, there was disagreement about whether such investment could properly fix the problem posed by Rosenstein-Rodan, which required the simultaneous establishment of multiple related industries in order to induce investment. Hirschman, in particular, argued that such “balanced growth” was unlikely to occur in African countries in the short-term because they lacked sufficient endowments of capital, skills, and resources to establish multiple modern economic sectors at the same time. Instead, Hirschman’s strategy for economic development was sequential investment in one venture after another, each correcting for the imbalances of the previous investment and ultimately producing a long-term balanced growth outcome (Hirschman 1958).

Modernization theory is distinct from most academic ideas in that it was swiftly translated from thought to action. This was due in no small part to Rostow himself holding positions in both the Kennedy and Johnson administrations, which were the political pilots of putting modernization theory into practice throughout the developing world (Latham 2000). However, as notable modernization economist W. Arthur Lewis noted, “international economic aid is supported by different people and for many different reasons,” (1965, 3) and its manifestation in American foreign policy reflected both the ambitions for human development of its foundational thinkers and a commitment, on the part of many of the intellectuals themselves and those in government, to use development aid to counter Soviet-influence in the developing world. On the receiving end, the African leaders ascending to power in the wake of decolonization had their own motivations to leverage this support in favor of projecting power and progress in their new nations (Bates 1981). In the sections that follow, I lay out some of the main ideas of the developmental period as they applied to the power sector, and discuss how they were manifested in policies and initiatives

Ideas

Industrialization

The expansion of electricity generation for industrialization was the defining goal of the developmental program, reflecting both its central place in modernization thinkers' view of development and African leaders desire to financially reward the electorate and cement elite coalitions (Bates 1981) The modal baseline of Sub-Saharan African power sectors at independence was characterized by limited generation infrastructure organized around colonial economic projects and supplying a minimal amount of consumer electricity to urban centers of colonial administration. Often in partnership with the IBRD and European and American industrial firms, developmental era regimes focused on large-scale state-led investments in generation, transmission, and distribution capacity that would service expansions of existing generation and industrial centers, as well as support further industrial efforts undertaken by state-owned and private firms[2].

While reliable data on electricity access levels are not available for this period, detailed data on total installed capacity (TIC), or the total electricity generation capability of national electricity systems, is available from 1960 in UN Statistical Yearbooks. I compiled the yearbook data into a panel dataset, and calculated year-over-year growth rates (%) from 1960 to 2015. These data are presented in Figure 14 below. SSA electricity sectors experienced robust growth as large scale state-financed projects greatly expanded generation capacity. Details of these projects for a sub-sample of countries are provided in Table III. The majority of this capacity growth was concentrated in hydroelectric projects, which were the modal form of generation projects and, by virtue of their design characteristics, required high volumes of capital.

[2] This assessment is based on an exhaustive review of International Bank for Reconstruction and Development reports; see bibliography.

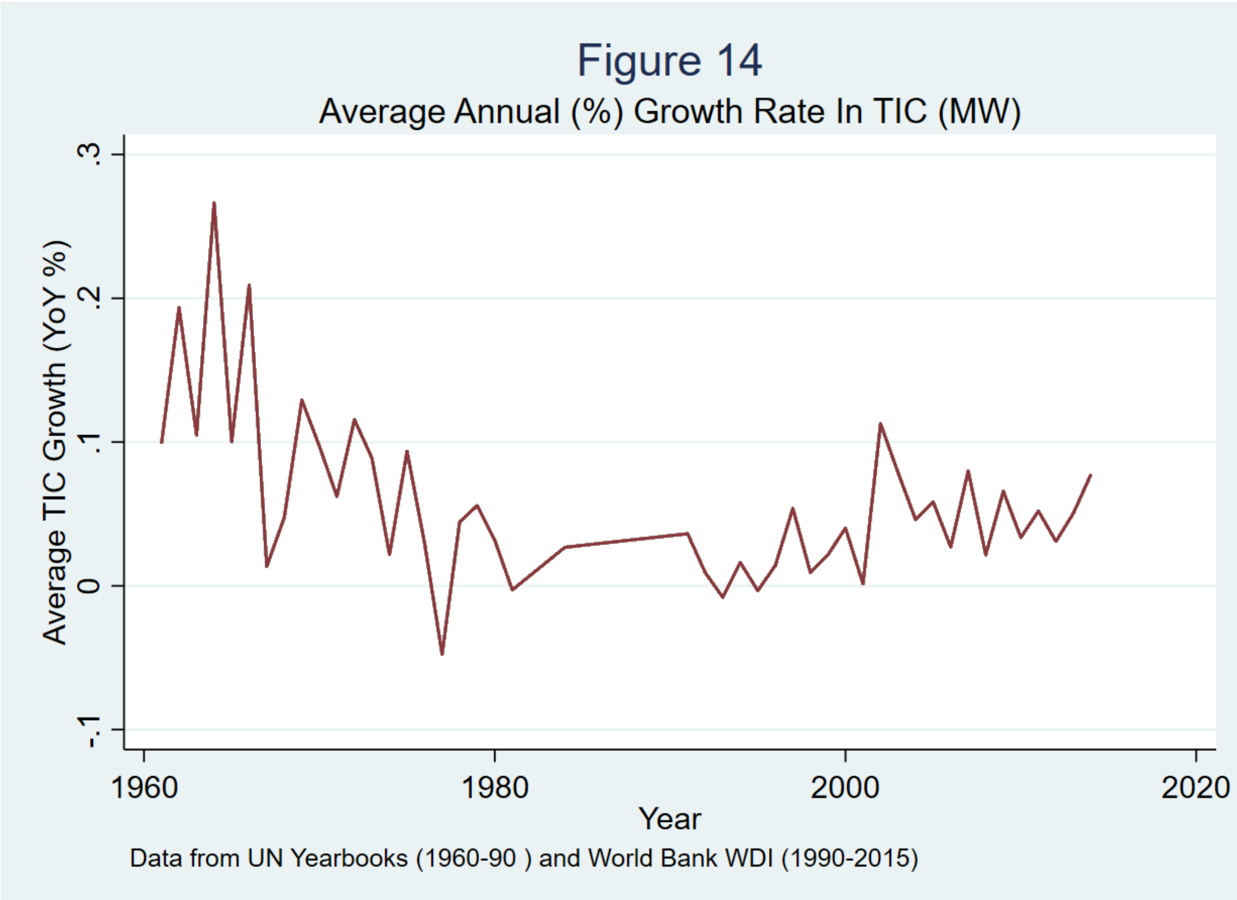

Figure 14: Total Installed Capacity of Power Plants. Compiled by the Author based on UN Statistical Yearbooks.

The first priority of electricity access expansion was to service industrial growth. As I detail in the following section on policy instruments, industrial growth and electricity generation were planned in an integrated fashion. Planned economic activities (state or private) served as a justification and a guaranteed source of cost-recovery for generation projects, which alleviated IBRD concerns about loan repayment. Generation capacity was, however, generally in excess of expected consumption from planned industrial activities, and the balance was channeled into urban public and small-scale commercial access which was subsidized through subeconomic tariff rates. In cases such as Ghana, this early investment provided a reservoir of generation capacity that would later enable significant expansions of public electricity access.

African Anticolonial Nationalism

There were some significant differences amongst the ideological orientations of the African leaders who assumed power following independence, although these differences were set upon a common base of anticolonial nationalism which had presented liberation leaders with organizational advantages that made decolonization politically possible (Young 2012). While it cannot be said that all African liberation movements were multi-ethnic or politically pluralistic, they succeeded in part by subjugating what would later become important tensions to the proximate goal of ridding the countries of colonial control. This common basis in a political unity rooted in anticolonial nationalism resulted in some core similarities in political organization and public commitments across Sub-Saharan Africa. Organizationally, liberation movements were centered around the party-state; single political parties whose leadership in achieving independence had earned them at least temporary widespread public approval and control over the halls of power at the moment of independence. Ideologically, they shared a commitment to the negative claim of anticolonialism and the positive claim that they would provide abundance to their people. In part owing to the strong, centralized bureaucratic authority of the colonial state structures these party-states inherited, there was also a common tendency towards economic statism (Young 2012).

Atop this common core of anti-colonial nationalism, there were a number of important ideological strains that characterized different regimes in the post-colonial period. Rather than conduct an exhaustive review (which has been done many times in many different ways), this section focuses on the major distinction between regimes that emphasized African Socialism and those which did not explicitly claim a socialist ideology. The importance of this distinction becomes clear when one observes the distinct social electrification trajectories of countries such as Ghana and Tanzania as opposed to Kenya.

African Socialism

Most notably articulated in the writings of Western-educated political leaders such as Julius Nyerere of Tanzania, Kwame Nkrumah of Ghana, and Leopold Senghor of Senegal, African socialism emphasized a return to customary African values of communitarianism, and a call for rapid, broad-based economic development. At least in the beginning, African socialism was at once influenced by and distinct from European socialism as it was practiced in the Soviet Union. On the one hand, African leaders drew inspiration from the Soviet Union's ambitious, centrally planned economic development projects, which as of the early 1960s had not yet been widely discredited and offered a road map for how the countries might put their great natural resource wealth to use for the public benefit. On the other hand, African socialism was distinguished from European socialism by its rejection of the Marxist dialectic's emphasis on class relations. African socialism argued that African societies need not inherit that labor-capital disputes that were themselves a product of historical European capitalism. Instead, African socialism saw European class distinctions as fundamentally irreconcilable with traditional African social organization, which conceived of all citizens as workers and rejected capitalism as the "parasitic exploitation" of one worker by another (Young 2012, 160; Nyerere 1977)

On a purely political level, socialism became a general rallying cry amongst some African nationalist leaders and activists to reject colonial exploitation, embrace economic independence, and frame post-colonial governments as in service of the African people. If for no other reason, this was important in that it imbued in African publics a widespread expectation that governments would provide for basic needs such as health, education, and general welfare (Gore et al 2019).

African socialism's bid to make good on its dual promises of public service delivery and broad abundance from democratic control over natural resources often took shape in the proliferation of state-owned entities. In the 1960s, SSA bureaucracies grew 7% per annum, and by 1970 nearly two-thirds of wage-earners were in the public sector. Up to 80% of total government operating budgets were allocated to public employee salaries (Young 2012, 133). At the core of this program were large hydroelectric projects, which were highlighted as evidence of the government's efforts to bring wealth and modernity to their constituents. In remarks promoting the construction of the Volta Dam project, Nkrumah remarked that "major projects such as the Volta are the new 'places of Pilgrimage' in this modern Age of Science and Technology. They serve as monuments to the determination and dedication of a whole people to raise themselves to a fuller and richer life." (Miescher 2014). In Nyerere's 1967 Arusha Declaration in which he laid out his socialist TANU's party's platform, he argued that "to Build and maintain socialism it is essential that all the major means of production and exchange in the nation are controlled and owned by the peasants through the machinery of their Government and their co-operatives….The major means of production and exchange are such things as: land; forests; minerals; water; oil and electricity…" (Nyerere 1977).

African Socialism provided a politically powerful ideology that served as the domestic justification for early large-scale state investment in electricity generation. The "five-year plans" of African Socialist-led governments that endeavored to bring industrialization and modernity to African states ultimately fell short under the mounting pressures of rising external debt stocks, declining prices for key commodity exports, and a dysfunctional economic system based on the reappropriation of agricultural revenues to industrialization projects that lacked sufficient support in human capital (Bates 2005). However, the ideology succeeded in providing both a vision of the infrastructural projects state-led investment could accomplish, and a widespread expectation that governments would supply electricity to the general public (Gore 2019).

Interest-Actors

National Political Leaders

At the moment of independence, African leaders faced strong pressures to enhance public services, assert territorial control, and secure political monopolies that would cement their position in power (Young 2012). All three imperatives required revenue, which African governments tended to raise through the manipulation of colonial economic institutions. African economies were centered around agricultural exports, the prices for which were set by national marketing boards. A common revenue-raising strategy was to set the national purchase price below that of global markets, buy the agricultural products at this fixed price, export them at global prices, and pocket the difference as an export duty. These revenues could then be repurposed for large-scale industrial projects such as hydroelectric power plants and steel mills that brought wealth to urban centers, public education and health initiatives, and military spending (Bates 2005).

Expansion of the power sector in the post-independence and developmental period can be seen as largely in line with other expansions of the post-colonial state in that it afforded opportunities for the extension of patronage to crucial elite constituencies (Young 2012; Bates 2005). Indeed, there is evidence that in the Ghanaian and Kenyan power sectors, key management and ministerial positions responsible for sector governance were distributed consistent with political and/or kinship-based priorities.

Finally, as Miescher (2014) notes, large infrastructural accomplishments served as proof of African governmments' commitment to bring wealth and modernity to their people. Large hydroelectric dams served as monuments to the progress of post-colonial governments, and African leaders believed such projects would help build broad public support and legitimacy.

Elites

In the post-colonial period elections are largely understood to have been symbolic, as liberation era party-states tended to dominate politics to the exclusion of credible opposition parties. Instead, the maintenance of power rested on forming coalitions of ethnic, customary, and geographic patrons that could deliver broad public support. Elites, or leaders of politically relevant societal segments, generally sought material benefits in exchange for support. These benefits consisted of land tenures, direct payments of goods, and the distribution of well-remunerated state jobs. The distribution of jobs not only conferred material benefits but helped give different ethnic groups a foothold in the rising urban professional classes forming in the two decades following independence. For local elites, jobs in the power sector, as well as associated industries (in the factories established to consume electricity), were highly sought after commodities.

International Development Institutions

The leading international development institutions in the postcolonial power sector regimes were the World Bank, USAID, UNDP, and European aid agencies. Development agencies generally had three goals: support the growth of primary commodity exports (cocoa, grain, ore, oil, etc) that could support the rapidly growing consumer demands of the post-war economies of the Western world, create markets for the export of Western secondary goods and technical services (the power sector projects of the period feature heavy involvement of European and American engineering and technology firms), and to secure diplomatic alliances against the growing Soviet bloc.

Development aid to power sectors could bolster productivity in commodity exports by supporting automatization in agriculture and mining activities. While there is substantial evidence to suggest that much of the generation capacity produced by state investments in large hydroelectric dams dramatically outstripped demand for productive use, it has been argued that the period's dominant frames of macroeconomic analysis held a strong bias towards infrastructure development indicators such as electricity production (van der Straten 2021). Thus whether or not such investments were an effective part of a larger economic strategy, they clearly functioned into development institutions' own assessments of how best to promote the economic interests of their donor countries. Further, such projects often created export opportunities for the services of American and European engineering and manufacturing firms.

To the extent that power sector investments were inefficient, the more pressing imperative of closing off the possibility of diplomatic and economic ties between African countries and the Soviet Union seemed to offset any associated misgivings. Given the political importance of power sector growth to national political leaders, international development institutions perceived great geopolitical value in supporting highly visible hydroelectric dam projects.

Regime Structure

A thorough review of IBRD, IMF, and Government documents focused on power sector projects in Sub-Saharan Africa provides us with a general understanding of the structure of power sector policy regimes of the developmental period. A compendium of countries and their various power sector institutions as well as major infrastructure projects, costs, and completion times is provided in Table 3. An outline of the modal organizational structure and set of institutions is provided in Figure 15.

<u>Strong Government Ministries</u>**:** Power Sector Regimes were governed from the top-down by a ministerial apparatus that functioned as policy directorate and sector regulator. These

institutions typically maintained control over one to four electricity companies through a controlling or complete equity interest.

Geographically Segmented State-Owned Enterprises: The portfolios of electricity companies were generally divided geographically rather than operationally; one firm would provide generation, transmission, and distribution services to the main urban load center (the state and commercial capital cities), another might see to the periphery, and one would oversee the development and transmission from major generation centers (river basins, thermal plants). Thus all firms generally had some degree of vertical-integration, although this portfolio was typically weighted towards one operational concern based on its geographic jurisdiction (i.e. firms charged with the administration of river basins tended to focus most efforts on generation, with some limited focus on distribution to service the other companies' demands for electricity).

Commercialized State-Owned Enterprises: SOEs were never privatized in the developmental period, however, they were formally "commercialized." This meant that, at the beginning of the developmental period, ministry divisions responsible for electric power were restructured as corporations with boards of directors, management teams with designations such as C.E.O., and corporate accounting systems.

Dense Management Network: State-owned enterprises had separate management teams, but it was common for the largest and oldest firm to supply staffing and management to the smaller firms. Board seats were occupied by executives from the other firms, members of the public (often from the commercial community in energy-intensive industries), and ministerial representatives.

Limited Private Sector Participation: Private sector activity was typically limited to non-existent. Minimal private sector participation occurred in the generation subsector at the sites of private industrial concerns. There was no private sector participation in the transmission and distribution subsectors.

Table IV: Power Sector Policy Regimes and Projects of the Developmental Period

Country	Policy Directorate	Sector Regulator	Institutions for Control of Electricity Generation, Transmission, and Distribution	Major Generation Projects- (MW/Cost/Completion Time)
Ghana	Ministry of Works and Housing	Ministry of Works and Housing	Government Electricity Department*, Electricity Company of Ghana (G), Volta River Authority (G)	Volta River Project I (Akosombo Dam) (588MW/ $190 mill/ 1961-65 (4)), Volta River Project II (Akosombo Expansion) (294 MW/ $21 mill/ 1969-72 (3)), Kpong Dam Hydroelectric Project (160 MW/ $250 mill/ 1976-1981)[3]
Kenya	Ministry of Power and Communications	Ministry of Power and Communications	East African Power and Lighting Company Ltd. (P/G), Kenya Power Company (P/G), Tana River Development Company Limited. (P/G)	Kamburu Hydroelectric Project (60 MW/ 40.8 million USD/ 3 years (1971-74)), Gitaru Hydroelectric Project (67 MW/ $123 million/ 1975-1978 (3))), Olkaria I Geothermal Power

[3] IBRD 1968, 1969, 1977A, B. (Ghana)

				Project (30 MW/$76.5 million/ Unit 1(1979-1982(3))[4]
Nigeria	National Electric Power Authority	National Electric Power Authority	Electricity Company of Nigeria (G), Niger Dams Authority (G), National Electric Power Authority(G)*[5]	

Country	Policy Directorate	Sector Regulator	Electricity Generation, Transmission, and Distribution	Major Generation Projects- (MW/Cost/Completion Time)
Uganda	Ministry of Commerce and Industry	Ministry of Commerce and Industry	Uganda Electricity Board[6]	
DRC	Ministry of Energy,	Ministry of	Gecamines (G), Regideso	Inga Hydro-Electric Power Project

[4] IBRD 1975, 1976, 1990 (Kenya)
[5] IBRD 1962, 1972 (Nigeria)
[6] IBRD 1964, 1967 (Uganda)

(Zaire)	National Energy Commission	Energy, Ministry of Portfolio, Department of Economy and Industry	(G), Societe Nationale d'Electricite (G)	(350 MW/$92.6 million/1968-72(4))
Rwanda	Ministry of Public Works and Energy	Ministry of Public Works and Energy	Electrogaz (G)	Ruzizi I, II hydrostations[7]
Cameroon	Ministry of Energy	Ministry of Energy	ENELCAM (G), EDC (G), POWERCAM (G), Societe National d'Electricite (G)*[8]	
Senegal	Ministry of Industrial Development and Craftmanship, Ministry of	Ministry of Industrial Development and	Electricite et Eaux de l'Ouest Africain (P/G), Electricite du Senegal (EDC) (G), Societe	

[7] IBRD 1984, Rwanda
[8] Pierre-Olivier 2002

	Equipment, Ministry of Rural Development, Ministry of Scientific and Technical Research	Craftmanship	Sengaise de distribution d'Energie Electrique (SENELEC) (G)[9]	

[9] IBRD 1973, 1980 (Senegal)

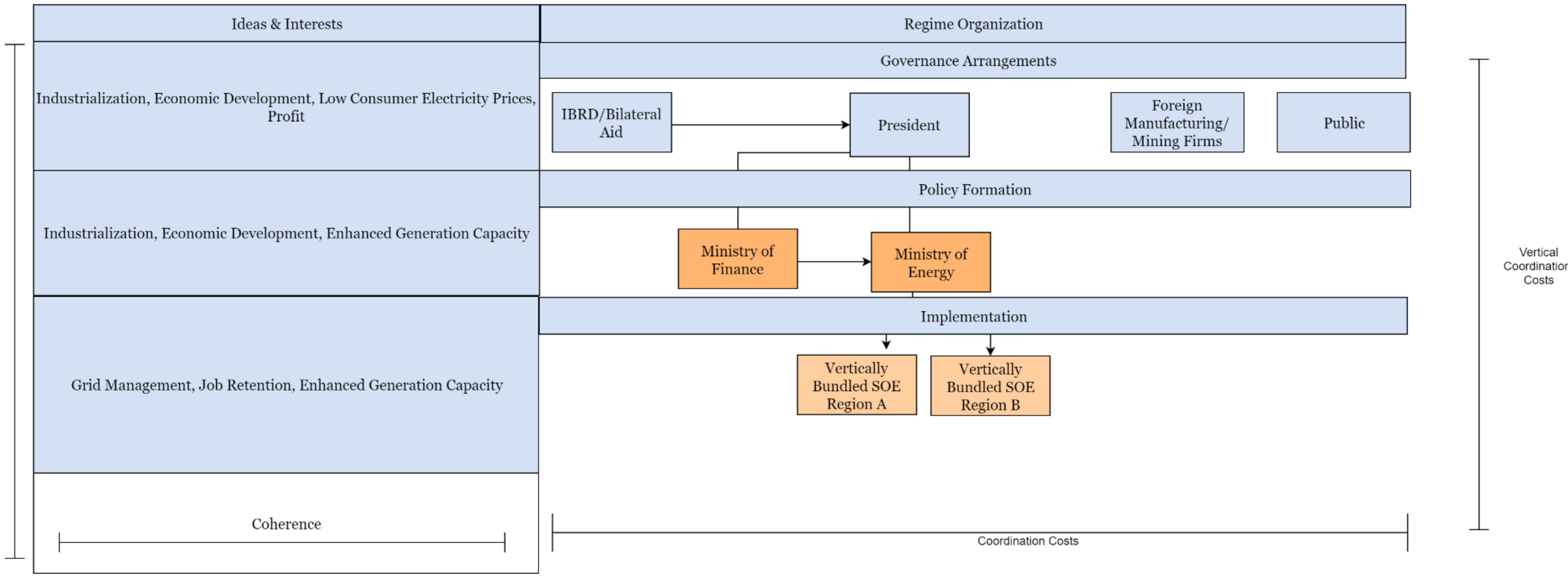

Figure 15: The Modal Developmental Power Sector Policy Regime

Policy Instruments

State-Led Direct Investment: The preferred and exclusive policy instrument for power project finance was state-led direct investment. The state, via the relevant ministry or SOE, would identify and commission projects to expand generation, transmission, and distribution capabilities. State appropriations were generally supported and/or underwritten by a combination of World Bank and bilateral loan agreements and credits. Domestic financing tended to be based on revenues from primary commodity exports, which were appropriated through agricultural marketing boards inherited from the colonial era. The marketing boards would set the domestic purchase price at which they would buy products from local farmers, and then sell the products for profit on global markets (Bates 2005).

Demand-Side Contracting: A significant amount of energy intensive economic activity that is expected to continue well into the future is generally required before a large-scale generation facility can be justified. This was especially true in the developmental period, when residential electricity use was not at all common and thus not a significant source of demand. Thus, rather than wait for the right sort of demand to emerge organically, the state would establish a source of demand by arranging a long-term contract for consumption through either a state-owned entity or private corporation that would consume a level of electricity proportionate to the planned capacity of the generation facility. This planned consumption represented some significant source of economic activity and growth supplying employment and income to local populations. The fact that such expected consumption rates were built into contracts at planning stages encouraged non-state financing partners (such as the World Bank and bilateral lender nations) of the electricity projects' economic feasibility (see World Bank assessment reports on the Akosombo Dam, the Seven Forks hydroelectric project, and the Inga Dam project, for example).

Industrialization-Centered Grid Expansion: In concert with demand-side contracting, early stage grid-expansion was centered around industrial planning. However, where transmission lines designed to serve industrial and commercial centers fell upon or near population centers, distribution lines were often constructed to supply electricity to local commercial and residential consumers. Later into the development period, as grids became denser from early industrialization efforts and resources permitted, grid-planning became more focused on expanding out from major population centers regardless of existing demand.

Subsidy Via Loss Generation: Few if any electricity SOEs were profitable, primarily because of subeconomic tariffs. Tariffs were increased in fits and starts at the urging of the World Bank, but generally lagged behind costs over time. Long-term contracts from demand-side planning locked in a certain amount of revenue along fixed tariff rates, the profitability of which depended on the variable cost of electricity production relative to the agreed upon rate. On top of these long-term contracts, however, SOEs tended to incur arrears from government and residential customers, despite offering already subeconomic rates to the latter. Rather than a dysfunction, this appears to be more of a consciously selected policy choice on the part of the ministerial apparatus, which retained veto power over SOE decisions on tariff-setting (this power would be delegated to nominally independent regulatory institutions in the subsequent era of reform). The incursion of losses on SOE's corporate balance sheets essentially represented a government expenditure on electricity subsidies.

Evaluation & Discussion

A review of the empirical evidence suggests the power sector policy regimes of the developmental era were highly effective at rapidly expanding generation capacity and supplying burgeoning industrial efforts with electric power (see Figure 14). While they did not substantially advance social electrification (as evidenced by the generally low rate of electrification at the beginning of systematic measurement in 1990, see figure 3), the provision of electric power supported the growth of state-owned enterprises that employed large numbers of Africans and constituted a new rising class of urban civil servants and public entrepreneurs. Further, the establishment of baseloads of generation that generally outstripped domestic levels of consumption actually provided a basis for subsequent expansions in social electrification in places such as Ghana, Kenya, and South Africa (see the introduction on the relationship between TIC and universal electrification trajectories).

What stands out about power sector growth in this period is the scale of projects and the rapid and efficient rate of completion. Most projects in the earlier years of the developmental period were completed in a period of three to four years (see Table III). World Bank project audits generally considered these projects to be timely and on-budget, with limited cost overruns from corruption, strikes, or poor planning.[10]

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[10] (Ghana- World Bank 1977A, "All projects were completed satisfactorily,"(i), Kenya- World Bank 1976- "This has been a straightforward project with no serious problems arising during construction and during subsequent operation. The delays are no more than normally experienced in a construction program of this nature." (A.9), DRC (Zaire)- World Bank 1986, "Project implementation has been satisfactory despite difficulties resulting front he country's inadequate manpower and management capability." (7), Uganda - World Bank- 1985, "UEB has remained a relatively effective institution when compared with other Ugandan parastatals which experienced the same period of particularly difficult problems… It has successfully maintained the power supply without adequate resources and have become accustomed to performing a limited program under close supervision of top management." (18),

The centralized, dense nature that characterized developmental policy regimes appears to have provided for relatively low coordination costs and a high level of coherence across relevant institutions. At the governance arrangements level, a commitment to rapid industrial growth shared by the IBRD and the heads of state meant that there was substantial financial support for large-scale projects. The party-state systems that characterized most SSA governments of the period resulted in a high level of continuity in leadership across the executive branch and on down through the management appointees of the major state-owned enterprises, allowing executives to expand the state under fairly unitary visions. While the monopolistic and exclusionary nature of party-states was met with a wave of military coups early in the developmental period, by the late 1960s many regimes had settled into power and the region entered what Crawford Young refers to as the “third phase” of the postcolonial state: the era of state expansion (2012). Notably, even when coups occurred they did not necessarily disrupt power sector policy regimes’ progress towards major infrastructure projects. For example, the initial construction of Ghana’s Volta River Dam occurred from 1961-1965, prior to the deposition of the Nkrumah government in 1966. The subsequent expansion of the dam began just three years later in 1969 and was completed in 1972 under terms that were considered on-time and within budget by the IBRD. The military governments that followed these coups tended to exert greater stability than the regimes that preceded them, and in many cases presided over substantial infrastructure development. For example, the early years of the Mobutu government in the Congo (Zaire) oversaw the establishment of the 350 MW Inga Dam hydroelectric project in the Congo River Basin and the Inga-Katango transmission line, projects that were completed in four years (1968-72) and within planned budgets (DRC- World Bank- 1986).

By contrast, regimes that lacked dense networks and coordinating authorities were associated with poor performance, according to World Bank audits in this period. Consider the following excerpt from an assessment of an IDA credit to Senegal:

“Several Government departments are assuming responsibilities in the energy sector: the Ministry of Industrial Development and Craftsmanship (MIDC) is responsible for hydrocarbon energy resources, the Ministry of Equipment for hydropower resources, the Ministry of Rural Development for timber/forests resources and the Ministry of Scientific and Technical Research for renewable energy resources (solar, wind). The Government has created a National Energy Commission to coordinate sector activities but, largely because of the difficulties of gathering its large membership, this Commission has not properly functioned. In order to help the Government formulate coordinated and coherent national energy policies, the project would finance two energy advisers to MIIDC, whose principal duties would be to help (i) prepare proposals for the overall organization and coordination of the energy sector, and (ii) formulate a comprehensive national energy plan.” (p.10) “The most pressing issue affecting the power sector, which is under the responsibility of MIDC, is the need to restructure the present transitional arrangements which expire December 31, 1981. This restructuring would be studied under the project in order to make possible the creation of a single national entity responsible for the development and operation of the power sector.” (p.10).
1980. “Report and Recommendation of the Pres. of the IDA to the Exec Dir. on A Proposed Development Credit to the Republic of Senegal for a Power Engineering and Technical Assistance Project” April 28, 1980 https://documents1.worldbank.org/curated/en/489341468104948874/pdf/multi-page.pdf

A similar example can be found in an assessment of Nigeria’s Fourth Power Sector Plan:

“ the existence of two statutory agencies with overlapping duties and functions created problems resulting in power failures, duplication of assets, administrative bottlenecks and delays in grid system extension….To correct the situation and ensure proper coordination of policies in the power sector the Government decided in 1969 that ECN and NDA should be merged.” (p.9)
1962. “Nigerian National Development Plan 1962-1968” December 31, 1962 https://documents1.worldbank.org/curated/en/136901468084231919/pdf/multi0page.pdf

Positive Policy Feedback Effect

Policy regimes that successfully completed large projects on time and within budgets tended to exhibit a policy feedback effect whereby the successful completion of a project would lead the personnel of international development institutions to reflect positively on these experiences, and be more likely to support additional power projects. Quotes in IBRD assessments consistently cite the success of past projects as a compelling reason to move forward with future ones, and often brush off lingering fiscal concerns such as arrears and subcommerical tariffs as small problems that SOEs seem sufficiently dedicated to solving in the medium to longer term.

Consider, for example, the progression of power sector projects during Kenya's development period, as documented by a series of World Bank evaluations, assessments, and audits. Upon independence in 1963, the Kenyan government inherited limited power sector assets, and relied heavily upon the import of power from the neighboring Uganda Electricity Board's (UEB) hydroelectric power station at Owen Falls. Consistent with Young's characterization of postcolonial African leader's imperatives to assert territorial control and independence in the developmental period, the government sought to expand indigenous sources of electric power through a set of investments in generation assets on the Tana River known as the Seven Forks Hydroelectric Project. However, the IBRD's analysts were skeptical of the project's economic value in light of the limited levels of electricity consumption, and believed the Kenyan government should continue to meet expansions in demand through negotiated increases with the UEB, stating, "we cannot see the justification for proceeding with the Seven Forks scheme at this stage and consider that it should be possible for both electricity undertakings to negotiate an increase in the supply of power to Kenya from Owen Falls to their joint advantage," (IBRD 1963, 179).

Not only did the Kenyan government disregard the Bank's reservations by continuing forward with the first stage of the Seven Forks project, but put forth an ambitious agenda for the expansion of electrification over the ensuing decade. After completion of the first stage of the Seven Forks project at Kindaruma, the government sought support for an additional station at Kamburu. According to an audit of the second project along the Tana River,the Kamburu Hydroelectric Power Project (consisting of two 30 MW generators), the Bank's analysts concluded that "teething troubles have been minor the overall standard of workmanship was excellent." The project was completed in three years (1971-74), and the audit concluded that "this has been a straightforward project with no serious problems arising during construction and during subsequent operation, (World Bank 1976, A.9). Following this success, the government subsequently sought financing from the Bank for yet another project, the Gitaru Hydroelectric Project. In their appraisal of the financing request, the Bank's analysts reflected positively on the Kamburu project; "construction of this project proceeded satisfactorily," (World Bank 1975, i) and viewed the prospects of the project favorably, providing financial support.

Given the IBRD's reservations about the Tana River hydroelectric expansion in 1963, it is notable that the government's initial success appears to have led to a change in the Bank's perspective on the nature of future projects. This seems to reflect both the Bank's updated views about national prospects for project management, but also a growing confidence in the personnel of both the Kenyan energy ministry and the partially state-owned power company East Africa Power & Lighting (EAPL), which are frequently referred to throughout the reports as having demonstrated sound management practices and strong organizational skills(Kenya-World Bank 1967,10;World Bank 1971; ii). This confidence and set of organizational and interorganizational relationships was the environment in which Kenya's exploratory investments in renewable geothermal energy began, and set the stage for the nation's leadership in renewable generation, a process which is documented in detail in the case study later in this work.

For all of the expediency in construction and implementation, low coordination costs and high levels of cross-institutional coherence, and the positive feedback loops, there were fundamental problems with the economic model that underpinned power sector growth in this period. First, the revenue model upon which state financing both for electric power SOEs and other industrial efforts was based was highly exploitative and vulnerable to macroeconomic shocks. As described by Bates (2005), the primary source of government revenues in the post-colonial period were the agricultural marketing boards. The state set domestic prices for primary commodity exports below their global market value and pocketed the difference. Revenues from this arrangement rested on farmers accepting low pricing and global commodity prices remaining high. These revenues were repurposed for a variety of state-owned enterprises not limited to the power sector. In many cases, they propped up otherwise unprofitable and unproductive enterprises in economic areas in which the country lacked any comparative advantage (Bates 2005). These investments, in particular the substantial costs of government salaries and pensions, were in many cases substantial financial liabilities rather than assets.

While power sector investment produced a valuable infrastructural asset, generation capacity generally outstripped consumption. Further, many of the manufacturing industries developed to provide demand for electricity production were uneconomic. As global commodity prices sank in the 1970s, the entire economic system of postcolonial economies began to unravel. While power sectors were hardly to blame for the tenuous structural foundation of the postcolonial economic model, they were indeed catalysts for its growth, and were also casualties of its precipitous decline.

As indicated by figure 14, the period from the late 1970s through the 1980s is marked by stagnant generation capacity across the region, as state revenues dried up and the costs of external debt service placed increasing pressure on national treasuries. Further compounding the scarcity of financial resources was an ideational shift amongst international development institutions brought on by the oil crises of the 1970s. Whereas “modernization theory” had traditionally provided justification for large-scale concessionary financing for infrastructure, the rise of the Washington Consensus demanded that governments balance their budgets and eliminate unproductive areas of state investment. Not only did financial support for infrastructure projects diminish, but states were forced to dramatically cut budgets in order to secure loans that kept basic public services afloat.

Overall, while power sector growth in the developmental period was not purely efficient in terms of its contribution to the overall project of economic development, it is impressive when taken on its own terms. Countries which had, at independence, inherited only the skeletal system assets European colonial administrations deemed necessary for their extractive operations, managed to dramatically expand their capacity in the ten years following decolonization. Most major hydroelectric dam projects were completed within three to five years, on par or faster than the timelines of contemporary projects in the United States such as the Hoover and Grand Coulee Dams (five and eight years, respectively). As will be detailed in the case studies later in this work, the significant expansion of generation capacity that took place during this period lay the supply basis required for the subsequent expansion of social electrification agendas in countries such as Ghana and South Africa.

Market Governance 1990-2005

The modern era of power sector liberalization began in the Reagan-Thatcher era as Western liberal democracies began a retrenchment of the states' role in the economy in favor of privatization and competitive free markets. The power sectors of some developed economies such as the United States, Germany, and Japan already featured high levels of private ownership and independent sector regulators, but many firms held private monopolies that were to be broken up through regulatory reforms. Countries such as Norway, Sweden, New Zealand and Australia introduced robust competition while maintaining high rates of public ownership (Pollitt 2012). In 1988 the European Commission initiated talks concerning the adoption of a European single market for electricity following Joskow & Schmalensee's influential *Markets for Power* (1983), which positively evaluated the prospects of free market mechanisms for a pan-European power sector. By the early 1990s liberalization became the dominant program for power sector reform at the World Bank, which began issuing recommendations and loan conditions pressuring debtor states in the developing world to adopt the reforms now taking hold across OECD nations.

Two definitive World Bank papers mark the Bank's adoption of the 1990s reform model. A 1993 World Bank Policy paper clearly articulates a shift in Bank policy to "aggressively pursue the commercialization and corporatization of, and private sector participation in, developing-country power sectors" (World bank 1993, 16). A clear requirement for future lending was "an explicit country movement toward the establishment of a legal framework and regulatory process satisfactory to the Bank" (World Bank 1992, 59). Included in the framework was the establishment of an independent sector regulator and a transition to more commercial principles of sector governance, with particular emphasis on private sector involvement. Unbundling reforms were recommended as a method of increasing efficiency and reducing costs. *World*

Development Report 1994: Infrastructure for Development emphasized that infrastructure in the power sector should be managed “like a business not a bureaucracy,” including greater private sector involvement in management, financing, and ownership leading to a commercial orientation (World Bank 1994, 2). The report advocates the introduction of competition through open entry to new firms across the power sector through competitive bidding, and casts utility unbundling as an effective means for promoting “new entry and competition in segments that are potentially competitive” (World Bank 1994, 53).

While there was a clear shift in World Bank thinking on power sector reform in the developing world, to what extent was it implemented in Sub-Saharan Africa? On the Bank’s own assessment, the answer is that implementation of the standard reform model was partial and piecemeal at best. Restructuring through horizontal and vertical unbundling has been limited in most cases and non-existent in others. In cases where legislation was passed to liberalize the sector, effective implementation was scarce, with government ministries maintaining active management roles in state-owned enterprises in which public divestment was rare. Energy subsidies were generally maintained. But while developing countries did not embrace a full-scale implementation of the liberalization program, some reform measures were quite popular. More than 70% of developing countries created an “Independent Sector Regulator,” and introduced Independent Power Producers (IPPs) into the generation subsector (Foster & Rana 2020).

The pace of reform slowed dramatically by 2005, ten years after the majority of reform processes had been initiated. By this point, the majority of developing countries’ power sectors fell into what Eberhard & Gratwick (2008) call the “hybrid model,” characterized by limited privatization and a heavy state presence. In the Bank’s view, the hybrid model was riddled with contradictions; independent sector regulators were created to oversee wholesale power markets that did not exist, while IPPs were forced to negotiate generation contracts with monopolistic buyers in distribution and transmission companies (Foster & Rana 2020). While some SOEs were restructured as corporations, their boards and upper management were typically staffed with Ministry personnel and political appointees.

A 2006 World Bank policy paper *Reforming Power Markets in Developing Countries: What Have We Learned?* (Bacon & Besant-Jones 2006) conducted an autopsy of the first decade of reform. The paper concluded that the stunted and uneven implementation of the 90s reform model demonstrated that a "one-size-fits all approach" was an ill fit for the "extensive range of economic and institutional endowments of these countries" (Besant-Jones 2006,1), and that starting conditions and national political and social contexts were important variables in determining the prospects for reform. The paper argued that future reform efforts could mitigate risk and increase longevity through policy sequencing, following the examples of the most successful reformers by "passing primary legislation for power market reform, establishing sector regulation, transact(ing) with IPPs, and privatiz(ing) some of the power supply industry" (Besant-Jones 2006, 111).

Ideas

Efficiency

Power sector liberalization refers to the set of reforms adopted to "liberalize" the power sector in line with similar efforts across other economic sectors such as commodities, finance, and healthcare. In general, liberalization implies a reduction or elimination of state asset ownership and subsidies, the introduction of competition between private firms, and the opening of national markets to imports and exports of human and financial capital, technologies, goods and services. Liberalization operates under a utilitarian logic of consequences designed to maximize efficiency. That is, policies following from the liberalization program are selected on the basis of beliefs about their expected efficiency gains rather than how appropriate they are in light of societal norms and values.

In the power sector, liberalization is intended to promote optimal sector efficiency through the introduction of free market enterprise, wherein the competition between firms is believed to induce the lowest possible consumer electricity prices. In a purely competitive power market absent government interference, firms compete on an equal playing field. In order for a firm to "win," that is, to become the most profitable firm, it must dominate market share. Firms attract greater market share by reducing prices, which they accomplish primarily through effective management practices (reducing labor and transaction costs, maintaining financial sustainability through budgeting and accessing cheap capital) and technological innovation that lowers production costs. In the ideal, the successful firm will deliver the greatest amount of electricity to the greatest number of consumers at the lowest cost. This shifts the burden of electricity production and distribution from the government to the private sector, and makes individuals responsible for electricity access not as taxpayers but as consumers with freedom of choice when it comes to electricity purchasing (Pollitt 2012).

Interests

The World Bank

The primary interest-actor behind power sector liberalization was the World Bank. The Bank developed the policy framework and made its implementation a condition of Bank financing throughout the late 1980s and 1990s. On the one hand, the Bank's actions appear to have been rooted in a genuine ideological belief that liberalization would lead to greater sector efficiency, a view supported by some of the successful early cases such as Chile, where sector liberalization led to increased private investment, generation capacity, electricity access, and transmission efficiency. On the other, the Bank's actions must also be seen in light of a number of changes in the global political economy.

Following the oil crisis of 1979, the Bank began to express public reservations about the international financial systems' capacity to recycle finance at levels sufficient to maintain economic stability. Economists' widespread expectation was that energy prices would continue to increase throughout the 1980s, placing a broad constraint on economic growth . The newly elected neoliberal governments of Margaret Thatcher and Ronald Reagan committed to anti-inflationary policies and reduced government spending. The Keynesian consensus that had dominated postwar economic thinking since at least as early as the Bretton Woods Agreement in 1944 was falling out. Robert McNamara, who had been at the helm of the Bank since the Johnson administration, became convinced that a fundamental change had occurred in the global economy (Berger & Beeson 2010). Across the developing world, external debt payments were now strongly outweighing foreign exchange reserves as primary commodity export prices continued to sink. The Big Push Model, with its casual treatment of debt and commitment to heavy investment, now seemed inconsistent with the economic order of the day. Structural-adjustment programs took its place.

Political Elites

Because the Bank attached liberalization to sector financing, political elites were motivated to implement, at least nominally, reforms in order to secure financial resources. However, sector reforms also presented a number of opportunities for government elites to distribute resources amongst their patrons in the form of jobs, equity in state-owned enterprises, and contracts (Tangri 1999; Szeftel 1998). The creation of an independent sector regulator meant the establishment of a new government bureaucracy and thus a number of well-compensated executive and staff positions. The commercialization of state-owned utilities meant the establishment of boards of directors and managerial positions. In the few cases where governments unbundled vertically integrated utilities, this created at least three separate firms, all requiring management and staff. State divestment from SOEs created the opportunity to distribute equity shares. The creation of a private electricity sector offered the opportunity to distribute profitable government contracts for the generation, transmission, and distribution industries. While the liberalization framework proposed a competitive tendering process, the modal form of procurement in sub-Saharan Africa was a bilateral contract negotiated between governments and large firms (Eberhard & Gratwick 2008). From the perspective of national political elites, selective implementation of reforms represented a set of opportunities for patronage that did not necessarily imply the ceding of control of the power sector.

Institutional Arrangements

Power sector liberalization is actuated through a series of policies, each with their own set of policy instruments.

1) Introduction of Competition: Prior to liberalization, most power sectors in and outside of the developing world are run by the state either directly through a government ministry or indirectly through a large, vertically integrated state-owned enterprise. Liberalization in the power sector requires the introduction of competition, which does not necessarily imply privatization. A primary reform effort is the vertical and/or horizontal "unbundling" of state-owned electricity enterprises. At the outset, state owned power companies are generally vertically integrated firms with control over generation, transmission, and distribution activities; vertical unbundling refers to the division of state owned enterprises into separate commercial units for each of these

activities. Horizontal unbundling refers to the subdivision of these specialized units into separate firms within generation, transmission, and distribution. The desired effect is to facilitate non-discriminatory access to monopoly networks and create viable competitors within each sector, driving down prices (Pollitt 2012). This can theoretically be implemented with total, partial, or no privatization, although the general trend favors partial privatization across all subsectors either through the offering of a portion of shares of state-owned firms to private investors, or the sale of some but not all enterprises to private buyers (Bacon & Besant Jones 2002).

2) Elimination of Subsidies: In order for newly privatized firms to compete fairly, government must eliminate subsidies favoring any corner of the power sector. Subsidies may be direct (payments to firms, provision of free government-sponsored services, tax exemptions and/credits) or indirect (favorable or uneven regulation, favorable price controls) (Pollitt 2012; Bacon & Besant-Jones 2002).

3) Commercialized Tariffs: Government must allow the market to set the tariff prices consumers pay for electricity. Governments often set tariff prices based on socially-induced criteria that ensure broad-based affordability of electricity; from the liberalization perspective, this may render the sector insufficiently profitable to attract private investment, dampening competition and innovation and dampening the free market model's ability to provide the most efficient pricing (Gregory & Sovacool 2019; Pollitt 2012; Collier & Venables 2012; Bacon & Besant-Jones 2002). While the general trend of implementation is to designate tariff-setting to an independent regulatory authority (see next section), these authorities are supposed to set tariffs based on market rates.

4) Independent Sector Regulator: The liberalization program calls for the creation of an independent sector regulator that controls permitting on generation, transmission, and distribution, and sets electricity tariffs in line with cost-recovery. Prior to reform, many vertically integrated utilities retain some regulatory authority over their own industry, permitting them to regulate competition out of business. For liberalization's other mechanisms (competition and privatization) to be effective, regulation needs to be removed from state-owned utility portfolios and placed in the hands of an independent sector regulator.

Implementation

As reform slowed after 2005, so did the Bank's pressure on governments to implement the liberalization model. The 2016 World Bank Independent Evaluation Group's assessment of the reforms concluded that the sluggish and incomplete timing of the reforms implementation called for greater attention to the political-economic context and "aligning program timelines with government reform programs," (World Bank 2016, 23). A large scale assessment drawing on dozens of Bank-authored country case studies on power sector reforms across the developing world entitled *Rethinking Power Sector Reform in the Developing World* (Foster & Anshul 2020) took a similarly cautious tone, emphasizing the need for a "two-track approach" that recognizes the various distinctions across national political contexts that may lead to different reform trajectories. In particular, the authors draw on a comparison of the case studies to conclude that reforms are more likely to be successful in countries with higher levels of power sector development and with "market-oriented" and contestable political systems.

In the most comprehensive review of the implementation of liberalization reforms to date, Urpelainen and Yang (2019), building on Erdogdu (2011), compiled data on implementation in 142 countries from 1982-2013. The authors found that the "pattern of hybrid power markets remains robust, as many countries implement hybrid reforms but hesitate to implement reforms that privatize or liberalize competition." Further, they found that hybrid reforms were most prevalent in poor countries, authoritarian regimes, and states with low institutional capacity. Through a panel analysis, they conclude that economic growth and institutional capacity are effective predictors of power sector reform. They argue in their conclusion that developing countries are thus likely to continue to move towards full implementation as economic growth and institutional capacity continue their current upward trend.

Understanding the impact of the liberalization program on the power sectors of the developing world has attracted significant scholarly interest amongst energy policy specialists and economists. Jamasb et al. (2004) find that the reforms led to increased operational performance in Chile, Argentina, Peru, the Philippines, Brazil, and Columbia. They found that sector investment increased in the Philippines, and electricity access increased in Peru. Haselip & Hilson (2005) found that, across electricity and mining sectors in South America and Africa, the reforms seem to have benefitted capital through increased shareholder value in associated enterprises. Pollitt (2012) found that privatization improves sector efficiency when accompanied by independent regulation, that independent regulation stimulates private investment, but that together privatization and independent regulation had no significant effect on electricity prices. Countries that liberalized tariffs generally experienced an increase in prices for household consumers (Pollitt 2012), and higher prices tended to lead to substantial public backlash that resulted in the retrenchment of reforms (Zelner et al. 2009).

Implementation of Liberalization in Sub-Saharan Africa: The Hybrid Model

Developing countries lagged the developed world in implementing liberalization reforms, but Sub-Saharan Africa was followed only by the Middle-East/North Africa (MENA) region in its implementation timeline (Foster & Anshul 2020). By the late 1980s the power sectors of Sub-

Saharan Africa were struggling to meet rising demand driven by population and economic growth. SSA governments turned to the World Bank for support in expanding their generation and transmission capacities and received a large volume of financial support conditioned on the enactment of the liberalization program. Following these agreements, power sector liberalization began at a relatively swift pace. In the period 1995-2005, SSA showed the largest increase along the World Bank's Power Sector Reform Index (PSRI) of any developing region (Foster & Rana 2020). By 2006, almost all the 24 SSA countries covered by the Africa Infrastructure Country Diagnostic (which collectively account for 85 percent of the sub-Saharan Africa population, GDP, and infrastructure inflows) had enacted power sector reform legislation, two-thirds had corporatized their SOEs and established some form of regulatory oversight institution, and greater than a third had some level of independent power producers operating in their generation subsectors. (Eberhard et al. 2008; vi). However, following this initial influx, reforms stalled, converging around the "hybrid model." In the hybrid power sectors which prevail in the region today, the national state-owned utilities retain monopsonistic position as the sole buyers of electricity, and operate their own generation facilities in addition to their transmission and distribution operations. Private sector participation tends to take two forms: as temporary management contracts for national SOEs or as Independent Power Producers that sell electricity to the national SOE. (Foster & Anshul 2020; Eberhard, Foster, et al. 2008; vi).

Clash of Ideas & interests: Efficiency vs. Developmental Ideas

The fact that sub-Saharan African power sector policy regimes converged around the hybrid model reflects a) the limited political appeal of the liberalization program's underlying idea of efficiency relative to the competing ideas of industrialization and African nationalism held over from the developmental era b) the constellation of domestic interests responsible for its implementation.

The liberalization program, and the idea of efficiency upon which it is founded, are distinguished from the ideas and policies that characterized the developmental era in that they did not emerge domestically. While African anticolonial nationalism, socialism, industrialization, and the developmental program emerged from an ideological commitment on the part of African leaders to deliver economic abundance to their electorates, the elevation of efficiency via the liberalization program was imposed externally by the World Bank.

Most Sub-Saharan African states followed a relatively similar political-economic trajectory from the mid-1970s through the 1980s that left them vulnerable to the demands of the World Bank by 1990. Crawford Young refers to this “fourth phase” of the postcolonial period as that of “state crisis,” characterized by the degeneration of party-state to personal rule (2012). The modal post-colonial state extracted revenues by using state agricultural marketing boards, an inherited institution from the colonial economic system. In the colonial economy, the marketing boards held a monopsony over crop yields. The boards would purchase cash crops from farmers at a price of their choice, and export them to consumers paying global market prices. The difference between the domestic and global market prices was kept in the board’s coffers, officially appropriated to bolster the agricultural sector in times of need. However, just as the colonial governments were not averse to dipping into board reserves to service other demands for revenue (such as fortifying their militaries), the post-colonial governments reappropriated this revenue to finance their developmental programs of industrialization and to develop foreign exchange reserves to pay for food and fuel imports. They simultaneously practiced a monetary policy of appreciating their national currencies, artificially lowering the domestic cost of imported food and fuels (Bates 2005).

This system worked fairly well amidst the global commodity boom of the 1950s and early 1960s, but as global commodity prices began to slump in the late 1960s, so did the ability of African states to finance their development projects and foreign exchange reserves. As foreign exchange reserves dwindled, the oil crises of the 1970s drove up energy costs, placing immense financial pressure on non-oil producing African states forced to import oil at global prices to help fuel their industrial ambitions. By the beginning of the 1980s, this sequence of economic events left the finances of governments across the region in tatters. Unable to meet public sector wages, the operating costs of unprofitable SOEs, or to purchase critical food and energy imports, African governments fell deep into external debt (Bates 2005; Young 2012).

As African states turned to international lending institutions for financing to keep public services afloat, they found that their former partner in modernization had adopted a new ideological commitment to neoliberalism that demanded a robust reshaping of public sectors in exchange for loans. Amongst other things, the Structural Adjustment Loans (SALs) offered by the World Bank and IMF required that African states retrench and reorganize their public sectors, devalue their currencies, and eliminate marketing boards. Cutting back or eliminating state-owned entities meant reducing the primary agents of economic activity, currency devaluation meant that domestic food and energy prices would rise, and the elimination of marketing boards gutted the state of its central mechanism for revenue extraction (Herbst 1990).

How did these external demands interact with the domestic ideas and interests of sub-Saharan African states? There is scant evidence of any indigenous ideological or interest-based support for the Washington consensus. First, the public expectations of abundance from nationalization of natural resources that were set by the African nationalism of the generation of liberation leaders that took power from the moment of independence had yet to materialize for most Africans. To the extent that such abundance had been delivered, it had been through the state-led economic efforts that were threatened by the reforms the Washington consensus demanded.. Not only were these reforms irreconcilable with the developmental program, but as

Herbst argued (1990), they threatened the instruments of patronage which African leaders had used to cement their political constituencies. In political contexts where votes mattered little, re-election of African rulers was contingent on ensuring the flow of goods to client-coalitions. In general, these coalitions centered around regional ethnic elites who controlled rural, agrarian constituencies, and urban publics, whose capacities to create civil unrest through both violent (rioting and looting) and non-violent (peaceful protests, strikes) tactics threatened the control of power. By demanding the elimination of the agricultural boards that had provided governments with the revenue necessary to hold these coalitions in place, as well as the monetary policies that had thus far made food affordable, these reforms threatened the linkages between rulers and their constituencies that held these nascent states together (Herbst 1990).

The power sector was at least as important to African governments' hold on power as the other economic areas through which the state conferred benefits to elite coalitions. Electricity access was not yet a widespread expectation of rural Africans at this point, who primarily continued to rely on biomass energy for domestic use. However, by the late 1970s transmissions networks in many sub-Saharan African states served residents (including most elites) in urban capitals and some major industrial operations accounting for significant economic activity. The political cost of divestment in some industries was limited to the elimination of benefits transmitted via government payrolls to the urban salariat. But divestment from the power sector represented a cost both to the direct beneficiaries of the sector itself as well as to beneficiaries from linked national industries that relied upon electric power, such as mining and manufacturing.

Preserving Structural Continuity Amidst Reform

Despite a lack of domestic ideological or interest-based support for liberalization reforms in the power sector, there was a need for international financing to keep electricity flowing to urban centers and major industrial operations, and retain at least a portion of public payrolls. Thus the challenge facing African executives was how to preserve control of and support for power sectors while implementing a level of reforms sufficient to satisfy Bank lenders. As I will demonstrate more fully in the case studies, African leaders employed a variety of selective implementation strategies to accomplish these dual goals, but some common tendencies reflect the shared sets of concerns and dynamics they faced.

Liberalization laws that nominally opened power sectors to private investment were commonly adopted (Gore 2019; Eberhard 2008). The absence of domestic capital markets, private sector entrepreneurs, or much interest from foreign investors in a high-risk, low-yield venture would have meant little cause for concern about serious competition for control of the sector, yet opened the opportunity for some privately sourced financial support. These same market conditions also meant that legal frameworks to enable independent power producer activity were hardly a threat to sector control, given that there was little possibility for any organic private sector growth. Instead, IPPs actually represented another opportunity for patronage; the liberalization programs' emphasis on state divestment from the power sector meant governments could sell off some infrastructural assets (power plants, portions of transmission networks) to favored economic elites at wholesale (or lower) prices. The portion of the sector to be sold or contracted off could be sufficiently marginal so as to not represent any potential threat to state sector control, but the payoffs to economic elite clients could be substantial. Benefits were often transferred through no-bid,bilaterally negotiated high volume contracts for generation, transmission, or distribution services that netted hefty profits for a new class of "tenderpreneurs," (Lee & Usman 2018).

Corporatization of state-owned enterprises was a threat to control only if it meant genuine organizational autonomy from government; this was simple enough to prevent by ensuring that the executive had clear power of appointment and recall over SOE leadership, a power which was retained through one means or another in every single implementing country. While corporatization could remain relatively nominal, unbundling required a genuine horizontal dispersion of authority. It is difficult to discern whether leaders found this too great a threat to sectoral control or simply considered the proposal unworkable, but few African states implemented unbundling reforms (Foster & Rana 2020; Eberhard & Gratwick 2008). To the extent that African power sectors did unbundle in the liberalization era, it was generally through "ringfencing" which ostensibly declared that generation, transmission, and distribution subunits would operate independently under a single organizational umbrella (Gore 2019). This meant little for leaders' sectoral control so long as the SOE executive retained unified authority over all three units, which was almost ubiquitously the case.

A truly independent sector regulator could threaten executives' use of the power sector to reward patronage networks in two key ways: 1) forcing transparency in the awarding of tenders 2) setting commercial tariff rates and holding firms accountable for equitable payment collection. These were significant threats, but most of the regulators created as a result of the liberalization program lacked the authority or political clout to hold relevant SOEs accountable or to set commercial tariff rates. Not only were they limited in authority, but in some cases they actually became tools of patronage themselves by limiting competition with SOEs and state-connected enterprises, and by having their executive and staff level positions staffed with clients of the national executive (Eberhard & Gratwick 2008).

The liberalization program was essentially an institutional imprint layered on to a prevailing set of structuring ideas and interests, resulting in a policy regime that is referred to today in the policy and gray literature as the "hybrid model," (Eberhard 2005). But this layering was not without its consequences. The first and most important consequence of this layering process was a particular form of agency loss that weakened sector governance by providing an outlet for strategic incompetence on the part of state-owned entities that has allowed them to shirk democratic responsibilities relating to electricity access and renewable energy development. Meanwhile, the mechanisms and opportunities for maintaining patronage networks not only remained intact, but expanded as a result of ambiguities created in the new policy regime.

Diminished Coherence

In the developmental era, state-owned enterprises were organizationally embedded in government ministries. This maintained a strong vertical line of accountability from the national executive, through the MoE, and into the operations of SOEs. SOEs were thus perceived as direct arms of government rather than independent corporations, and their actions (or inactions) could be tied directly to the choices of national executives. The liberalization program changed this through the corporatization of SOEs. While the executives of SOEs still retained their accountability to national executives through power of appointment, the organizational prerogatives of corporatization implied an alternative set of statutory justifications such as financial solvency that SOEs could offer for the dereliction of legislative priorities. This is not to say that SOE leaders were free to ignore the preferences of national executives, but that they could strategically shirk legislative responsibility for implementing certain programs that were less important to national executives so long as they continued to service their main priorities.

A main priority of the power sector for most African national executives has been maintaining subsidies to key urban constituencies, government departments, and state corporations. Much of this has been accomplished by allowing arrears to continue unpaid, or by allowing illegal connections. On the other hand, obligations from significant pieces of executive-backed legislation calling for expansions of electricity access and renewable energy generation go unmet. When confronted by journalists, legislators, or other watchdogs, the typical explanation is that the firms' bottom line would not allow for the implementation of the program. The irony of this excuse is that often, the cause of the insolvency is the firms' refusal or inability to collect arrears from municipalities and other government clients. Effectively, the SOEs willingness to continue patronage subsidies by shirking one responsibility enables it to shirk others. Amidst all of this there is little question that national executives could order the arrears collected, often negating the fiscal excuse offered for the shirking of responsibilities. This, however, is generally against the executives' own interests in cementing voter coalitions. The correction for this sort of behavior that the liberalization program is supposed to offer comes in the form of credit-rating downgrades for the SOEs. This is sometimes avoided by providing last minute government appropriations. However, credit downgrades of SOEs are seen by the government as preferable to the sovereign credit downgrades that would result from the government's assumption of the expenses associated with maintaining their electricity patronage. Subcommercial credit ratings are thus a common characteristic of SOEs in the hybrid model.

The Maintenance and Extension of Patronage

As discussed in the previous section, the provision of subsidies via arrears and illegal connections was not threatened by the corporatization of SOEs. National executives' ability to control management personnel meant that core patronage priorities could still be met. But not only did the implementation of the liberalization program not threaten patronage linkages, it expanded the opportunities available for national executes to reward and extend patronage networks.

The economic arrangements of the developmental era were managed by dense networks of state-owned utility executives, board members, and government ministers. As the pressures of insolvency and liberalization led states to divest from many of their economic activities in areas such as agriculture, mining, manufacturing, and tourism, elite state employees previously ensconced in the patronage network were left unemployed. In the absence of any private sector entrepreneurial class, the government drew from favored elements of this cache of civil servants to form what has come to be known across the region as tenderpreneurs. In the newly "liberalized" power sector, benefits could now be transmitted to this group through the awarding of government contracts to newly formed private sector corporations with these elites at the helm. This shaking up of the existing flow of government benefits allowed national leaders to either reward previous clients or forge new alliances to expand their coalitions.

Effects of the Hybrid Model on Electricity Access

The liberalization reform model was intended to rescue Sub-Saharan African power sectors from the problems that arose in the 1980s. In particular, power sectors faced a lack of capital investment in generation, transmission, and distribution infrastructure, insolvent public utilities, and inefficient management. Introducing private sector competition was expected to spur capital investment in infrastructure by reducing barriers to investment and increasing potential returns. . Since the region's power sectors did not, as a rule, implement the model fully, the reforms' failure to produce their intended effects (reducing costs, increasing capital investment, or enhancing efficiency) is not surprising. And given the fact that they were not fully implemented, we have no way of knowing whether they would have yielded these results other than analyzing their impacts in other geographic regions. However, given that some reforms were broadly implemented (commercialization of SOEs, the passage of a liberalization reform law, the introduction of IPPs, the creation of an “independent” sector regulator), it is important to identify what effects these measures did have on sector performance.

Liberalization reform decentralized power sector policy regimes by institutionally distancing SOEs from political interference via commercialization and reassigning some responsibility for generation growth to the private sector. The intention was to make these SOEs more efficient and attractive to investment, spurring growth in generation capacity.

Sustainable Development 2005-2022

Following ten years of selective reform, the governments of Sub-Saharan Africa stabilized around the hybrid model and by 2005 the international development community was forced to reckon with the intractable challenges that political-economic contexts posed to full implementation of the liberalization program (Bacon & Besant-Jones 2006). Without abandoning its endorsement of the promised rationality of the textbook reform model, the Bank and affiliated institutions began to shift focus to advocating for policy frameworks that supported the social and environmental priorities of the Millennium Development Goals (MDGs) such as universal electricity access and growth of renewable energy sources. However, there were three major problems facing this shift in Bank policy.

First, the Bank failed to recognize how the selective implementation of liberalization era reforms had afforded state-owned entities the power to shirk government initiatives. The solvency incentive, or state-owned entities formal obligation to maintain profitability against expenses, provided a powerful justification with which to shirk government-backed obligations to extend electricity access and invest in renewable energy generation.

Second, the Bank failed to appreciate how liberalization of the power sector engendered new political-economic coalitions that were motivated to resist the social and environmental initiatives it began advocating. Under the hybrid power sector policy regimes that emerged from the liberalization era, state-owned entities transformed from monopolistic actors with total sectoral dominance and a clear responsibility for sector policy implementation into monopsonistic actors lacking a clear responsibility for implementation but with new obligations to transmit benefits via preferential bilateral contracting, which helped cement elite political-economic coalitions. This resulted in an accumulation of political-economic interests behind forms of hydrocarbon-based generation that resisted renewable energy investment.

Third, the social and environmental policy packages the Bank began recommending, a combination of market-based instruments (MBIs) and policy frameworks that made them work, assumed a set of sector characteristics and capacities that never existed in the first place (domestic capital markets, international investor interest in the power sector, competitive electricity generation markets, strong rule of law, clear regulations, commercial tariffs) or had been gutted by the impacts of the liberalization program (strong vertical accountability between policy directorates and implementing agencies, effective horizontal coordination across generation, transmission, and distribution).

As I will show, the countries that have been most successful in reaching goals of universal electricity access are those that averted the worst consequences of the liberalization era by retaining developmental policy regime structures against external reformatory pressures. With one exception (Kenya), significant utility-scale renewable energy development has hardly occurred anywhere on the continent. This failure is a result of the state of power sector policy regimes at the time the goal of renewable energy development was incorporated. States which have been successful at expanding electricity access (Ghana, South Africa) did so with power sector policy regimes that had yet to be reformed. However, renewable energy legislation has been introduced into actively reforming and post-reform environments, and has thus largely not been incorporated into the pre-reform regimes responsible for the successful implementation of energy access expansion policies. Countries which reformed their policy regimes prior to significant expansions of electricity access have failed to realize this objective.

The “New Governance” and Sustainable Development 2005-Current

Background

Sustainability in energy systems has been a part of the policy conversation since as early as the 1970s, when the Arab states of the Organization of Petroleum Exporting countries levied an oil embargo against the West. Amidst skyrocketing energy prices, countries such as the United States began pursuing energy independence through the exploration of domestic fuel sources. While this policy shift was primarily motivated by security of supply concerns, it sparked interest in pursuing renewable energy sources as a sustainable alternative to costly dependence on foreign oil or (what was then perceived as) risky nuclear energy. (Hancock & Vivoda 2014). Such interest gained further political traction as scientists and environmentalists began to direct attention towards the costly externalities of fossil fuel dependence, including water and maritime pollution from oil spills, hazardous air pollutants, acid rain, and climate change. While the early international environmental cooperation efforts were focused on stratospheric Ozone depletion, a problem only partly caused by carbon-intensive energy use, by the 1980s greenhouse gas emissions and climate change began to take center stage.

A series of events in the early 90s set the stage for the incorporation of sustainability into development policy: the first was the Intergovernmental Panel of Climate Change (IPCC)’s first assessment report, issued in 1990, which framed climate change as a critical challenge threatening humanity and requiring global cooperation. This assessment led to the creation of the United Nation Framework Convention on Climate Change (UNFCCC), the key international treaty on global warming that has laid the institutional groundwork for successive climate summits and agreements, which would subsequently formulate “learning networks” that promoted environmental policy ideas amongst its development initiatives.

The issuance of the Rio Declaration and Agenda 21 at the 1992 Rio Earth Summit together laid out the principles and directives of the UNFCCC sustainability program. Principle 16 of The Rio Declaration emphasized that “national authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment,” (UN 2017;3). Section 2.37 of Agenda 21 stated that “all countries should develop policies that improve efficiency in the allocation of resources and take full advantage of the opportunities offered by the changing global economic environment,” and recommended that countries “provide scope for appropriate economic instruments, including market mechanisms, in harmony with the objectives of sustainable development and fulfillment of basic needs,” as well as to “remove biases against exports and in favor of inefficient import substitution and establish policies that allow them to benefit fully from the flows of foreign investment, within the framework of national, social, economic and developmental goals,” (United Nations 1992, Sec. 2.37).

The United Nations Environment Programme organized a “Consultative Expert Group Meeting on the Use and Application of Economic Policy Instruments for Environmental Management and Sustainable Development” in Nairobi in 1995 in order to develop specific recommendations for a policy framework for sustainable development. A background paper for the conference by Harvard economist Theodore Panayoutou argued that the “standards-driven environmental policy in developed countries” wherein “environmental management” was “divorced from economic policy and sustainable development” had proven cost-ineffective and a “drag on economic growth,” In contrast, the argument continued, in developing country contexts “the divorce of environmental policy from economic policy and from efforts to achieve sustainable development is meaningless and potentially disastrous both economically and environmentally,” and thus, imposing environmental regulatory constraints on economic activity “to protect the environment for its own sake rather than as an input in sustainable development has very limited appeal." Instead of "command and control" mechanisms which "require the generous use of resources such as capital, government revenue, management skills, administrative and enforcement capabilities," all in short supply in developing economies, developing countries should "adopt instruments that integrate environmental and economic policy and that are parsimonious in their use of scarce development and management resources," (Panayouto 1994).

The paper continues to lay out a series of market-based instruments (MBIs) that would respond to the sustainable development program as laid out in Rio, specifically: a) the removal of distortionary subsidies, b) secure property rights, c) pollution taxes d) user charges, e) tradable emission permits, f) refundable deposits. Additionally, the paper argues for "full-cost pricing" of economic activities that internalized social and environmental externalities. This suite of MDIs offered a path forward to sustainable development that, in the view of Panayotou, did not depend on bureaucratic capacity or financial resources, and would, in his own words, "in effect transfer from bureaucrats to the market the responsibility of identifying and exploiting new and additional low cost sources of pollution control," (1994). The conclusions of the Nairobi meeting laid the policy foundations for a market-based program of sustainable development that would become institutionalized over the course of the next two decades.

The institutionalization of the market-based approach to sustainable development in the international lending community began with the creation of the Global Environmental Facility and the World Bank's embrace of renewable energy lending as part of its development strategy, which Martinot (2001) traces through three key developments: 1) the Bank's establishment of the Asia Alternative Energy Program (ASTAE), which facilitate and implemented RE projects in Asia, 2) the publication of "Rural Energy and Development: Improving Energy Supplies for Two-

Billion People (World Bank 1996) which “emphasized the connection between energy services and rural poverty alleviation,” and helped launch over 10 bank projects for rural energy access through distributed solar, and 3) the adoption of the WB sector strategy paper “Fuel for Thought: Environmental Strategy for the Energy Sector.” The paper “promised to promote energy sector reform that makes renewables more competitive with conventional energy sources,” and promised to promote RE projects “as mainstream activities where they are cost-effective solutions to energy and environmental priorities.”

In 2000 the UN formally incorporated “sustainable development” into its program through the adoption of the Millennium Development Goals (MDGs). MDG #7 committed the UN to environmental sustainability, the first priority of which was to “Integrate the principles of sustainable development into country policies and programmes and reverse the loss of environmental resources,” (United Nations 2000). Importantly, the basis upon which they invoked the principles of sustainable development was firmly rooted in the policy logics established in Nairobi in 1995, a fact which is evidenced by the policy frameworks advocated by the World Bank over the next two decades.

Following the liberalization era of reform, the power sectors of the developing world had largely stabilized around the hybrid model by 2005. Importantly, this meant that the incorporation of sustainable development policy in power sector policy regimes began in the context of quasi-liberalized power markets, and was thus built on a shared fundamental assumption with the liberalization program about the possibilities and challenges facing renewable energy in developing countries: barriers to market entry were the primary culprit constricting supply growth. The underpinning logic of this assumption is that promoting renewable energy growth is a market problem requiring a market solution.

Following over a decade of discussion, policy formulation, and institutionalization, the sustainability development program began in earnest in 2005 when the G8 Finance Ministers agreed to try and accelerate progress towards the MDGs by providing enough funds to the World Bank, IMF, and the African Development Bank to cancel $40 to $55 billion in debt for members of the heavily indebted poor countries. This debt write-off allowed countries to divert resources away from debt service and towards the furtherance of the MDGs, as well as allowing them to apply for additional capital from IDIs (Elliot 2012).

In the mid 2000s power sector legislation dedicated to dual goals of universal energy access and the development of renewable energy production began appearing across sub-Saharan Africa (see table IV below for a compendium of this legislation). The policy approach embedded in this legislation was fairly uniform, essentialized by the MDIs developed over the previous decade. The administrative and policy mechanisms of the sustainable development era are best captured through the World Bank's "Regulatory Indicators for Sustainable Energy" (RISE) index, which measures countries' progress towards what the Bank considers "good" policies for promoting electricity access and renewable energy development. RISE divides its indicators into goal-based categories: Energy Access (8 indicators), Energy Efficiency (12 indicators), and Renewable Energy (7 indicators).

Table V: Laws and Policies for Sustainable Development.

Countries	National Electrification Plan	Year	Legal Framework for Renewable Energy	Year
Angola	Regional Policy for Universal Access to Modern Energy, General Electricity Act	2014	Sustainable Energy for All 2030, National Renewable Energy Strategy	2015
Benin	Benin Policy and Development Strategy of Electricity Sector 2008	2008	Benin Policy and Development Strategy of Electricity Sector 2008	2008
Burkina Faso	Burkina Faso FDE Fonds Developpement Electrification Statuts 2010	2010		
Cameroon	Cameroon Energetical National Plan	2005	Cameroon Development Energy Sector Master Plan	2006
Central African Republic			Central African Republic Presidential Decree 2010, Central African Republic: The New Strategy of ENERCA Corporation	2010
Congo, Dem. Rep.			Law No. 14/011 (Electricity Sector)	2014
Côte d'Ivoire	Electricity for All Program	2014	Electricity for All Program	2014
Ethiopia	National Energy Policy 2013	2013	National Energy Policy 2013	2013

Ghana	Ghana Strategic National Energy Plan 2006-2020	2006	Renewable Energy Act 2011	2011
Kenya	Kenya Energy Act 2006	2006	Kenya Energy Act 2006	2006
Liberia	Liberia National Energy Policy	2009	Liberia National Energy Policy	2009
Malawi	Malawi National Energy Policy 2003	2003	Malawi National Energy Policy 2003	2003
Mali			National Strategy for the Development of Renewable Energy	2006
Mauritania	Poverty Reduction Strategy Paper		Poverty Reduction Strategy Paper	
Niger	Niger National Electrification Strategy	2017	Niger National Electrification Strategy	2017
Nigeria	Nigeria National Power Sector Reform Act	2005	National Renewable Energy and Energy Efficiency Policy	2015
Rwanda	Electricity Access Roll-Out Plan	2008	Rwanda Energy Policy	2015
Senegal	Letter of Policy Development of the Energy Sector	2012	Renewable Energy Law	2010
Sierra Leone	Sierra Leone National Energy Policy	2009	Sierra Leone National Energy Policy	2009
Somalia	Somalia National Development Plan	2012	Somalia National Development Plan	2012

South Africa	Integrated National Electrification Plan (INEP)	2001	REIPPP	2010
Sudan	National Strategic Plan for Sudan	2007	Sudan Renewable Energy Master Plan	2005
Tanzania	Tanzanian Energy Development Access Programme (TEDAP)	2008	Tanzanian Energy Development Access Programme (TEDAP)	2008
Togo	National Development Plan	2017	Togo Strategy of accelerated growth and promotion of Employment (SCAPE) National Action Plan for RE	2013
Uganda	The Energy Policy for Uganda	2002	Renewable Energy Policy For Uganda	2007
Zambia	National Energy Policy 2008	2008	National Energy Policy 2008	2008
Zimbabwe	National Energy Policy 2012	2012	National Energy Policy 2012	2012

Key Problems with RISE Indicators for Sub-Saharan African Power Sectors

The RISE indicators are both evaluative and prescriptive. The purpose is to build a set of “best practices” induced by observing the regulatory practices of countries which have successfully expanded electricity access and developed renewable energy generation, and then to measure countries’ progress towards emulating those practices. RISE has been criticized for adhering to a “one size fits all” model of regulatory prescription which ignores a set of prerequisites for successful implementation (Urpelainen 2017). In particular, the RISE indicators require a high level of “institutional capacity,” technical aptitude on the part of regulators, as well as sufficiently robust capital market interest to respond to incentives such as the FiT.

This work argues that the RISE package is a particularly poor fit for the power sectors of Sub-saharan Africa in large part because 1) it depends on state capacity for policy coordination that either never existed or was damaged by the liberalization reform processes of the previous era 2) it continues to presume a level of market activity that is precluded by a lack of government interest and policy regime coherence. I will explain these criticisms in turn.

Emphasis on Planning

The RISE indicators’ focus on power sector planning for electricity access and renewable energy is a retreat from the standard reform model’s emphasis on decentralization and market (rather than state) led development. But effective policy planning requires coherent policy regimes led by pilot agencies that can retain focus on goals and calibrate policy instruments as appropriate. The standard reform model, particularly its emphasis on corporatization and unbundling, dissected fairly unitary developmental regimes with lines of vertical accountability from the executive down to implementation into more horizontally dispersed organizations featuring formally autonomous implementing agents. This horizontal dispersion of authority, as well as the introduction of commercial incentives for SOEs responsible for implementation, created elements of incoherence in power sector policy regimes that have made sector planning difficult to implement.

The most important element of incoherence resulting from liberalization is the solvency imperative. Following liberalization, most SOEs in Sub-Saharan Africa were at least formally corporatized (Foster & Anshul 2020). While in practice it is well understood that incorporated SOEs retained responsiveness to political principals through powers of appointment and board seats, particularly with regard to matters affecting distributive mechanisms of patronage, formal corporatization did layer on a new set of institutional rules for SOEs that required them to adopt commercial practices, most notably an imperative to maintain their bottom lines of profitability and solvency against political pressures. So while corporatization did not truly free SOEs from political obligations to political executives, the solvency imperative provided a powerful reason for SOEs to resist costly legislative obligations that political principals will not force them to implement. Two examples illustrate this pattern of behavior by which public utilities cite financial concerns to shirk legislative obligations to fund renewable energy projects, while engaging in far more costly practices that serve patrons at higher levels of government.

In Ghana, following the passage of the Renewable Energy Act of 2011 and in-line with its Feed-In-Tariff (FiT) policy, the Electricity Company of Ghana was obligated to sign power purchase agreements (PPAs) with renewable energy providers at premium rates approved by the Public Utilities Regulatory Commission (PURC). However, after the PURC approved a number of offers from Independent Power Producers (IPPs) under the FiT scheme, ECG refused to sign the PPAs, citing financial concerns. At the same time, ECG's primary source of insolvency was outstanding arrears from the accounts of government agencies. This instance was documented both in secondary accounts (Pueyo 2018) and from an interview with senior officials from the Ghanaian Ministry of Energy conducted by the author.

In South Africa, a similar process occurred following an amendment of the Electricity Regulation Act in 2009 intended to spur renewable energy growth. The Renewable Energy Independent Power Producer Program (REI4P) was introduced in 2011 to serve this goal by securing bids through a FiT scheme. The program initially attracted significant investor interest, however by 2015 Eskom employed a variety of direct and indirect political measures to resist signing PPAs with the renewable energy IPPs, publicly citing financial concerns (Eberhard 2011). This refusal occurred amidst the operation of what is now a well-documented system of state capture by which billions of rand were effectively looted from corporate coffers by a network including President Jacob Zuma, ANC party elites, and the Gupta family.

While these examples differ markedly in the scale and manner in which the state-owned utilities acted to support political principles, they reflect the same underlying regime characteristic induced by liberalization reforms that has stymied the sustainable development agenda: the commercialization of state-owned utilities enables them use the insolvency induced by serving patron-client relationships as justification to refuse to implement pro-renewable energy policies. This phenomenon is examined in greater detail in the case studies later in this work.

Emphasis on Market-Based Instruments

Unlike the developmental regimes that preceded the hybrid regimes produced by the liberalization era, the sustainable development program places little emphasis on the deployment of state capital and resources to implement its infrastructure goals. Instead, the majority of capital, construction, and operational requirements for meeting sector goals are intended to come from private sector activity. This approach has yielded some results in countries with robust capital markets, but the risk to reward profile in most African power sectors is insufficiently attractive for foreign investors, and domestic capital markets are weak. Analysts from the Financial Investment Governance perspective insist that this risk profile can be improved with commercialized tariffs, improved creditworthiness of state-owned enterprises, and sovereign guarantees of payment obligations in PPAs. Yet emphasis on these technical fixes belies underlying problems of political economy that render these reforms extremely unlikely.

Commercialized tariff structures threaten government subsidies to key constituencies. Governments rely on subcommercial tariffs to make electricity access affordable to mass publics, which they count on for political support. Governments also stabilize long-term demand and cement elite coalitions through long-term contracts that provide cheap energy to bulk industrial clients. Sacrificing either represents significant political costs that most governments are unwilling to assume.

Improving the creditworthiness of State-Owned entities also threatens a key set of subsidies. The poor financial situation of SOEs is frequently the result of long-term arrears run by politically important municipal governments (such as Soweto in South Africa) and national governmental clients such as ministry offices (as in Ghana, where, according to an estimate from a senior Ghanaian Ministry of Energy in an interview conducted for this work, over 90% of the arrears of the major electricity SOE come from unpaid government accounts)(see interview A).

Sovereign guarantees require governments to assume significant financial risk for private projects which they cannot later take credit for. According to a ministry official interviewed for this project, governments will generally honor such guarantees as not doing so jeopardizes their sovereign credit rating (see interview A). They thus represent a financial cost with no clear political reward. Overall, absent sovereign guarantees, the political-economic imperatives of governments to retain control over distributive mechanisms available in the power sector, as well as general threats of political and policy instability, make the risk profile untenable for most investors (see interview B).

A Systematic Evaluation of Three Eras of Governance

This section has thus far reviewed three eras of power sector governance in Sub-Saharan Africa, discussing the ideas and interests that motivated each program of reform, the interactions between eras of reform, and the particular ways in which policy regimes have accommodated and resisted change. However, in order to more comprehensively assess the impact of these reforms on the two primary outcomes of interest that motivate this work, electricity access and renewable energy growth, a more systematic evaluation is needed. What follows is a quantitative estimation of the effects of particular policy instruments on universal electricity access and renewable energy production using a new panel dataset on policy interventions.

The goal of the analysis was to identify the relative strength of state-led and market-based policy instruments in promoting key power sector goals of universal energy access and renewable energy growth across a broad swath of Sub-Saharan African countries, accounting for differences in size, population, and democratic quality. In particular, the analysis measures whether countries that implemented reforms from the liberalization and sustainable development eras of governments fared better or worse than their peers who resisted them.

Variables and Data

The following is a description of the variables and measures used. A complete reporting of descriptive statistics can be found in Table VI.

Unit of Analysis

The unit of analysis is the country-year. The number of sample countries varies across models from 18-25, but attempts to comprehensively represent every country in the region as allowed by data constraints Details of the countries included in each model are featured in the appendix.

Dependent Variables

Access to Electricity (totalaccess, ruralaccess): A central motivation of power sector reform has been to increase access to electricity. In order to measure access to electricity, I use the Electricity Access (% of Total Population) indicator from the World Bank's World Development Indicators data for both total population and rural population specifications. The WDI data is available from 1990-2015.

Renewable Energy Generation (rengentotal) In order to measure total electricity generated from renewable sources, I use annual data on total RE generation from renewables from the International Renewable Energy Agency (IRENA). The data measure generation in megawatts, and are available from 2000 to 2021.

Renewable Energy (% of Total Electricity Production): Increasing electricity production from renewable energy relative to hydrocarbons is a key power sector priority both because it lowers dependence on costly imports of hydrocarbons used for thermal generation, increases the domestic security of supply, and reduces contributions to global warming. Renewable energy penetration is measured using data from the World Bank's WDI dataset, available 1990-2015.

Independent Variables

Liberalization Reforms

The liberalization reforms are a policy mix intended to make the power sector more efficient and productive and to attract private sector investment in generation by doing so. In order to measure the extent of power sector liberalization, I utilized data from the Power Sector Reform Tracker (PSRT) (Urpelainen & Yang 2018) which tracks the implementation of specific power sector reforms at the country-year level from 1982-2013. The PSRT tracks eight key reform indicators based on country-level analysis of legislation and regulation. Each indicator is binary (0,1) representing a yes/no indication of whether or not a reform has been implemented, and the PSRT score represents the sum total of these indicators (1-8). The use of a composite indicator is analytically desirable as these reforms are intended as a synergistic policy framework.

Liberalization Law (r_law): The passage of a law restructuring the power sector by unbundling, commercializing, and/or privatizing state-owned utilities and opening the sector to private investment and firms.

Corporatization (r_cor): This variable indicates whether or not the state-owned entities have been corporatized, which means that they have been removed from the direct control of government and established as independent corporations with boards of directors.

Independent Regulatory Agency (r_reg): The establishment of an independent regulatory control agency that sets electricity tariffs, issues licenses for private power sector activity, controls access to the transmissions network, and enforces sector regulations.

*Independent Power Producer*s (r_ipp): This variable measures whether or not it is legal for independent power producers (IPPs) to operate in the generation subsector.

Unbundling (r_und): This variable indicates whether or not governments have divided vertically integrated SOEs into separate units for generation, transmission, and distribution. This reform is intended to remove natural monopolies and spur competition, leader to greater electricity supply.

Wholesale Electricity Markets (r_wem): The creation of voluntary public wholesale electricity market institutions which allow suppliers to compete in the generation of electricity, guarantee access to the grid, and broker trades.

Choice of Supplier (r_cos): The ability of consumers to select an electricity provider amongst multiple competitive providers.

Privatization (r_prv): This variable indicates whether or not governments have privatized their state-owned entities by divesting and selling equity and assets to private sector investments, as well as submitting to organizational restructuring that outfits utilities as private corporations.

I expect an inverse relationship between the implementation of liberalization reforms and the accomplishment of power sector goals. This expectation is based on the theoretical intuition that liberalization leads to decentralization, misaligned incentives, and administrative incoherence.

Regulatory Indicators of Sustainable Energy (RISE)

The World Bank has recently compiled a set of regulatory indicators it considers best practices for the development of sustainable energy and universal electricity access. The RISE indicators feature state-led and market-based policy instruments. This work has selected key indicators representing both state-led and market-based approaches to sustainable development.

National Electrification Plan (r_plan): A National Electrification Plan (NEP) is a government-designed policy plan that outlines specific terms for implementation of on-grid and off-grid access to electricity. NEPs set time-based targets for national electrification rates and map out specific plans for completion based on particular grid extensions and investments in generation capacity as appropriate. They are state-led in that while they may include provisions to attract private sector investment, they feature clear state commitments of capital and institutional resources towards electrification.

National Renewable Energy Plan (r_replan) : A national renewable energy plan (NREP) is a government designed, state-led plan that includes renewable energy as part of generation planning, provides for state capital and institutional resources for renewable energy investment, and sets specific targets for implementation. NREPs go further than laws and policy frameworks for encouraging renewable energy investment and set out clear state-led strategies for increasing renewable energy as part of the national generation mix.

Feed-In-Tariff (r_fit): Feed-in-Tariffs (FiTs) are a market-based instrument designed to induce investment in renewable energy generation by guaranteeing long term (10-20 year) cost-reflective tariff rates for independent power producers. FiTs reflect a delegation of renewable energy development implementation to the private sector, rather than state-led actors.

I expect NEPs and NREPs to be positively associated with growth in electricity access and renewable energy development, as they reflect a delegation of implementation to state institutions with clear responsibilities to political principals, who should face public pressures for service delivery. This is in contrast to FiTs, which rely on a combination of SOEs and Independent Power Producers with conflicting commercial incentives, as well as Independent Sector Regulators who face pressures to meet the demands of both. NEPs and NREPs feature clear obligations for SOEs as directed by political principals in the Ministry and/or Presidency, and are thus more likely to be effectively implemented by the state apparatus.

Data on RISE indicators are collected in the following way. The RISE website does not provide longitudinal data on the implementation of its selected regulations. Instead, RISE provides a recent "Scorecard" that ranks countries' scores (0-100) on each indicator. RISE does not provide a year of implementation, but includes references to the legal documents (policy statements or legislation) that justify the scores For each country-year, I coded the regulatory indicator (i.e. Feed-In-Tariff) as "1" if the score is greater than 50, and "0" if the score is less than 50. If the score is greater than 50, I identified the year of implementation using the documents provided by RISE. Year of implementation is used to create longitudinal data, with the value of implementation coded as "1" at the first year of implementation and held as "1" for every year thereafter. Country-years for each regulatory indicator prior to the year of implementation are coded as "0," representing the absence of the regulation[11].

[11] A detailed description of the coding is featured in the Appendix, as well as a link to the original dataset.

Other Theoretically Motivated Variables

Wealth(gnpc)*:* National wealth is expected to have a positive impact on sector outcomes as it suggests greater availability of financial resources. I thus include gross national income per capita (gnpc) to control for variations in wealth. Data is from the World Bank World Development Indicators, and is measured in US dollars.

Democratic Quality (elecdem)*:* Competitive, pluralistic electoral democracies are expected to perform better than non-competitive, unipolar democracies in public service delivery, as governing parties face greater pressure to provide benefits to constituents in order to secure re-election. In order to measure democratic quality, I include the V-Dem Polyarchy index which assesses the quality of electoral democracies around the world.

Population Density (popdens): The more dense the population of a given country, the less costly it should be to expand electricity access, as it requires less transmission and distribution infrastructure to reach citizens. I thus include a measure of population density (popdens) from the World Bank World Development Indicators, measured in people per square kilometer of land area.

Interaction Terms

NEPs and Democratic Quality (PlanxDem): NEPs should be more effective in increasing electricity access when there are strong democratic institutions to hold leaders accountable for implementing them. I examine this effect using the interaction term PlanxDem (r_plan*elecdem).

NEPs and Wealth (PlanxGNPC): Wealth may enable countries to more extensively implement NEPs, thus increasing electricity access.I examine this effect using the interaction term PlanxGNPC(r_plan*gnpc).

Liberalization and Democracy (PSRIxDem): Liberalization reforms may be more effective when electoral accountability is strong as economic actors can pressure governments to implement policies fairly, leading to stable and balanced conditions for market growth. I examine this effect using the interaction term PSRIxDem (psri*elecdem).

Liberalization and Wealth (PSRIxGNPC): Higher levels of wealth suggest a more mature market economy, and thus conditions under which market solutions to power sector growth should be more effective. I examine this effect using the interaction term PSRIxGNPC(psri*gnpc).

NREPs and Democracy (REplanxDem): NREPs should be more effective in increasing renewable energy production when there are strong democratic institutions to hold leaders accountable for implementing them. I examine this effect using the interaction term REplanxDem (r_replan*elecdem).

NREPs and Wealth (REplanxGNPC): NREPs should be more effective at increasing renewable energy production when governments have more resources to commit to them. I thus examine the interaction effect of wealth and NREPs using the term REplanxGNPC (r_replan*gnpc).

Feed-in-Tariffs and Wealth (FITxGNPC): FiTs should be more effective at expanding renewable energy generation when there are robust capital markets to support private investment in the subsector. I thus examine the interaction of FiTs and Wealth with the term FiTxGNPC(r_fit*gnpc).

Table VI: Descriptive Statistics

	Descriptive Statistics						
	count	sum	mean	sd	min	max	sum
totalaccess	1296	37932.27	29.26872	25.80804	.01	100	37932.27
ruralaccess	1049	20231.12	19.28611	24.22613	.0006132	100	20231.12
rengentotal	840	441344.8	525.4105	918.9271	0	9517.913	441344.8
reshare	957	1081.637	1.130237	3.925018	0	48.27479	1081.637
r_plan	806	261	.3238213	.4682233	0	1	261
psri	2928	1708	.5833333	1.363749	0	8	1708
r_replan	899	199	.2213571	.4153914	0	1	199
r_fit	868	80	.0921659	.2894268	0	1	80
r_prv	1312	115	.0876524	.2828966	0	1	115
r_cor	1312	447	.3407012	.4741258	0	1	447
elecdem	2673	786.681	.2943064	.1970051	.009	.84	786.681
gnpc	1354	2143643	1583.193	2381.988	93.23841	17002.98	2143643
popdens	2710	182360	67.29152	100.6314	.7886334	623.5172	182360
PlanxDem	781	126.959	.1625595	.2550267	0	.79	126.959
PlanxGNPC	715	355972.5	497.8636	1101.11	0	7802.683	355972.5
PSRIxDem	2673	705.694	.2640082	.6874185	0	5.341	705.694
PSRIxDem	2673	705.694	.2640082	.6874185	0	5.341	705.694
REplanxGNPC	805	252520.6	313.6902	868.0791	0	7802.683	252520.6
FITxGNPC	775	130148.1	167.9331	792.4311	0	7802.683	130148.1
N	2928						

Models

I specify a total of twenty-two models to test various relationships between the theoretically motivated independent variables and the outcomes. The models are all panel regressions with country fixed effects, and each is run with and without time dummies. The full results of the models with country effects and time dummies are not presented here for reasons of space, but can be found in the appendix.

Table VII: List of Models and Variables

Model	Dependent Variable	Independent Variables
I	totalaccess	r_plan elecdem psri gnpc popdens
II	ruralaccess	r_plan elecdem psri gnpc popdens
III	totalaccess	PlanxDem r_plan psri elecdem gnpc popdens
IV	ruralaccess	PlanxDem r_plan psri elecdem gnpc popdens
V	totalaccess	PlanxGNPC r_plan psri elecdem gnpc popdens
VI	ruralaccess	PlanxGNPC r_plan psri elecdem gnpc popdens
VII	totalaccess	PSRIxDem psri r_plan elecdem gnpc popdens
VIII	ruralaccess	PSRIxDem psri r_plan elecdem gnpc popdens
IX	totalaccess	PSRIxGNPC psri r_plan elecdem gnpc popdens
X	ruralaccess	PSRIxGNPC psri r_plan elecdem gnpc popdens
XI	totalaccess	PlanxDem r_plan r_prv elecdem gnpc popdens
XII	totalaccess	PlanxDem PlanxGNPC PSRIxGNPC PSRIxDem r_plan gnpc elecdem psri popdens
XIII	ruralaccess	PlanxDem PlanxGNPC PSRIxGNPC PSRIxDem r_plan gnpc elecdem psri popdens, fe
XIV	rengentotal	r_replan r_fit elecdem gnpc
XV	rengentotal	r_REplanxDem r_replan r_fit elecdem gnpc
XVI	rengentotal	FITxGNPC r_fit elecdem gnpc
XVII	reshare	r_replan r_fit elecdem gnpc
XVIII	reshare	REplanxDem r_replan r_fit elecdem gnpc
XIX	reshare	FITxGNPC r_fit elecdem gnpc
XX	reshare	tic r_fit gnpc
XI	reshare	tic rengentotal gnpc
XX	reshare	ticXgnpc rengentotal tic gnpc

Results & Analysis:

In this section I present and review the findings of the panel regressions. I present the results for the regressions in Tables VII, VIII, IX, X and XI (results presented are without time and country dummies), and discuss them in turn. In order to interpret the relative strength of statistically significant variables that are of different scales I standardize them by doing the following. I multiply the Standard Deviation (**σ**) of each variable by its coefficient to produce Δ. I multiply Δ *100 and divide the result by the **σ** of the dependent variable *Y* to produce *Δ*. Thus, Δ= change in *Y* when *X* increases by one standard deviation, and *Δ* tells us what percentage of a **σ** of *Y* Δ corresponds to.

Table VIII: Results from Models I-VI

	(I) totalaccess	(II) ruralaccess	(III) totalaccess	(IV) ruralaccess	(V) totalaccess	(VI) ruralaccess
r_plan	2.490**	0.429	-5.117**	-10.25***	3.211**	-3.099*
	(2.88)	(0.42)	(-2.95)	(-4.93)	(3.02)	(-2.54)
elecdem	19.82***	15.07***	12.63***	6.731	20.62***	8.836*
	(6.94)	(3.77)	(4.02)	(1.63)	(7.02)	(2.15)
psri	0.430**	0.360*	0.398**	0.278	0.417**	0.418*
	(2.91)	(2.08)	(2.75)	(1.66)	(2.82)	(2.46)
gnpc	0.00431***	0.00359***	0.00426***	0.00356***	0.00487***	0.000993
	(8.69)	(6.40)	(8.77)	(6.56)	(7.03)	(1.31)
popdens	0.141***	0.122***	0.154***	0.133***	0.137***	0.149***
	(9.50)	(5.37)	(10.44)	(6.05)	(8.97)	(6.53)
PlanxDem			17.96***	25.07***		
			(5.04)	(5.83)		
PlanxGNPC					-0.000805	0.00379***
					(-1.16)	(4.94)
_cons	0.880	-6.178***	2.485*	-4.088*	0.563	-4.097*
	(0.76)	(-3.58)	(2.10)	(-2.39)	(0.47)	(-2.35)
N	617	533	617	533	617	533

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table IX: Results from Models VII-XI

	(VII) totalaccess	(VIII) ruralaccess	(IX) totalaccess	(X) ruralaccess	(XI) totalaccess
PSRIxDem	-0.610	1.741*			
	(-0.80)	(1.99)			
psri	0.719	-0.475	0.876***	0.0412	
	(1.84)	(-1.05)	(4.68)	(0.18)	
r_plan	2.484**	0.514	2.174*	0.653	-11.17***
	(2.87)	(0.51)	(2.53)	(0.65)	(-6.83)
elecdem	20.58***	12.52**	19.78***	14.74***	10.14***
	(6.84)	(2.99)	(7.00)	(3.70)	(3.86)
gnpc	0.00438***	0.00343***	0.00588***	0.00257***	0.00380***
	(8.69)	(6.06)	(9.17)	(3.53)	(9.01)
popdens	0.138***	0.124***	0.132***	0.128***	0.149***
	(9.17)	(5.49)	(8.89)	(5.62)	(10.21)
PSRIxGNPC			-0.000417***	0.000272*	
			(-3.81)	(2.18)	
PlanxDem					25.85***
					(7.94)
r_prv					7.545***
					(8.11)
_cons	0.660	-5.125**	0.316	-5.600**	3.722***
	(0.55)	(-2.84)	(0.27)	(-3.22)	(3.54)
N	617	533	617	533	541

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Electricity Access

The results find mixed support for a small, positive relationship between the existence of National Electrification Plans and electricity access. The strongest effect (+2.49%) of r_plan is in model I, however this effect reverses and shrinks upon the inclusion of time effects (-1.98). Increases in PSRI exhibit a consistent positive, statistically significant, in Models !, II, III, V, and IX, although it is also quite small (the largest effect is +.43% in Model I, which remains significant and increases slightly to .63% when time effects are included).

The results become more interesting when interaction terms are included. The coefficients for the PlanxDem interaction term in Models III and IV suggest that democracy has a stronger impact on both total and rural electricity access when a national electrification plan is in place (+17.96% and +25.07% respectively). These results are robust to the inclusion of time effects (18.4% and 23%). To put this into perspective,a single standard deviation increase in democratic quality under an NEP (.25) is associated with a 4.6%[12] increase in electricity access, or 23% of a single SD increase in electricity access (19%).

For Model III, the within R-squared value is fairly high (.57), suggesting the model explains the majority of variance within countries, however the rho value (fraction of the variance due to between country variance) is .90, suggesting that model explains only a minimal (.10) amount of variation between countries. Country effects for Model III are generally significant and negative with the following exceptions: Nigeria, Senegal, and Somalia are not significant, and Cameroon, Ghana, South Africa, and Sudan are positive and significant. Ghana and South Africa both have relatively strong democracies and histories of national electrification plans, and thus something else unique to these countries is also contributing to their electricity access rates. One

[12] Figures based on the sample and coefficient in Model III without time effects.

possibility is that their high levels of installed capacity at the beginning of the time period covered by the data (1990-2015) made it easier for the countries to easily expand their access levels, so I ran the model again including Total Installed Capacity (tic). TIC is not significant, and does not reduce the size of their country coefficients. There are thus some other important variables accounting for these differences.

For Model IV, the within R-squared is lower than Model III (.39), suggesting that the model accounts for less within-country variance in rural electrification. The rho is lower (.82), so less variation in rural electrification is explained by between country variance than for total electrification. The countries with significant negative effects are Burkina Faso (-13.3), the Central African Republic (-5) Chad (-5), Malawi (-23,4), Mali (-5.2), Mozambique (-7.9), Niger (-5.5), Rwanda (-50), Sierra Leone (-12), Tanzania (-10), and Uganda (-18). One thing that stands out about this group of countries is that most (9 out of 11) experienced intense civil conflict at some point during the period of time covered by the sample.[13]

Increases in wealth under an NEP (Model V) have no statistically significant relationship with total electricity access, although they do bear a positive and statistically significant relationship with rural electricity access. To better interpret this effect, a single SD increase in PlanxGNPC (1142.327$ per capita) is associated with a 4.32% increase in rural electricity access, or 28% of a single standard deviation of rural electricity access (15.45%). This effect is robust to the inclusion of time effects and increases slightly (.0042% per unit increase, or 31% of an SD of rural electricity access).

[13] I attempted to systematically test for the impact of civil war using the COW Intrastate Conflict dataset, but the data are not easily incorporable because they code for the names of the "sides" rather than the countries, and also appear not to count some of the conflicts that occurred in these countries. Systematically incorporating a complete civil conflict variable may explain these country effects.

The interaction terms for power sector liberalization also present some interesting findings. The interaction effect PSRIxDem has a positive and statistically significant relationship with rural electricity access (+1.741%). This effect remains significant and grows to 2.78% with the inclusion of time effects. PSRIxGNPC has a negative and statistically significant relationship with total electricity access (Model IX), although this does not remain significant to the inclusion of time effects. PSRIxGNPC has a positive and statistically significant relationship with rural electricity access, and this remains robust to the inclusion of time effects and grows in strength (from .000272 to .0004762). To get a better sense for this relationship, I consider these effects in terms of standard deviations. A single SD increase of PSRIxGNPC (4748.6$ per capita) is associated with a 1.29% increase in rural electricity access without time effects, or 2.26% increase when time effects are included. Respectively, this correlates to 8.3% and 14.63% of a standard deviation of rural electricity access (15.45%). This suggests that under higher levels of liberalization, increases in wealth have a greater impact on rural electricity access.

After identifying these interaction effects, I ran two additional models that included all of the interaction terms to assess how they compared to one another against both total and rural electricity access outcomes. The results are displayed below in Table VIII.

Table X: Results from Models XII & XIII

	(XII) totalaccess	(XIII) ruralaccess
PlanxDem	21.38***	21.54***
	(5.86)	(4.85)
PlanxGNPC	-0.000691	0.00296***
	(-0.99)	(3.75)
PSRIxGNPC	-0.000471***	0.0000685
	(-4.00)	(0.52)
PSRIxDem	-0.334	-0.166
	(-0.41)	(-0.18)
r_plan	-6.308***	-11.45***
	(-3.47)	(-5.26)
gnpc	0.00655***	0.00130
	(8.82)	(1.55)
elecdem	12.30***	3.191
	(3.84)	(0.74)
psri	1.043**	0.334
	(2.65)	(0.74)
popdens	0.142***	0.155***
	(9.51)	(6.89)
_cons	1.760	-2.711
	(1.48)	(-1.53)
N	617	533

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Model XII provides strong support for PlanxDem relative to the other interaction terms. PlanxDem is statistically significant and positive at 21.38%. The only other significant interaction term PSRIxGNPC, which is negatively related to total electricity access at -.00047%. Standardized, a one SD increase in PlanxDem (.25) is correlated with a 5.41% increase in electricity access, or 27% of a standard deviation of total electricity access (19.81%). By contrast, a one SD increase is PSRIxGNPC is correlated with a -2.1% decrease in electricity access, or 10.6% of a standard deviation in the outcome. When time effects are included, PlanxDem remains significant but the coefficient decreases to 16.8%, and PSRIxGNPC is no longer a significant predictor.

The within R-squared value for Model XII is fairly high (.59), suggesting it accounts for the majority of variation in the outcome within countries. However, the rho value of .89 suggests that a high level of variance comes from the country effects. The countries with negative and significant coefficients(Benin, Burkina Faso, CAR, Chad, Ethiopia, Kenya, Malawi, Mali, Mozambique, Niger, Rwanda, Sierra Leone, South Sudan, Tanzania, Uganda) are the same as for Model IV with the additions of Benin, Kenya, and South Sudan. Again, the majority (all but Benin, Kenya, Malawi, and Tanzania) experienced some intense civil conflict during the period observed, which may account for many of these country effects.

When the same interaction terms are tested against rural electricity access in Model XIII, only the interaction terms including r_plan are significant. PlanxDem is positive and statistically significant at 21.54%, while PlanxGNPC is positive and significant at .00296%. To more clearly compare these effects, a one SD increase in PlanxDem (.26) is associated with a 5.7% increase in rural electricity access, or 36% of a SD(15.45). A one SD increase in PlanxGNPC (1144.32$) is associated with a 3.38% increase in rural electricity access, or 21% of an SD. When time effects are included, both remain significant but PlanxGDP’s coefficient is weaker at 17% and

PlanxGDP's is stronger at .0031. The country effects are essentially the same as for Model XII, although Nigeria is significant and positive.

Renewable Energy

Table XI: Results from Models XIV-XIX

	(XIV) rengentotal	(XV) rengentotal	(XVI) rengentotal	(XVII) reshare	(XVIII) reshare	(XIX) reshare
r_replan	462.0***	496.9**		1.301***	6.488***	
	(5.59)	(2.88)		(3.48)	(7.70)	
r_fit	83.43	87.99	-34.45	5.016***	7.244***	9.712***
	(0.75)	(0.78)	(-0.28)	(7.58)	(10.21)	(10.93)
elecdem	-395.1	-392.5	199.3	1.968	2.107	1.490
	(-0.74)	(-0.73)	(0.37)	(1.54)	(1.73)	(1.20)
gnpc	0.116*	0.118*	0.0894	-0.000569**	-0.000522**	0.0000561
	(2.00)	(2.01)	(1.49)	(-2.80)	(-2.70)	(0.28)
REplanxDem		-83.80			-11.79***	
		(-0.23)			(-6.79)	
FITxGNPC			0.284***			-0.00150***
			(5.42)			(-6.44)
_cons	647.6**	644.7**	522.3*	0.924	0.786	0.706
	(2.95)	(2.93)	(2.37)	(1.94)	(1.73)	(1.54)
N	484	484	484	445	445	445

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The results from Model XIV report a statistically significant and positive relationship between the existence of a national renewable energy plan (r_replan) and renewable energy generation (rengen). The coefficient suggests that the creation and implementation of a renewable energy plan is associated with 462 MW more installed renewable generation capacity. When time effects are included, the coefficient decreases to 196.94 MW but remains significant. To aid interpretability, a typical coal-fired power plant has an installed capacity of 600 MW, and a single megawatt of installed capacity can power anywhere from 400-900 homes a year, depending on consumption levels. (Fleming 2019). None of the other variables in Model XVI are significant with or without time effects.

The within r-squared value for Model XIV is quite low (.15), suggesting that other factors account for the majority of the variance in renewable energy generation. The rho (.63) suggests much of the variance is due to between country variation. Examining country effects reveals several things: first, Kenya, which is the regional leader in renewable energy, does not have a significant country effect, so NREPs appear to at least partially account for its high levels of RE production relative to other countries. The countries with significant, positive correlations with rengentotal are Ethiopia, Mozambique, Nigeria, South Africa, and Zambia. Ethiopia, Mozambique, and Zambia are all hydrostates (>75% generation from hydro), and most hydroelectricity installations in the region occurred in the developmental period prior to the timeline of the dataset (1990-2015). However, I collected historical data on hydroelectricity generation from UN yearbooks 1960-1990, and so I include a variable for hydroelectric generation dating back to 1960 (tichydro) (Model XIV.1 in the appendix). When historical stocks of hydroelectric generation are included, the country effects of Ethiopia, Mozambique, and Zambia are no longer significant, suggesting that this accounts for their high levels of renewable energy generation relative to other countries in the sample. As for South Africa and Nigeria, they are the continent's two largest economies. While gross national income per capita is controlled for in the model, this may not be capturing the full effects of these countries' national wealth on renewable energy generation, which instead may be reflected in another economic measure such as capital accounts or foreign direct investment.

The interaction term REplanxDem is not significant in model XV. Because of the inclusion of the interaction term in this model, the coefficient for r_replan represents the parameter when democratic quality is equal to zero. Because of the low level of democratic quality in the region (mean=.29 and the minimum is .009), this is worth considering. Renewable energy plans appear to be associated with strong growth in renewable energy generation even in the total absence of democratic institutions, suggesting that governments have motivations to follow through on them regardless of public pressure. Upon the inclusion of time effects, however, r_replan is no longer significant.

Model XVI estimates the coefficient for the relationship between the interaction term FITxGNPC and renewable energy generation, which is positive and significant at .284 MW. This suggests that, when a FiT policy is in place, increases in wealth are associated with greater renewable energy generation than when one is not in place. This result holds and grows stronger (.36) with the inclusion of time effects. No other variables are significant with or without the inclusion of time effects (aside from r_fit, which has a negative relationship when GNPC=0, a theoretical impossibility).

When examining country effects, which account for .63 of variation in the outcome, I find that Ethiopia, Mozambique, Nigeria, South Africa, and Zambia are significantly and positively correlated with renewable energy generation. Again, three out of five are hydrostates, so I ran the model again to account for historical hydroelectric generation (Model XVI.1 in the Appendix). As expected, this renders the country effects from the hydrostates (Ethiopia, Mozambique, and Zambia) insignificant. As with Nigeria and South Africa, these country effects are probably linked to an economic variable not captured by the model.

Model XVII estimates the relationships of NREPs and FiTs on renewable energy as a share of total generation capacity. Both variables are significant at 1.3% and 5% respectively, suggesting that the presence of a FiT has a stronger impact than NREPs on the amount of renewable energy in generation portfolios relative to hydrocarbons. This may be because FiTs generally increase the short-term costs of electricity purchases, and may thus crowd out financial capacity for the purchase of hydrocarbons. The inclusion of time effects renders r_replan insignificant, while the r_fit coefficient slightly increases to 5.27%. The only significant country effects ceom from Ghana (-2) and Kenya (+16). I explain the reasons for Ghana and Kenya's respective failure and success in renewable energy generation in depth in the case studies.

Model XVIII estimates the coefficient for REPlanxDem's relationship with reshare, which is significant and negative at -11.79%. The estimate for FiT is positive and significant at 7.24%. The results are robust to the inclusion of time effects, with REPlanxDem remaining significant at -11.04% and re_plan continuing to be positive and significant at 7.27%.

Finally, Model XIX estimates the coefficient for the interaction FiTxGNPC's relationship with reshare. Surprisingly, the estimate is significant and negative, pointing the opposite direction of the same interaction terms's relationship with total renewable energy generation. This suggests that as wealth increases when a FiT is in place, it negatively impacts the share of renewable energy in the generation portfolio. How do we reconcile these two findings? A reasonable explanation is that economic growth in regulatory environments promotes renewable energy generation, but simultaneously promotes hydrocarbon generation at a faster rate. These results hold with the inclusion of time effects, although the coefficient decreases slightly from -.0015 to .0012%. Again, it aids comprehension to present this finding in standardized terms. A one SD increase in FITxGNPC (828.5$) is correlated with a -1% decrease in reshare, or 20% of a standard deviation in reshare (5%).

To further explore why economic growth has a positive effect on total RE generation while FiTs are in place, but a negative effect on RE's share of total generation, both independently and then to a greater extent when interacted with FiTs, I specify three additional models (see table X below). Model XX estimates the relationship between economic growth (IV) and total installed generation capacity from all sources (DV). Model XXI estimates the relationship between total installed capacity (IV) and RE as a share of total generation (DV). Model XXII estimates the interaction of total installed capacity and economic growth (ticXgnpc) on RE share of total generation.

Table XII: Results from Models XX-XXII

	(XX) tic	(XXI) reshare	(XXII) reshare
r_fit	670.1***		
	(6.91)		
gnpc	0.791***	-0.000104	0.0000198
	(16.55)	(-0.35)	(0.06)
tic		0.000235	0.000957
		(0.52)	(1.06)
rengentotal		0.00347***	0.00318***
		(4.16)	(3.57)
ticXgnpc			-0.000000164
			(-0.92)
_cons	834.4***	-1.404	-2.264
	(21.39)	(-1.56)	(-1.74)
N	541	204	204

t statistics in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Indeed, increases in GNPC exhibit a strong positive effect on Total Installed Capacity (.79). This result remains robust to the inclusion of time effects, but decreases slightly to .75. Neither increases in total installed capacity (tic) or the interaction of Total Installed Capacity and GNPC (ticXgnpc) have a statistically significant correlation with RE share, although the sign of the latter term is negative. As generation capacity increases, RE share does not necessarily decrease. Increases in wealth lead to greater electricity production overall (Model XX), including from renewables (Models XIV, XV). FiTs increase the amount of RE generation that comes from economic growth (Model XVI). But RE generation gains from economic growth may be outweighed by parallel trends in economically driven growth in generation capacity from other sources (Models XVII, XVIII, XIX, XXI, and XXII). FiTs may only increase RE shares of generation relative to other sources when economic growth is not driving increased overall generation, however this possibility will need to be further investigated.

Summary and Discussion

My analysis makes several important contributions to the empirical literature on electricity access and renewable energy growth in Sub-Saharan Africa. First, virtually none of the quantitative literature has systematically studied the role of national electrification plans in electricity access. All of the studies I reviewed focused extensively on the effects of the regulatory indicators in the PSRI (privatization, commercialization, etc) but none evaluate how these instruments perform in comparison to state planning (Dertinger & Hirth 2020; Imam et al. 2018; Jamasb et al. 2017; Erdogdu 2011, 2014; Karakezi & Kimani 2004). This is perhaps because of the lack of systematic data available on national electrification plans, which I introduce in my dataset. Second, while research identifies the importance of democratic representation for electricity access (Aklin et al. 2018; Trotter 2016; Min 2015), less attention has been paid to the ways this public demand is met through public policy implementation. I compare the effects of democratization on electricity access conditional on the policy choices governments make, and show that these choices matter. While there is some evidence that democratic gains under liberalized policy regimes positively impact electricity access (Model

VIII), these appear to be consistently outweighed by the effects of national electrification plans under similar democratizing conditions (Models III, IV, XII and XIII).

My findings make several important contributions to the literature on renewable energy growth in Sub-Saharan Africa. First, there has not yet been a systematic panel data analysis of the effects of Feed-in-Tariffs across Sub-Saharan Africa. Quantitative work has tended to focus more on economic and human capital variables and participation in the Kyoto treaty (Baye et al. 2021; Oluoch et al. 2021; da Silva et al. 2018; Ackah & Kizys 2015). Existing work on the effectiveness of FiTs in Africa has primarily come from case studies (Odarno et al 2017; Eberhard et al. 2018, Pueyo et al. 2016; Moner-Girona et al. 2016). I provide evidence that FiTs do not have a statistically significant impact on total renewable energy generation in Sub-Saharan Africa. This finding stands in stark contrast to evidence on the effectiveness of FiTs in other parts of the world (Jenner et al. 2013 (Europe); Smith & Urpelainen 2014 (United States); Sovacool 2010 (Southeast Asia), but is consistent with evidence from Latin America and the Caribbean (Jacobs et al. 2013) and the findings of case studies in the region (Ndiritu 2020; Pueyo et al 2016; Pegels 2011). This evidence merits reassessment of the heavy reliance on this instrument as a best practice for promoting renewable energy in the region (Urpelainen 2018; Alizada 2018). I investigate some of the mechanisms behind the failure of FiTs in the case studies in the next section of this work. In these studies, I show how policy regime incoherence, specifically incompatibilities between the incentives of the institutions responsible for implementing FiTs, account for their failure.

Second, I draw attention to the effectiveness of state planning in the renewable generation sector. I show that national renewable energy plans are more strongly associated with growth in total renewable generation capacity than FiTs. As with the literature on electricity access, research on renewable energy growth is consumed by a focus on getting markets right (see case studies and panel investigations in previous paragraph). More research must focus on the effects of state planning and investment. One obvious next step is to delve deeper into the variation within national renewable energy plans. In the case study on Kenya, I show how the country's state-led investments in geothermal energy have established the country as the regional leader in renewable energy production, and thus provide a crucial account of effective state planning.

Third, I find that while FiTs are not correlated with growth in total renewable energy generation, they are correlated with increases in the position of RE generation relative to other sources. I investigate the possibility that this derives from overwhelming positive effects of economic growth on other areas of generation, but do not find statistically significant evidence for this explanation. Another explanation worth exploring is whether the financial impacts of FiTs, which generally increase short-term generation costs, reduce the availability of funds for other energy purchases, causing RE generation share to increase relative to traditional sources.

Comparative Case Study

The previous section conducted a comprehensive, regional overview of successive waves of power sector reform in Sub-Saharan Africa and their impact on the region's power sectors, outlining the history and architecture of three major eras of power sector governance. The comparative case study that follows endeavors to identify the specific causal processes by which these reform efforts affected electricity access and renewable energy development through their impact on power sector policy regimes. Specifically, the cases identify instances in which interactions between incumbent regime structures and novel institutions and interests produced incoherent policy regimes that struggled to accommodate new policy goals. They also identify instances in which policy regimes, and the bureaucrats, institutions, and interests they comprise, resisted policy reforms in order to maintain commitments to universal electrification or renewable energy development. This section thus builds on the quantitative analysis by narrowing the analytical lens to identify micro and meso level mechanisms within regimes, such as policy feedbacks and strategies of resistance.

This comparative case study applies the model of policy regime coherence developed in the theory section to three power sectors in Sub-Saharan Africa: Ghana, Kenya, and South Africa. The model examines how variations in regime structure, augmented through the dynamic effects of waves of power sector reform, have produced different levels of regime coherence, amounting to variations in success at pursuing sequenced policy goals of industrialization, universal electricity access, and renewable energy development.

The cases are selected on the basis of Mill's Most Similar Systems (MSS) design. MSS selects cases on the basis of similarities in control variables, and differences in independent variables.

The selection of Ghana, Kenya, and South Africa controls for the following variables: regional (they are all in Sub-Saharan Africa), democratic (the countries were all part of the third wave of democratization, and transitioned from various forms of authoritarianism to multi-party democracies over the course of the 1990s), Anglophone, Western bloc (with the exception of Ghana in the immediate years after independence, all three countries have been more aligned with Western powers than the Soviet-bloc), and period of independence (all three countries became independent from Britain in the period from 1959-1963).

The countries vary in the independent variable (policy regime structure) cross-sectionally and over time. Each country had similarities in the developmental regime period, but with somewhat different goals. Each country experienced similar external pressures to reform their power sectors, but implemented different reforms at different times, under different circumstances, and to different ends.

The countries also differ markedly in their energy resource endowments, especially in the period following independence prior to the discovery of additional resources or the advent of new technologies, each of which reflect government policy choices and are thus captured by variation in the regime variable. Each country roughly represents a distinct class of Sub-Saharan African energy economy; Ghana is richly endowed with hydropower resources, South Africa has abundant hydrocarbon resources (coal), and Kenya has few traditional energy resources and has historically relied heavily on imports to meet its electricity demand.

Data for the case studies was compiled through an exhaustive review of International Bank for Reconstruction and Development (IBRD)/ World Bank Reports, academic and journalistic accounts, and official reports and legislation issued by the governments under study. Data for the case study on Ghana was supplemented with extensive fieldwork in the country. Over two months, from January through March of 2020, I traveled to Ghana and met with ministry officials, policy specialists, activists, community leaders, and members of the general public in Accra and the rural town of Abakrampa in the Central Region. Data for the case study on South Africa was also supplemented with more limited interview evidence, as the fieldwork was cut short by a global pandemic.

The case studies serve to prove a central point of this work: African countries' struggles to advance the sustainable development agenda are rooted in complex institutional problems that result from decades of path-dependent behaviors interacting with reform efforts that inadequately respond to these persistent dynamics. The policy literature's focus on specific instruments and institutions, as well as the general bias in favor of market-oriented approaches to development, are clouded by a myopia that ignores the enduring role of history in shaping the effectiveness of contemporary policy making. The bureaucrats I encountered in the Ghanaian public service were generally pure in both their intentions and actions to improve electricity access and expand renewable energy. Yet many of their efforts are rendered ineffectual by dysfunctions that can only be recognized when one studies the sector holistically, as complex policy regimes constituted by a historically accumulated cast of actors and institutions that frequently struggle to function with sufficient unity of purpose to accomplish their important goals.

Power to the People: Ghana's Path to Universal Electricity Access

The Developmental Regime

Ghana's developmental power sector policy regime was built around an institutional core of tightly interwoven domestic actors (the Presidency, the Ministry of Energy, the Electricity Company of Ghana, the Volta River Authority) and external actors primarily responsible for financing the regime (the International Bank for Reconstruction and Development/World Bank, the United States Agency for International Development, the Kaiser Aluminum Company)(IBRD.A 1957,1960). The structure and interests of this regime are rendered in Figure 16 below. In the developmental period, this fairly simple and institutionally coherent regime coalesced around a policy of industrialization that leveraged large combinations of state-capital and foreign developmental assistance to build major power sector infrastructure such as the Volta River Hydroelectric Project. This period oversaw significant expansions in the country's total installed capacity, from 103.2 thousand Kw in 1960 to 900 thousand Kw in 1980 (United Nations Statistical Yearbook 1965, 1985). This growth in capacity was primarily leveraged to support large scale industrial operations and electricity access for residents of urban centers, despite the fact that the high volume electricity produced from the Volta Dam often exceeded the demands of domestic economic activity (IBRD.A 1968).

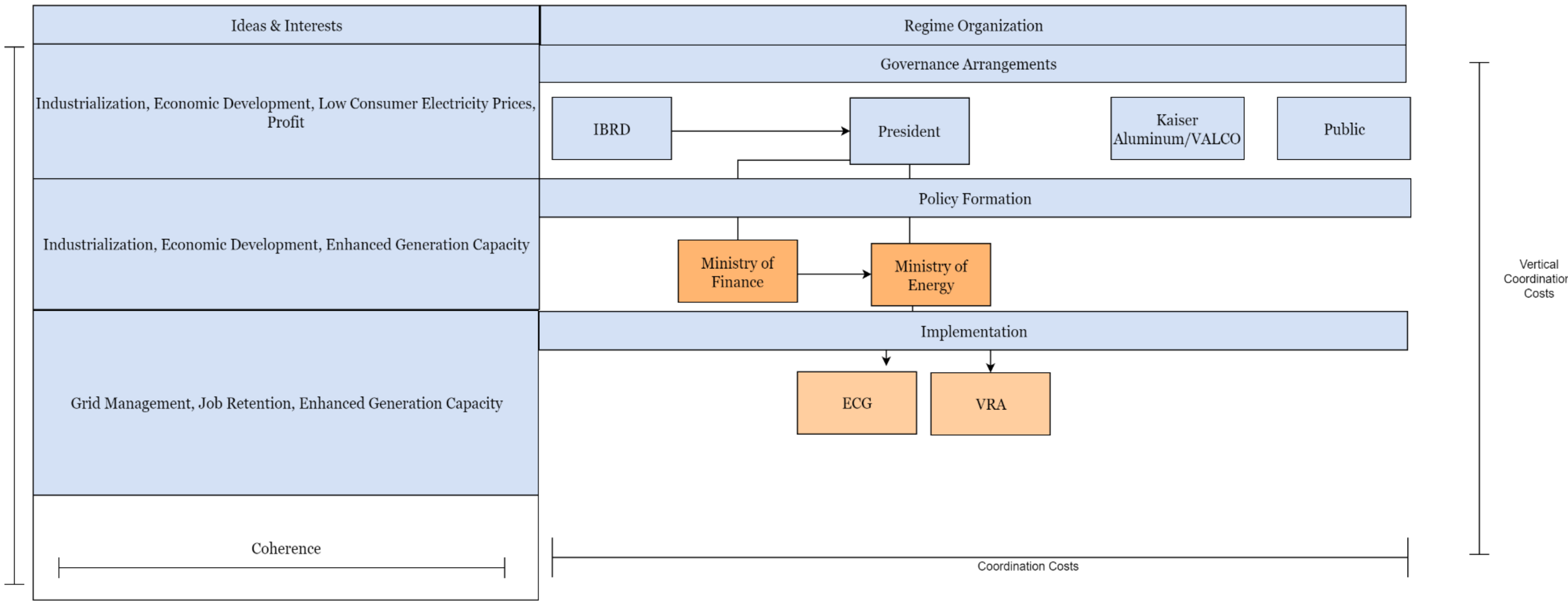

Figure 16: Ghana's Developmental Power Sector Policy Regime. Source: Author

In the late 1960s Ghana's postcolonial economic model began to struggle. Financing state-owned enterprises with expropriations from the agricultural sector via state marketing boards became an unviable fiscal strategy as global commodity prices sank. This also dried up foreign exchange reserves, and thus the ability of the government to continue artificially deflating the price of food imports by appreciating the cedi (Bates 1981). Falling incomes, unpaid public sector employees (including the military), and skyrocketing food prices did not take long to manifest themselves in political instability, and a military coup in 1966 deposed the government of Kwame Nkrumah, which had held power since independence. This began a thirteen year period of political instability in Ghana in which political power rotated between democratically elected leaders and military coups, and in which the nations' geopolitical alignments shifted from the Nkrumah era's courting of the Eastern bloc towards a more open embrace of the West and its developmental institutions. This new political environment placed dual pressures on the Ghanian public sector: first, it faced political instability at the level of the national executive, and thus could not rely on the support of a consistent principal backed by democratic legitimacy. Second, national leadership faced pressure from Western developmental institutions to cut unproductive public sector investments (Herbst 1991; Bates 1981). Amidst these pressures, however, the developmental power sector regime not only remained institutionally intact but continued a fairly robust program of infrastructure investment backed by World Bank financing. Evidence of this continued function is found in the numerous Bank-funded power sector projects that took place following the coup.

In 1966 the power sector undertook a six year development program focused on rehabilitation and expansion of distribution systems in Accra, Tema, Kumasi, and Takoradi which was co-financed through a $7.5 million loan from West Germany and British Supplier credit, $4.7 million provided by ECG and the GoG, and $17.6 million through an International Development Assistance Credit from the World Bank. A Bank report discussing the investment noted that “the distribution facilities are essential to meet the demands for power and to utilize to the maximum extent energy available from the Volta River Project by replacing diesel generation in areas already connected to or to be connected to the VRA transmission system.” The report further notes that “ECG would be a suitable Beneficiary of an IDA Credit. Since the decree establishing the Corporation in early 1967 satisfactory efforts have been made to correct inherited deficiencies in organization, staff, management, administration, and accounting,” (World Bank, 1968).

The fact that the developmental power sector policy regime remained institutionally sound and continued to secure international financing following the 1966 coup reflects how little the overarching ideas and interests surrounding the power sector had changed since independence. Domestically, national executives continued to see the power sector as instrumental to the country's economic progress, which was still seen as dependent on rapid industrialization (IBRD.A 1967). That same belief in the sector’s ability to deliver economic progress benefitted executives’ political futures, whether that meant cementing elite coalitions through industrial development or expanding employment opportunities for the general public (Miescher 2014). Externally, while the IBRD had always maintained reservations about the fiscal consequences of Nkrumah’s proliferation of state enterprises, they did not view the power sector as an unproductive area of public investment, but rather shared the domestic view that expanding electricity supply could lead to greater productivity in areas of comparative advantage such as mining, smelting, and agriculture. Further, while the institutions responsible for implementation had been divided into two tightly interconnected, vertically-integrated organizations (ECG and the VRA), not only was the bank not recommending further decentralization, but it was actually in active talks with the government about the organizational benefits of merging the two organizations (IBRD 1970).

The period of political instability came to an end in 1979 with the military coup that placed John Jerry Rawlings in power. The Rawlings' government engaged in a far-reaching campaign of fiscal austerity and monetary discipline that reshaped the Ghanaian public sector (Tsikata 2001). Again, however, not only did the developmental power sector policy regime remain fully intact, but in 1989 the Rawlings' regime set in place a policy framework known as the National Electrification Scheme (NES) that would lead to the most significant expansion in electricity access that had yet occurred in the nation's history.

Established in the years leading to Ghana's first democratic election since Rawlings' rise to power, the NES reflected Rawling's political prerogative to extend public benefits into the long-neglected northern regions of the country, which would end up forming a critical aspect of the political coalition that kept him in power through the 1990s. The NES set a goal of universal electricity access by 2020 (Kemausuor & Ackom 2017). According to a senior official at the Energy Commission interviewed by the author, Rawlings' government began a process of electricity expansion in return for political support that would lead to a mantra now widely traded in the country's rural regions, "no electric power, no political power."[14]

Incorporating the policy goal of extending electricity access did not appear to stretch the capacities of the developmental regime. The National Electrification Scheme was designed so as to inlay the expansion of electricity access into the organizational fabric of the developmental regime by assigning the responsibility of grid extension and management on the same limited set of actors (the MoE, ECG, and the VRA) rather than establishing new institutions or policy mechanisms. This kept coordination costs constant, and layered no new rules or ambiguities on the regime. A World Bank evaluation report of the Northern Grid Extension Project speaks to the

[14] See interview B.

effectiveness of the developmental regime's implementation of the NES: "the project was well prepared and implemented with commendable efficiency. The facilities included in the original scope of the project were completed below budget and on schedule." (World Bank 1993; ii).

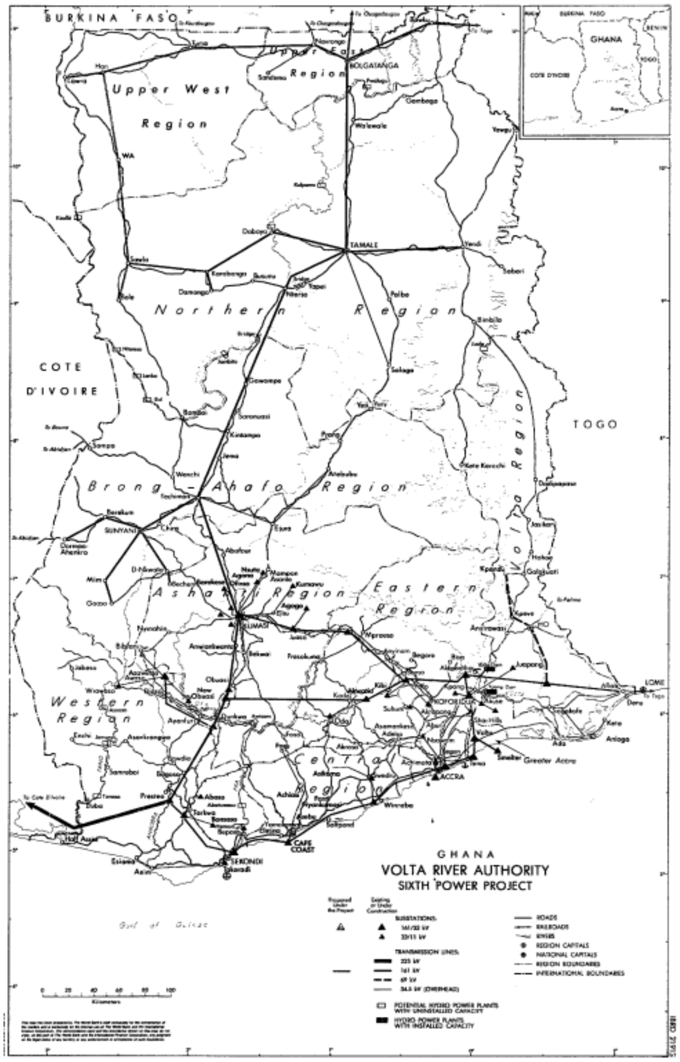

Figure 17: Ghana's Sixth Power Project

Similar to historical generation projects, the core of financing for the expansion came from direct investments by the GoG (with assistance from the World Bank), invested through the MoE, which laid plans for grid expansion and laid transmission lines. ECG continued to assume operation of any extensions to the grid, receiving proportionate appropriations to cover costs from the MoE. The large baseload of installed generation capacity that the regime had developed over previous decades provided sufficient resources to support the expansion of the grid for the first ten years of the program, a period which oversaw the electrification of 2350 communities (approximately 56% of the original 4200 targeted communities) (Kemausuor & Ackom 2017). Figure 17 presents the plan of the Volta River Authority's Sixth Power Project, which continued the previous Northern Grid Extension Project's ambition to expand electricity access deep into the country's northern regions by linking them to the Volta River hydroelectric facilities in the Southeastern Volta Region. To this day, the Volta and Northern Regions remain strongholds of Rawling's National Democratic Congress (NDC) party, demonstrating the longstanding political significance of these investments[15].

A Bank report issued to assess the Sixth Power Project characterizes the longstanding relationship between the Ghanaian power sector policy regime and the Bank. "The Bank Group has been closely associated with Ghana's power sector for almost thirty years. The government has requested our further assistance in developing the sector. With VRA, the Bank Group's role has evolved from that of project financier to catalyst, facilitating major co-financing with a small IDA contribution, as was also the case in the Northern Grid Project," (IBRD 1990). While the regime held tightly together in an essentially continuous fashion from independence through 1990, a series of events in the mid-1990s began to challenge the decades' old arrangement.

[15] See Interview B. In a separate work, I examine the relationship between the distribution of electricity and political party affiliation. I find that while the early extensions of the grid under JJ Rawlings followed political incentives to win support in the northern regions, there is limited evidence that decision about the grid were political in the 2000s or 2010s. However, I do find that there is a micro-politics of electrification that plays out at the local level and through the control of labor for the construction of distribution lines and electricity meters.

Partial Liberalization

The calls for power sector liberalization beginning the mid-90s were initially met with resistance from the Rawlings government. Already set upon an aggressive path to national electrification, the power sector policy regime was actively extending transmission and distribution infrastructure and the Rawlings' administration had already received political rewards for its efforts in the North, heading off a challenge from Adu Boahen and the newly formed New Patriotic Party (NPP) in 1992. Extending electricity access continued to be perceived as politically, economically, and socially beneficial. Institutionally, the centralized power sector regime functioned effectively as an arm of the state's developmental and political priorities. Strong vertical accountability between the management of ECG, the Ministry of Mines and Energy, and the Presidency provided a clear link between sector governance and political action that voters could recognize and reward. So long as the president's political fortunes remained tied to effective implementation, opportunities for shirking and self-enrichment were scant (Tsikata 2001). However, in 1993 a drought led to sweeping power cuts across the country, exposing the liabilities of the country's overreliance on hydroelectricity. In a bid to diversify the sector, the GoG sought support from the World Bank for the construction of a thermal power plant. The Bank offered financing in exchange for the government's adoption of the liberalization model of power sector reform. The Ghanaian government's response to this condition was a strategy of outward placation and internal regime resistance that significantly stalled the implementation of even the most basic reforms (Gore 2019).

The GoG began by issuing a framework for reform which established the Power Sector Reform Committee (PSRC), which would study and make recommendations about how to reform the sector. The Bank took this as a sufficient commitment to reform and issued a $175.6 million loan for the thermal plant. Three years later, the PSRC issued a plan that would 1) establish an independent regulator, 2) unbundle the Volta River Authority to allow competition in generation and distribution, 3) corporatize state-owned entities, and 4) make tariff-setting procedures more transparent. While the reform recommendations represented the consensus at the Bank, their implementation encountered significant resistance that led to long-term delays. The privatization of the Volta River Authority was opposed by VALCO, which feared the elimination of the aluminum company's long-term electricity contract that was a cornerstone of the developmental regime's program of industrialization. VALCOs' continued protests delayed the privatization of the VRA for nearly a decade. The Ministry of Mines and Energy's attempt to raise tariffs approximately 300% was met by swift resistance from civil society, which held ongoing protests which successfully appealed to the Rawlings' administration to halt the increase. The administration did establish the Public Utilities Regulatory Commission (PURC), which it tasked with establishing tariff-setting guidelines. And while the PURC moderately raised tariffs in 1998 and adopted guidelines in 2000, the institution has never maintained a policy of setting cost-reflective tariffs (Pueyo 2018; Kemausuor & Ackom 2017; Interview A, B). Throughout the 1990s, amidst these pressures to reform, the energy policy regime continued to execute its responsibilities, with the MoE, ECG, and VRA working together to extend distribution and transmission and invest in generation capacity.

Some aspects of the liberalization era reforms proved less controversial. Parliament passed legislation opening the sector to private investment and establishing the Energy Commission, which would retain licensure powers over the private sector. In 2000, the EC granted the first license to an IPP for electricity generation. While they were never privatized, ECG and the VRA were corporatized in 2000, and set under the direction of independent boards of directors. In 2005, following a major energy crisis, the parliament passed legislation authorizing the unbundling of the VRA (Gore 2019). Figure 18 displays the regime as of 2009, following the implementation of the reforms. It is important to ask how the reforms that were implemented interacted with the incumbent developmental policy regime.

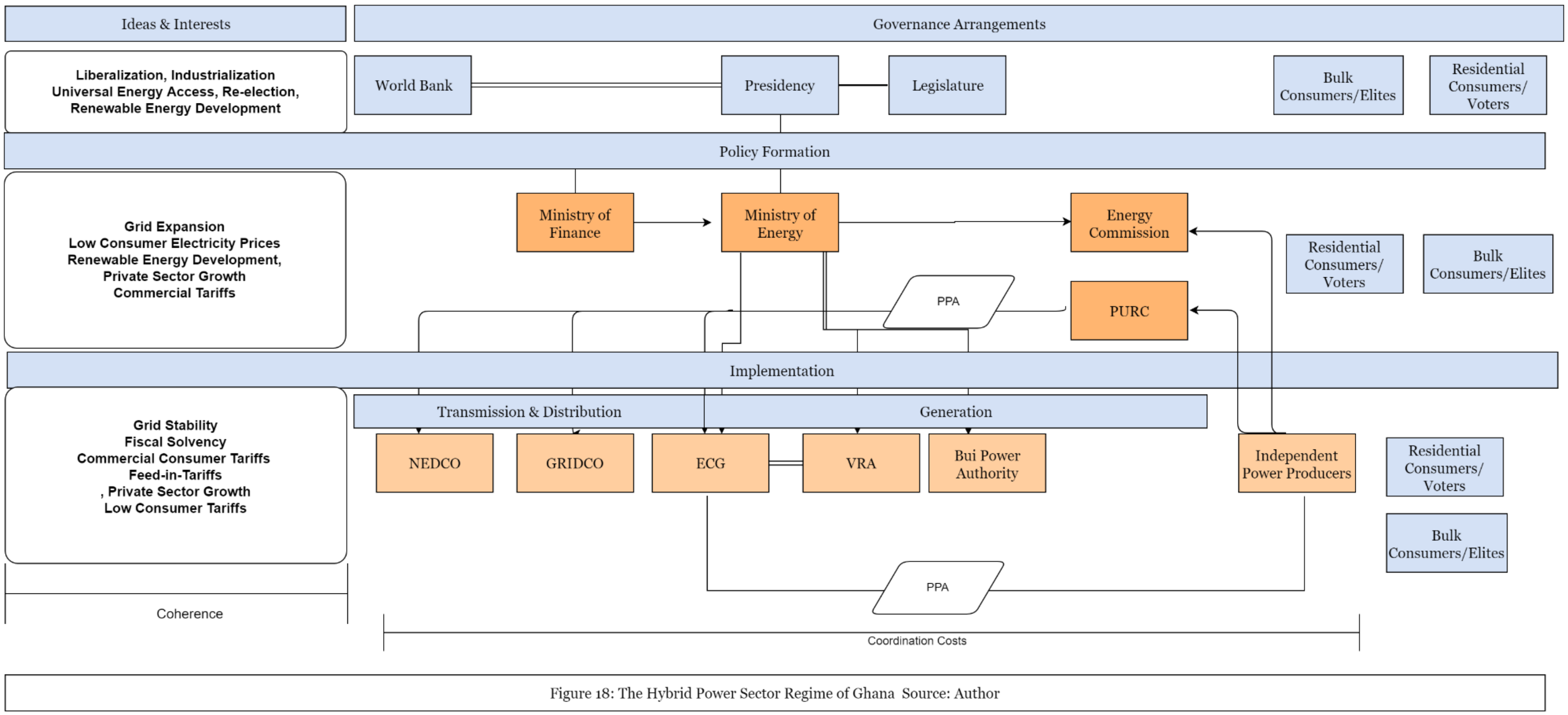

Figure 18: Ghana's Hybrid Power Sector Policy Regime

Institutional Layering of Commercialization

The developmental power sector policy regime was structured around centralized state control over generation, transmission, and distribution. In the early developmental period (1960-1980) this regime's purpose was to serve the industrialization project. In the latter stage of the developmental regime (1980-2008), the regime served the additional purpose of rapid social electrification. The government's selective implementation of the liberalization reform model reflects its ongoing commitment to maintaining the developmental regime's capacity to continue the NES while accommodating the changing ideas and interests of IDIs. However, while this implementation did not threaten the government's ability to make good on its commitment to expanding electricity access, it did create opportunities for the strategic shirking of new initiatives designed to promote renewable energy development. This shirking occurred because, while some regime characteristics changed, government priorities and the core of the developmental regime did not. The regime characteristics that did change were a) a layering of new institutional rules that allowed state-owned enterprises to selectively implement legislative obligations b) a shifting of the generation responsibility to the private sector. While the power sector policy regime has essentially ignored its obligations to promote renewable energy, it has continued to serve the developmental objectives it was created around, both through its traditional policy mechanisms and the augment of private thermal generation.

First, I will address how the policy sector power regime retained its ability to enact the NES in spite of partial implementation of reforms. Second, I will focus on how the layering of new institutions and rules created conditions that would allow for the subversion of subsequent renewable energy initiatives. Third, I will discuss how, rather than promoting renewable energy production, liberalization has catalyzed private sector growth in the traditional hydrocarbon generation industry.

From 1994 to 2008, the government resisted reforms that would threaten the regime's ability to continue implementing the NES. Implementation of the NES required that the government retain control over the operation of generation, transmission, and distribution infrastructure, as well as the power to keep tariffs at subcommercial rates that were affordable for the nation's poor. Privatization was not implemented as it would have ceded management control of ECG and VRA to investors, and thus the ability to reject the operational obligations of the NES. Commercialization, however, only required that the companies formally incorporate, adopt commercial reporting practices, and institute boards of directors. Since there was no issuance of equity to private shareholders, board seats were often given to government officials loyal to the Ministry and Presidency, and thus represented only a formal change to the firms' management structure (Kumi 2017, Interview D). These individuals remained committed to the implementation of the NES, and thus the core implementing institutions of the developmental regime remained intact.

The passage of a liberalization law simply allowed private actors into the generation, transmission, and distribution space. However, the government retained monopolies in transmission and distribution, and thus held a monopsonistic position in the generation sector. The liberalization law did not preclude the state from continued direct investment in the generation sector, and the inclusion of private actors only served to benefit the developmental regime. First, the government retained total formal control of access to the market through the Energy Commission, whose director was appointed by the President and held licensing power over private activity (Kumi 2017, Interview B). Second, if firms were granted a license to operate in the sector, they had to provide pricing that was acceptable to the government, which remained the single buyer of electricity. If a private generation firm could meet those conditions, it would only serve to benefit the policy regimes' goals of expanding electricity access. So rather than truly "market-driven" pricing, the outcome was essentially state-set pricing.

The creation of an independent sector regulator in the Public Utilities Regulatory Commission represented the governments' biggest concession to the Bank's proposed reform model. However, the PURC was not seen as an independent tariff-setting authority, and has consistently bent to pressure from the executive to maintain subcommercial tariffs, allowing the government to continue its provision of electricity to the nation's poor(Gore 2019). Even when the PURC raises tariffs, the government generally intervenes by appropriating funds to PURC to reduce consumer bills (Interview B).

The government and the regime's resistance to full implementation of the reforms preserved sufficient coherence around the long-held priority of extending electricity access, which continued at more or less the same rate that began in 1989. However, commercialization of ECG and the VRA did result in a layering of new institutional rules of corporate governance that created a rational-legal basis for the firms to resist future legislative obligations that did not rank as high as electricity access on the executive's list of priorities.

The Failure of Renewable Energy Development

In 2011 the Ghanian Parliament passed the Renewable Energy Act, which amongst other things set a goal of 10% of electricity generation from renewable energy sources by 2020 (Kumi 2017). While this may have been an unrealistic goal in the first place, the fact that Ghana has essentially made no progress whatsoever in increasing the share of renewable energy generation in the power sector is a result of a policy implementation failure rooted in the regime incoherence that emerged following the power sector reforms of the late 2000s.

While the goal of electricity access thrived under a coherent, unified developmental regime for almost two decades, the goal of renewable energy development was conceived in a policy regime altered by the implementation of liberalization reforms that lacked a similar coherence around this new policy goal. The incoherence that has prevented the expansion of renewable energy is a product of the misalignment of the administrative responsibilities and policy instruments of the Renewable Energy Act and the new layer of institutional incentives the liberalization reforms had placed on the energy policy regime, in particular the solvency imperative commercialization placed on the major state-owned entities such as ECG and VRA.

The Renewable Energy Act of 2011 designated the Energy Commission as the pilot agency for the Act's implementation. That the Energy Commission, and not the Department of Mines and Energy, was chosen as the pilot agency reflected the new role the government believed the private sector would play in the power generation sector. Whereas the DoME (previously the DoE) had traditionally governed the power sector through command-and-control tactics such as those exhibited in the early development period, the Energy Commission was a "steering" agency created as part of the liberalization model to accomplish national policy objectives through the governance of private sector activity rather than direct intervention. To this end, the EC was charged with overseeing the implementation of the three primary policy instruments designed to incentivize (rather than directly invest in) renewable energy generation: the Feed-In-Tariff and Net Metering Schemes and the Renewable Energy Fund.

Feed In Tariff

The Feed-In-Tariff (FiT) is a widely adopted policy in the developed world designed to incentivize IPPs by offering long-term, cost-reflective power purchase agreements (PPAs) that guarantees investors an acceptable rate of return. Over time, the FiT rate decreases in order to incentivize IPPs to compete by reducing production costs. In Ghana, the FiT rate was to be set by the PURC in consultation with the EC based on the type of technology used to generate electricity, assurance of the financial integrity of public utilities, and a balancing of investor interest against the net effect of the cost of the renewable energy on consumer tariffs. The PURC and EC were also charged with specifying a percentage of SOE power purchases that were to come from renewable sources. The REA required both that the SOEs sign PPAs approved by the PURC under the FiT rate, and that they connect IPP's generation infrastructure to the transmission grid, the costs of which were to be passed to the IPP through the tariff rate.

The FiT program initially attracted some investor interest, with the EC granting 124 provisional Wholesale Electricity Supply Licenses for utility scale grid-connected renewable energy (RE) projects in the years following the passage of the REA. However, of these 124 licensees only three projects have resulted in production. An exchange from an interview between the author and several senior officials from the Ministry of Mines and Power conducted in February 2020 illustrates how this breakdown took place.

Senior Official #1: We tried to encourage renewable energy by using the Feed-in-Tariff policy. The FiT rate was set at 21 cents/kwH, which is very high, which was an attempt to encourage investors to come and develop these systems. As time goes on, investors started coming in, and this started impacting the cost of electricity, as all the other (non-RE) providers would just undercut the FiT rate by a small amount. And so it wasn't impressive. And so we decided to go to a competitive tendering model.

Interviewer: So who made this decision to switch to the tendering model?

Senior Official #1: It was a ministry decision. So we went to the tendering model. But then we had a problem, people would apply and get their provisional licenses, get the approvals by the Energy Commission, they would give them a provisional license, which was open, and then they don't build. On paper we had a lot of people who registered, subscribed to a lot of megawatts, but then they never show up.

Interviewer: So they never show up?

Senior Official #1: Exactly, So it is a procedure, so you go to get the PPA, so now, we also give the energy commission, so we make sure the provisional license is capped at one year, so you can get all of your licenses, so you can go and look for your offtakers. So now the new ones which came in, they signed the power purchase agreements, but then they cited financial reasons for backing out. So in view of that, we have put a moratorium on utility-scale solar from IPP. You can only do rooftop. Unless we exhaust those who have signed the PPAs, then we cannot sign anymore.

So based on this experience, it keeps shaping our policy, and the way we contract RE. Also, we realize we have to do some investment in the grid. We have to do some tech exercise. So when people are looking to subscribe, we have to make sure only this part of country. So we are going through a lot.

And, so far, it may look as if we have not done much, but we currently we have 14, 20 , and 50 MW.solar projects.

Interviewer: These are state driven?

Yes, these are purely state driven. So we are looking at all these other PPAs that have signed up, but we have given them timelines. But currently we are overcapacity, so we have scheduled them to come online. If demand changes, all the policies may change, and we may bring down the moratorium. And then the state-agencies ones will keep going on. So in terms of REs, we are doing well but we are being cautious. Mostly we need grid stability, and wind and solar are very variable.

Interviewer: What has gone on with ECGs issues collecting payment? As I understand it there are significant issues with arrears. Can you give me your overview?

Senior Official #2: The biggest challenge is the payment from the ministry departments and agencies. So that's where the problem is. According to ECG, if they were to collect from agencies, the collection rate would be between 90-95%. So now, what do we do with the ministries? You also realize the tariffs are not at cost-recovery. So now the government is also saying, to mitigate the fiscal impact, they pay the IPPs for the excess capacity, which is much much more than what they owe. So, indirectly, if you do the offsetting, ECG is rather owing them.

Interviewer: Can you repeat that?

Senior Official #2: So IPPs are demanding their payment for their excess capacity. Someone has to pick that bill up. So government is paying those bills on behalf of ECG, for their IPP bills.

Interviewer: So if you took that into account, it would offset..

Senior Official #1: Even outstrip it.

Senior Official #2: Exactly, for the system to be financially stable, government is trying to pay their bills through the budget allocations. So government is giving them the money directly from the budget. In that case, they take care of the excess capacity.

Interviewer: So then why wasn't the priority for the government to pay the IPPAs directly rather than pay ECG and have them pay.

Senior Official #2: They're private sector. So they have a payment guarantee. So if the government does not pay, it affects our sovereign credit.
Source: Interview A - Conducted by Author With MoE Officials in February 2020. Full transcript and recording in appendix.

The failure to convert investor interest into electricity generation is generally attributed to breakdowns in the negotiations between IPPs, the PURC, and SOEs over the terms of PPAs. One issue has been the ten-year contract timeline stipulated in the REA, which is perceived by investors as too short to guarantee cost-recovery unless tariff rates are sufficiently high. Yet in many cases, the PURC approved PPAs offered sufficiently high tariffs; the problem lay with an underlying lack of confidence in ECGs willingness and ability to honor the payment obligations required under the REA. In the case of FiTs, as in the other policy instruments discussed in this section, ECG cited new institutional rules layered under commercialization in order to avoid shirk legislative obligations to develop renewable energy resources.

Net-Metering

Net-Metering schemes are a popular, widely deployed policy instrument designed to stimulate consumer demand for renewable energy technologies by allowing grid-connected customers to sell electricity generated from small-scale home generation systems (such as solar and mini-wind) back to the utility company. This purchase is generally conferred through credits against consumers' home electricity bills. In sunny locations, consumers can generate enough electricity to incur credits in excess of their debts to the utility, which the utility may either pay to customers directly or simply continue to rollover into more credits.

The REA provided for the creation of the National Rooftop Solar Program, a net-metering scheme which would incentivize residences to purchase solar panels and feed solar energy back into the grid. In an initial pilot rollout, thirty-three net meters were successfully installed at specified commercial residential facilities. However, in 2017 when the program was to be scaled up following the success of the pilot program, ECG raised concerns to the EC and PURC that the program would incur large revenue losses, and that the costs of the storage systems to retain the excess generation from the net-metered homes should be passed to the consumers. While the EC and PURC have stated that they would work to reinstate the program, they have yet to come to an agreement with ECG and the NRSP remains on hold.

The ease with which ECG was able to preemptively halt the implementation of the net metering scheme demonstrates the strength of the company's position within the power sector policy regime relative to the more recently created institutions in the EC and PURC, in whom the legislature had vested control over the policy. That ECGs explanation for their rejection of the policies' implementation was its potential impact on their fiscal situation is another example of how the firm leverages the layered institutional rules of commercialization to shirk policy implementation.

The Renewable Energy Fund

The Renewable Energy Fund was created by the REA to "provide financial resources for the promotion, development, sustainable management and utilization of renewable energy sources." To this end, fund monies were to be appropriated to support "the provision of financial incentives, feed-in-tariffs, capital subsidies, production-based subsidies and equity participation" for grid-connected RE, mini and off-grid RE, RE projects outside the power sector, and "any other renewable energy activity the Commission may determine." The Fund thus represented both an attempt to assist in the financial costs associated with the implementation of the two primary policy instruments discussed above (FiT and net-metering) as well as the closest approximation of a vehicle for state-capital investment in the RE sector though equity participation and direct infrastructure investments.

The problem with the Renewable Energy Fund is quite straightforward; it has never been significantly funded. Per the REA, financing for the fund was to come from Parliamentary appropriations, premiums collected by the Electricity Commission from IPPs applying for production licenses, appropriations from the general Energy Fund established under the Energy Commission Act of 1997 (which had established the EC and provided it with a discretionary fund), a parliamentary approved portion of government levy from the export of domestically produced biofuels, and “any other monies that are provided by the Minister Responsible for Finance.”

In practice, because the Renewable Energy Fund was under control of the Energy Commission, it was expected that the main source of funding would come from the EC’s appropriations of monies from its general Energy Fund. However, the Energy Fund itself is financed by a levy on petroleum products, which has provided only limited contributions, and thus the EC has not set part of the EF aside to support the REF. The EC’s financial weakness is a reflection of its status as a “steering agency” whose financial resources are marginal compared to the central institutions of the developmental regime, such as the Ministry of Mines and Energy.

Exploitation of Ambiguities in a Layered Policy Regime

The conclusion that ECG’s refusal to honor its obligations to the FiT and Net-Metering programs is a selective exploitation of the layered commercialization rules is evidenced by the fiscal commitments the firm does make. First, one of the primary sources of ECG’s financial insolvency is a lack of revenue collection from government customers, which reflect 65% of the firm’s rolling arrears (Pueyo 2018, Interview A). ECG’s adherence to its solvency imperative is janus-faced; hawkish when it comes to meeting the costs of renewable energy policies, and profligate when it comes to holding government debtors accountable.

The political logic of ECG's reluctance to collect arrears from government accounts is well-illustrated by an exchange between myself (interviewer) and a senior official at the Energy Commission from an interview conducted at the Commissions' offices in Accra in February of 2020.

Interviewer: How does the government continue to not pay ECG bills. Does it have to do with the way the management is appointed? Senior Official: It is a chicken and egg scenario. If you are a business person at a utility company, you have to go to the consumer and say pay me for this amount of electricity. If the consumer does not pay, you disconnect the person. You get it. As you indicated, government is the biggest consumer of electricity. Number one, it does not pay, it doesn't pay all its bills. Now, interestingly, government is the one who appoints the management of ECG. Will you bite the hand that feeds you? That's the point. Will you bite the hand that feeds you? Secondly, when ECG is going for a loan, to expand its infrastructure, Government is the guarantor. Interviewer: So government can continue to approve loans for ECG expansion, not pay their bills, ECG can grow, but just keep on writing off the arrears… Senior Official: (laughs) Yes! Just keep writing off the arrears! That is how complex it is…
Source: Interview B Conducted by the Author February 2020 at the Energy Commission, Accra. Details, full transcript, and recording in appendix.

Secondly, while ECG has avoided signing PPAs with renewable energy IPPs for financial reasons, they have not been reluctant to sign and honor PPAs with hydrocarbon-based IPPs. In the period since the opening of the generation sector to private investment, the overwhelming majority of new generation capacity from the private sector has been from thermal sources (Pueyo 2018). As noted in the excerpted exchange from Interview A, part of what led to the growth of the thermal generation industry was a perverse incentive resulting from the FiT; when the government set the tariff rate high (even on global terms) in order to attract RE investment, it effectively served as a price signal for traditional hydrocarbon providers, who then increased their tariffs to just below the FiT rate. This incentivized greater investment in hydrocarbon generation, which now dominates the subsector (Kemausuor & Ackom 2017). Another ironic effect of this process was that the combination of increases in generation from private sector PPAs from hydrocarbon providers and approved but unmaterialized bids from renewable generators led to an oversupply of generation capacity, which resulted in the Energy Commission suspending the issuance of generation licenses to renewable energy IPPs in 2017 (Aboagye 2021, Interview A).

Conclusion

ECG's substantial investments in private thermal production and its subsidization of government electricity consumption reflect the continuing dominance of the central ideas, interests, and institutional relations of the developmental regime, in which a tightly knit coalition of state-owned enterprise management, ministry officials, and the office of the presidency maintain a cross-institutional, coherent focus on the expansion of electricity generation and distribution. The REA's failing was not embedding the goal of renewable energy growth into the structure of the developmental policy regime. Instead, the REA's reliance on market-based mechanisms, the success of which was contingent on buy-in from state entities with countervailing priorities, rendered their success vulnerable to SOEs exploitation of ambiguities of responsibility created by the layering of commercialization rules.

The fact that the REA was designed in such a way that the policy regime could simply not implement it by adhering to an alternative set of legal-rational obligations is ultimately a reflection of the priorities of the regimes' principals at the governance arrangements level. If the president, who has complete control over the management of the relevant institutions, so desired, he could force the regime to implement the law. But the president's priorities, and those of the policy regime, continue to focus on the goals of rapid capacity expansion and access, goals for which the financial costs of FiT, Net-Metering, and the Renewable Energy funds do not fit in. Yet the REA's creation of a policy framework for renewable energy has redirected the focus of scholars away from the underlying political-economic considerations that make it fail, and towards improving the framework itself. Focusing on technical improvements to the framework is problematic not only because it misses the fundamental reason why the framework has failed to produce results, but because it distracts from the underlying political-economic circumstances that perpetuate its failures.

The incoherence that produces this dysfunctional implementation is not lost on the bureaucrats at the center of the regime. During an interview with several senior MoE officials, the Deputy Director for Nuclear and Alternative Energy said the following:

Senior Ministry Official: "One way we are doing this now, is being more collaborative. We used to have all these different organizations and they planned separately, and these were not synced. But this power sector master plan has brought everyone together, with a project coordination team with governmental background. So all of these institutions have been brought together to plan on a common ground and not be siloed. So now there is consensus. Even in the demand numbers there is a consensus appraoch.So even if governments change, the institutions are still there, and have consensus. And if they have been brought together in such a form then going ahead will not be that difficult."
Source: Interview A - Conducted by Author with MoE Officials - February 2020

The Director's quote suggests that senior officials recognize that a lack of coordination and planning across the regime is at the heart of failures such as that of the REA thus far. Furthermore, bureaucrats are seeking to remedy this incoherence through recent initiatives such as the Power Sector Master Plan and the Energy Sector Recovery Program. While Ghana has thus far struggled to get its renewable energy program off the ground, and its reliance on market-based instruments and persistent split incentives across the power sector regime's institutions do not necessarily augur improvement, the country has fared far better than many of its neighbors in its preservation of the core regime relationships that have managed the successful implementation of the NES. Incorporating renewable energy into this effective, coherent, and centralized administrative structure may suggest a useful path forward.

Control, Coherence, Chaos: The New South Africa's Developmental Decade and Descent Into Incoherence

South Africa is a regional leader in electricity access, but its performance in this regard has declined since the onset of a supply crisis that began in the mid-2000s. Its performance on renewable energy development, while lauded by many in the development community, is lackluster in absolute terms and woeful relative to its potential. This study makes three regime-contingent points about the country's progress towards energy access and renewable energy development. The first is that regime incoherence emerging from the implementation of liberalization reforms is largely responsible for the supply crisis of the mid-2000s. Instead of maintaining the vertically-integrated, centralized power sector of the developmental period, the government signaled that the burden of generation would shift from the monopolistic SOE Eskom onto a non-existent private sector, leading to a generation shortage that still has yet to be filled. The second point is that the shortfall created by this incoherence presented ambiguities in the system that the Zuma administration exploited to build a vast patronage network that has had catastrophic effects on state capacity and legitimacy. This leads directly to the third point, which is that rather than being incorporated into the developmental regime, the introduction of renewable energy took place in the context of the Zuma administration's kleptocratic exploitation of ambiguities and incoherence wrought by the liberalization agenda. This has led to the paradoxical outcome that market-based policy instruments for the promotion of renewable energy have been an outright failure in the most developed market economy on the continent.

The study proceeds as follows. I begin with a historical overview of the power sector from the late colonial and into the developmental period in order to lay out two important contextual elements of the nation's power sector regime history. First, a constellation of economic interests known as the Minerals-Energy Complex (MEC) which originated early in the nation's history continues to define its power sector in fundamental ways. Second, South Africa is unique in that its developmental period is cut into two distinct periods, during and after Apartheid. Much of its initial state-led power sector infrastructure growth occurred under Apartheid, but with glaring racial inequalities in its progress towards social electrification. The study then turns to the period after the democratic transition in 1994.

The end of Apartheid resulted in a fundamental change in the priorities at the governance arrangements level that led to a brief but substantial period of sector growth that is in some ways similar to the developmental regime of Ghana but different in that it began somewhat later and under the strong pressures of liberalization that had already begun to take hold across the region. The period from Nelson Mandela's ascendancy to the presidency until the rise of Jacob Zuma is thus marked by simultaneous processes of dramatic state-led progress towards social electrification alongside ongoing selective implementation of liberalization. The study then turns to how what was initially a benign attempt to liberalize the power sector inadvertently set the stage for a malignant exploitation of incoherence that permitted criminal mismanagement, corruption, and outright chaotic disruption. It is persistent regime incoherence arising from this undoing that has thus far stymied the nation's progress towards its renewable energy goals, and slowed progress towards universal electrification in what was once the most likely nation in the region to achieve it first.

The Minerals-Energy Complex and the Political Economic Foundations of the Power Sector

Commercial coal mining in South Africa began in the 1870s when the burgeoning diamond mining industry based in Kimberly had exhausted local lumber resources and required a new source of fuel for its increasingly mechanized operations. The incidental discovery of numerous large coalfields in the Orange Free State led to the formation of the South African and Orange Free State Coal Mining Association, which established mining operations at the Bedworth Colliery as well as transportation of coal to Kimberely. By the 1880s, Kimberley became one of the first cities in the world to install an electrical grid to power public streetlights, leading to ever greater economic growth and demand for energy. The Victoria Falls Power Company (VFPC), established by the colonial government of the Transvaal, began building thermal power plants in addition to the construction of the Victoria Falls hydroelectric power station, providing an increasingly large and centralized source of electric power to support industrial mining growth (Christie 1984).

The swift and interconnected industrial growth of the mining and energy sectors occurred in a period of near constant war in South Africa, and the strategic importance of electricity production to the colonial government's military dominance was not overlooked. The recently formed government (The Union of South Africa) passed the Power Act of 1910, which defined electricity as a public service and granted the government power of expropriation over private electricity operations after a thirty-five year period. Following a decision to transition South African Railways from steam power to electricity, the government passed the Electricity Act of 1922, which endeavored to lay the foundation for the development of an electricity supply industry that would provide the nation with cheap electric power. To manage this process, the government established the Electricity Supply Commission (ESCOM) in March of 1923 (Gentle 2008).

Under Escom's management, the electricity and coal industries were joined at the hip. Thermal power plants designed for the processing of low-grade coal were built adjacent to co-financed collieries. Low grade coal was then fed directly from the collieries to the power plants on conveyor belts, while higher grade coal was exported through long-term "cost-plus" contracts that provided a reliable income stream. The closely coupled industries of mining, coal, and electricity formed what could come to be known as the "Minerals-Energy Complex" (MEC), a political and economic arrangement that would power a century of industrial growth and support the creation of a number of other large parastatals in steel, petroleum, logistics and rail (Fine & Rustomjee 1996).

The gains in income and quality of life from the rapidly developing MEC and the expansion of residential electricity access were concentrated primarily amongst the urban British middle and upper classes. The Great Depression followed by the economic demands of the Second World War drew many Afrikaaners from rural agricultural areas into the cities to find work in the rising industrial sector. These same economic pressures drove the United Party Government to relax segregationist labor and residential policies in order to allow black South African entry into the industrial labor market. Blacks and Afrikaaners competed for working class jobs in urban areas, leading to high levels of political and economic resentment amongst Afrikaaners for the economic integrationism of the Smuts' led United Party (Gentle 2008).

Apartheid, the Minerals-Energy Complex, and Eskom

Two important political and economic events occurred in 1948 that reordered energy governance arrangements into a form that would persist for the apartheid era and into independence in 1994. The first was Eskom's expropriation of the Victoria Falls Thermal Power Corporation (VFTPC), and the second was the defeat of Jan Smuts' United Party by the Afrikaaner nationalist National Party led by D.F. Malan.

By 1948 the energy industry was struggling to meet the demand of the mining industry. Coal shortages from war demand, rapid growth in domestic manufacturing, and the incapacity of South African Railroads to handle the transportation of coal had slowed energy supply.This was further augmented by Afrikaaner coal-mine owners who exported low-grade coal in defiance of the export monopoly granted to high-grade coal mine owners. In negotiations with the VFTPC, mine owners felt they were unable to obtain certainty from the energy firm about its ability to provide increasingly large blocks of power. The Anglo-American Corporation demanded that Escom expropriate VFTPC immediately in order to secure its commitments, two years prior to the window set forth in the governing Power Act of 1910. Escom acquiesced and acquired VFTPC with £15,000,000 in financing provided by Anglo-American. This acquisition made Escom the largest producer of electricity in the nation, an important moment in its evolution from a state regulator of private and municipal electricity generation and distribution to a state monopoly over electricity generation, transmission, and distribution (Fine & Rustomjee 1996; Gentle 2008).

1948 was also the year that Smuts' United Party was defeated by the Afrikaaner nationalist National Party led by D.F. Malan, a critical moment for South African politics with important ramifications for energy governance arrangements. The National Party acted swiftly to reinstate and expand segregationist policies both through intensifying the enforcement of existing segregatory acts and the passage of new legislation. The Population Registration Act of 1950 provided the legal basis for segregation by establishing mechanisms for determining and registering the race of every South African; citizens were labeled as “White,” “Colored,” or “Native (Bantu),” with Indians later included as “Asian” in 1959. The Native Laws Amendment Act greatly expanded and strengthened the “pass laws” of the early twentieth century, which required blacks to carry legal documentation in order to enter or remain in white areas. Specifically, Section 10 of the Act prohibited African men and women from remaining in urban areas longer than seventy-two hours without a special employment permit. The Government then set about defining the political rights of each racial group; the “Bantu Authorities Act” established separate government for the black rural areas to be run by chiefs and headmen appointed by the White government, abolished the Natives Representation Council that had functioned as the sole source of urban black political expression, and restricted voting power to white citizens (Mamdani 2018).

Apartheid had several impacts on energy governance, some of which simply reinforced existing arrangements, and others which substantially changed them. The strengthening of political and economic suppression of blacks contributed to maintaining the supply of cheap Black labor, helping to keep energy prices low. It also ensured the continued dominance of a White monopoly over capital. However, in the Union period (1910-48), Eskom had functioned primarily as a regulator of a thriving private energy market which had accommodated foreign, mostly British-owned firms, constituting a form of corporatist market-centric energy governance (Gentle 2008). Under the new apartheid government, a form of what Leonard Gentle calls “Keynesian racial capitalism” emerged in which the state endeavoured to secure conditions for the financial accumulation of the white (and increasingly Afrikaaner) capitalist class. This meant that Eskom would now have a fundamentally different and larger role in shaping energy production, transmission, and distribution. Eskom’s mission statement from 1948 provides insight into the institutional leadership’s understanding of its mandate:“The South African Electricity Supply Commission sees its task as to ‘render, but the provision of power without profit, a worthy and ever-increasing contribution to the development of South Africa and the welfare of her peoples.” (Escom 1948). While the acquisition of the VFTPC had established Eskom as the primary producer of electricity, it was just the beginning of Eskom’s role in this new, more statist form of power sector governance.

Beginning in 1948 Eskom began seeking capital to increase its generation capacity. The firm was able to secure £10.75 million in 1951, and a further $30 million USD from the International Bank for Reconstruction and Development (now the World Bank), and electricity generation increased sixfold from 1948 to 1975, from 2378 MW to 12134 MW. In 1960 Eskom began interlocking power stations into a single national grid, which was completed in 1973. The firm also automated production processes, enabling entire power stations to be switched on and off from a control room in Simmerpan (Gentle 2008). All of this expansion was necessary to underwrite the economic agenda of the post-war period, the political economy of which is summarized succinctly by Benjamin Fine, “In the interwar and immediate post-war period, core MEC sectors drove the economy, furnishing a surplus for the protection and growth and, ultimately, incorporation of Afrikaner capital. State corporations in electricity, steel, transport and so on, represented an accommodation across the economic power of the mining conglomerate and the political power of the Afrikaners.” (Fine 2008, 2). In this way, Eskom and the power sector policy regime occupied an essential role in what was an industrial-growth driven developmental model that rested on the provision of cheap electricity, delivering large profits to an expanding White capitalist class.

Geopolitical objectives also factored into the motivations of Apartheid-era power sector governance arrangements. In 1964 a war for independence had broken out in neighboring Mozambique between the Mozambique Liberation Front (FRELIMO) and Portugal, which was still aggressively protecting its colonial properties on the continent. Fearing the rise of a Black communist government on its northern border, the apartheid government wanted to both support the Portuguese and create a market for (and thus dependence on) South African electricity. As part of a colonial industrial arrangement the Portuguese constructed a major hydroelectric power station at Cahora Bassa, but the plant transmitted electricity via High-Voltage Direct Current rather than the Alternating Current (AC) system that dominated the Portuguese-constructed transmission grid. Mozambique lacked the infrastructure to convert the electricity for its domestic use, but it was available in South Africa, so Eskom began buying electricity from the Portuguese at a discount, using a portion of the electricity for its own purposes, and then selling the balance back to Mozambique at a profit. This dependence meant that when FRELIMO ultimately took power in 1975, they had far less control over their energy sector than desired (Isaacman 2021).

The Apartheid era represented a shift in energy governance arrangements from a liberal corporatism that accommodated the existence of private electricity generation firms to a racialized developmentalism influenced by the internationally favored Keynesian economic theories that dominated development thinking at the time. This arrangement protected and expanded the economic power of the White elite and vested sectoral dominance in a single national power sector parastatal at the heart of the Minerals-Energy-Complex.

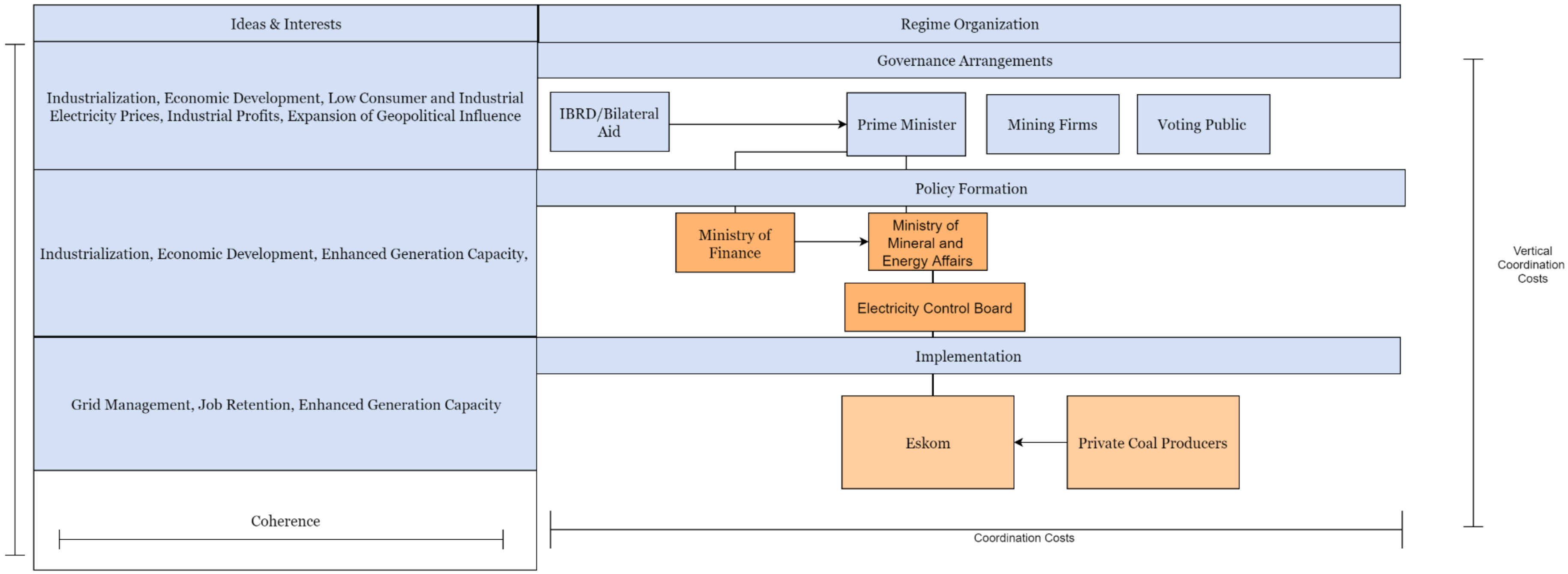

Figure 19: South Africa's Developmental Power Sector Policy Regime

Late Apartheid and Selective Neoliberal Reform

Despite the important historical, material, and political differences that set South Africa apart from the rest of the region, the nation's energy sector was not immune to the wave of neoliberal regulatory reforms propagated by international institutions in the late 1970s.
The global price of gold collapsed in 1983 resulting in broad damage to the economy. Parastatals (including Eskom) found it difficult to service their debt obligations, and the International Monetary Fund issued a sternly negative assessment report. In response, the government formed the DeVilliers Commission, an investigatory body charged with the goal of examining Eskom and electricity pricing. The Commission recommended nationally (rather than municipality) set electricity tariffs, the lifting of the public interest limitation on profit-making, and the reformation of the firm into a more commercial entity subject to taxation (Kantor 1988). The findings of the Commission informed the Electricity Act of 1987, which repealed the public-interest provision of the 1922 Electricity act, allowing Eskom to turn a profit, replaced the Electricity Control Board with the Electricity Council (a body made up of monopoly capitalists from the mining and energy industries), and the transfer of ministerial accountability from the Ministry of Mineral and Energy Affairs to the Ministry of Public Enterprises (which was to oversee privatization) (Gentle 2008; Fine & Rustomjee 1996).

By 1988 global international pressure had mounted against the apartheid regime, including a 1987 UN-led oil embargo. As the specter of democracy loomed, the White minority government had new incentives to fast-track the privatization of the energy sector regime. While justified in the language of neoliberal rhetoric popular at the time, privatization offered a means of potentially maintaining white elite control over the electricity sector, an important objective to maintaining their privileged economic status. Failure to privatize Eskom could allow it, and thus control over a power sector essential to the heavy industry enterprises owned by the White economic elite, to fall into the hands of a Black-led regime with Communist sympathies. In 1990, a Joint National Energy Council/Eskom workshop called for the depoliticisation and deregulation of the energy supply industry, and put forth a number of proposals to adopt market-oriented approaches to distribution and the unbundling of generation, transmission, and distribution. But by this time, P.W. Botha, a hardline racial conservative defender of Apartheid, had been replaced the more moderate F.W. De Klerk, who immediately began negotiations with Nelson Mandela that would bring an end to apartheid. The transition had already begun (Greenberg 2008).

The Democratic Transition and the Power Sector Policy Regime

A crucial element of the power sector regime under Apartheid was that the distribution of gains from cheap electricity were concentrated amongst a minority White capitalist elite. But under the democratic transition, these exclusionary governance arrangements faced a combination of redistributionary pressures from both the broader, newly enfranchised Black public and the ANC elite. Mandela's government immediately began channeling the benefits of cheap electricity towards the public through the National Electrification Project. However, material benefits did not begin broadly flowing to the ANC elite themselves until after partial liberalization occurred, after which the expansion of procurement and generation contracts would enable the flow of benefits from Eskom to help construct Mbeki's vision for a new, Black, entrepreneurial class. This self-consciously developmental model would also set the stage for Jacob Zuma's subsequent exploitation of the power sector. This shift in governance arrangements had significant consequences for the shape of the power sector regime at both the formulation and implementation levels, and can be explained through three overlapping processes.

I. (1994-2004) Partial liberalization opens up the power sector to private sector participation, and the government halts state investment in Eskom's generation capacity in anticipation of substitution by private capital. The Government and Eskom initiate the National Electrification Program, significantly expanding electricity access (and demand).
II. (1996-2009)The Mandela and Mbeki governments successively initiate and expand two programs designed to facilitate a Black entrepreneurial class by offering contracts with parastatals: GEAR and BEE.
III. (2009-2018) Jacob Zuma is elected president amidst a partially liberalized power sector with a growing tenderpreneur class. Zuma begins aggressively expanding a patronage network based, in significant part, on the financial exploitation of the organization of the power sector policy regime.

Together, these overlapping processes increased the obligations of the power sector as well as the number of actors responsible for policy formulation and implementation. As the number of actors increased, so did the coordination costs of planning and implementing policy, a fact reflected both by the lack of effective sector planning as well as growing adversity between institutions across the regime. Specifically, a lack of coordination between the Department of Minerals and Energy (DoME) and Eskom emerged as their relationship was soured by increasing levels of political intervention by bureaucrats into the parastatal's operations. Initially motivated by an earnest attempt to leverage the parastatal's outsize economic influence in favor of the ANCs developmental goals, interventions by the executive degenerated into a corrosive exploitation of patronage opportunities offered by the private-sector procurement system created in the liberalization process.

I review these processes in turn, linking events to the changing structure of the power sector policy regime. I then turn to the consequences of these changes for sustainable development outcomes.

Stage I: The Rise of the ANC and the Corporatization (and Conservation) of Eskom

In 1992 the ANC held a meeting on electricity policy in Cape Town in which civil society activists expressed distrust of Eskom and a desire for privatization or restructuring that would disassemble an organization they criticized as an instrument of racist apartheid policy. However, in a confirmation of Eskom's structural importance to control over the nation's political economy, it was the firm view of the leaders of the liberation movement such as Nelson Mandela that Eskom should remain in public ownership (Lawrence 2020; Greenberg 2008). So while many of the ideas and interests in the office of the Presidency would shift dramatically, the structural relationship between South African political leadership at the government arrangements level and Eskom at the policy formulation and implementation levels would remain the same.

The African National Congress took formal control of the state following the successful election of Nelson Mandela in 1994. While Mandela's government did not intend to fully privatize Eskom, it did plan to partially liberalize the power sector in order to take advantage of global capital markets' newly favorable disposition towards the nascent democracy. The government passed a number of legislative acts intended to reform the power sector in accordance with the standard reform model advocated by the World Bank; in 1995, through Amendments to the Electricity Act of 1986, the Electricity Control Board was replaced with the National Energy Regulator of South Africa (NERSA), an independent regulator with far greater power than the ECB, including the ability to regulate market access through the licensing of all generation, transmission, and distribution firms, as well as tariff approval. The Eskom Amendment Act of

1998 vested ownership of the firms' equity in the state, repealed its tax-exempt status, and mandated that the Ministry of Public Enterprises incorporate Eskom as a limited liability corporation with share capital, opening the firm to equity financing on top of the state's controlling share (Eberhard 2003).

Following Thabo Mbeki's election to the presidency in 1999, the government began what would be a more aggressive but ultimately abbreviated push for reform of Eskom. The Eskom Conversion Act of 2001 directed the firm to convert its generation, transmission, and distribution firms into three separate holding companies that were then slated for privatization. In the years leading up to and during these reforms, the government began denying Eskom's requests to finance additional generation capacity in anticipation of private capital investment in the generation subsector (Eberhard 2003). As the Mbeki administration was directing Eskom to halt generation capacity, the Department of Mines and Energy was already raising red flags about the possibility of electricity shortages over the next decade unless generation investments were made. A DME White Paper from 1998 stated, "the next decision on supply-side investments will probably have to be taken by the end of 1999 to ensure that the electricity needs of the next decade are met." (DME 2011). This decision to stop Eskom's generation investment in spite of rising demand conditions would yield critical consequences by stage III.

The government created a genuine independent sector regulator in NERSA, and Eskom was formally reconstituted as a corporation in 2002. However, the portion of the reforms that actually threatened to change energy governance arrangements were the unbundling and subsequent privatization requirements dictated in the Conversion Act that would disassemble Eskom and decentralize management of the power sector (Eberhard 2003). Eskom began preparation for unbundling by organizationally "ringfencing" their generation, transmission, and distribution businesses, and readying assets for partial sale. However, by 2003, the government began backing off from implementing privatization reforms. At the time, Finance Minister Trevor Manuel cited a poor global climate for privatization, as well as the recent California energy crisis which had come as a result of deregulation in the energy sector (Greenberg 2008). However, some scholars have attributed this decision to internal pressure from the ANC's coalition ally COSATU (Coalition of South African Trade Unions), in partnership with the South African Communist Party (SACP), who perceived privatization as a potential threat to Eskom workers organized under COSATU's union affiliates NUM and NUMCA, which together with the Mynwerkers Unie (which represented White employees) accounted for three-fourths of the parastatal's workforce, as well as a threat to the continuing provision of affordable, socially-driven consumer electricity pricing (Lawrence 2019). After their 2004 election victory, the ANC formally announced that it would not be moving forward with the sale of Eskom's core assets (Eberhard 2008).

By 2004, Eskom's expansion of its generation capacity had been frozen for five years against rising national demand for electricity. Rising demand was driven in part by the governments' ambitious National Electrification Program, which electrified 2.5 million new homes from 1994 to 2000 (South African Department of Minerals & Energy 2001). But by the time Eskom recommenced its program of expanding generation capacity in 2005, following the governments' announcement that it would remain public and "bundled," its resources were severely constrained, and low tariffs meant the firm had limited cash reserves (Eberhard et al 2008). Whereas the general expectation was that by 2005 Eskom would be a partially privatized entity issuing shares to raise equity financing, instead it remained a fully public entity that was now raising capital through debt financing. While its business had been harmed, with negative ensuing effects for the South African economy, government and Eskom's leading industrial clients, formally organized into the Energy Intensive Users Group (EIUG), remained dependent on the parastatal. Figure 20 shows the configuration of the policy regime in this period.

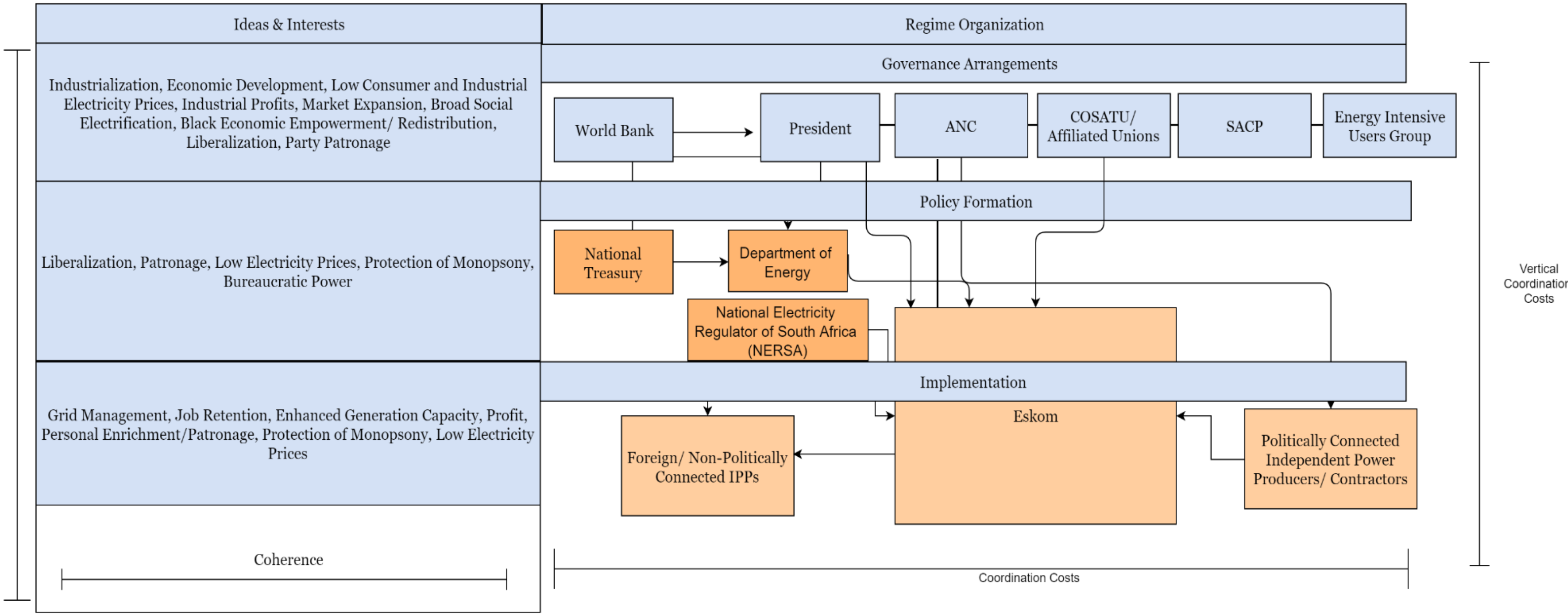

Figure 20: South Africa's Hybrid Power Sector Regime

Stage II: GEAR and BEE

In order to right the economic injustices of the Apartheid Era, the Mandela and later the Mbkei administrations initiated a series of reforms intended to redistribute the nation's wealth and elevate the status of the still overwhelmingly poor Black population. These reforms began with Mandela's Reconstruction and Development Programme (RDP), which was a conventionally Keynesian program intended to stimulate social and economic development through fiscal spending. However, the Mbeki administration abandoned the RDP in favor of the Growth, Employment, and Redistribution (GEAR) program which emphasized privatization of parastatals and fiscal austerity. Alongside GEAR and part of a larger program known as Black Economic Empowerment (BEE), the Mbeki administration passed the Presidential Procurement Act of 2000, which mandated preferential treatment for historically marginalized groups in the distribution of state procurement contracts (Ponte et al. 2007).

Taken together, GEAR and BEE interacted with the liberalization reforms of the previous stage to reshape the power sector policy regime in important ways. While Mbeki backed away from a full unbundling and privatization of Eskom, partial sector liberalization opened the door for private sector contracting in generation, as well as many associated contracting opportunities along the power sector value chain. Under this altered regime structure, 30% of Eskom's generation was to come from power-purchase agreements with privately held BEE-backed businesses (Greenberg 2008). The developmental state agenda and BEE requirements thus began redirecting a greater share of benefits from the MEC-Eskom governance arrangement towards the new political elite and a rising class of what would come to be known as "tenderpreneurs," (Lawrence 2019). These reforms established the policy regime which Jacob Zuma would inherit several years later.

BEE and GEAR have been widely criticized since their initiation for combining to “promot(ing) the growth of a small but remarkably wealthy, politically-connected ‘empowerment’ elite”, rather than encouraging the broad-based economic empowerment that the country’s vast inequality called for (Southall 2006). Southall argues that this is, however, a product of necessity borne out of the structure of the Apartheid economy that the ANC inherited. While the pre-apartheid Union regime featured limited state intervention in the economy, the National Party presided over an economic program that some now refer to as Afrikaner Economic Empowerment (AEE) (Verhoef 2009). Beginning in the 1960s, the National Party expanded the public enterprise sector surrounding the Minerals-Energy Complex in order to grow Afrikaner employment and income. The suite of parastatals expanded rapidly as global sanctions and divestment forced the government to substitute previously imported goods with domestic production, driving the state to occupy increasingly large shares of economic sectors in which the country had no natural comparative advantage. By 1981, over 70% of the assets of the top 138 companies in South Africa were controlled by state corporations and eight private sector firms, all controlled by the White minority. By the early 1990s, parastatals directly contributed about 15% of GDP (Southall 2006). Thus, merely by taking control of state assets the ANC was now presiding over an economy built on parastatal-driven inequality.

Mandela’s RDP responded to this inherited inequality by redirecting government revenues to social spending, but BEE and GEAR reaffirmed the organizational structure of AEE by resituating parastatals at the center of an ethno-centric economic growth agenda. Lawrence (2020) argues that “GEAR can arguably be read as marking continuity from the Botha to Zuma presidencies,” (2020; 73). The opening of the lucrative generation sector to private participation was at the heart of this political-economic readjustment, and the dysfunction and corruption that were to emerge under the Zuma regime must be understood in this context.

Stage III: Jacob Zuma and the Exploitation of the Hybrid Power Sector Regime

The ANC is a big-tent political party that encompasses a variety of factions with somewhat distinctive political and economic ideologies (Beresford 2015). By the mid-2000s, the relatively centrist Mbeki administration had fallen under pressure from competing elements of the ANC to increase the flow of economic benefits to Black South Africans, who remained largely poor, especially in the urban townships and rural areas. This challenge found leadership in Jacob Zuma, Mbeki's terminated Deputy President. A charismatic populist, Zuma blended leftist economic rhetoric with Zulu nationalism, building a coalition based on the party's disaffected left-wing. This challenge to Mbeki's leadership came to a head at the ANC's annual conference held in Polokwane in 2007, in which Jacob Zuma defeated Mbeki to become president of the ANC (Gumede 2008). In the party-state model that has governed South Africa since independence, the ANC president becomes the nation's president through the party's nomination. Zuma ascended to the presidency in May of 2009.

Jacob Zuma's rise to power coincided with the ramifications of Eskom's decision to halt direct investment in generation capacity from the 98-2004 period. As previously discussed, the government discontinued appropriations for Eskom's investments in expanding generation capacity in anticipation of the firm's privatization and entry of private generation firms into the market under the terms of the GEAR-BEE preferential procurement agenda. However, the expected influx of private capital did not occur, and as such there was only limited market penetration from IPPs, so when Eskom recommenced the expansion of its generation capacity in 2004, it did so at a severe disadvantage relative to the heightened (and increasing) levels of electricity demand which had come as a result of the governments' developmental agenda, which was now delivering subsidized or free power to millions of previously energy impoverished South Africans under the NEP social electrification program. By the time Zuma came to power, a combination of these historic delays and a related shortage of coal left South Africa on the precipice of a serious energy crisis (Eberhard 2008).

The fact that Zuma inherited an energy shortfall proved a boon to his mandate to expand upon Mbeki's developmental state. An energy shortfall meant that the state needed to take action to increase energy supply; Zuma channeled this need into increased funding for Eskom's procurement budget. But first he had to remove the constraint that had slowed Mbeki's efforts. In what has become known as "Nene-gate," Zuma expelled the well-respected finance minister Nhlanhla Nene, doing away with what had been one of the major constraints to the full recalibration of energy governance arrangements (Bisseker 2017). In the first years of the Zuma presidency, Eskom's procurement budget rose from an annualized average of .8% of GDP in the period 1998-2007 to over 3% of GDP by 2012. Meanwhile, the newly appointed Minister of Public Enterprises made clear to Eskom management that it was no longer necessary to operate as a business, stating that this "is our money and we have the right to leverage it to achieve what we want to achieve," (Bowman 2020).

Eskom awarded billions of rand in tenders across the production, operation, and maintenance value chain to many brand new firms that had emerged in the space created by BEE legislation. Unfortunately, many of these firms, led by politically-connected elites who have come to be known as tenderpreneurs, did not deliver on the terms of their contracts, resulting in construction failures and delays that stunted the recovery of the energy sector (Lawrence 2019; Bowman 2020). For example, relief from the energy shortfall hung largely on the construction of two 4.8GW coal-fired power station megaprojects at Medupi and Kusile. Eskom Rotek Industries, a wholly owned Eskom subsidiary, was appointed to establish the Kusile site through foundational work such as drain digging, pipe laying, and earthwork. However, it was unable to deliver and its contract was terminated, which created a bottleneck for other contractors which had been retained to start construction following the foundational work. In an illustrative incident, Mitsubishi Hitachi Power Systems Africa, a firm which was a quarter owned by its BEE partner Chancellor House, an ANC funding vehicle, was contracted to manage the boilerworks of the Medupi and Kusile plants. The firm installed boilers that were insufficient to meet the demands of the project, yet invited President Zuma in 2012 to attend a pressure test of Medupi's first boiler as a demonstration of the projects' ongoing success. Management ignored the objections of Eskom engineers, and when steam was pumped into the pipes connected to the boilers, tools and debris were blown out by the pressure. According to journalists covering the event, Zuma "gave no indication that he was aware anything was wrong. He said in a prepared speech that he was 'delighted' with the progress being made on the project and congratulated his minister, Eskom and its workers 'for a job well done." (Burkhardt & Cohen 2019). As of this writing, neither project has been brought fully online.

Inefficiencies from corruption in Eskom's procurement practices are an important part of the explanation for the nation's sluggish recovery from the energy shortfall. And particularly flagrant incidences of corruption, especially those involving the Guptas', a family of Indian businessmen who have been involved in a number of corruption scandals surrounding what has been called a system of "state capture," have been important elements to the story (Bisseker 2017). However, this corruption should not be understood merely as the discrete actions of a corrupt group of individuals, but rather as the reequilibration of regime structures and practices to accommodate pre-existing governance arrangements under a new elite cartel.

Under the governance arrangements of the power sector policy regime in the Apartheid system, a legal-rational patronage system allowed a minority White elite the vast accumulation of industrial profits underwritten by Eskom's subsidization of cheap power (Bowman 2020; Lawrence 2019; Greenberg 2008). Placed in perspective, the activities of the "Zuptas" and their affiliates in the ANC party-state simply represent the reestablishment of an enduring set of governance arrangements by which the benefits of the nation's vast coal resources flow to a small coalition of political and business elites. Eskom's role in underwriting the profits of other industries is contingent on political elites' continued sponsorship of the firm; this sponsorship is contingent on political elites' reception of benefits from these profiteers. The BEE-procurement nexus thus constituted a new channel for the flow of benefits to elites, and an equilibration of decades old energy governance arrangements under a quasi-liberalized hybrid power sector regime.

Sustainable Development Under The Hybrid Regime

The three-stage sequence of power sector policy regime transformation from a more classically developmental organization in 1994 to a quasi-liberalized host of patronage, dysfunction, and corruption has frustrated the goals of universal electricity access and renewable energy growth in South Africa. While the country was slated to achieve universal electricity access before any of its regional peers, the dissolution of the developmental regime beginning in the mid-2000s ultimately robbed it of its capacity to do so. And while the country's comparatively robust market economy and strong geographic conditions situated it to be a leader for renewable energy on the continent, the regime's incoherence has truncated progress on this goal as well.

The National Electrification Program substantially changed the electricity access situation in South Africa over the 90s and 2000s, bringing power to millions. Yet it also expanded demand for electricity significantly. During the period from 1994-2008, electricity consumption growth averaged 2.5% annually (Bowman 2019). It was clear to analysts shortly after the DoME directed Eskom to halt investment in generation capacity that private sector participation would have to materialize quickly to meet the demands of the growing transmission grid (Eberhard

2003). The lack of coordination and shared accountability between a newly corporatized Eskom and the DoME was an early sign of the incoherence that would characterize the hybrid regime. By 2008, Eskom was struggling to meet demand, forcing the firm to begin scheduled rolling blackouts, or "load shedding," a practice which has become a target of national derision in conversations and on social media. Since the onset of the generation crisis, progress towards universal electrification has noticeably stalled (as can be seen in Figure 21).

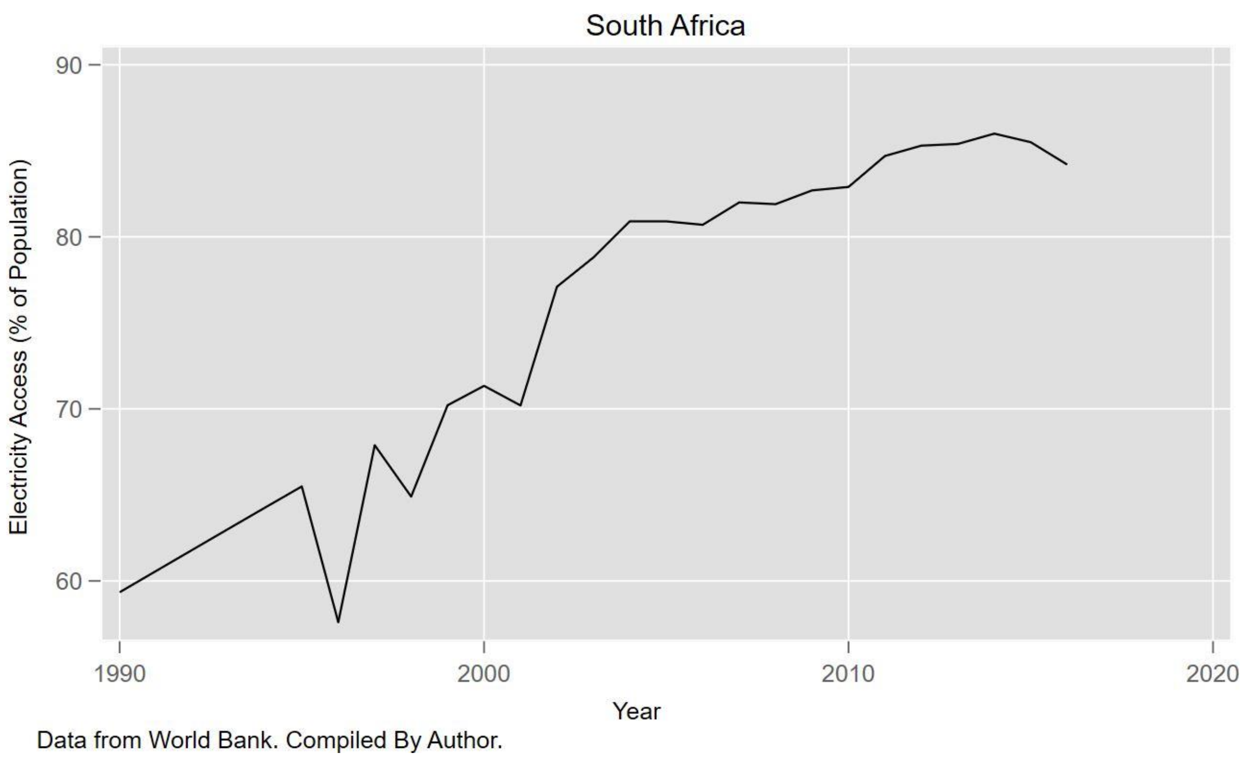

Figure 21: Electricity Access in South Africa 1990-2014. Source: Author. Data: World Bank World Development Indicators

Efforts under the Zuma administration to improve the situation through private procurement were riddled with irregularities and graft, and have been possible only because of the changes to the policy regime that took place over the 2000s. Rather than the uniformly accountable government apparatus that characterized the early days of the implementation of the NEP, attempts to contract the power sector out of its problems have consistently resulted in sluggish, failed, or altogether abandoned projects to improve generation capacity.

The exigencies of the power supply crisis of 2008 represented an important opportunity for the growth of renewable energy in South Africa. With Eskom now facing both a coal shortage and struggling to meet its mandate to provide cheap electricity for the national industries that had traditionally supported the elite patronage network, the firm needed to expand supply quickly. In spite of their potential to help solve the crisis, however, renewables have not yet played a substantial role in repairing the energy shortfall, and by most indications, they are unlikely to anytime soon. Why has this been the case?

Amidst the energy shortfall, Eskom has largely been able to continue servicing its major patrons in government and EIUG. Increased appropriations for Eskom and the BEE-procurement nexus has created a thriving channel of benefits to political elites, and Eskom has managed to provide low cost, long-term contracts for its major industrial customers primarily by accumulating debt (Bowman 2020). When NERSA approved a doubling of tariffs in 2007 to enable greater cost-recovery for Eskom, it was met with swift resistance from a combination of industry groups (Chamber of Mines, Minerals Council of South Africa, the EIUG) as well as trade unions. This led NERSA to slow the tariff increases, leading Eskom to pile on debt in order to continue providing electricity to the MEC at sub-commercial rates. Meanwhile, Eskom's efforts to increase supply have primarily focused on the troubled construction of the Medupi and Kusile coal-fired power plants (Ting & Byrne 2020).

Why have their efforts not incorporated great renewable energy generation? In 2009, the DOE amended the Electricity Regulation act to accommodate large-scale renewable energy projects with private sector investors, and NERSA began the Renewable Energy Feed-in Tariff (REFIT) intended to generate 10,000 GWh by 2013. The proposed tariff rates were intended to cover generation costs as well as a return of 17% over a twenty-year generation contract. The government issued the Electricity Regulation on New Generation Capacity, which delegated clear institutional responsibilities for DoE as a purchasers of power from RE IPPs, and Eskom as buyer and signatory of PPAs approved by NERSA (a scheme similar to employed in Ghana's FiT program). Together, these policies laid a strong foundation for the incorporation. What happened next, however, epitomizes the incoherence and interministerial rivalries that emerged under the decentralized hybrid regime.

Following its attempt to initiate the REFIT, NERSA was accused of stepping outside its mandate when it approved legally binding tariff agreements ahead of Department of Energy approval. (Ting & Byrne 2020). NERSA agreed to review the tariffs, considering DoE's suggestion that they had been set too high, although no power had yet been purchased at these rates. After missing its own deadline to issue revised rates, it subsequently proposed reductions of 25% for wind, 13% for concentrated solar power, and 41% for solar PV. Then, Minister of Energy Dipuo Peters stated that the 2009 rates, and not the reduced tariffs of 2011, would apply to the first round of procurement under REFIT (Lawrence 2020). The National Treasury subsequently claimed that NERSA lacked tariff setting authority under the Electricity Regulations Act, and was allowed only to consider applications for generation licenses and PPAs on a case-by-case basis. Citing a legal opinion, NERSA retorted that it was, in fact, responsible for tariff setting, as it was acting under a direct mandate of the DoE. (Ting & Byrne 2020; Lawrence 2020). Finally, the DoE and Treasury secured a judicial opinion that argued that the FiT approach was a form of "non-competitive procurement" inconsistent with the ERA, and the DoE officially dumped the REFIT initiative. Following "informal feedback from the private sector on design, legal, and technology issues," the DoE, in partnership with the Treasury, initiated the "Renewable Energy Independent Power Producer Program" (REIPPP) (Eberhard et al. 2014).

The development and implementation of REIPPP has been applauded in that it was able to quickly generate private sector interest and activity in renewable energy generation. Notably, REIPPP was developed and operated out of the IPP office within the DOE in close consultation with the Treasury Department, historically an institutional adversary of Eskom (Bisseker 2017). The IPP office is an ad hoc group within DoE that is staffed by over one hundred private consultants with limited permanent staff from the government. According to secondary interview evidence, the IPP office was able to work effectively with private sector partners to instill interest and confidence in the bidding process. Additionally, the REIPPP received significant attention in the public debate on the energy shortfall, leading to an open contestation of Eskom's dominance in the sector and enhanced public scrutiny on its behavior. Leading up to 2015, South Africa produced approximately 5 GW of subscriptions in four bidding windows across 77 Renewable energy generation projects (Ting & Byrne 2020).

While REIPPP was able to make initial progress in securing bids, Eskom effectively resisted signing the majority of proposed PPAs through a variety of subversive actions. In 2015, Eskom leveraged its monopoly status to block the signing of PPAs with RE I4PP IPPs by preventing them from receiving budget quotes necessary to finalize their agreements. They also created additional barriers to entry by raising grid-connection costs for RE developers. Finally, Eskom encouraged the National Union of Metalworkers of South Africa (NUMSA) and the National Union of Mineworkers (NUM) to begin protesting the loss of jobs from the decommissioning of old coal-fired power plants. The NUM conducted nationwide strikes which halted the scheduled decommissioning of five old coal-fired power plants (Ting & Byrne 2020). By 2017, under pressure from renewable energy industry associations and the press, NERSA began an investigation into Eskom's refusal to sign PPAs with renewable firms. When pressed on the matter, Energy Minister Mmamoloko Kubayi stated "Treasury issues guarantees to Eskom, and Eskom is concerned that if they are required to sign PPAs for REIPPP bid window 3.5, 4 and 5 projects, it will further impact negatively on their balance sheet. This is why we had to include Treasury to have a look at the impact to ensure we do not get another downgrade. We are waiting for the task team to come back to us.” (Yelland 2017). NERSA's investigation has itself been criticized for undue delays and a reluctance to make hearings open to the public (Slabbert 2017).

Why did Eskom and its allies across the policy regime act to suppress the growth of a niche RE industry? First, it is important to briefly recall how the Eskom-Zupta patronage operation worked. Eskom’s monopsony over procurement gave the firm the ability to set prices on any power-sector related contract. By granting favored firms (such as those contracted to service the Medupi & Kusile coal-fired power plants) overvalued contracts, they could transfer the firm’s revenues into private hands. Allowing REIPPP to function required allowing a formalized, competitive procurement process to set pricing, which would have allowed RE firms to consistently underbid overvalued coal contracts (even though, at the time, solar and wind were not yet cost-competitive with coal, especially in a country as rich with the resource as South Africa). A related reason is that, following Zuma’s accession to office, there was a critical change in enforcement over mineral rights. Prior to this change, enforcement was based on the 1991 Minerals Act which gave land owners total rights over any mineral found on their land. Under a new law (the Mineral and Petroleum Resources Development Act) which took effect in 2009, these rights were negated. The MPRDA regulated rights based on BEE directives, and notes that owners of rights prior to the MPRDA needed to apply to keep them within five years of the new laws passage or lose them entirely. Owners who did not have existing BEE-compliant deals in place struggled to meet this deadline, and began to seek political connections in order to obtain them. This expanded further opportunities for patronage, and deepened incentives to protect Eskom’s autonomy and control over the procurement process. Indeed, the Zuma government approved another coal-fired power station in August 2013. From

2009 to 2014, the value of procurement contracts to BEE companies grew from R20.8 billion to R125.4billion (Lawrence 2020).

Conclusion

While the majority of new generation capacity in South Africa over the last couple of years has been from renewable sources, they still occupy a miniscule portion of South Africa's generation mix. As of 2019, non-renewable energy sources accounted for 95% of South Africa's electricity generation portfolio (IRENA 2019). The end of the Zuma administration has offered the opportunity for South Africa to move past its historical attachment to coal and become a regional leader in solar power generation, however whether such a change will occur is still far from clear.

As this review has shown, the energy transition in South Africa will have to deal with regime elements attached to coal interests that far predate the Zuma administration, and reach deeply into the political-economic order of the nation. A large part of the problem is rooted in historical governance arrangements that bind the fortunes of corporate and political elites to the pipeline of cheap coal burned in Eskom's power plants. Making this problem worse is the now deeply incoherent, disunified character of the policy regime. Interministerial competition at the policy formulation level makes coordinated policy planning difficult. Eskom's enduring influence across all three levels of the regime make its compliance essential to any effective reform, absent its unlikely unbundling. And while Eskom's unbundling might bring an obstructing institutional Leviathan to heel, such decentralization might only worsen the incoherence that already frustrates policy coordination. Further, the firm's entrenched culture, hierarchical structure, and powerful command of technical expertise and resources also offers an opportunity for swift and effective implementation of an energy transition, but it must be coerced into doing so by its political and economic principals in the seats of government and corporate power.

The exclusionary nature of Eskom's operations in the colonial and apartheid eras were morally reprehensible. Yet whatever political master it served, the firm historically proved a highly effective implementing agent for government policy. In the early years after independence, the firm continued to function effectively as it diligently implemented the Mandela government's social electrification agenda. Up until the late 2000s, Eskom was an internationally well-regarded electricity company known for its preservation of effective management in spite of its massive size and responsibilities. In many ways, Eskom's near century-long ability to effectively underwrite the South African economy's developmental agenda across three distinct political eras is a significant feat of public management. It was only upon the introduction of World Bank backed decentralizing reforms that effective sector-planning and management began to be replaced by incoherence and dysfunction. A reintegration of Eskom under a strong public service mandate guided by motivated political leadership could quickly change the nation's energy economy, and in so doing reshape the entire energy economy of Southern Africa.

Sustainable State Capitalism: Kenya's Renewable Energy Success

Kenya leads Sub-Saharan Africa in renewable energy generation. However, until recently, Kenya lagged most of its peers in public access to electricity. Through a review of the evolution of the Kenyan power sector, this case study makes two related points about how the changes to the nation's power sector policy regime continue to affect the goals of renewable energy generation and electricity access.

The first point is that Kenya's regional leadership in renewable energy production is a consequence of the incorporation of geothermal generation as a key part of the developmental regime's emphasis on industrialization. Early exploratory investments by the state and the UNDP proved the viability of geothermal investment in Kenya, and effectively derisked the sector in the view of private investors. Further, the availability of geothermal electricity to support the generation sector amidst the oil crises of the 1970s demonstrated its potential to secure an energy future independent of imported hydroelectricity from Uganda and costly fossil fuels from global markets. Subsequent investment in the sector by a combination of state, donor, and private actors, as well as increasing reliance on electricity by domestic, politically connected manufacturing interests, led to a powerful support coalition for increasing exploratory state investment in the technology, constituting a positive policy feedback loop that has resulted in geothermal occupying 44% of the country's generation portfolio. Utility-scale solar and wind energy were not incorporated in the developmental era, but rather were introduced as part of the liberalization and sustainable development eras that followed it. Whereas developmental financing instruments (large investments of state capital and high volume developmental assistance) were available and critical to the establishment of geothermal as a major power source, the growth of solar and wind has been contingent on a set of market-oriented policy instruments that are ancillary to the dominant organization of political economic interests in the regime. The success of these policy instruments is dependent on a high level of coherence with the rest of the policy regime that is precluded by these dominant interests.

The second point is that Kenya's recent successes in expanding electricity access are a consequence of two significant political-economic changes: the first is that heightened democratic pressures for public service delivery coming as a result of the legalization of multi-party democracy in 1992 placed pressures on the Moi and Kibaki government to invest in expanding access. However, both administrations' progress on this issue was constrained as external pressures to liberalize the sector laid bare the inconsistencies between the inherited, highly state-led policy regime and the strictures of commercialization, and exposed inefficiencies in the regime's operations that provoked bureaucratic rivalry and an increasingly incoherent regime character. The election of Uhuru Kenyatta to power in 2013 led to a reassertion of the central political economic arrangements of the developmental regime, in which close coordination between KPLC and political leadership yielded swift progress towards government policies, with limited concern for the solvency of the public utility. However, this resurgence is marked by a key difference from the developmental period; the politicization of electricity access over the previous decade meant that it was now an important policy goal of the regime. The regime began equilibrating to the developmental arrangements in order to promote an aggressive social electrification strategy.

The introduction of liberalization reforms and market-based policy instruments have had only a marginal effect on either universal energy access or renewable energy growth. Progress towards both goals have come about when the developmental regime is functioning. Instead, perhaps the most significant effect of liberalization of Kenya's power sector has been the development of a private sector hydrocarbon generation industry.

The Developmental Regime

The developmental Kenyan power sector policy regime was structured under the monopolistic control of the East Africa Power and Lighting Company (EAPL), a fully commercialized corporate entity with a fifty year bulk supply license granted by the Government of Kenya. EAPL was responsible for nationwide electricity generation, transmission, and distribution in Kenya with the exception of generation and transmission to the Nairobi area, which was managed by the Kenya Power Company (est. 1954) over whom the EAPL held a management contract (IBRD.B 1963). Several other fully state-owned entities were incorporated over the course of the developmental period, all under the EAPL umbrella: the Tana River Development Company (est. 1964), the Tana and Athi Rivers Development Company (1974) and the Kerio Valley Development Authority (1979) (Godhino & Eberhard 2019). Comprising a single corporate umbrella, EAPL functioned as a vertically-integrated utility responsible for generation, transmission, and distribution of power. EAPL was loosely regulated by the Power Advisory Board, which the IBRD states “keeps a close check on the EAPL company’s accounts and all matters affecting consumer interests.” The Power Advisory Board was composed of members of the public nominated by the Kenya Government, who were primarily “principals from the commercial community,” (IBRD 1967, 10). Figure 22 presents the configuration of the developmental policy regime.

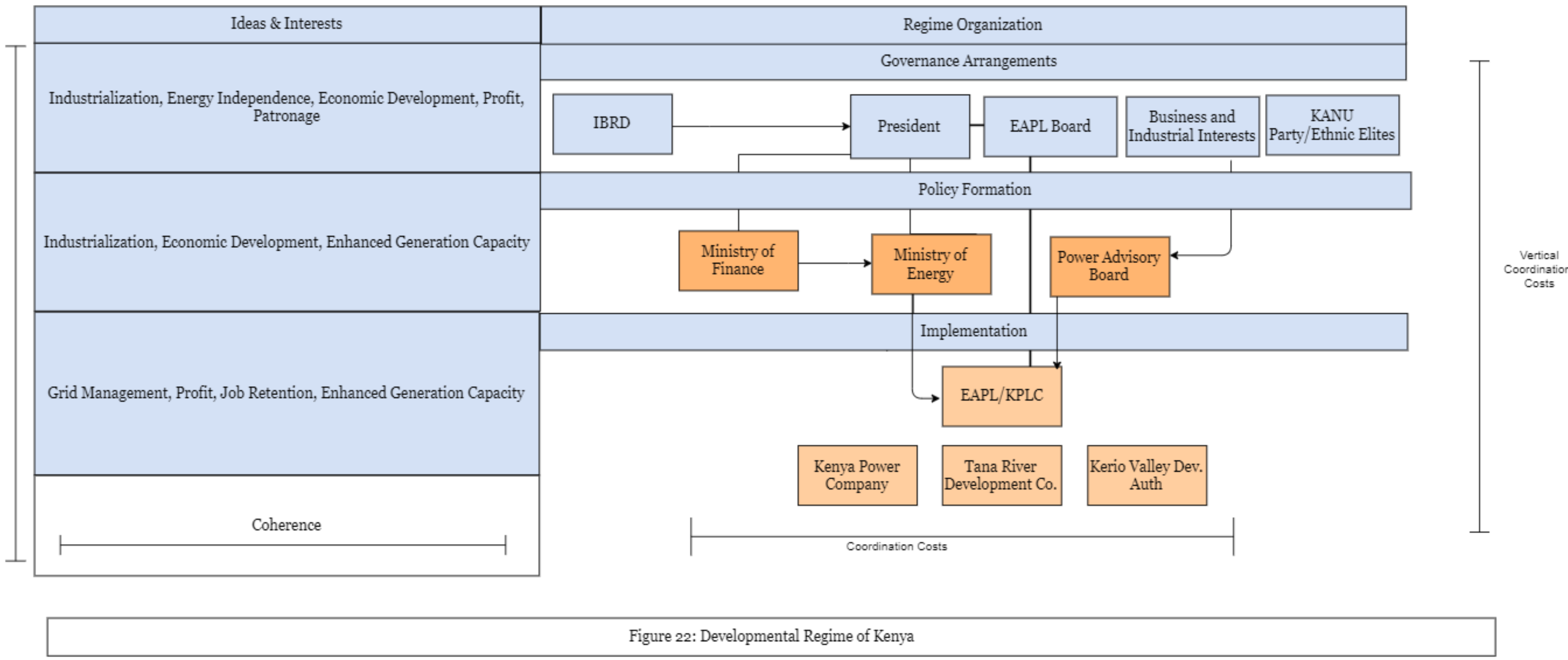

Figure 22: The Kenyan Developmental Power Sector Policy Regime

While the EAPL was a privately held corporation listed on the Nairobi Stock Exchange, the firm’s management team, board, and the Government maintained a dense network characterized by consistent communication and coordination. An IBRD report emphasizes that “the close relationship between the (state-owned) companies and with the government has proved very beneficial in avoiding duplication of overheads and in avoiding conflicts of interest. The close liaison with the Government through the Government nominees (who are in some cases officials of the Ministry of Power and Communications) on the Boards of the three companies, has enabled the Company and the Government to understand each other's problems and agree on common policies with regard to power developments.” (IBRD 1967.B). Coordination costs in the developmental period were low, as the EAPL represented a unitary umbrella management structure for the various publicly-owned utilities that worked directly with the government on policy planning.

In the period from 1960 to 1980, the Government, EAPL, and the IBRD and associated lending partners proceeded along “Development Plan 1966-88” which included seven major infrastructure projects representing 150 MW of installed capacity. Much of the early developmental focus concentrated on hydroelectricity. Notable projects included the multi stage Seven Forks Hydroelectric Project, as well as the Kamburu Hydroelectric Project. (IBRD 1967; IBRD 1976). These hydroelectric projects were not initially seen as economically justifiable by the World Bank. However, the Kenyan Government, which (in spite of the Bank’s explicit recommendations to the contrary) seemed eager to decrease its reliance on imported power from neighboring Uganda by increasing its generation capacity, pressed on with the first stage of the Seven Forks project at the Kindaruma site on the Tana River. Following successful completion of this project, the government sought further financial support from the Bank for a second power station at Kamburu. An audit of this project describes it as “straightforward with no serious problems” and commends the quality of construction (World Bank 1976). The government subsequently sought and received financing for a number of other hydroelectric generation projects throughout this period, substantially increasing its generation capacity.

The availability of electric power grew increasingly important in the context of Kenya's economic development strategy in the postcolonial period. Kenya's economy grew rapidly through a combination of public investment, increased small-plot agricultural production, and industrialization (Acker & Kammen 1996). From 1963-1973, GDP and agriculture grew at annualized averages of 6.6% and 4.7% (Bureau of African Affairs 2007). African-owned firms occupied a core component of growth in this period, and relied heavily on state finance from institutions such as the Agricultural Finance Corporation and the Industrial and Commercial Development Corporation (Swainson 1978). An IBRD assessment notes the steady increase in electricity sales from 1966, with projected growth of 9.5% for the period 1967-1975. Further, the report notes the expected need for greater generation investment to avoid a shortfall in the early 1970s (IBRD 1967). Kenya entered the 1970s with comparatively stronger economic conditions than many of its neighbors, although its economy would likewise be buffered by the decade's successive oil crises. Given Kenya's reliance on imported fuels for both the larger energy sector and its thermal power plants, the oil shocks laid bare the country's significant economic vulnerability to global fuel prices (Acker & Kammen 1996). However, this liability had already been recognized by Kenyan officials and the World Bank, and the government had already begun making moves to diversify domestic power production.

The Incorporation of Renewable Energy Technologies Into the Developmental Regime

To understand why the development of geothermal generation continues to be a primary focus both of the Kenyan Government and its development partners today, it is important to recall the reasoning behind the initial decision to move forward with exploration in the Kenya Rift. Unlike many other African countries, Kenya is not endowed with abundant hydrocarbon resources or hydroelectric power at the scale of hydrostates such as Ghana or the DRC, and has thus always relied heavily on the import of expensive petroleum fuels to power thermal power plants (Kiplagat et al. 2011). As Kenya's early reluctance to rely on Uganda for imported hydroelectricity demonstrates, the developmental regime was strongly motivated to develop an independent, secure supply of electric power. Geothermal exploration in Kenya thus began as early as 1956 with the drilling of two wells at Olkaria in the Rift Valley.

In 1967, in partnership with the United Nations Development Program (UNDP), the GoK began extensive geothermal resource assessments, leading to a decision to focus further development on Olkaria. Six wells were drilled from 1971-1976, yielding positive results (MoEP 2013). Rising global petroleum prices throughout the 1970s placed even greater pressure on the GoK to develop alternative energy sources to fuel its power grid, and by 1978, even unproven geothermal potential seemed to offer a more economic generation investment than continued reliance on thermal or hydroelectric expansion. This view was shared by both the GoK and the World Bank (World Bank 1990). With World Bank financing, the project continued, and 23 wells were drilled at Olkaria. The first geothermal power plant, Olkaria I, was commissioned in 1981, providing 45 MW of installed capacity.

As geothermal energy was introduced, the power sector policy regime retained its centralized character. In 1983 EAPL rebranded itself as the Kenya Power and Lighting Company (KPLC). KPLC continued to function as a vertically integrated utility in which the government held a controlling equity interest. In the 1980s, a series of legislative and regulatory acts affirmed the wide discretionary powers of the KPLC (the State Corporations Act of 1986, the Electric Power Act 1986). Through the 1980s, KPLC's senior leadership maintained close connections to key political decision makers. In a detailed review of the power sector, Godhino & Eberhard note that “these close relationships would characterize the way the sector was run well into the 1990s. In this way, KPLC was absorbed into the national political economy, which was becoming more centralized” (2019).

In contrast to many African countries in the 1980s, which were struggling to recover from the impacts of the oil crises of the 1970s, the Kenyan economy swiftly rebounded by 1980, and enjoyed steady growth throughout the remainder of the decade (Dunne & Asaly 2005). While the still nascent levels of power from geothermal sources played only a minor role in insulating Kenya from escalating energy costs, its viability and future importance was not lost on the wider power sector policy regime. Early geothermal development had important effects on the governance arrangements level of the regime by building a diverse support coalition of government, donors, international investors, and domestic manufacturing firms all interested in the continued growth of this new source of energy (Byrne et al 2014). The Kenyan government’s role in the early exploration of geothermal has been widely credited for derisking the sector in the eyes of donors and investors, who subsequently followed Olkaria’s early success with a flood of investment and technical support for further geothermal development (Godinho & Eberhard 2019; Kiptanui et al 2018). This period proved crucial in positioning Kenya as a supportive environment for non-traditional sources of electricity generation, and by the mid-2000s Kenya would take on a reputation as “the pilot for everything” in terms of regional power sector innovations (Newell et al. 2014). Yet despite the widely recognized importance of the state’s role in this development, a series of events both in and outside of the power sector led to a discrediting of the Kenyan state that would reshape the Kenyan power sector policy regime for nearly two decades.

The Liberalization Era

In the late 1980s Daniel Arap Moi's government was engaging in increasingly brazen acts of corruption and authoritarianism, from which the power sector was not immune (Dowden 2008). The Turkwel Gorge Dam, commissioned in 1986, became the target of widespread allegations of corruption and bribery, and reflected the liabilities of a highly centralized power sector when the government is essentially free of democratic accountability and motivated to pursue personal enrichment. In reaction to the corruption, an aid embargo was levied by Kenya's major donors, including the World and the IMF (Hawley 2003). Meanwhile, events such as the *Saba Saba* riots in 1990 and international criticism placed pressure on the Moi government to allow multiparty elections (Dowden 2008). In perhaps one of the greatest threats to the KANU party-state that had maintained a stranglehold on power since independence, the Moi government was forced to concede to both multiparty elections and substantial power sector reform.

By 1990 Kenya's developmental power sector regime continued to perform well in generation capacity relative to its peers, featuring a total installed capacity of 750 MW (as compared to Uganda's 150 MW and Tanzania's 300 MW). However, as the developmental regime had prioritized industrialization and not public access expansion, its electricity access rates remained in line with those of its neighbors, at around 7%. It appears that the pressures of multiparty democracy drove the KANU government to begin a steady, if slow, progress of social electrification beginning around 1990 (Godhino & Eberhard 2019).

Despite its relatively strong performance in growing generation capacity, the combination of the aid embargo and a drought that diminished the production of the nation's hydroelectric facilities forced the GoK to concede to the demands of its donors. In order to lift the embargo, the World Bank insisted that Kenya adopt the standard reform model. In response, the GoK issued a policy paper in 1992 that established an intention to proceed with commercialized tariffs and a reduction in subsidies to parastatals. By 1996, the Kenyan power sector was undergoing its first wave of liberalization reforms, bringing an end to the aid embargo. Generation was unbundled from transmission and distribution, and two IPPs began operating under seven year contracts, with tenders for two larger twenty-year IPPs offered. The Electric Power Act of 1997 established an independent sector regulator, and tariffs were upwardly adjusted to 75% of cost, significantly reducing one of the primary channels through which benefits from the power sector flowed to industrial consumers (Godhino & Eberhard 2019).

Prior to this increase in tariffs, KPLC was still turning a profit despite the fact that tariffs covered less than half of long-run costs. This was largely because the costs of some generation companies were covered by the government and thus not reflected in tariffs. This sort of cross-subsidized financing structure was a hallmark of the way developmental regimes ran; tariffs were offered to industrial clients and publics at subcommercial rates, with the difference between operating costs and revenue covered by the government. Despite being a vertically owned state-owned monopoly, KPLC had better than average performance, technical expertise, and capacity. Most importantly, in its tight coordination with the state, it had shown a strong commitment to long term planning for sector development. However, this proximity to the state eventually fell victim to political leadership's incentives to line its pockets as the threat of competition for power from multiparty democracy loomed.

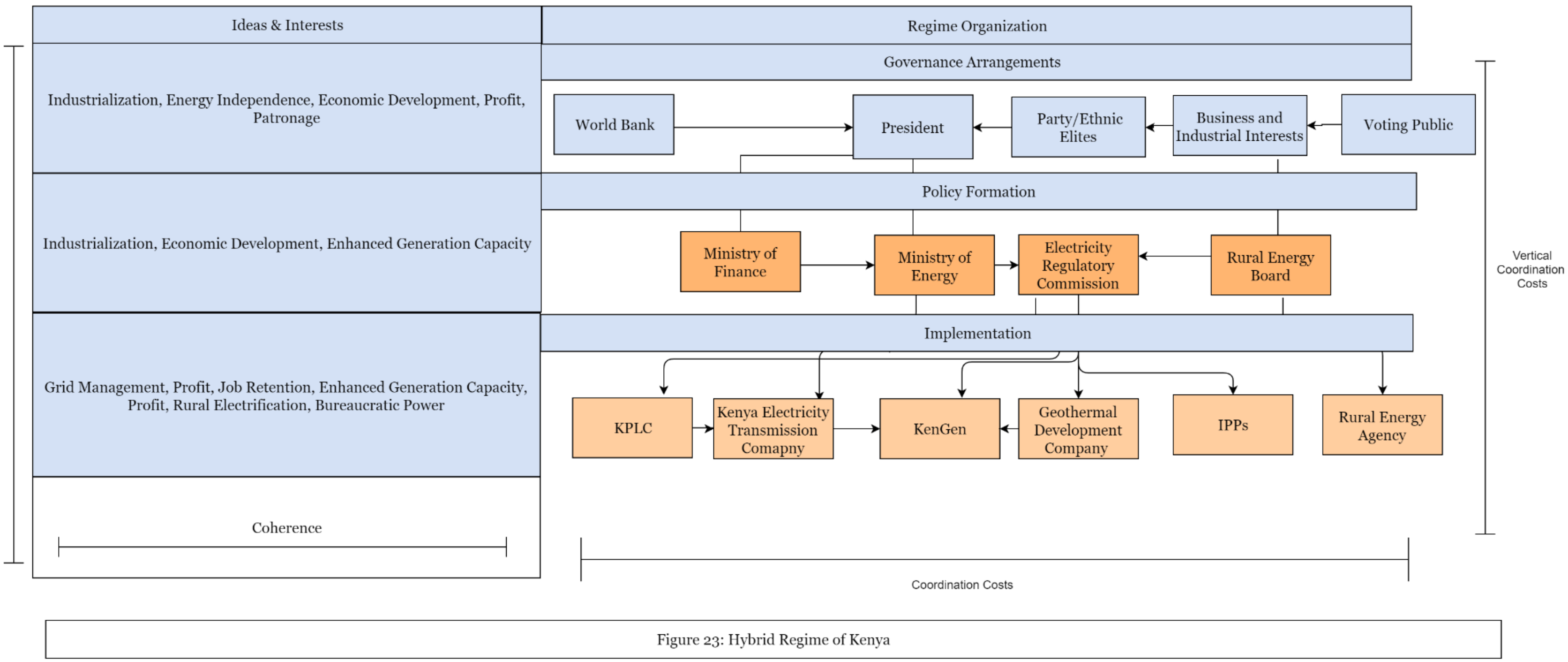

Figure 23: The Kenyan Hybrid Power Sector Policy Regime

The Unbundling of Bureaucratic Politics

While the leadership of KPLC was largely defiant in its attitude towards reforms that would strip the company of its sectoral monopoly, the separation of generation from transmission and distribution led to the creation of the Kenya Generation Company (Kengen), which became a key bureaucratic counterpoint to KPLC within the regime. KenGen protected its independent control of the generation sector, and found support in the newly created independent sector regulator. The opposition between the two state-owned firms was represented by KPLCs (which continued to control transmission and distribution) mounting debt to KenGen, which it was reluctant to pay. KPLC was accustomed to the developmental model in which they operated generation, and long-term issues with cost-recovery were absorbed by the government. With generation now formally removed, this sort of internal cost-passing was no longer possible, and the inability of tariffs to cover the power purchase agreements with KenGen exposed the firm’s insolvency absent government support. In this way, the layering of commercialization began to produce cleavages within the regime that would result in increasingly incoherent operational behavior.

In 2002 KPLC owed KenGen approximately $140 million, and KenGen found itself unable to pay contractors on the ongoing Olkaria II geothermal project. A meeting between KPLC, KenGen, the World Bank and the European Investment Bank was held at the national treasury. Under pressure from donors, KPLC agreed to honor its debts to KenGen (Godinho & Eberhard 2019). This was a critical moment as it reflected the fact that unbundling had become a financial reality for KPLC; it could no longer rely on the governance arrangement of the developmental regime. The government’s interests remained concentrated in the expansion of generation, for which

KPLC was no longer the preferred regime partner. Coerced into unbundling, KenGen took on this new role.

The policy regime continued to change in 2002 with the historic election of President Mwai Kibaki, the first non-KANU politician to hold the office since the legalization of multi-party elections in 1992. The dense network between KPLC and the GoK and MoE had been formed under over thirty years of KANU dominance, and thus KPLC now faced a new set of political actors at the governance arrangements level. Together with unbundling, this represented the most significant change to the developmental regime. The reformed regime structure is presented in Figure 23.

Lacking the KANU's connection and dedication to the specific arrangements of the power sector policy regime that had operated from independence until the late 1990s, Kibaki's Democratic Party government continued to pursue some reforms, replacing leadership at the MoE and investing in the capacity of the ISR. Kibaki's leadership marked the transition from the developmental regime into the "hybrid model" that continues to characterize the Kenyan power sector today. But while Kibaki certainly represented a changing of the guard, it is important to examine how many of the governance arrangements of the developmental era were preserved, albeit with some new actors.

The Hybrid Regime Vs. The Developmental Regime

The developmental regime was centered around a close connection between the GoK/MoE, a single vertically integrated SOE in whom the government's primary interest was the expansion of generation, and external financing from the development community. The regime was oriented towards expanding electricity generation for industrialization and economic growth, and government assumed substantial costs to ensure the implementation of sector planning that was carried out in close coordination with the responsible SOE. Only late in the developmental regime, after the establishment of multiparty elections and the credible threat of electoral accountability, did the expansion of social electrification begin.

The hybrid regime differed from the developmental regime in three major respects: 1) Partial unbundling divided the sector into two major bureaucratic units responsible for transmission and distribution (KPLC) and generation (KenGen). As discussed in the previous section, this resulted in rising bureaucratic competition and financial instability for KPLC. 2) The rise of the Kibaki government in 2002 represented the most significant change in political power at the governance arrangements level, and combined with commercialization and unbundling, ended a decades-long arrangement between KANU and KPLC whereby the government served as the fiscal sponsor for the SOE, which acted diligently to carry out government objectives. 3) The sector was opened to private sector activity.

Renewable Energy Development Under the Hybrid Regime

Renewable energy experienced a bifurcated growth pattern under the hybrid regime that clearly marks the differences in outcome between state and market led approaches to RE promotion. Geothermal continued to benefit from the reputational, material, and political advantages it had begun to establish decades earlier. Continued exploitation of the Rift Valley added to the stock of geothermal generation capacity, while state carved out geothermal’s role as a state-sponsored effort through the creation of the Geothermal Development Company in 2008, a majority state-owned “Special Purpose Vehicle” (SPV) for the continued promotion of geothermal activity. Solar and wind technology, on the other hand, have not enjoyed the same level of state sponsorship as geothermal, and have generally been relegated to a series of market-led instruments that have been only moderately successful in promoting growth. I explore these paths in detail in this section.

Geothermal

Following the consolidation of geothermal into the developmental regime in the 1980s and 90s, by the mid-2000s it had come to represent a significant source of electricity generation, accounting for 21% of KenGen's portfolio in 2005 (KenGen 2005). Even as large portions of the power sector were being privatization, the GoK acted to institutionalize the state-led arrangements that had underpinned geothermal development. In 2004, the MoE's Sessional Paper No. 4 established the fully state-owned Geothermal Development Company, which would be placed "in charge of geothermal resource assessments and sale of steam to future IPPs and KenGen for electricity generation," (Ministry of Energy 2004, IX). KenGen's 2005 Annual Report details plans to construct the "Olkaria II 3rd Unit Geothermal Project," which was "needed to make use of the excess steam of Olkaria I and II power plants… to supply about 35 MW to the national grid." (KenGen 2005). As of 2010, As of 2010, the MoE's National Energy Policy indicated that, of 1815MW of planned increases in capacity, twenty-six percent would come from geothermal sources (Ministry of Energy 2011). Throughout the Kibaki administration, Geothermal continued to enjoy a privileged position in utility-scale generation growth vis-a-vis other alternative sources of energy.

Under the Kenyatta administration, geothermal energy has only grown more central to the nation's electricity strategy. An interview with a member of senior staff at the Ministry of Finance under the new government stated, in 2013, "If energy is the number one priority for the President, geothermal is the number one priority for energy," (Newell et al. 2014). As of 2017, Geothermal represented 43% of total generation capacity, and is now the dominant source of national electric power. Kenya's new "National Geothermal Strategy" places geothermal as the center of the country's generation plans (Godhino & Eberhard 2019). Recently, when asked about the government's plans for future generation, CEO of KenGen stated plainly, "Our strategy going forward is geothermal." (Burkhardt & Herbling 2021, Bloomberg).

As in the past, Kenya's state-led efforts have been followed by private investment, which has substantially expanded the capital available for further exploitation of geothermal resources in the Rift Valley. Geothermal is now the central source of electricity generation in the country, and is supported aggressively by a coalition of interests across the governance arrangements, policy formulation, and implementation levels.

Wind & Solar

In contrast to geothermal, wind & solar have experienced an altogether different growth trajectory. Whereas geothermal has been the beneficiary of a sustained program of state-led investment with roots in the developmental model, growth in wind and solar have primarily been the product of private enterprise, albeit in different ways.

The majority of growth in solar has been through SHS and pico-solar systems, which are primarily the domain of private business. SHS growth has been somewhat successful in terms of providing access to a reliable source of residential electricity for Kenya's middle class. Generation from SHS, however, still represents a relatively minor portion of Kenya's total installed capacity, and is not a component of grid-scale generation. The FiT was first launched in 2008 and subsequently revised in 2010 and 2012. As of 2012, the FiT rate (set at 12 cents/kwh) was considered the least attractive for IPPs relative to the margins possible with wind or mini-hydro. The Ministry's attitude towards the low level of investment attracted by this

FiT rate has been largely dismissive. The Minister of Energy stated, “Investors are more concerned about making quick returns rather than large-scale impact and transformation of poor people’s lives. This is why they complain about feed in tariffs being low… The government thinks these tariffs are reasonable both for consumers and investors. This is the reason why solar production is low. The government does not want consumers to pay higher for energy.” (Newell et al 2014). As of 2019, the FiT policy has not resulted in the commission of a single solar energy project (Godinho & Eberhard 2019).

While solar now offers indisputably lower cost inputs and shorter lead times than geothermal, and confers unique advantages in expanding electricity into rural areas, its relatively miniscule contribution to generation in Kenya reflects its status within the regime. Solar was not incorporated into the developmental regime but emerged under the framework of the quasi-liberalized hybrid regime. It lacked the incumbent developmental regime support of geothermal, and was thus relegated to market-led instruments that reflect a fundamentally lower level of commitment from government.

Solar’s primary role in the Kenyan power sector has been through the update of off-grid Solar Home Systems (SHS). While SHS do offer a unique opportunity for alleviating Kenya’s rural electrification deficit, the majority of SHS sales have been concentrated in densely populated regions in the Western, Central, and South Eastern portions of the country (Wagner et al. 2021). Further, SHS uptake has primarily been the product of incentive schemes such as the waiver of VAT and import tariffs on PV products, rather than direct investment by the state. Because SHS is not directly subsidized by the government, the costs of purchase and installation remain beyond the reach of most Kenyans, especially those in rural areas. Empirical studies of SHS uptake in Kenya have consistently found strong support for the “energy ladder hypothesis,” which purports that the probability of households choosing modern fuels increases substantially with improvements in income, wealth, and education (Baek et al. 2020; Byrne et al. 2014; Lay al 2013).

Compared to solar, wind has become a relatively more important part of utility-scale generation. However, this has not come primarily from projects commissioned under the FiT, which has resulted only in several small scale projects (the Kinangop Wind Farm (60 MW), which has not been commissioned and is now in receivership, and the Kipeto Wind Farm (100 MW)). Instead, the most significant expansions of wind generation have been the project of large, bilaterally negotiated deals between the government, donors, foreign export banks, and foreign corporations. The centerpiece of this sort of arrangement is the Lake Turkana Wind Farm Project (Cookson et al. 2017).

The Lake Turkana Wind Project is not the product of any competitive-bidding system. Instead, the project is the result of concerted talks and planning between the MoE and a consortium of foreign-owned investors and energy companies (Pueyo 2018; Godinho & Eberhard 2019; Cookson et al. 2017). This long-term planning has provided sufficient coordination across the interested parties to permit high levels of public investment based on the completion of the project, most notably the MoE’s construction of a high voltage power line to link the wind farm’s generation capacity to the grid. Growth in utility-scale wind is thus primarily a product of a corporatist style of co-investment and sector planning that is reminiscent of developmental-era projects. It is not the product of Kenya’s major private sector RE policy instruments such as the Feed-in-Tariff, which has been responsible for a comparatively minor share of wind generation.

Universal Energy Access Under the Hybrid Regime

Electricity access grew only modestly under the majority of the hybrid regime's tenure. From approximately 7% in 1990, access rates grew to just under 20% by 2010. Access rates then experienced their most significant growth rate in history in the three years prior to the 2013 election, shooting from 19.2% in 2010 to 31.5% in 2013 (World Bank 2020).

The slow progress towards electrification in the period from 1990 to 2010 reflects the constraints of liberalization on the sort of aggressive expansion that was possible under Ghana's developmental regime. As the power sector policy regime faced external constraints on fiscal expansion, and KPLC fell into fiscal distress as it lost the state sponsorship it had enjoyed in decades prior, only minor progress on electrification was possible without bucking the demands of the donor community. Relatively sluggish growth in access under Kibaki and the hybrid regime became heavily politicized in the run up to the Presidential elections of 2013, in which challenger Uhuru Kenyatta of National Alliance Party (previously of the KANU, subsequently of Jubilee) campaigned on promises of universal electricity access. This politicization of electric power is clearly reflected in the massive surge in electrification rates from 2010 to 2013.

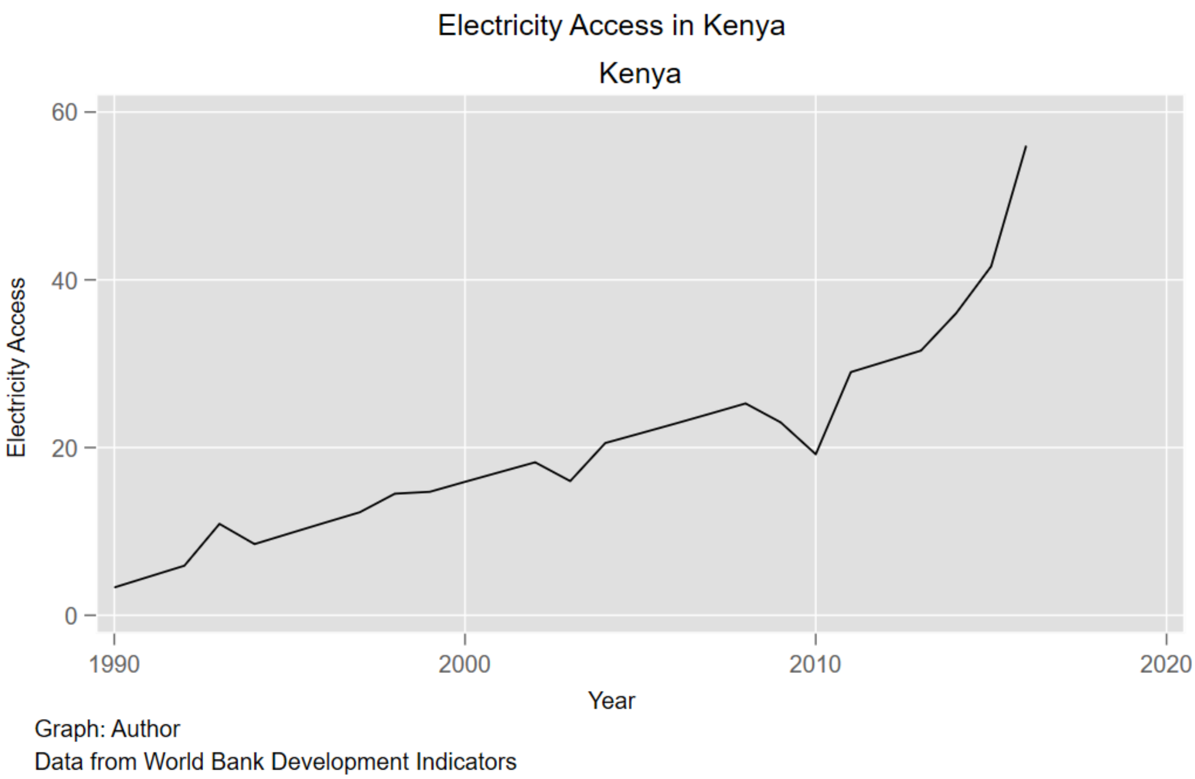

Figure 24: Electricity Access in Kenya 1990-2015. Source: Author. Data: World Bank World Development Indicators

Kenyatta's promises were not empty. Since his accession to office electricity access has grown at a rapid pace. This growth in access rates reflects something of a return to the governance arrangements that characterized the policy regime prior to Kibaki. Specifically, concerns over KPLC's solvency that occupied the Kibaki administration's approach to sector governance have been all but abandoned since the initiation of Kenyatta's social electrification program. Gains in electrification rates since 2013 are almost entirely attributable to state-led, subeconomic efforts to expand to the grid. The administration's disregard for the constraints of fiscal discipline intended by the liberalization reforms has drawn criticism from the World Bank. Grid expansion has been tied to a similarly developmentalistic expansion of electricity supply. As the discussion of state-led geothermal documented in detail, aggressive commitments of state capital have underwritten the majority of expansions in generation capacity, of which IPPs continue to contribute a relatively minimal amount (Godinho & Eberhard 2019).

Conclusion

This conclusion will proceed as follows. I begin by restating my central argument and presenting the supporting empirical evidence obtained through my research. I then respond to a series of alternative explanations and counterarguments. This is followed by a proposal for policy regime organization that responds to the diagnoses of the problems of regime incoherence facing sustainable development identified in the empirical analysis. I then connect this proposal and the findings to empirical and theoretical work on governance, public administration, and development. I finish with some concluding remarks about the future involvement of international development institutions in sub-Saharan Africa, and argue for the necessity of a change from the existing approach.

Policy Coherence: The Argument and Evidence

My argument is that sub-Saharan African governments' capacity to reach universal electricity access and cultivate their renewable energy resources depends on the coherence of policy regimes in the power sector. Specifically, when government is motivated to make progress on these goals, it must be able to rely on a set of institutions (public, semi-public, and/or private) to design and implement effective policies to these ends. Doing so requires that these institutions work together and not at cross-purposes, that they share ideas and interests around accomplishing these goals, and that they be sufficiently centralized to allow planning and coordination around energy supply, demand, infrastructure, and the incorporation of renewables. I have argued that when government principals committed to power sector development exert strong control over centralized bureaucracies, they can make swift progress that sends signals across the policy regime and results in compounding levels of development over time. When they attempt to decentralize the sector by offloading key responsibilities to a combination of public and private actors with mixed interests, bureaucratic competition raises coordination costs and drives incoherent and ineffective policy regimes.

In support of this argument, I began by providing a regional overview of three eras of power sector governance in sub-Saharan Africa: developmental (p.75-99), liberalization (99-117), and sustainable development (117-130). Through a review of government documents, World Bank reports, and academic and gray literature, I applied a theoretical model of policy regimes to understand how these different eras of governance shaped and reshaped the institutional organization and policy programs of the region's power sectors. This review laid the basis for a quantitative assessment of the effectiveness of the primary policy instruments of these agendas, respectively: national electrification plans (developmental), sector liberalization via commercialization, privatization, and unbundling (liberalization), and sustainable development (feed-in-tariffs). Using a new panel dataset on over twenty-five sub-Saharan African countries over four decades, I showed the strength of state-driven policy approaches such as national electrification and renewable energy plans relative to market-driven instruments in achieving the goals of universal electrification and renewable energy development (p.136-60). A working assumption of the quantitative analysis, based on a careful review of the policy instruments under study, was that market-led policy interventions expanded the circle of responsible implementation actors from public entities to an increasingly complex network of regulatory agencies and private sector actors, resulting in greater decentralization and higher coordination costs. I conducted a comparative case study to subject this assumption to scrutiny and investigate the direct relationships between policy regime coherence and effective sector governance.

Through a historical institutional analysis of three essential countries that closely document how power sectors operated under centralized and decentralized conditions, I traced how external reformatory pressures resulted in increasingly complex policy regimes that struggled to expand electricity access and renewable energy production. In Ghana, I showed how the country's greatest progress towards universal electrification came in the 1990s as the Rawlings' government resisted liberalization pressures and engaged in a state-led national electrification plan that rested on the closely-knit institutions of the developmental policy regime constructed after independence (p.145-151). I then showed how Ghana's efforts to increase renewable energy failed because, unlike the electrification policies, they relied on a newly installed set of institutional actors with competing ideas and interests. Specifically, globally promoted best practices such as Feed-In-Tariffs and net metering collapsed as parastatals spurned the regulatory agencies and private sector actors intended to drive the growth of renewables. I provided interview evidence with top government officials that testified to the specific mechanisms of incoherence whereby the state electricity company rejected statutory obligations to purchase renewable energy, meanwhile receiving cover from the executive branch in return for the continued writing off of government accounts in arrears. Further, the very fiscal distress such activities brought upon the parastatal served as the justification for their abdication of responsibility in the purchase of renewable energy contracts (p.157-165). While a centralized policy regime effectively brought electricity access to over ninety percent of Ghanaians, the increasingly complex constellation of actors responsible for the sector has failed to cultivate the nation's renewable energy potential, and left its electricity supply vulnerable to the threat of droughts and volatile global energy prices.

In Kenya, I showed how the nation's singular achievements in renewable energy growth are the consequence of early stage state-led investment in geothermal energy production, which is now the supply base for the country's rapidly expanding social electrification agenda. Beginning as early as 1965, the Kenyan government's decision to invest in experimental energy production across the Rift valley reduced risk in the subsector and encouraged an ever growing flow of public, donor, and private investment in geothermal energy (p.201-203). Amidst reformatory pressures and changes in government, the executive branch's continued commitment to ensuring the growth of geothermal instilled confidence in the personnel of multilateral institutions and private investors. This commitment has rested on a centralized core of institutional actors including the energy ministry, the Kenya Power and Lighting Company, KenGen, and the state-owned Kenya Geothermal energy company, which was created in the liberalization reform era to affirm centralized government's capacity to steer geothermal development (p.209-211). In further support of the key role of government in this action, I examined the relative insignificance of solar power in the national generation portfolio. Unlike geothermal, solar has been relegated to the same market instruments as in Ghana and South Africa, and has seen only marginal gains heavily concentrated amongst the nation's wealthy, urban residents (p.211-213).

Kenya's progress on electricity access similarly demonstrates the importance of state-centric policy leadership. For most of the country's history, social electrification was not a policy priority. Only after the transition to multiparty democracy in the 1990s did electrification begin to slowly increase. However, even then progress was muted as the government simultaneously implemented liberalization reforms that drove incoherence between the countries major parastatals and deconcentrated implementation across a growing group of public, semi-public, and private sector actors. Bureaucratic competition between the generation and distribution firms characterized the liberalization era from 1990 to the late 2000s, during which growth in electricity access was slow. As the case study demonstrated, electricity access began its current rapid clip only when Uhuru Kenyatta was elected in 2013. Under the Kenyatta administration, the government committed the policy regime to the goal of electricity access by acting through its historic implementing agent, KPLC. Rejecting market constraints and fiscal insolvency, KPLC has rapidly expanded national electricity infrastructure, reflecting the centrality of electricity access to the policy regime and the national political economy. This growth in access has been made possible by the government's sustained commitment to geothermal, which now lays the basis for the country's expanded electricity supply (p.214-215).

South Africa's power sector story demonstrates both the possibilities of a centralized developmental state and the dangers of quasi-liberalization to policy regime coherence. Inheriting a well-managed, fiscally solvent, and energy-endowed parastatal in Eskom, the democratic government of Nelson Mandela leveraged the state's power to dramatically expand electricity access for millions of energy impoverished South Africans. This growth was balanced on an enduring set of governance arrangements whereby energy-intensive industry and the government worked closely together to ensure the flow of cheap electricity from the nation's abundant coal reserves. However, as my analysis demonstrated, a series of overlapping stages of decentralization and liberalization created ambiguities of responsibility and opportunities for corrosive exploitation that resulted in incoherence, ineffectiveness, and a severe discrediting of the state and its institutions (p.178). First, partial liberalization opened the power sector to private participation and halted state investment in the generation subsector, a development which took place alongside the governments' rapid expansion of social electrification (p.180-184). Second, the Mbeki government launched an economic program intended to spur economic growth through the distribution of contracts with parastatals, increasing the role of private actors in the power sector (p.184). Third, an energy shortfall followed from the government's halting of generation investment in anticipation of private capital investment, and the Zuma administration responded by exploiting procurement in the quasi-liberalized policy regime to line the pockets of his patronage network at the expense of the power sector. I argue that Zuma's corruption in the power sector was made possible by the regime structure the administration inherited, which redistributed responsibility for the nation's power sector goals from central state institutions to a diffuse network of unaccountable private sector actors (p.185-189).

Renewable energy policy in South Africa was introduced amidst the energy shortfall and in the institutional context of the quasi-liberalized power sector policy regime. The same gaps in accountability and diffuse structure of the implementation level of the regime rendered the government's market-oriented renewable energy policies defunct. While initially attracting investor interest, the government's renewable power procurement program could not compete with the political economic faction built around coal, procurement, and corruption. Eskom's corporate statutory identity afforded the parastatal legal subterfuge that enabled it to shirk renewable power purchases in favor of continued participation in the Zuma administration's patronage network. While refusing to sign power purchase agreements with wind and solar providers, Eskom and the government heavily invested in corrupt coal production projects that failed to offer cost savings or timely relief from the nation's electricity shortage (p.188-195). Even while load-shedding continues to plague the county with rolling blackouts, renewable energy occupies only a miniscule share of the nation's generation portfolio.

With regard to institutional capacity, an alternative account that I call the neoclassical approach evaluates the quality of state institutions in the power sectors as facilitators of private capital investment. The neoclassical account considers successful development to be contingent on the adoption of the Standard Reform Model in the power sector, a policy package of corporatization, privatization, unbundling, the establishment of independent regulatory agencies, and commercial tariff pricing (p.33-36). I quantitatively evaluated the effects of these policy interventions on universal electricity access and renewable energy development, and found only limited support for positive effects on electricity access. I explored the reasons for this in the case studies; corporatization did not generally improve parastatal's performance in any way that served the public benefit. Instead, parastatals tended to adopt the *de jure* clothing of corporatization and use its statutory obligations as justifications for selectively avoiding financial obligations on the basis of political, rather than financial, priorities. This pattern is directly observable when electricity parastatals refuse to sign power purchase agreements for renewable energy; the Electricity Company of Ghana cites solvency concerns to reject legal obligations to purchase renewable energy while simultaneously allowing government customers to avoid paying bills (p.177-179). Eskom similarly cites costs as a reason to refuse renewable energy purchases while engaging costly procurement contracts in the coal supply value chain that support the ANC patronage network (208-212).

The fiscal state of utilities has generally only improved when governments satisfy their accounts and demand little in terms of meeting social electrification goals. Privatization has failed to attract anything close to the level of capital investment necessary to fill the role of the state in expanding electricity access or growing renewable energy. Where it has occurred, unbundling generation from transmission and distribution has evoked bureaucratic competition and/or incoherence between subunits, such as the lack of coordination leading to South Africa's generation supply crisis (p.188-200), and the financial brinksmanship between KPLC and Kengen (p.207-8). Independent regulatory agencies have either not been truly independent, or their *de facto* ability to coerce parastatals has been overpowered by SOEs' more privileged political-economic status. When regulatory agencies have attempted to set commercial tariff prices, they have been consistently met with broad opposition from across important elements of the policy regime, as in the 1990s in Ghana (p.153-3) or the 2000s in South Africa (p.190). The reasons for this are unlikely to change; electricity access is deeply politicized in all three countries studied, and the vast majority of the public cannot afford to pay commercial prices. Institutional consumers that can afford consumer pricing are also often unwilling to pay; the primary source of arrears in Ghana are government accounts (Pueyo 2018; Interview A), while in South Africa, large politically valuable municipalities such as Soweto can resist payment in exchange for political support (Bowman 2020).

Twenty years after the World Bank and African governments began initiating the SRM across the region, it has not been fully implemented in any single case (Foster & Rana 2020). To the extent that it has been implemented, there is, at best, mixed evidence that it contributes to improved corporate utility performance primarily manifested in reduced transmission losses. Such gains offer little progress on social electrification or renewable energy development. Electricity access and renewable energy growth are both salient public priorities and regular rhetorical features of successful political campaigns in Africa; privatization of public utilities and electricity generation are not. So if the SRM is not part of an effective strategy of achieving those goals, it is unclear why it remains central to World Bank approaches to sustainable development. Persistent efforts to roll out these reforms have resulted in the "hybrid model," which my analyses have shown to be at best a source of weakened inter-institutional coordination, and at worst an opportunity for corrupt exploitation.

I set out to understand why Sub-Saharan African countries struggle to obtain universal electricity access or cultivate their renewable energy resource potential. The quantitative analysis and the cases just discussed have provided a meaningful answer to this question. Committed governments that retain strong centralized bureaucracies with minimal dispersions of responsibility and resist pressures to delegate power sectors to market leadership can be highly effective at eliminating energy poverty and developing renewable resources. Ghana's National Electrification Scheme, South Africa's National Electrification Program, Kenya's state-led geothermal energy development, and the regimes which designed and implemented these policies all provide strong evidence for this claim. On the other hand, when governments relegate key power sector goals to market leadership and allow wide dispersions of responsibility for implementation, policy regimes become incoherent, unwieldy, and vulnerable to exploitation. Ghana and South Africa's failed renewable energy agendas, and Kenya's stunted progress on electrification during its liberalization period from 1990 until 2013 all provide strong evidence of this claim.

Alternative Explanations and Counter-Arguments

A theory is only as strong as its ability to withstand criticism and alternative explanations. I began this work by ruling out two of the more obvious explanations for why some countries succeed at sustainable development of their power sectors and why others fail: wealth and democratic development. While economic growth and democratic consolidation are critical goals for any country, they do not appear to offer superior explanatory value when it comes to electricity access and renewable energy growth in Sub-Saharan Africa.

Wealth appears to play some important role as an enabling factor in social electrification, as the majority of countries which have achieved greater than fifty percent electricity access are on the wealthier end of the continent's income distribution. However, above that threshold there is no clear linear relationship between the two variables. This question was explored more deeply in quantitative analyses, which found increases in wealth to be less statistically significant than either institutional quality or the presence of particular policy interventions.

Democratic development appears to be a more important variable than wealth in explaining electricity access. In the panel data analysis, democracy was correlated with large and significant increases in electricity access that outpaced even the policy interventions under review. Still, democracy does not offer an explanation for the significant variation in the trajectories of growth in electricity access amongst the continents' most democratic countries. Further, it provides only a limited explanation of how and why willing democracies succeed at expanding electricity access and others fail. Strong public demands for electricity appear to play an important role in motivating the governments of Ghana, South Africa, and Kenya to pursue social electrification programs. However, public pressure does not account for why South Africa's social electrification progress abruptly halted in the mid-2000s, or why Kenya's swiftly increased in 2013. Ghana's exceptional progress in social electrification, while motivated by democratic pressures leading up to the transition to multiparty democracy in the early 90s, was made possible by the country's massive development of hydroelectric resources that took place in the undemocratic period from the late 1960s through the 1980s. Democracy may be a strong explanation for why governments become motivated to pursue universal electrification, but it offers little purchase on how they are able to do so.

The level of countries' democratic consolidation appears to have almost nothing to say about renewable energy growth. Kenya is the least democratically consolidated country of the three case studies and features an unexceptional level of democracy for the continent more broadly. However, Kenya is far and away the continental leader in developing renewable energy resources. The power sectors of leading Sub-Saharan African democracies such as Ghana, South Africa, and Botswana share the rest of the region's negligible development of renewables. As the case study demonstrated, Kenya's leadership in the renewables sector owes primarily to concerted government policy that predated its transition to multiparty democracy by decades.

The failure of Ghana and South Africa's renewable energy agendas does not appear to be the result of any notable changes in democratic quality. The quality of Ghana's democracy has improved since the country began considering renewable energy in the early 2000s. The case can be made that South Africa’s renewable energy failure is a consequence of a coincident decline in democratic quality under the Zuma administration, in which norms and institutions eroded under the president’s patronage network. My case study findings do not reject that Zuma’s actions were an important element in holding renewable energy growth back. However, this explanation emphasizes agency at the expense of important structural variables that offer more generalizable lessons about renewable energy growth in the region. First, as my analysis of South Africa’s liberalization period demonstrates in detail, the Zuma administration’s actions were made possible by the policy regime Zuma inherited. The patronage network’s *modus operandi* was to exploit opportunities in power sector procurement that were made possible by administrative and policy reforms that predated the administration. Second, the patterns of policy failure by which the leading parastatal (Eskom) exploited autonomy afforded by its corporate identity to reject statutory obligations to purchase renewable energy in favor of financially serving the priorities of patrons in the executive branch closely mirrors the pattern in the Ghanaian case. While the outcome in Ghana was not widespread corruption and state capture, both the policy pattern and its consequences for renewable energy growth were identical. The same can be said for solar energy in Kenya, which has not been given the same privileged status as geothermal. Kenya’s leading parastatals reject renewable energy power purchase agreements on fiscal grounds, although they continue to outspend their budgets when it serves the goals of their principals in the executive. Specifically, KPLC aggressively serves the Kenyatta administrations’ goal of electricity access at the expense of its fiscal health, and uses these financial problems as a justification to reject power purchase agreements with private renewable energy producers.

The particular patterns of policy regime incoherence between parastatals and the private sector that led to underdevelopment of wind and solar resources are similar across all three cases, and can be traced back to three commonalities: historic political economic linkages between parastatals and executive political priorities, the corporatization of parastatals, and the relegation of solar and wind development to market-based mechanisms contingent on those parastatals' cooperation. Parastatals' corporate status allows them to selectively shirk market-based mechanisms for renewable energy growth on the basis of fiscal solvency while serving more costly political priorities of patrons in government. What sets South Africa apart from Ghana and Kenya is that the political and financial priorities of Eskom's principals that took precedence over solar and wind contracts were rooted in self-enrichment rather than social electrification, although the outcomes for renewable energy were ultimately the same.

Rather than wealth or democracy, it is the presence of centralized, coherent policy regimes backed by committed principals in government that explains sustainable power sector development in Sub-Saharan Africa. The implication of this argument is a wholesale rejection of the dominant, neoclassical approach to sustainable development and energy governance in favor of a return to the state-led policy regimes that characterized the post-independence period. While I have provided evidence to support this view, it raises a number of serious objections that warrant a response. These objections are as follows. First, leaders and international development institutions tried the state-led model for much of the latter half of the twentieth century, and it has largely failed. Sub-Saharan Africa is still the poorest region on earth, lags behind most of the world in democratic development, and is characterized by high levels of corruption, political violence, and instability. Second, what infrastructural progress was achieved under state-led models in sub-Saharan Africa was highly undemocratic, and a return to this style of governance would imply damage to democratic accountability and increase liabilities for corruption. Third, where does the money come from? If one is to reject the role of private sector financing, then there is an obvious need to explain where the capital for infrastructural investments will come from. I will address these objections in turn.

State-Led Development Has Already Failed in Africa

The first objection is that state-led development was the modal approach from the time of independence until the 1980s, and resulted in reckless spending, corruption, debt crises, and state failure. This was a widely held view amongst a circle of what Evans calls “neo-utilitarian" scholars that “castigated the Third World state as ‘predatory’ and ‘rent-seeking.” (1989; p.561). In the period following decolonization, the African socialist governments that took power engaged in spending programs in infrastructure, health, education, and state-owned enterprises intended to spur social and economic development. These approaches were largely supported by influential economists of the modernization school who supported a “big push” for development that would lay the basis for the growth of modern economies (Rosenstein-Rodan 1943). These scholars argued that market economies were only possible after certain levels of infrastructure had been achieved, a view based on the experience of the commercial economies of Western Europe and the United States wherein state investments in electricity, communication, and transportation rapidly expanded the interconnections between producers and consumers of goods and services (Rostow 1960). It was thought that a similar feat could be accomplished in Africa by partnering with national governments to support state investments that would stimulate the region’s significant agricultural and natural resource economies. Such policies would not only bring wealth to African societies, but incorporate them into the global market economy and serve the political and economic interests of the West, which was by then involved in a geopolitical struggle to counter the influence of the Soviet Union (Latham 2000).

As documented in the case studies in this work, dozens of major electricity generation projects took place during the modernization period of sub-Saharan Africa’s development, particularly the construction of hydroelectric dams. These projects were seen both by international development institutions and African leaders as important steps forward in bringing the region’s economies into the modern era by supplying the electricity necessary to power industrial and manufacturing enterprises. Problems emerged as the prices for the region's primary agricultural exports sank in the 1970s, and governments began to struggle to support the state-owned industrial enterprises that were the major consumers of electricity (Bates 1989). However, the scale of this problem depended on the extent to which individual African countries had invested in state-owned enterprises in areas in which they had no comparative advantage. Ghana and Nigeria are oft-cited examples of such overextensions of the state. By the 1970s, both countries had invested in state-owned companies in everything from banking to air travel to tourism (Adeyemo 2017; Appiah-Kubi 2001).

Many African states sank deeply into debt attempting to keep their state-owned enterprises afloat. The distribution of bureaucratic jobs and the urban land ownership and lifestyles associated with their salaries constituted an important part of the political economic strategies African leaders employed to retain control of their states, and their protection was thus imperative to maintaining state control. However, as domestic finances dried up and external debt skyrocketed, African countries were forced to implement strict programs of fiscal austerity. This coincided with military challenges for state control that arose from a combination of the historic marginalization of ethnic groups at independence and surges of military financing supporting proxy conflicts of the Cold War (Young 2012).

By the 1980s, the thinking of development institutions had changed alongside that of economic leadership in the United States and the United Kingdom. Neoliberal economists argued that the elimination of government debt and adoption of strict monetary policies was essential to promote export growth in developing economies (Berger & Beeson 2010). This diagnosis was applied to African states, and the vulnerable uneconomic state-owned enterprises served as a useful justification to press the adoption of the so-called Washington Consensus. But how fair were these criticisms with regard to state-owned power sectors?

There are important differences between state-owned electricity companies and the other public enterprises common across the region in the three decades after independence. The first difference is categorical; electric power is a utility and even its subeconomic operation is generally considered an acceptable beneficiary of state subsidy as it can facilitate economic growth in areas of comparative advantage (Huntley 2021; Kessides 1993). While significant generation surpluses are undesirable, this was not generally the case across Sub-Saharan power sectors, as the electricity produced was usually matched to consumption through demand-side contracting with planned industrial operations (rather, power sector problems generally came from insufficient generation capacity arising as capital expenditures sank in the late 1970s and 80s (AfDB 2018; Munasinghe 1989; review of World Bank documents in regional overview). Thus, whether state-owned power sectors were overextended is more of a question of whether the enterprises they powered were themselves uneconomic, and thus levels of power generation were lacking justification. Indeed, postmortems of bloated African public sectors focus primarily on failed ventures that violated the principles of Hirschman's (1958) balanced growth arguments by attempting to stimulate industries for which there was insufficient human and resource capital, and no comparative advantage. If it is the case that the modest levels of electricity production across the region in this period could have been used effectively had they been channeled to more productive enterprises, the problem with the state-led approach appears to have more to do with downstream industrial policy than with public infrastructural investments in power production. This leads to the second important distinction between SOUs and most other SOEs in Sub-Saharan Africa.

Because low-cost electricity is a utility essential to economic enterprise, most SOUs in Sub-Saharan Africa were established by colonial governments decades before the many SOEs in banking, agriculture, construction, tourism, and other industries that came to essentialize overextensions of the African state. In the Anglophone cases studied in this work, SOUs benefit from managed transitions that saw the transfer of skills from the highly trained expatriate employees to the African civil service management and staff (World Bank- Ghana- 1957; World Bank- Kenya 1963; 1967[16]). They were thus well-run state institutions prior to and in the years following independence. These institutional foundations of practical, development-oriented management and training originating in the British Civil Service tended to persist in the organizational cultures of the Electricity Company of Ghana, Eskom, and Kenya Power and Lighting Co., and set them apart from the upstart SOEs established later in the twentieth century. It is worth briefly taking a closer look at how these differences set the experiences with electrical utility companies apart from the broader failures of the SOE economies, and thus ought to have different implications for the appropriateness of divestment and privatization policies.

Ghana's major early-stage power sector investments were centered around the Akosombo Dam at the Volta River. The level of hydroelectric production from the dam was targeted to meet the demand of VALCO aluminum company, an enterprise jointly owned by the Government and Kaiser Aluminum. VALCO operated as a profitable aluminum smelting corporation for over fifty years, supplies ten percent of its aluminum production to local factories, and is the foundation of the national aluminum industry, which remains a key part of the nation's manufacturing sector (Osei 2017). The firm held a long-term power purchase contract with the Volta River Authority that was renegotiated under the Rawlings' administration to reflect the increased costs of

[16] Eskom was different in that the "Africanization' of the parastatal's executive ranks did not occur until the 1990s, although similar in regards to the managed transition and skills transfer (Greenberg 2009).

electricity production in the 1980s, and the updated contract held until the early 2000s when the Kufour administration was unable to renegotiate another contract (Kuruk 1991). The arrangement's economic value preserved it amidst the Rawlings governments' widespread program of privatization and structural adjustment in the late 1980s and 1990s.

Rather than the electric utility sector, the targets of the Rawlings' government and World Bank advisors' divestment and privatization program were state enterprises that had been built in one of two phases of public sector expansion that occurred after the establishment of the public utilities. The first phase were SOEs constructed under the Nkrumah's administration's practice of expropriating agricultural revenues for the establishment of firms across a wide variety of commercial industries. The second were partial or total state acquisitions of equity in privately held companies through a policy of nationalization under the Acheampong administration. What these enterprises had in common was that, unlike VALCO, they were not built on any comparative advantage in resources or skills, instead relying on revenues from profitable exports to keep them afloat. So, while it appears that such policies of retrenchment were likely justified, as by the 1980s the majority of these public enterprises were budgetary burdens, neither ECG nor the VRA qualified as parts of the sluggish state (Appiah-Kubi 2001). It was only after the Rawlings' administration departed that reform of the power sector began, and as discussed in the case study, this was motivated by the pressures of a drought that threatened the nation's hydroelectric-reliant generation sector rather than a perception that the sector or its state-led approach was economically equivalent to the SOEs of either the first of second phases of public sector expansion (Gore 2019).

In South Africa, Eskom effectively provided cheap electricity from its establishment in 1913 until the energy crisis of the mid-2000s, which as discussed in the case study was largely a function of poor planning and increasing incoherence under external reformatory pressure for liberalization (Eberhard 2016; 2005). The firm played a critical role in the establishment of the mining industry that continues to serve as an essential part of the South African economy (Fine & Rustomjee 1996). The country benefits from a strong comparative advantage in electricity generation owing to its abundant coal resources. Aside from the recent corruption at Eskom, the majority of dysfunction in the South African public sector can be attributed to industries created in one of two waves of ethnocentric state economic intervention that occurred long after the establishment of Eskom and the Minerals-Energy Complex: Afrikaner Economic Empowerment (the wave of state-owned enterprises, jobs reservations, and wage distortions enacted by the National Party government to improve the economic position of Afrikaners in the early years of Apartheid) (Giliomee 2008; Greenberg 2006; 1980) and Black Economic Empowerment (the ANC program of economic reparations for Apartheid, which was also centered around parastatals and job reservations). While Eskom is often lumped into discussions of these enterprises (SAFAIR, Telkom, Transnet, Sasol), it predates all of them by at least 25 years and was established under the comparatively economically liberal policies of the British-dominated Union of South Africa (Fine & Rustomjee 1996). What role these other enterprises have for the future of the South African developmental state project is a subject of scholarly debate and discussion, but their distinct history and economic justifications fundamentally set them apart from Eskom, however dire the firm's current conditions may be. Unlike Eskom, many of these firms have little history of ever being productive enterprises, and are not the products of advantages in factor endowments like coal.

The electric utilities sectors of these Sub-Saharan African countries charted a different path than the other institutions of state-led economic planning. While many other PEs proved unproductive, utilities have been as close to "pockets of competence" as can be found across African public sectors (Roll 2014). Rather, attempts to stimulate economic activity in areas lacking domestic factor inputs have occasionally placed pressure on public utilities to supply electricity to operations that do not net economic value for publics or investors. Subjecting the power sector to the same sorts of reforms as these ill-fated ventures mistakes their culpability in the failures of twentieth century state-led development and has already resulted in the retrenchment of what has been a necessary building block for some of the region's greatest economic accomplishments, to say nothing of the social benefits of public electricity access. While previous models of state-led development in Africa have failed, there is insufficient evidence that the diagnoses of these problems should inform approaches to the sustainable development of African power sectors. Instead, as will be argued later in this chapter, policymakers and development institutions should capitalize on the historic competencies of state-led power sectors to provide leadership for the cultivation of renewable energy resources and the expansion of electricity access.

State-Led Development Was Corrupt

Another important objection is that the infrastructural growth from the period 1960-1990 was often conducted under undemocratic governments and associated with the looting of the state. Endowing the state with the money and power to build the necessary infrastructure for renewable energy growth and universal electricity access could lead to similar patterns of corrupt behavior by the state. Many African states in the period 1960-1990 were party-states or military dictatorships with no electoral accountability, which allowed leaders to line their pockets and those of their patronage networks with stolen monies from state appropriations for infrastructure. Such practices led to important criticisms of the international aid architecture of this period, and to a transition towards credit-based models of development assistance and privatization of public services provision.

Multiple high-profile examples of corruption in the power sector can be found in both state-led and privatized policy regimes. Indeed, as with state-led development, privatization has a very mixed track record when it comes to corruption. This appears to be because of a simple but important fact: corrupt actors and systems exhibit corrupt behavior whether they approach development through the state or not. As Stiglitz states, “if a government is corrupt, there is little evidence that privatization will solve the problem. After all, the same corrupt government that mismanaged the firm will also handle the privatization,” (2002). This has generally held true in the empirical analyses that have been conducted on the relationship between privatization of parastatals and corruption in sub-Saharan Africa.

Literature on the privatization of parastatals has generally found that when governments do privatize, these processes are unlikely to fix any corruption issues. Tangri’s study of privatization across Sub-Saharan Africa found that “where states elites have been able to direct and manage closely the privatization process and, in particular, ensure that privatization transactions maintain rather than undermine political support for themselves, the governments have been less unwilling to undertake public sector divestiture programmes.” (1999). Consistent with this finding, a comprehensive review of privatization activity in the region from 1991 to 2002 found that the choice of PEs to be privatized was generally not transparent, information about transactions was rarely available in the early stages of the sale of state assets, that final approval of transactions was generally confined to a small group of state officials, that the use of proceeds from privatization has rarely been transparent, and that apparently competitive transactions are often later revealed to be the products of political patronage (Buchs 2003, 34).

In a well-cited quantitative study of privatization and corruption in water and electric utilities in Sub-Saharan Africa, Auriol and Blanc (2009) find that for Sub-Saharan African power companies to be socially optimal, they must “extract rents out of the wealthy part of the demand to subsidize access to the middle class and poor." This is generally only possible if statutorily empowered publicly-owned utilities coerce this redistribution. However, the far more common occurrence is that publicly-owned utilities are socially non-optimal and unprofitable because, rather than subsidizing the poor, political and economic elites tend to extract subsidies for themselves by refusing to pay their bills (a pattern that was observed in the Ghanaian case study). "Socially good" privatizations, where corrupt, unprofitable public utilities are privatized to maximize the efficient use of resources, are unlikely to occur both because elites who have captured the policy process wish to retain these subsidies, but also because the enterprises are unprofitable and thus unlikely to be attractive to private sector actors *unless* corruption is involved. Privatization of *profitable* public utilities, on the other hand, are usually socially non-optimal as the government has already achieved an economically efficient and beneficial way of providing a service, and thus the sale of such firms tends to be the product of non-social incentives such as bribery. "Socially bad" privatizations, where non-corrupted public utilities are privatized are thus easier to achieve and more likely (2009). This pattern is consistent with findings of the aforementioned review of utilities privatization that found that elites tend to tightly control the privatization process and resist transparency (Buchs 2003), as well as studies of power sector procurement processes in hybrid systems, which generally take place through non-competitive, bilateral contracting rather than competitive tendering systems (Eberhard).

Some studies have quantitatively examined the relationships between specific regulatory reforms of the power sector SRM (commercialization, privatization, independent regulatory agencies) and corruption (Imam et al 2019; Wren-Lewis 2015; Estache et al. 2009). Unsurprisingly, they consistently find that corruption has negative effects on power sector performance (Imam et al 2019; Wren-Lewis 2015; Estache et al. 2009). However, findings on the impacts of regulatory reforms on corruption are mixed and qualified. Imam et al.(2019) apply a dynamic panel estimator to data from 47 Sub-Saharan African countries from 2002 to 2013 to identify the impacts of independent regulatory agencies, private sector participation, and corruption on technical efficiency, electricity access, and national income. By combining each regulatory variable (independent regulatory agencies, private sector participation) with the corruption variable they produce two interaction terms to estimate whether the negative effects of corruption on the dependent variables (technical efficiency, electricity access, and national income) are stronger or weaker when the regulatory intervention is present. They find that the negative effect of corruption is weaker when there is an IRA. However, it is important to note that, outside of the interaction term, the authors find IRAs have a positive and statistically significant relationship with transmission losses, meaning that IRAs are associated with reduced sector efficiency. This leads to the confusing conclusion that “the establishment of IRAs acts as a limiting factor of losses when corruption increases, but also limits loss reduction as countries become less corrupt,” (p.539). Private sector participation is found to have no direct impact on technical efficiency, and no mitigating effect on the impacts of corruption.

In a similar analysis, Wren-Lewis investigates how increases in regulatory autonomy and privatization influence the effects of corruption on firm productivity in Latin America and the Caribbean (2015). Again combining regulatory variables with corruption into interaction terms, the author applies a fixed-effects estimator to a panel of 153 electricity distribution firms across 18 countries from 1995-2007. The analysis finds that the negative effects of corruption on firm productivity are slightly weaker for privately owned firms than for PEs when a “good” IRA (as determined by Andres et. al’s (2007) Electricity Regulatory Governance Index) is present. So, IRAs more strongly mitigate the effects of corruption on private firms than on public firms. However, this result loses its significance and flips direction when the author controls for government surplus/deficit over GDP. The author hypothesizes that this is because less fiscally responsible governments are associated with inefficient PEs and thus privatization has a stronger impact on productivity in these contexts.

Using a global sample of 153 developing countries over the time period 1990-2002, Estache et al. (2007) evaluate the impact of regulatory interventions on corruption's impact on electricity access. First, the authors find that, independently, both privatization and corruption exhibit directly negative, statistically significant effects on electricity access (measured using consumption data). Second, when they combine privatization and corruption into an interaction term (as in Wren-Lewis 2015 and Imam et. al 2019), privatization *strengthen*s the negative effect of corruption on electricity access. Third, the authors find that IRAs reduce the effects of corruption on electricity access.

The empirical studies of privatization and corruption in utilities sectors yield three consistent findings. First, they find that corruption has a negative effect on sector performance and electricity access. Second, they find that Independent Regulatory Agencies can mitigate the negative effects of corruption. Third, they do not provide support for the claim that privatization can mitigate the negative effects of corruption in the power sector. In light of the other qualitative and theoretical work discussed, this is unsurprising. As Stiglitz (2002), Tangri (1999), Buchs (2003), and Auriol and Blanc (2009) argue, privatization is unlikely to mitigate corruption because the divestiture and sale of state assets is generally managed by the precise actors responsible for corruption in the first place. Further, as Auriol and Blanc argue (2009), the cases in which privatization might offer social benefits are those in which it is least likely to occur. Public electric utilities that do turn a profit reflect socially optimal investments of public resources and are the least corrupt, and are thus simultaneously the poorest candidates for privatization from a public perspective. Yet these same utilities are the most attractive and valuable assets from the perspective of private investors. Thus PEs that are most likely to be sold are thus those for which the sale entails the greatest social costs.

Corruption clearly hurts power sector development, but privatization does not appear to help. This is likely because corruption in the power sector is epiphenomenal of the wider problems that motivate and enable corrupt behavior across government, such as a lack of electoral accountability, transparency, rule of law, legislative oversight mechanisms, and poor compensation and a lack of public service ethics in the bureaucracy. Thus it makes sense that the only regulatory intervention that exhibits mitigating effects on corruption are independent sector regulators, which may be insulated from broader patterns of state corruption. State-led approaches do not offer any promise of reducing corruption where it exists either; eliminating corruption from the public sector is not the focus of this work. What we can do is set aside the notion that privatization of the power sector carries less liability for corruption than a state-led approach.

Where Does the Money Come From

The final objection I will address in this conclusion is the question of finance. African governments face significant budgetary constraints that are likely to worsen as the region's debt-to-GDP ratios continue to grow. This scarcity of domestic financial resources underpins the neoclassical literature's argument that amidst such constraints, the best (and perhaps only) path forward for power sector development is for governments to facilitate conditions that attract foreign direct investment (FDI). Unfortunately, two decades of reform have attracted limited and insufficient levels of FDI, a problem the neoclassical approach attributes to weak regulatory frameworks (Foster & Rana, 2020; Collier & Venables 2012). I argued early in this work that the reasons for the policy deficiencies the neoclassical approach identifies are deeply rooted in the political economies of sub-Saharan African countries. These problems are unlikely to change so long as electricity production and distribution remain central levers of political control. Subsidization of public and government consumers through uncommercial consumer tariffs and unpaid bills and monopoly control of electricity supply are closely connected to the political priorities that have historically structured the region's policy regimes. As demonstrated in the case studies, reforms have generally served only to layer statutory clothing upon institutions and logics of governance that remain largely the same. Inconsistencies between these path-dependent patterns of regime behavior and the fiscal constraints of liberalization have seen the region's utilities sink into fiscal distress as they attempt to balance obligations to principals in the central state with commercial imperatives such as solvency and creditworthiness.

These path-dependent policy regime qualities mean that so long as improved utility performance remains a precondition of expanded FDI, it is unlikely to occur (Huenteler et al. 2017). However, while FDI has not grown substantially, the sources and scale of funding for African power sectors have expanded dramatically since the reengagement of donors and development banks began in 1990 (Streatfeild 2018). Annual power sector investments by African governments and international development institutions reached an all-time peak in 2015 at $33.5 billion (AfDB 2018). Governments are by far the primary investors in infrastructure, followed by western international development institutions, Chinese state investment, Arab country investments, and finally the private sector (AdDB 2018).

Under the advice of the World Bank, SSA governments' power sector reforms were intended to replace development finance, domestic revenue, and public management with foreign direct investment and private management. However, rather than stimulate private sector participation, the reforms' greatest impact on capital flows has been to secure higher volumes of funding from the very development institutions that recommended them. This would not be problematic if the strategy was to co-finance state-led power sector projects in order to drive infrastructural growth for broad social and economic benefit. Yet the strategy is to transfer responsibility for sector growth from bureaucrats to entrepreneurs, who currently control only a marginal portion of the sector. This then begs the question, who, if anyone, is steering the development of Sub-Saharan African power sectors? As demonstrated in the case studies, the answer is not entirely clear. Reforms reduced the steering role of the state, funding increased, entrepreneurs did not take the reins, and growth in generation capacity continues to occur at a sluggish pace that is insufficient to meet forecasted demand (IEA 2020). Growing ambiguities of responsibility have coincided with expanded investment, and the result has been a failure of either states or markets to reach the goals of the sustainable development agenda.

I have argued that central tenets of the SRM are irreconcilable with the political economies of SSA power sector policy regimes, but it is not clear that governments' failures to implement these reforms are as significant a deterrent to private sector participation as some of the problems in coordination and coherence they have caused. The neoclassical literature insists that the solution to the current deficit in private sector participation is to double-down on the SRM in order to "rationalize" SSA power sectors to conform to market expectations, but the private sector itself does not appear to share this literature's concerns with restructuring, commercialization, and privatization. Probst et al. (2020) conducted a survey of fifty-one private investors with experience in SSA power sectors, and evaluated the correlations between concerns cited in their responses and the Regulatory Index for Sustainable Energy (RISE) and the Power Sector Reform Index (PSRI) (the regulatory indices used the in the quantitative analyses earlier in this work). Rather than commercial tariffs, sector restructuring, or even past firm performance, investor perceptions of sector attractiveness were most highly and positively correlated with the existence of a national electrification plan, consumer affordability of electricity, and the existence of a framework for stand-alone systems (p.34-25). This work found the existence of a national electrification plan to be the most significant predictor of electricity access rates; it seems that investors (particularly those in on-grid power) find the existence of clear and consistent policy commitments to social electrification to be a key determinant of sector risk (p.34-35). A similar investigation of private sector actors in SSA infrastructure projects conducted by McKinsey and Co. consultancy cited “a limited deal pipeline… often due to the lack of a long-term master plan that can bridge political cycles,” as one of six market failures responsible for the lack of infrastructure development. Others included delays in obtaining licenses, approvals, and permits, a lack of capacity and motivation to get projects off the ground, and “a lack of coordination between responsible agencies.” Neither a lack of privatization or a need for greater sector decentralization were cited as investor concerns (Lakmeeharan 2020). The single common source of investor concern cited in Probst et al (2020), the McKinsey report (2020), and the neoclassical literature (Gregory & Sovacool 2017) is the need for sovereign payment guarantees that ensure cash flow even if offtakers (primarily utilities purchasing power) encounter financial distress, a reform that calls for neither privatization or restructuring, but rather closer coordination, planning, and risk sharing between utilities and central government. As demonstrated in the case studies, the SRM has primarily served to decentralize power sectors, cause coordination problems, and increase the number of institutional bureaucratic players involved.

Bridging Africa’s infrastructure financing gap is an important part of the long-term development of the region. And private sector participation is almost certainly an important part of that strategy, as it has been in the late stages of infrastructure development in upper-income countries. But practitioners of development must be clear-eyed about what is happening and what is likely to occur, and adapt their strategies to these realities. The private sector currently perceives the sector’s risk profile as undesirable, both because government commitments are unclear and inconsistent, and because profitability is low relative to the many opportunities available in highly mobile global capital markets. This reality reflects the short-run subeconomic character of early-stage investment in network infrastructure (electricity, roads, water, and sewage), an area in which governments of the developed world have historically intervened both through direct investment and service provision and through private sector guarantees.

Just as the early reliance on private capital investment for infrastructure sets Africa apart from developed economies, the lack of clear leadership by either the state or the private sector sets the reality of the sustainable development agenda in contrast with either the developmental governance of the East Asian NICs or the regulatory states of Anglo-American economies. In both Japan and South Korea, state leadership in industrial policy was critical in structuring information flows that instilled the necessary confidence on the part of private sector actors to eventually play a key role in growth (Wade 2005; Johnson 1982). These economies were set aside from Anglo-American systems by virtue of the substantive role of the state in economic development, in which state enterprises and agencies drove coordinated economic growth. This leadership created economic spaces in which private enterprise could bank its success on the continuity and coherence of state industrial policies. The Anglo-American liberal market economies, by contrast, featured a more limited role for government in which it merely set the rules of the market, and investment and entrepreneurial leadership was reserved for the private sector within the bounds of the “regulatory state.” (Hall & Soskice 2001). However, this characterization belies the more explicitly developmental role of the state in countries like the United States in establishing the infrastructure that underwrote much of the private sector activity that would follow (Cain 1997). The modernization school of economists that led the World Bank in the 1950s and 60s recognized the importance of the state in the early stages of development, and attempted to replicate it alongside the national governments of Africa (Latham 2000; Rostow 1960, 1959). But this model was displaced by the regulatory state model before any of the important infrastructural goals could be completed, and thus a preoccupation with “getting the rules right” in order to attract private sector participation displaced the goal of “getting the roads right” before the latter could ever be accomplished.

Because the necessary infrastructural gaps were never filled, “getting the rules right” has never attracted the private sector participation expected in the regulatory state model. Investors regularly cite the region’s underdeveloped infrastructure as a key barrier to investment, and the importance of infrastructure quality to attracting FDI is well-documented in economic literature. And because that same regulatory state model has now been appropriated to infrastructural growth itself at the expense of an active state role, private sector participation in the general market economy is even less likely. Attempting to attract private capital to spur economic growth in anything other than extractive industries without developing infrastructure first puts the cart before the horse. Rather than attempting to facilitate the entry of private capital, African countries must leverage the state to create the infrastructural conditions that might enable it. The power sector, an area of infrastructure in which many African states hold significant comparative advantage by virtue of rich energy resources, is an excellent area to start. Acknowledging that the state must lead in this area is the first step. Reshaping policy regimes into coherent implementers of industrial policy rather than regulatory environments for virtually non-existent private sector participation is the next step, to which I will now turn.

Towards a Sustainable Democratic Developmentalism: Integration, Coordination, and Leadership in African Energy Governance

To shape coherent policy regimes in the power sector African states must learn from the past but prepare for the future. The case studies identified the features of developmental policy regimes in a trio of Sub-Saharan African states that contributed to the effective administration of government policy. These were centralized administrations, with a clear structure of vertical accountability that linked the executive to the ministry of power, and the ministry of power to a limited number of vertically integrated state-owned utilities with a geographic, rather than functional dispersion of responsibilities. Priorities were decided at the governance arrangements level, which encompassed the executive and a limited number of consulting partners such as multilateral financial institutions, foreign corporations, and political elites. Policy was designed and overseen at the policy formulation level, generally occupied solely by the ministry of power. Budgetary appropriations and policy plans were then communicated to the state-owned utilities at the implementation level, who deployed resources in close coordination with the ministry. The ministry often occupied some role in the implementation stage as well, making the infrastructural investments that would then come under the operational responsibilities of the SOU. This system functioned effectively because there was limited polarity in decision-making, and management at all levels maintained close vertical communication about challenges facing policy plans. Private sector participation was limited to demand-side contracting with planned industrial operations, so that electricity production was built on clear forecasts for how much power was needed. Multilateral institutions worked closely with governments and corporate partners to ensure confidence across the regime about supply and demand conditions, authorizing concessionary financing for state power sector development conditional on proportionate corporate investment commitments. There are some aspects of these policy regimes that can be replicated for the twenty-first century, and there are some that must be updated to meet both normative obligations and increased complexities associated with the population and economic growth that has occurred since the mid-twentieth century. Returning to the theoretical model of the policy regime established in chapter two, and drawing on relevant contemporary theoretical and empirical work from public administration and development studies, I will address what can be preserved or restored at each level of the policy regime, and what must change to meet these new obligations.

The Governance Arrangements Level

A primary drawback of the developmental policy regimes was the lack of democratic input at the governance arrangements level, which reflected a corporatist mode of governance in which the only source of popular influence was the president, or possibly rival ethnic elites brought into a governing coalition. Outside of these representatives, whose democratic credentials were dubious, the main sources of input were multilateral institutions and bulk corporate consumers. Scholars have theorized and empirically explored forms of "democratic developmentalism" that restore the role of state leadership and administration in economic areas critical to human development while incorporating the preferences of the public in setting priorities (Hochstetler & Tranjan 2016; Evans 2010; Robinson & White 1998). Public preferences may be institutionalized through the establishment of a public consortium of civil society representatives and citizens-at-large. This may include entities such as grassroots organizations with specific concerns about project siting, environmental organizations, faith groups, labor unions, and domestic corporations. Such consortiums insert deliberative democratic input into governance arrangements so that policy priorities may be said to reflect popular democratic will. However, they must also have clear voting rules and power vis-a-vis the elected authority of the president and the legislature. Most legislatures in Sub-Saharan Africa lack policymaking capacity and their actions tend to reflect the preferences of the governing party (Nijzink et al. 2007), so while they are constitutionally included in the governance arrangements level, it is likely necessary to establish such civil society consortiums to effectively incorporate the range of affected interests in the setting of power sector priorities.

Multilateral development institutions will continue to play an important role at the governance arrangements level in a financial and technical consulting capacity. However, unlike over the past two decades, this role must cease to be conditional on sweeping changes such as sectoral restructuring and privatization. As I have shown, these recommendations are hardly ever implemented according to textbook expectations, and tend to decentralize and complicate policymaking and implementation in ways that severely limit effective governance. Instead, institutions such as the Bank should make clear financial commitments and condition aid on the democratic quality of expenditure. A straightforward way of doing this is to reserve funds for the construction of infrastructure rather than for grand plans of administrative reorganization and the establishment of new agencies, institutions, and bureaucratic payrolls. Multilateral institutions can also insist on the presence of their technical personnel at lower levels of the regime, which has the triple benefit of protecting the expenditure of development finance, facilitating skills transfer, and ensuring that implementation is in compliance with public priorities. This role will be more specifically discussed in the policy formulation and implementation sections.

Multinational corporations will also continue to play a role at the governance arrangements level by making financial commitments on the demand-side which can then better inform discussion amongst the president and the public consortium. Knowledge of a commitment to a mining operation, for example, can direct public questions and policy planning towards specific projects, securing local consent and presidential commitments to necessary infrastructure. Multilateral institutions can play a key informational role by providing governments with third-party assessments of costs, which will enable them to make determinations about commitments. This will necessarily involve the Ministry of Power, who will incorporate these considerations into the policy formulation process and its plans to oversee operations at the implementation level.

The Policy Formulation Level

The Policy Formulation Level should closely mirror the structure of the original development regimes. Having received directives on public priorities from the governance arrangements level, the Ministry of Power develops specific plans for implementation, including the deployment of ministry or utility resources for the construction and operation of infrastructure, and the securing of appropriations from the Ministry of Finance to cover costs of public investment. The crucial reform recommended here is a restoration of the mode of governance in the developmental era in which the ministry's central concern is achieving public priorities through the deployment of public resources rather than attempting to attract private sector participation. To be clear, the sorts of planning common to the sustainable development era, depicted in Table XX, generally involved setting targets for additional generation capacity to come from the private sector. Development rested on the achievement of those targets. This has not worked, and by making realistic commitments based on available financial and human resources, the Ministry can establish clear benchmarks for itself that will be entirely under its control.

Private sector participation is currently part of the policy formulation level in how Ministries set generation and access targets but also in institutional design. Hybrid systems have two institutions at the policy planning level which deal with the private sector: energy commissions and independent sector regulators. Energy commissions generally exist to pilot programs intended to attract private sector participation to meet targets set by Ministry plans (such as net-metering and Feed-in-Tariffs), and utilize standardization tools to increase energy efficiency and promote renewable energy, often affecting the import of energy-related technologies, products, and services. Independent sector regulators monitor the legal compliance of generation, distribution, and transmission firms, set consumer electricity prices, and approve power-purchase agreements between independent power producers and publicly owned T&D utilities. This constellation of veto points has proven to be a source of incoherence in two ways; it frustrates the Ministry's ability to forecast and plan on additional private sector generation capacity (see interview A with Ministry officials), and the private sector's confidence in project timeline approvals (Lakmeeharan 2020; Gregory & Sovacool 2017).

Independent sector regulators have strong theoretical motivations and some empirical evidence to support their downward impact on corruption and positive impacts on private sector participation. While their ability to independently set tariffs seems to be either non-existent or bypassed by central government subsidies, their other regulatory functions can clearly offer benefits to the sector's efficiency and legality. Further, reserving their role in approving PPAs appears to be a meaningful bulwark against corruption in the public utilities (the other problems with this process will be addressed in the implementation section) as well as a clear way of affirming utility compliance with laws intended to grow generation capacity. ISRs should retain this limited role.

The biggest source of polarity at the policy formulation level will come from the involvement of multilateral financial institutions. As in the developmental era, IDIs disburse funds directly to ministry accounts for specific projects. They can secure agreements at the governance arrangements level to allow their technical personnel to oversee expenses, and provide information about costs and risks. Because priorities and projects have already been agreed at the governance arrangements level, the role of multilaterals is not to advise ministries on the economy of specific projects, but rather to provide the best information possible about how to spend combinations of public and development finances efficiently while meeting democratic targets, and flagging any corrupt activity or mismanagement of funds. This links the execution (or lack thereof) of social electrification projects to democratic priorities rather than market mechanisms, and strengthens vertical coordination with the governance arrangements level.

The Implementation Level

The implementation level requires restoration of the centralization and vertical control that characterized the developmental period. While full-scale unbundling is a rarity in the region, partially unbundled sectors might benefit from reintegrating functions into a single entity in light of the increasing evidence that this practice creates coordination problems that are hardly outweighed by the limited and spurious evidence of its gains to efficiency. Taken from the point of view of ministerial officials in the planning process, orchestrating cohesive action between autonomous organizations with functional codependencies poses obvious coordination problems. Gains in firm-level efficiency from unbundling are small and do not appear to have the desired effects on private sector participation; private investors do not view the transmission and distribution subsectors as desirable investments for a variety of reasons, none of which have to do with whether the T&D utilities are unbundled. The public value of subdividing these functions into independent firms must then be seen purely in terms of savings, which must then be weighed against the relative costs of reducing the ability to coordinate effectively in the administration of public policy goals. If combining subunits into a single firm makes them relatively less profitable and efficient entities but more reliable instruments of complex policy goals such as the extension of social electrification infrastructure, governments must consider whether those social gains outweigh the modest financial ones, especially while discounting the probability of private sector investment.

Drawing back to the discussion of the policy formulation level, in which I argued that the mode of governance must change from sector planning based on anticipated private sector participation to one based on guaranteed public investment, this same shift must resonate on down through the implementation level. Concretely, this means that implementation is primarily a task of publicly owned utilities, and not of private firms. Ministries may not lay failures to meet targets at the feet of private sector actors or continue trying to fix the problem by appealing to them, but set goals based on available resources and oversee the public utilities in accomplishing them. To the extent that such restricted planning means reducing the ambition of goals for social electrification and renewable energy, but that such goals are actually accomplished, this will enable a clearer portrait of the limitations of state action and the need for additional resources without muddying the waters with what the private sector can, cannot, will, or will not do. Public policymaking can reflect sober assessments of these resource constraints, which can create stronger cases for additional support from IDIs. Making clear commitments and consistently meeting them will also mitigate some of the uncertainties private sector actors currently face when making investment decisions, a point which will be addressed more thoroughly in the next section on the relationship between state action and private sector activity.

This need for a change in the mode of governance from anticipated private sector investments towards clear commitments and implementation of public sector projects bears particularly strongly on renewable energy policy. Consider the general policy pattern around renewable energy promotion as conceived by the modal “sustainable development era” legislation. Governments make ambitious commitments to raising renewable energy generation to ten or twenty percent of generation capacity, only to delegate the responsibility for actually doing so to the private sector. This is to be achieved by creating incentives, primarily through Feed-in-Tariffs, that offer pricing that guarantees cost-recovery. This strategy consistently falls apart for similar reasons. ECs and ISRs agree to PPAs that are above what utilities are willing to pay. Utilities either cite their commercial prerogatives as a reason to reject the PPAs, or oversubscribe to PPAs to the extent of insolvency, at which point ECs initiate a moratorium on the PPAs. In the latter case, the PPAs are usually riddled with accusations of corruption and impropriety in the contracting process. When one of these patterns inevitably emerges, a clean up act will ensue whereby the government either retroactively appropriates money to the utilities to pay IPPs in order to rescue their credit rating, or pays the firms themselves and allows the firms credit to be downgraded. This is a not a coherent policy approach, but a series of institutions with competing incentives and little or no coordination failing to work cohesively towards a ministerial goal.

A change to a mode of governance whereby the ministry makes clear commitments to the construction of renewable infrastructure and either builds it itself, creates an SOE (such as Kenya Geothemal) to construct it, or charges the utilities with doing so brings renewable energy development back into a structure of vertical accountability to public priorities established at the governance arrangements level. Such preferences would then be included directly into ministerial planning, and executed by the public utilities. Determinations of the level of renewable energy investment will thus reflect public preference ordering about competing concerns of cost, environmental impact, and energy independence. There are some states in sub-Saharan Africa where all of these considerations align behind renewable energy investment; there are others in which it serves environmental concerns but is not the most efficient pathway to universal electrification. Governments and institutions for public accountability must make those decisions, and actors at the implementation level must translate them into material reality, rather than leaving this most important task to the vagaries of a convoluted and incoherent quasi-market system. Voters can then hold governments accountable for making good on their promises, rather than being confronted with a combination of unrealistically ambitious promises and administrative and market failures.

States and Markets in the Power Sector

I have argued for a reassertion of the state and its institutions as the central decisionmakers and administrators of power sector policy. I have made this case on the grounds of good governance, which I define as the government's ability to translate democratic preferences into action and outcomes consistent with public preferences. Because the private sector has yet to play the role asked of it in existing modes of governance, I have sidelined it in favor of recentralization of government bureaucracy, which I argue offers a clearer and more proximate path to achieving the outcomes African citizens say they want. However, I do not reject the evidence that suggests that existing capital formations are insufficient to fully bring about universal electrification or renewable energy development at scale. It does appear that, unless multilateral financial institutions are willing to commit to doubling their financial commitments, there must be complementary investment from the private sector. Beginning with the stipulation that the current model is not effectively attracting this investment, from my review of the case evidence as well as the literature addressing the concerns of private investors, my conclusion is that the policy recommendations above will lead to outcomes more consistent with alleviating leading investor concerns than continuing with the current model of reform. This conclusion rests on the following points: 1) The primary concerns of investors are policy uncertainty and delays in project approval 2) Policy uncertainty and delays in approval are caused by regime incoherence 3) Making policy regimes more coherent by implementing the above recommendations will mitigate policy uncertainty and expedite project approvals.

First, the best and most recent evidence available on the topic suggests that investors' primary concerns with SSA power sectors are uncertainty about government policies, delays in project approval, and concerns about cost-recovery (Probst et al 2020; McKinsey 2020). With regard to policy uncertainty, National Electrification Plans that clearly articulate where public investments are committed and where they are not reduces uncertainty about where demand for electricity will exist. When policy regimes demonstrate follow through on these commitments without relying on the private sector to do so, it creates a clearer portrait of government capabilities and limitations as well as market opportunities. In some circumstances, reliable government action will create price signals that can instill confidence in capital markets to fill gaps where such investments will be profitable. In other circumstances, those price signals will be insufficient to attract market activity (market failure), and lay bare areas where greater public investment (and development finance) is needed.. This process begins, however, with governments becoming reliable designers and executors of their own policies, in contrast to the current policy pattern, whereby government sets targets for generation capacity and wait for the private sector to meet them. A good example of how this can work is Kenya's Lake Turkana Wind Power Project. The Kenyan Government committed to a wind power plant at Lake Turkana, and made costly investments in high voltage transmission infrastructure that would transport electricity to urban and industrial centers of consumption. The project attracted a growing number of private sector investors, whose confidence was rooted in the government's investment. Another example is the Ghanian government National Electrification Project, which over successive administrations demonstrated a commitment to expanding electricity access and demand for additional supply. Ghana has not had trouble attracting private sector generation bids from hydrocarbons to fill the need created by this massive infrastructural commitment.

Second, delays in approvals are exacerbated by expanding bureaucratic veto players in the policy process. Currently, SSA power sector investors generally face at least three veto points when attempting to get a power generation project off the ground: licensure to operate by the energy commission, approval of the cost structure by the ISR, and then agreement by the public utility to purchase the power. As discussed earlier, it can be difficult to pass all three of these veto points because these institutions often operate with conflicting incentives and understandings about what is affordable and consistent with larger sectoral planning taking place at the ministry (which is itself often changing because of a lack of a credible national electrification plan, see item #1). Consolidating at least the EC and the ISR into a single institution responsible for price setting, and ensuring this institution is in direct coordination with the ministry and the public utilities about both the available budget for power purchase, would eliminate a source of uncertainty about approval, and reduce the amount of veto players responsible for delays. It would also help the government avoid oversubscriptions to generation, which lead to moratoriums and deter subsequent investors.

Third, and directly related to the second point, is that concerns about cost recovery begin with insolvent utilities. Utilities are often insolvent because they tend to directly or indirectly subsidize one or more consumer classes (government accounts, the poor). Part of why this practice continues comes down to governments simply being dishonest with themselves and the markets about the total costs of electricity; revenues plus the debts and arrears of utility companies reflect the full cost of national electricity expenses, which generally outstrip budget appropriations. Rather than increase budget appropriations, which may increase government debt and risk harming the sovereign credit rating, debt is shouldered by public utilities, which then renders them uncredible buyers for independent power producers. This system is made possible by corporatization, which allows utilities to function as independent corporate entities taking on debt and permitting arrears. Limiting the statutory authority of utilities to borrow and increasing their obligations to honor PPAs forces appropriations from government ministries to reflect the full cost of utilities' obligations. The elephant in the room is that utilities' fiscal obligations to subsidize consumers through arrears are often not reflected in a National Electrification Plan, and thus ministries do not request budgetary appropriations to meet them. This can be resolved by accounting for these costs, making them part of the national electrification plan, and appropriating resources accordingly. Where such resources do not cover the costs of these expenses, appeals must be made to development banks; this will certainly be a more attractive request than additional funding for dysfunctional utilities that mask the actual priorities and costs of electrification. Alternatively (and less ideally), National Electrification Plans can include budgetary allocations to cover the cost of sovereign payment guarantees that ensure IPPs compensation directly from governments, and maintain transparent accounting of available funds so IPPs can determine for themselves whether or not such a guarantee is likely to cover expected costs.

The changes recommended in the previous section are primarily intended to improve public sector governance by increasing the coherence of policy regimes, but I have shown here how they would also serve to alleviate the primary concerns of private investors. I have also shown how many of the problems investors face, specifically the lack of clear national electrification plans, expanded bureaucratic veto players, and uncertainty over cash flow are the outcomes of regulations intended to liberalize the sector, respectively the retrenchment of state planning, the layering of an incoherent regulatory state, and the corporatization of public utilities.

Contributions to the Extant Literature

Institutional Quality, Governance, and International Development

Scholars and development practitioners have increasingly converged on the importance of such terms as “institutional quality,” “institutional capacity,” “bureaucratic quality,” and “governance” to social, democratic, and economic development. It has thus far been unclear what these terms imply from a public administration perspective. For example, what does a bureaucracy of “high quality” look like? What are the organizational features consistently found in “good governance”? And are “capacity” and “quality” the same thing? For too long, there has been a practice of accepting World Bank Indicators as measures of these concepts without critically assessing their assumptions, or investigating how variations in public organization might account for them. This is problematic as it limits our understanding of how to improve conditions that many now consider essential for key development outcomes. This work contributes to this literature by confronting these difficult questions in an area of great importance to sustainable development.

I began by investigating what the literature on sustainable development meant when it used terms such as “governance” and “institutional quality.” Ahlborg et al. (2015) took it to be well represented by the World Bank’s Worldwide Governance Indicators for Rule of Law and Control of Corruption. Many others have accepted this sort of definition when studying the relationship between institutional quality and development. These indicators, however, actually have little to say about bureaucracy itself and tend to reflect a set of assumptions rooted in institutional economics. They exist to assess how well the government sets “the rules of the game,” and thus measure institutional quality in terms of the strength of “the regulatory state.” This is in contrast to alternate conceptions of the states’ role, most notably the “developmental state,” which, as Haggard, Johnson, and others have pointed out, rests much more on the capacity of the bureaucracy as an effective technocratic and economic actor (Haggard 2018; Johnson 1982).

Important work on energy development such as Aklin et al. (2018) invokes a more developmental meaning of institutional capacity, or “government’s access to an administrative apparatus that is capable of implementing policies in a competent and cost-effective manner.” In addition to government interest and local accountability, Aklin et al. (2018) explored how variation in institutional capacity accounted for reductions in energy poverty. However, this work did not offer a positive organizational theory that accounted for such variations, and thus did not draw conclusions about what features might be common to administrative apparati that are effective implementers of government policy. I have done so by closely studying the dynamic organizational features of three national power sector bureaucracies over fifty years.

A key contribution of this work is to bring in theories from public administration to account for variations in institutional capacity, and thus connect them to the larger development literature concerned with the role of governance. A large body of work has gone into understanding what makes effective public administration, but it has thus far been curiously disconnected from most development studies that invoke the importance of governance. This is because these development studies have generally rested on extant quantitative measures of governance, which have assumed an almost "taken for granted" status in this literature. While they offer considerable analytical leverage by virtue of their breadth, they do not appear to be telling us nearly as much about what makes bureaucracies effective as they do about rule of law, transparency, or corruption. All of these are related to the bureaucracy, but do not constitute it.

Energy policy is complex, and involves a multitude of actors, interests, and governance approaches. Thus in order to understand why some states are effective at making and implementing it and others are not, I drew from the emerging policy regimes literature, which admits complexity by approaching policymaking as a dynamic, multi-actor process. Taking Howlett's nested model of policy instrument selection as a starting point for a formal model of a policy regime, I incorporated elements of political economy into each level of the model. This synthesized some of the older thinking on policy regimes with its more recent resurgence in the policy sciences, specifically how political economic variables contribute to coherence. This theoretical model proved a valuable way of conceptualizing a unit of analysis (policy regimes in different periods of organization), which could then be related to the development outcomes of interest through methods of historical institutional analysis. This allowed me to make more substantive claims about institutional capacity by tying specific regime qualities to outcomes. I found that in the power sector, centralization was important for maintaining vertical lines of accountability between heads of state, policy designers, and implementers. This same theory and method can be used to investigate whether these findings hold in other areas of development, leading to another important question; are the organizational features underpinning strong institutional capacity the same across policy domains?

Networked sectors (such as highways, railways, telecommunications, water, or sewage) demand a form of comprehensive analysis that does not treat institutional units in isolation. In this study, I showed how extant policy analyses' narrow focus on utility performance sacrificed understanding of the causal processes frustrating their fiscal management. By looking at the structure of a policy regime, and incorporating elements of historical institutionalism and political economy, it is possible to identify underlying path-dependences that account for the behavior of individual institutional units that would be invisible if one is studying the unit in isolation. Future scholarship can investigate whether the same findings of this work can be said to apply to these other sectors.

Pressures for liberalization were sectorally broad and thus there are good reasons for scholars of other development sectors to consider the myriad ways in which they may have interacted with pre-existing institutions to produce unintended outcomes. Specifically, the commercialization and/or partial privatization of parastatals in the developing world layers a particular set of expectations, governing logics, and freedoms on institutions which have historically been arms of the state rather than atomistic firms in the market. While a considerable literature has studied the privatization of parastatals, situating how parastatals navigate and potentially exploit their new statutory identities within the context of policy regimes can offer greater understanding of the impacts of this process.

While some may argue with the particular theory and method used in this study, the overarching point that institutional quality and good governance require closer examination from a public administration perspective cannot be missed. I have tried one approach and it has afforded some useful empirical evidence for an important humanitarian policy question. Future scholarship can attempt to incorporate other theories of public administration to account for what makes institutional capacity strong. Such findings can offer constructive insights for quantitative estimations of the effects of governance on development.

Public Administration, Fragmented Governance, Bureaucratic Autonomy, and Reintegration

This work also speaks to important debates in public administration concerning “agencification” and “fragmented governance,” “bureaucratic autonomy,” and the need for “reintegration” of the bureaucracy. There has long been debate about the merits of affording the bureaucracy greater autonomy from political interference. The classic Weberian and Wilsonian case for bureaucratic autonomy was that a rational-legal bureaucracy must be insulated from the incentives and throes of electoral politics in order to effectively implement policy. The advantages of autonomy were thus originally understood to be rationality, professionalism, and incorruptibility. Such was the basis upon which Anglo-American and European bureaucracies expanded for much of the twentieth century; meritocratic hiring and promotion criteria, fixed-pay schedules, and (to varying degrees) independence from the daily activities of legislative chambers and their members (Sager & Rosser 2009). However, the concept of bureaucratic autonomy took on new meaning as the New Public Management (NPM) wave of reform took hold access the Western world, and autonomy was increasingly associated with “agencification,” or the transfer of government activities from within a unitary, vertically integrated ministerial structure to one or more distinct and formally semi or fully autonomous entities (or “agencies”) (Christensen, Lie, & Laegrid 2008).

Whereas the autonomy of the rational-legal bureaucracy from politics was generally considered essential to effective administration, agencification was increasingly criticized for undermining some of the original intentions of bureaucratic autonomy through the capture of agencies by political clients (Grzymala-Busse 2008; Christensen & Laegrdi 2006; Hellman et al. 2000). It was also criticized for giving rise to a number of coordination problems that made administration more difficult, a phenomenon which has been referred to as fragmented governance

(Christensen 2012). Most of this literature has focused on the developed world. This is in part because many of the most complete cases of NPM implementation occurred in parts of the developed world, and there was a current of scholarly doubt as to the extent of its implementation in the developing world (Hyden 2013). At least with regard to the power sectors of Sub-Saharan Africa, this doubt is mistaken. As documented in the case studies and the regional review of regulatory reform, agencification and the rise of the "regulatory state," were essential features of power sector reform in the 1990s and 2000s. These interventions were directly responsible for what I have referred to as policy regime incoherence, but which also cleanly fits into the category of fragmented governance.

While agencification and the regulatory state have received sufficient criticism for their effects on governance in the developed world, these problems can be exacerbated in political contexts like Sub-Saharan Africa where neo-patrimonialism, weak rule of law, and corruption make regulatory capture even more likely. Consider two of the main actors that were the beneficiaries of at least statutory bureaucratic autonomy in the period following liberalization reform: state-owned utilities and independent sector regulators. SOUs were "agencified" through commercialization, which legally separated them from the central ministerial apparatus and empowered them to act autonomously to become profitable, self-sufficient enterprises. While these fiscal benefits have generally failed to materialize, governments continue to use these entities to pursue political goals. This would not necessarily be a problem if these goals were all universalistic and consistent with democratically ordained public policy initiatives, but sometimes they are not. Actions such as ignoring arrears on government accounts or those of select municipalities, providing politically important firms with subsidized electricity, or preferentially awarding procurement deals to politically favored firms are patronage politics acting under the cover of autonomy. The solvency imperative, which can be ignored when an action is taken for political-economic survival, can be invoked when a public policy priority calls for financially costly action (such as purchasing renewable energy). Through the vehicle of commercialization, agencification opens the door for bureaucratic behaviors that would, inside a ministerial apparatus, be either more difficult to justify against the ministries' own stated public policy obligations, or be subject to more direct accountability from voters. Instead, these choices can be chalked up to the mismanagement or fiscal insolvency of a nominally"independent," public enterprise.

Just as there has been a wide literature documenting the problems of fragmented governance, there is also important research investigating how administrative effectiveness can emerge from within it. Erin McDonnell's analysis of Sub-Saharan African bureaucracies makes a similar diagnosis of the effects of administrative reform as that found in my case studies of the region's power sectors. She argues that many of the World Bank's top-down administrative restructuring efforts "may impose *de jure* changes, but struggle to create bona fide reform that changes *de facto* practices." This "results in a facade familiar in many developing states, layering a veneer of administrative functionality over inner characteristics that haunt reform efforts." However, she also finds that within challenging bureaucratic environments, pockets of effective governance, or "interstitial bureaucracy," can emerge. McDonnell's examination of the Policy Analysis and Research Division (PARD), a research unit within the Ghanian Ministry of Finance and Economic Planning, finds that the department achieves "quasi-autonomy over personnel through a combination of strategic choices and leveraging political capital," enabling them to maintain levels of competency and *esprit de corps* that allow them to effectively accomplish their mandate to provide economic research. Such "patchwork leviathans" are "cobbled together from scarce available resources, with organizational diversity sewn loosely together into the semblance of units."

Identifying pockets of competence may be an important analytical step in understanding how to improve governance from within existing bureaucracies rather than engaging in further efforts to reform them from the top-down, as has been the practice in the power sector. Patchwork leviathans manage to succeed within adverse institutional environments because they effectively leverage these environmental characteristics to benefit their own effectiveness. Three examples from my analysis of Sub-Saharan African power sector policy regimes seem prescient here: first, in the Ghanian power sector in the 1990s and 2000s, a core network across the Electricity Company of Ghana and the Ministry of Power persevered in implementing the National Electrification Scheme amidst a shifting bureaucratic landscape characterized by both a changing presidential administration and sectoral restructuring and liberalization, bringing electricity access to millions of Ghanaians. Second, the Kenya Geothermal Company became well known for its accumulation of technical skill, and its ability to attract and retain support from government, donors, and the private sector. In so doing, it accomplished its mandate of expanding the supply of geothermal energy which now lays the basis for the country's expansion of electricity access. Finally, the independent power producer office within the South African Department of Energy was widely recognized for its ability to swiftly catalyze private sector interest in renewable energy generation. This ad hoc unit was staffed by over one hundred private consultants, and featured limited permanent staff from the government; interview evidence explained how the IPP office maintained connections and support from leadership at DoE and Treasury, and worked effectively with private sector partners by conveying accurate and timely information about cost-recovery, permitting, and the bidding process. (Ting & Byrne 2020; Eberhard et al. 2014).

Rather than wiping the slate clean with restructuring, partnering with and building out from pockets of effectiveness can provide a useful strategy for development institutions looking to increase the quality of governance. However, as McDonnell argues, "advancing understanding of institutional change requires disaggregating the state into complex, interrelated systems of agents and agencies." The policy regime framework applied to the case studies in this work provides a useful theoretical tool for doing so. By looking at governance environments holistically, scholars and practitioners can better understand why agencies and institutions function the way they do, analyze intrastate variation in effective governance, and identify pockets of competence upon which effective governance can be built.

Limitations and Areas for Future Research

I set out to answer a specific set of questions about sustainable development of Sub-Saharan African power sectors, and leveraged a new theory of policy regime coherence as well as original case studies, interview evidence, and quantitative data to evaluate it But how generalizable are the findings of this study to power sectors across the region and in other parts of the developing world, and how generalizable is the theory of policy regime coherence to other areas of governance?

First, a limitation that must be considered when assessing the generalizability of the inferences from the case studies is that they are all Anglophone countries that are relatively wealthy and democratic for the region. Part of the reasoning for this limitation is intentional; it was necessary to control for some strong sources of variation that were likely to account for the differences in the power sector between, for example, Ghana and the Democratic Republic of the Congo. I have never contended that wealth and democracy are not important prerequisites for good governance; they are, in fact, very important, and many countries in the region will need to make considerable progress o n both before they are able to approach anything resembling effective public administration of the power sector. But the need to consolidate democracy and grow wealth are well-known challenges and are not the subject of this investigation. Instead, the goal was to look at countries that had made reasonable progress in both respects in order to evaluate how variation in public policy and administration might account for successes and failures in accomplishing sustainable development goals.

With regard to the findings' applicability to the Francophone and Lusophone countries of the region, there are some important similarities that likely make the findings applicable, but also some important differences that warrant qualification. In terms of similarities, SSA countries have all relied on the World Bank for financial and technical support for their power sectors and were thus subject to the same pressures for liberalization. Because of this fact, there are likely some broad similarities in contemporary governance across the region that make the findings about incoherence in hybrid policy regimes generally applicable. However, there do appear to be differences based on former colonizer in the average levels of reform implementation; former British colonies have the highest average PSRI (8), followed by French (6), Portuguese (4), “other” (Ethiopia, Eritrea, Liberia, Somalia, South Sudan)(3), and Belgian (2). I have repeatedly emphasized how historical path-dependencies influence the shape and effect of reform implementation, and thus there are some differences in governance in the developmental era that might have made the extent and impact of reforms different. Future research should investigate the relationship between the institutions of former colonizers and power sector reform.

There does not seem to be a statistical correlation between development of the power sector (in terms of total installed capacity) and colonial identity. My own limited review of the administrative structure of Senegal, Cameroon, Rwanda, and the DRC does not suggest any fundamental differences; like the Anglophone cases (both those highlighted in the case studies and those included in the more general review in chapter three), these countries’ policy regimes were limited to a ministry, and one to four geographically distributed vertically integrated public utilities. Yet despite these historical similarities there was a unique tendency amongst the Francophone countries to implement liberalization reforms through what are referred to as concessionaire agreements or private management contracts.

Countries that adopted PMCs handed over the entire operation of their power sectors to private companies, which were then under contract to meet specific goals set by the state. Independent analyses of these approaches largely consider them a failure, with the notable exception of

Gabon (Foster & Rana 2020; Eberhard 2008). Under a PMC, Gabon reached one the highest levels of electricity access in Sub-Saharan Africa, a fact made more unique by Gabon's impoverished democratic credentials relative to other social electrification leaders. Some have questioned the legitimacy of Gabon's numbers, as well as the glaring cleavage between urban and rural access rates. However, even on independent analyses, the program appears to have been a success relative to the vast majority of African countries which face significant shortages in both urban and rural access rates. Future work could more closely apply the theoretical lens of policy regimes to the Francophone cases to better understand why they were more likely to adopt concessionaire agreements, why they have mostly failed, and why Gabon's appears to have been a success.

Concluding Remarks

I began this book by discussing the motivations of my research. Sub-Saharan Africa lays at the center of two great but conflicting humanitarian challenges; transitioning from fossil fuels and ending energy poverty. Despite the dismal tenor of many conclusions about the region's governance, African states have demonstrated incredible resilience and effectiveness in solving these problems when certain conditions are met. When governments are committed to growing renewable energy or expanding electricity access, when they can draw upon a bureaucratic apparatus that is united around accomplishing these goals, and when international partners support their plans, the speed and scale of progress can be remarkable. This work has contributed to understanding how African states can build effective bureaucratic administrations. It is the final condition, the support of international partners, that I will discuss in these concluding remarks.

The World Bank and Western Bilateral aid institutions were critical partners in the developmental period of African power sectors, providing financing and technical assistance that made large power sector investments possible. While recommending reforms on a case-by-case basis, it was not until the 1980s that the Bank began demanding sectoral restructuring and government retrenchment as a condition for further assistance. While aid flows returned to their previous levels by the early 2000s, the nature of the partnership had changed; no longer would finance and technical assistance be offered to support large-scale direct government investment into major electricity generation projects. The private sector would have to fill this role. This has not happened, and so African leaders have turned to a new development partner to support their infrastructural goals: China.

China is now the leading partner in Africa’s infrastructure projects, financing and constructing hydroelectric dams, solar and wind farms, and transmissions networks across the continent as part of its global Belt-and-Road initiative (McDonnell 2022; AfDB 2018; Eberhard 2008). When one considers the way that China approaches investment in African governments, it is easy to understand why it has so swiftly displaced Western institutions as the region’s leading infrastructure development partner. Some analysts attribute this to the fact that Chinese aid is not conditional on recipient governments’ respect for human rights or free elections (Hodzi 2012; Condon 2012). This is surely true in some cases, but an arguably equally important driver of the Chinese aid approach’s success is its lack of conditionality vis-a-vis bureaucratic restructuring, and its support for direct investment by the state in large-scale energy projects. In this way, Chinese aid architecture is reminiscent of the Western approach in the mid twentieth century, and is thus more conducive to the centralized models of development that were once highly effective in the region.

The best example of the Chinese approach to supporting African power sectors is the China Ex-Im Bank’s support for the development of six large hydropower projects with a projected total installed capacity of over 7000 MWs (Eberhard 2008). These massive projects are financed through concessionary loans; long-term, low interest credit instruments extended as part of the ExIm banks’ stated objective to boost economic cooperation between developing countries and China. China’s EximBank is one of what are referred to as its “policy banks,” and are heavily influenced by government policies and are not constricted by commercial principles (Brautigam 2010).

What has China gotten in return for its support of African infrastructure? Chinese support has secured mining rights to rare earth mineral deposits essential for the construction of semiconductors, solar panels, circuitry and automobiles. Chinese loans are denominated in renminbi, and thus contribute to their goal of displacing the dollar as the world's reserve currency (Brautigam 2010). But most importantly, Chinese aid has tilted the balance of Africa's diplomatic support in its favor. The majority of African countries now vote with China on UN Resolutions. African countries do not join in the censure of China for its democratic and human rights abuses (Olewe 2021). China has also altered the balance of naval power in the crucial seas off the horn of Africa through the establishment of a military base in Djibouti, situated in the Chinese owned-and-operated Port of Doraleh. China is engaging in a comprehensive commercial and diplomatic strategy to build a sphere of influence in Africa, and by many accounts it has already succeeded.

African countries have many reasons to welcome Chinese engagement with open arms. China is plugging the region's infrastructure financing gap, making the "big push" modernization economists of the 1960s argued was a prerequisite for market economies to emerge from traditional societies. Western aid comes with strings attached, many of which, as my research has shown, have proven ineffective in accomplishing their goals. African leaders must be strategic, not ideological, if they are to secure the financial and technical support they need in the near future. Yet the medium-to-long term implications of an Africa that abandons human rights and democracy and supports China's expansionist ambitions are dire for both African people and Western liberal democracies.

African people have suffered greatly when their governments abandon respect for free elections and human rights. Some of the worst atrocities of recent decades, such as the genocides in Rwanda and Darfur, have occurred under such circumstances. The notion that African nations' new primary development partner is currently engaged in an outrageous display of oppression of the Uyghur Muslim minority population bodes poorly for the future of human dignity on the continent. Increased reliance on Chinese aid means greater freedom from Western pressure to respect minority rights and hold free and fair elections. Returning to the matter of electricity access, short-run gains in infrastructure can be undercut by the decline of electoral pressures for expanded service delivery. Good governance requires both the hardware of infrastructure and the software of democratic accountability.

Western liberal democracies have self-interested reasons to be concerned about Chinese expansion on the continent. As the United States and Western Europe continue to standardize electric vehicles and renewable energy generation, and as technology occupies an increasingly large share of their economies, commercial access to Africa's rare earth minerals will become essential (Lu 2021; Raimondi 2021; National Bureau of Asian Research 2019). The Bab-el-Mandeb strait that links the Gulf of Aden to the Red Sea, and thus the shipping gateway to Europe through the Strait of Hormuz, was already of strategic importance to Europe's energy security prior to Russia's invasion of Ukraine. The invasion has exacerbated the strait's strategic value, and China's naval base in Djibouti can threaten the West's ability to maintain shipments of oil and natural gas to Europe (Council on Foreign Relations 2018). The United States' normative position as a global leader for democracy and human rights, damaged as it has been by the Iraq War and the Trump administration's coddling of authoritarians, will be further diminished if its diplomatic influence in Africa is allowed to wither away.

Whether the reasoning is strategic or humanitarian, it is clear that if Western liberal democracies and the development institutions they control wish to remain relevant in Africa, they will have to compete with Chinese assistance. Further, as I have argued in these pages, they will have to rethink how they do so, at least when it comes to the critical development goals of universal electricity access and renewable energy development. There is nothing mutually exclusive about supporting state-led development, democratic consolidation, and human rights simultaneously. If African governments find support for state-led development more valuable than market-oriented solutions, as China's regional prominence demonstrates, such a change in strategy should result in a stronger position from which Western diplomats can advocate for the advancement of democratic institutions and human rights.

At its core, sustainable development in Africa begins with Africans. As voters and civil society continue to place greater pressure on their governments to invest in renewable energy and expand electricity access, leaders will have to respond. Scholars and development practitioners can help by critically examining the successes and failures of the past, and expanding knowledge about the best ways forward. I hope that this work has made a meaningful contribution to that project.

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