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How Oil-Reliant, Autocratic Regimes Transition to Renewable Energy

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Abstract

Climate change is here, yet even as states transition to green energy, oil remains supreme at both the international and national levels. Many nations around the world have based their economies on the production of fossil fuels, leaving these countries entrapped in the “resource curse,” often contributing to the development of autocratic regimes. As the world economy moves away from fossil fuels, these countries will be left with the question of how to transition to green energy sources. In this paper I examine how the approach to green energy implementation differs between autocracies and democracies. More specifically, I demonstrate the different tools these varying regime types have at their disposal for oil-reliant autocracies to transition to renewable energy sources. I find that autocracies are able to use their unilateral control to issue top-down directives for green energy policy and investment in a degree greater than that present in democracies, that they have a more streamlined process for deciding on green energy projects due to fewer veto players, and that they are able to reduce barriers to entry and in turn increase the implementation speeds of projects.

I. Introduction

On Thursday, December 5th, 2019, Saudi Arabia's state-run oil company Saudi Aramco sold shares for what became the largest initial public offering (IPO) in history. The move was made in part to “wean [the nation] off its dependence on oil” (*BBC News*, 2019), which is reflective of the larger global attempt to transition away from oil. As it exists today, the international system is dominated by the fossil fuel industry. It fuels everything from our economies to the way our societies function, and it consequently has a tight grip on national governments, dominating how decisions are made. This grip has started to loosen, however, as the threat of climate change has become ever-more apparent. Boasting a clear scientific consensus and with more frequent natural disasters to back it up, global acknowledgement of anthropogenic climate change largely driven by carbon emissions continues to grow. As such, many countries have begun initiatives to reduce their reliance on carbon emitting industries, of which fossil fuel is the largest.

One solution to this problem, at least in the view of many scientists (Turner, 1999; Elliot, 2000), lies in renewable energy. By one account “renewable energy sources and supporting technologies are to be the cornerstone” (Scholten and Bosman, 2016: p 273) of a sustainable future. That being said, transition to renewables is not necessarily an easy thing for nations to do, as the reliance on the fossil fuel industry runs deep. Countries easing off of fossil fuels, especially those reliant on them for daily energy production and commercial needs, run the risk of weakening their existing institutions that rely upon oil revenue, as well as nullifying the infrastructure and jobs in place to sustain it.

As the world shifts toward renewable energy, demand for and therefore the price of oil and fossil fuels will likely drop. This raises concerns about how nations will adapt, given that

many derive the majority of their income and base much of their organizational structure around oil extraction and revenue. Existing research on how states adapt to green energy tends to focus on the states as a whole, but largely overlooks how individual nations will fare and why some can transition easier and more effectively than others. Further complicating this question is the fact that regime types – systems of government – often vary quite significantly between states with and without major oil revenue. Specifically, unanswered questions about the transition to green energy are even more pressing for countries where fossil fuels are the primary resource and where less-democratic forms of government exist.

When it comes to regime type and renewable energy sources, most existing work focuses on the renewable energy deployment strategies in democratic, western states. This creates a rather glaring omission since autocratic regimes, particularly those reliant on oil, likely utilize drastically different methods. The process of transitioning to renewable energy is inherently different between states owing to their government structure and the available tools that the political structure provides them. By analyzing the current transitions in progress and the different tools used by oil-reliant autocracies versus democracies, the progress to date may be used to inform a theory on how different regimes, specifically oil-reliant, autocratic regimes, transition, one that other states would may be wise to follow.

My research largely aligns with the notion that oil-reliant, autocratic regimes have more power and methods to implement renewable energy than their democratic counterparts. I find that autocracies are able to use their unilateral control to issue top-down directives for green energy policy and investment in a degree greater than that present in democracies, that they have a more streamlined process for deciding on green energy projects due to fewer veto players, and that they are able to reduce barriers to entry and in turn increase the implementation speeds of

projects. Ultimately, the way that oil-rich autocracies transition to renewable energy is unique when compared to democracies, and capable of implementing change at a much faster pace.

II. Existing Research and Unanswered Questions

In assessing how oil-reliant, autocratic regimes transition to renewable energy, there are a variety of different factors that must be taken into account. Primarily, these factors have to do with the broad impacts of climate change, regime type and resource curse, and the relationship between government structures and energy transitions. Climate change is relevant because of the risk it poses to existing governmental and economic systems, and the change necessitated by its emergence. Regime type specifically is impacted by climate change, perhaps no regime more so than those gripped by resource curse, which makes a review of how states go about energy transitions all the more important. Current research has outlined the threat of climate change very well, as has the existing work relating to the relationship between resource curse and regime type. There is little existing work that ties all these concepts together, however, and analyzes how climate change forces change in nations, specifically oil-reliant regimes, that otherwise would be more hesitant to do so, and how these regimes go about transitioning.

Impacts of Climate Change

Is climate change a real and pressing threat to nations around the globe? The answer, according to an overwhelming scientific consensus, is yes. This work by scientists is aggregated in the “Intergovernmental Panel on Climate Change (IPCC) Scientific Assessment,” which states that an increase in carbon dioxide emissions due to the burning of fossil fuels is driving a rise in the global average annual temperature (1990). Scientists estimate that if we stay at the same rate

in terms of carbon emissions, then we will see a temperature increase of 1°C by 2025, which would mean that temperatures are increasing at a rate greater than any seen in the past ten-thousand years (IPCC, 1990). This temperature increase threatens to impact all aspects of human life through the effects of increasing global temperatures, rising sea levels, and biodiversity loss (IPCC, 2018), all of which are forcing us to reassess our current lifestyles and practices.

Climate change poses a risk to many other facets of our world besides just our natural systems. In addition to its environmental effects, climate change has real, immediate implications for the structure of national governments. According to many scholars, such as Scholten and Bosman (2016), climate change factors are ultimately fueling major institutional changes like transitioning energy sources, weakening economic foundations, and straining political tensions. These mounting changes have the potential to undermine the existing structures of our society. As such, governmental acceptance and acknowledgement of the inherent risks of climate change prompts the need for countries to transition away from standard forms of energy to alternative, renewable sources.

On top of the structural changes that climate change compels, it also has particularly dire impacts on the economic prospects of states producing significant amounts of oil and gas. Most notably, oil producing entities, both at the corporate and national levels, are being assailed by three existential threats: increased periods of low oil prices due to increased supply, the tightening of emission regulations, and lastly, the emergence of cheap and renewable alternatives, such as solar energy and wind farms. The most significant of these threats is the tightening of global energy policy, which in turn can make alternatives cheaper and more attractive (Ploeg, 2016). Within the last several years, for example, the price of solar energy has dropped drastically, making it far more feasible for countries to implement (Devabhaktuni et al.,

2013). As it stands, most oil-producing states have failed to answer the question of how they plan to earn money when their resource reserves are either depleted or obsolete (Ploeg, 2016). Many have failed to invest sovereign funds into research and development of renewable energy, due to their own weak institutions and shortsightedness (Ploeg, 2016), leaving them with no diversified economy and few options for success.

In truth, many oil-rich nations would rather not address the complicated reality of transitioning away from fossil fuels. Instead, massive oil exporters like the United States and Russia have remained dismissive of calls to change, despite the overwhelming scientific evidence of its necessity. This is largely due to the monetary benefit associated with oil and fossil fuels, which gives nations a vested interest in maintaining the status quo (Elliot, 2000). Moreover, it is much cheaper to continue using fossil fuels and maintain the status quo, than it is to undertake the costly state interventions necessary to implement green energy (Elliot, 2000). Even if the populace is interested in the change, moving away from fossil fuels and to a greener economy threatens to have “troubling impacts on trade and investment flows” (Cosbey, 2011: p 31) Nonetheless, continued reliance on oil is not sustainable long term and countries have little choice but to face reality, and work to wean themselves off of traditional energy sources and transition to renewables.

While not every country is actively preparing for climate change, the threat of its subsequent impacts on traditional energy have forced a vast majority of countries around the globe to acknowledge the need to transition domestically to renewable energy. International agreements, like the Paris Climate Agreement, have been agreed upon to achieve individualized goals. Moreover, there is active research being undertaken to assess how to successfully transition to renewable forms of energy, like solar within individual states. This is even true of

some states that are major oil exporters and currently generate high percentages of their GDPs from oil exports, such as Saudi Arabia, which is being forced to address the ways in which it can prepare themselves for a new energy future.

Climate Change, Regime Type, and the Resource Curse

While any state's transition away from fossil fuels will inherently be difficult – owing to its stated economic and infrastructure ramifications – some will find it more difficult than others. For instance, non-democracies may find this especially challenging. The transition to renewable energy threatens to alter the status quo and undermine the existing government structures and institutions that have formed around oil resource extraction - making the necessary transition much less appealing. The complex problem of whether or not a nation will implement renewable energy cannot be answered without careful consideration of the country's regime type and its reliance on fossil fuels

Before going any further, it is beneficial to have a clear definition of the various regime types. To begin with, autocracies can be defined as a government structure in which an individual holds absolute power and the system of government for the country lacks any type of bureaucracy (Alvarez et al., 1996). Individuals within the state have no power or influence in the decision-making process. In contrast, democracies are the exact opposite, though not purely defined by political participation. For a nation to truly be considered a democracy, the citizenry must have a large amount of political freedom to express their own individual views (Alvarez et al., 1996), whether that be in support of a green energy transition or not.

Of course, there are also many regimes that fall in between, with the most common term for these states being anocracies. Anocracies are seen as “semi-democracies”, with weak

institutions and rampant governmental ineptitude (Hegre et al., 2001; Fearon and Laitin, 2003; Vreeland, 2008). They exist in the phase between democracies and autocracies, and essentially display a mix of regime characteristics. Anocracies are often prone to corruption which can make them riper for exploitation internally and from foreign powers. As a whole, anocracies tend to be far less stable regimes than democracies and autocracies, and often give way to one of the other forms.

Whether a nation emerges as an autocracy, democracy, or anocracy can be attributed to the respective nations' relationship to resources and wealth. These variables cannot be overlooked, as the inherent economic and political implications that accompany natural resources are significant. This is especially true of fossil fuels, particularly oil, which carry with them immense monetary value. This supposed wealth has forced countries around the globe to grapple with an issue known as resource curse, which occurs when a state rich in resources struggles economically (Ross, 1999; Sachs and Warner, 1999; Collier and Hoeffler, 2005; Gilberthorpe and Papyrakis, 2015). The issue of resource curse subsequently plays heavily into determining regime type.

Though a variety of factors are important in determining the governmental structure of a nation, perhaps none are quite as influential, or as well researched, as resource curse. This can be loosely defined as any state with an abundance of resources managing their economies poorly and, therefore, performing worse than less endowed states (Ross, 1999; Sachs and Warner, 1999; Collier and Hoeffler, 2005; Gilberthorpe and Papyrakis, 2015). In other words, the resource curse represents the failure of a state to successfully capitalize on the resource and its resulting opportunities in the long term, leaving the state poor and crippled despite the surplus of potential wealth. While notions of the negative consequences of resource wealth have been around since

the 1950's, the theory of resource curse was first presented in its modern form by Auty in 1993, when the negative association between resource dependence and economic growth was established. Oftentimes, the introduction of a major resource leads to issues ranging from intervention by outside groups to wealth hoarding, all of which negatively impact the economy and government. This ultimately leaves states with weaker governments, institutions, and economies than they had before.

More specifically, the resource curse affects both the political and economic functions of states. Economically, the resource curse and any economic growth largely influenced by a single resource have been found to hinder long-term development (Sachs and Warner, 1999). This leaves national economies over-reliant on a single resource. The abundance of one resource leads to overinvestment in the sector, starving other industries of the economic capital needed to survive, which hurts export revenue and job availability. Politically, resource curse is related to policy failures, with lawmakers focusing solely on short term gain and allowing the intervention of outside actors, in both cases opening them up to corruption and weakening their existing institutions (Ross, 1999; Hodler 2006). Frequently, government officials allow investment from outside actors for a share of the income. When outside groups are able to force their way in like this, they are able to extract an undue amount of the resource wealth, hoarding the money for themselves while depriving the state of much needed revenue. Overall, the impacts of resource curse on the heavily intertwined political and economic spheres of a nation are driven by the same resource, with the most common culprit behind the development of resource curse being oil.

When it comes to oil in particular, almost all oil-dependent states share certain characteristics. First, they rely upon resource driven growth and derive a significant percentage

of their wealth from the extraction of that resource. As a result, the resource dominates the country's exports and grips domestic politics and institutions. Second, when oil is a state's primary source of revenue, it is particularly vulnerable to changes in the world energy markets that affect oil value. Third, oil-reliant states are also likely to be less democratic when compared to non-oil-rich nations.

Taken together, states that heavily dependent upon oil revenue often fall into the category of "rentier states." As explained by Ross (2001) and Herb (2005), rentier states are those that derive a majority of their national revenues from a single resource, usually oil. These nations' primary industries are all overwhelmingly consumed by a single resource, but they are successful in extracting a significant amount of monetary wealth from it, making them ripe for corruption. The vast amount of economic wealth potential presented by the oil resources available makes nations with already weak institutions vulnerable to further exploitation. Colgan, for instance, finds that the dominance of oil is clear in domestic politics, an issue that is often exacerbated by the prevalence of resource curse in most oil-producing states (2014). As he argues, oil income creates "petrostates" that are prone to corruption (Colgan, 2014), with officials prioritizing oil extraction profits over citizen welfare.

The profits officials receive are then, in turn, used by the state to pay for citizen complacency through patronage in the form of rent windfalls (Collier and Hoeffler, 2005). The work presented in "Resource Rents, Governance, and Conflict" further expands upon the relationship between oil and corruption issues, including patronage, as established by Colgan. The work solidifies the idea of resource curse and rentier states, explaining how conflict develops as a result of the profuse of patronage and the weak, non-democratic institutions that

develop in these countries because of it (Collier and Hoeffler, 2005). Ultimately, these characteristics lend themselves overwhelming to autocratic regime structures.

There is a plethora of literature that identifies that oil wealth is a strong indicator of resource curse, rentier states, and the development of authoritarian governments (Ross, 2001; Collier and Hoeffler, 2005; Colgan, 2014). As the development of resource curse and autocratic regimes is a long-lasting process, it allows for thorough studies, all of which reaffirm the positive correlation between autocracies and oil. Rentier states often take the form of autocracies, so much so that the relationship between oil resource extraction and autocratic regime structures can be described as a symbiotic one. Essentially, the wealth coming from the oil extraction allows a few individuals to consolidate and maintain power amongst themselves.

Within these “rentier-autocracies”, the wealth derived from natural resources like oil typically accrues to a small group of elites. These individuals are then able to strengthen their own position through co-optive means, such as paying off citizens, or increasing military spending to keep citizens in line (Wright et al., 2013). These regimes are also able to shield themselves from a certain level of accountability to their citizens through their rent pay-outs. Additionally, oil wealth and high oil prices have the ability to strengthen regimes and have been found to have stabilizing effects on the government (Cotet and Tsui, 2013; Morrison, 2015; Korotayev et al., 2018). On top of that, oil resource wealth can actually actively hinder the development of democratic systems within a nation (Ross, 2001; Wright et al., 2013) which serves to benefit autocratic systems of governance.

The factors listed above may present themselves in a variety of ways, but leave states looking decidedly similar from the outside. The prospect of oil makes it open season on the resources of the nation, with outside actors scrambling to get a piece of the pie. The existing

weak state either is unable to stop this influx of outsiders or is complicit in their involvement. Oil pours from the ground and goes straight into the coffers of corrupt officials and foreign companies, bypassing the citizens and government who often desperately need the money. Other industries falter as much needed investment is directed to the extraction of the resource, causing economies to deteriorate and local resources to evaporate. This results in the governing body being weakened further, at which point a few individuals may be able to consolidate power and install a less-democratic system of government. The resulting autocracy is one that is wholly dependent upon oil as its primary form of industry, as well as its primary export, but is able to capitalize on the resources enough to keep its citizens at bay. This makes the state beholden to the swings in global oil prices (Korotayev et al., 2018), which can have significant destabilizing effects and are likely to be more common as climate change worsens and global powers move away from oil.

In sum, non-democracies face an especially complicated path forward regarding their transition to renewable energy, as their regime structures are often inherently intertwined with reliance on the resource. Autocratic, dictatorial regimes may specifically find this challenging, as these nations are frequently rampant with issues relating to resource curse. Oftentimes, these countries develop into rentier states, using the resource wealth to strengthen the government and keep its citizens at bay. The existing research is very thorough, which assists in developing a conception of the states and their relationships to oil. That being said, it provides few explanations for how these nations may react to an outside threat like that of climate change, instead focusing primarily on civil wars and domestic interference. How rentier-autocracies ultimately react depends upon how these governance structures interact and carry out transitions.

Governance Structures and Energy Transitions

It is well-established that oil wealth is strongly linked to regime type, and rentier-autocracies in particular, but there is an equally important link between government type and the implementation of green energy programs. By this, I mean that the way a government is organized heavily impacts the methods it uses to transition its energy sources. In effect, depending on the structure of the state's political institutions, a nation may have more, or fewer, resources at its disposal to transition its energy sources away from fossil fuels to renewables. Different institutional arrangements and structures work in distinct ways to encourage or dissuade the development of the green energy sector. Some states choose to delegate their regulatory and decision-making authority to actors, often handing off their green energy policies to the will of private institutions. (Lockwood et al., 2016). Others take a more hands on approach to governance and use their political powers to either support or preclude green energy development.

Regime type is important because, at its heart, the movement toward a renewable energy system “is fundamentally a political struggle” due to the relationship between energy-politics and political power (Burke and Stephens, 2018: p 78). For example, green energy is often associated with strong democratic regimes and increased socio-political will, leading to the emergence of the term “energy democracy”. The political will to establish green energy is reliant upon regime type as well as economic structure, with the functioning of energy systems ultimately determined by the policy decisions made for implementation (Rutherford and Coutard, 2014; Burke and Stephens, 2018). Slight changes in political processes can lead to different and diverse transitional outcomes, such as how concentrated energy politics often hinder renewable energy transitions (Burke and Stephens, 2018). As such, there is no clear path for nations to follow in

transition to renewable energy and different regimes can result in drastically contrasting processes.

Regime type plays a role in determining where, within the country, the primary driver for green energy transitions originates. In some structures, governments have more sway in deciding energy policy unilaterally, while others utilize more bottom-up strategies, in which the motivations for energy transitions begin with smaller departments or cities (Emelianoff, 2013). These differences in structure play a large role in determining how movements towards renewables turn out. However, regardless of where the movement originates within a given nation, the transition to renewable energy is a long-term event. It necessitates the gradual introduction of renewable systems so as to not harm the existing, resource-based, national economy, but to nurture the emerging industry, while simultaneously preparing the state for the future. It is a complex process, one that requires immense amounts of political will and power to form coherent policy and affect fundamental change at a governmental level. This type of change is not always easy to implement and can originate through different socio-political mechanisms depending on the existing government make up and regime structure.

In theory, political power in authoritarian states is less restricted than in democratic societies due to increasingly-consolidated governance structures. To illustrate, consider the concept of veto players. Veto players are generally defined as “individual or collective actors whose agreement is necessary for a change in the status quo” (Tsebelis, 2002: p 19). According to this theory, countries with fewer veto players have a greater ability to change policy (Bayulgen and Ladewig, 2016). Democracies, in many cases, are intentionally designed to contain more veto players, so as to not allow one individual to have too much power. In contrast, political power is much more consolidated in autocracies, with veto power being held by just a

few individuals. As such, autocratic states have more autonomy over their decision making and have the ability to pursue any energy policies they deem fit (Bayulgen and Ladewig, 2016). Given this role in the decision-making process, the power constraints, or lack thereof, present in a governance structure can affect the degree to which green energy systems are successfully established. For autocracies, this means decisions can be made much more unilaterally, while democracies require decisions to be approved by multiple parties and organizations.

Like their more autocratic counterparts, western nations recognize their energy vulnerabilities are being heightened by climate change. This subsequently encourages states to develop renewable and alternative energy sources. Democratic states as a whole tend to be more center-left leaning, meaning they are more willing to adopt climate change and renewable energy policies (Lockwood et al., 2016). Democratic states have also run into problems transitioning, however. At a grassroots level, citizens use their voices and demand to be a part of the decision making process, especially when the construction projects are local for them (Hindmarsh and Matthews, 2008). That being said, those same grassroots movements can work in the opposite direction as well and push for the construction of green energy systems. Some democratic states, such as the United States and Australia, have mandated the construction of renewable energy systems, but have been hamstrung by inconsistent policies at the state, federal, and local levels (Hindmarsh and Matthews, 2008). Essentially, certain democratic structures of government can obstruct action at different levels (Lockwood et al., 2016), making any attempt to transition more complicated than it has to be.

In effect, existing literature on governance structures and energy transitions suggests that a state's regime type heavily influences how it interacts with the energy industry, and subsequently, how they transition to renewable energy – if at all. There are a variety of ways in

which governments can, theoretically, support or hinder green energy development. This includes directly investing in the sector using its own funds, providing political incentives, and controlling the development of energy projects. In general, government ownership of energy projects is positively correlated with the project's success (Kim and Urpelainen, 2014). Similarly, there is a good amount of data compiled from the United States on how different policies can support, or hinder, the deployment of green energy. The three main methods identified as being effective are financial incentives, regulatory changes, and rules and regulations. One particularly effective method is for states to restructure their regulatory frameworks, which can influence the speed with which projects are developed (Menz and Vachon, 2005).

Despite the significant academic and policy interest in both green energy and oil-rich states, we do not yet understand how oil-reliant autocracies transition to renewable energy, and what methods, if any, they use to limit or encourage development in practice. We also do not know how this process compares to green energy installation in democratic states, or how these distinctions may influence the success of renewable projects. Ultimately, bringing together this literature is important to help answer these remaining questions, as well as to establish a basis for my analysis. First, underscoring the very basis of my project is the idea that nations around the world must address and plan for a transition to renewables based on climate change, something they may be hesitant to do. From there, understanding oil's hold on the political system through resource curse is important for comprehending the ways in which autocratic regimes form.

Within the energy transitions themselves, it is important to know the various ways in which regime type can influence its implementation. As aforementioned, switching to renewable energy is a political process that requires a certain amount of political will, either stemming from the top, or bottom, of the national hierarchy. Moreover, the regime structure is crucial in

determining the tools and methods through which a government goes about implementing projects, ultimately determining the overall strategy for renewable energy deployment and the systems' success.

III. Theoretical Expectations

How do I expect regime type to affect transitions to green energy in practice? To begin with, I take a deductive approach to my research, working down from theories on regime type and structure to how those factors manifest themselves in state-level actions to promote or preclude renewable energy production. I start by examining the larger constructs of resource curse and rentier states, looking at theories of regime type to establish baseline definitions of different regimes, specifically autocracies and democracies. This is heavily informed by the "Classifying Political Regimes" work of Alvarez et al. (1996). From there, I isolate specific regime characteristics that the frameworks mentioned, such as veto power, to gain an understanding of structural factors that may benefit, or hinder, the successful deployment of renewable technologies.

In brief, I argue that while oil-rich autocracies may be more hesitant to transition to renewable energy sources due to their relationship to fossil fuels, once they do decide to transition, they will find it easier to do so than their democratic counterparts. The ease of the process and the initial hesitance is primarily a result of the regime type and the oil-reliance of the nation. I am therefore primarily interested in how two separate variables affect transition to green energy: regime type and oil wealth. I discuss each of these in turn.

On the one hand, regime type is a given factor that can play a large role in dictating government strategies and success for the establishment of a green energy system. That being

said, there is growing research suggesting the global movement away from oil will have a destabilizing effect on nations (Cotet and Tsui, 2013; O'Sullivan, et al., 2017). While I do not explore the potential for regime change occurring alongside the energy transition and assess only stable regimes in this process, it should be evaluated in future research.

On the other hand is oil wealth. Oil wealth, based on notions of resource curse and rentier states, has an integral role in determining the regime type of a nation (Collier and Hoeffler, 2005; Ross, 2001), so it is important to acknowledge the hold it has on any given government. Without doing so, it can be difficult to correctly understand how a state works to transition to green energy sources. By including this as a variable, I am able to account for rentier states and isolate their moves when contrasted with those of non-oil-rich democracies.

Existing research suggests several hypotheses related to how these two variables, taken together, will affect transition to green energy. I test these in a comparative case-study analysis that I detail in the following section.

First, oil-rich autocracies should have more authority to forcefully dictate how their markets should behave and what industries should be invested in. Decisions about green energy more commonly originate from national leaders, who have more power to encourage or force the companies within their jurisdiction to follow the government's lead. If true, I expect to see autocratic states issuing clear directives on how they want companies and organizations to approach the climate crisis, be it through the implementation of proactive policies or a reaffirmation of the status quo. Autocracies and their leaders will use their unique control of the nation to decide how the country's industries will respond. That being said, due to the inherent government interest in maintaining the oil production of rentier states, I expect to see posturing

towards change, but less meaningful action actually occurring. While projects and lofty goals may be announced, they likely have little follow through.

Second, oil-rich autocracies have more methods at their disposal to either implement, or prevent the development of, green energy systems. This essentially means that autocracies have much more authority to fast-track projects or unilaterally stop them, as the renewable energy position or strategy is determined by the dictator, rather than through a government agency or legislative body. In an autocracy, there are fewer decision makers with power, aka veto players, meaning projects can be greenlit at the desires of a few select individuals. Similarly, autocracies can stop projects without providing much explanation behind their reasoning. In an autocratic state, this system is likely realized with a streamlined approval process that ultimately goes back to the same key individuals. In effect, this means one should observe a much smaller review process with a few key individuals making the decisions in relation to projects.

Third, in autocracies, there is quicker implementation of projects at far cheaper prices than renewable energy projects carried out in democracies. Renewable energy projects in democracies are subject to a large amount of review, frequent delays, and alterations due to citizen and legislative input. Autocracies face no such restrictions in their decision-making process and have a higher degree of control in terms of dictating entry costs and barriers. As such, one would expect to see much more expedient projects in autocratic states when compared with those in democracies. Moreover, it would be unlikely to find projects stuck in review or approval processes, as the state can decide how to proceed without necessarily having to hear from other parties. That being said, corruption is also an important factor to acknowledge in energy projects in autocracies. Corruption levels tend to be higher in oil-rich autocracies (Ross, 2001; Herb, 2005; Colgan, 2014), a factor that has the potential to drive up construction costs

and extend the timeframe of projects. While undoubtedly a factor, I expect the impact will not be great, as the projects are high priority for the governments and will still be completed at far lower rates and much quicker than in democratic nations.

Essentially, my hypotheses can be translated in three major observable implications that I expect to see if a nation is classified as an autocracy and is largely oil-reliant. Firstly, oil-reliant non-democracies have a large amount of control of their economies, which they use to dissuade from large investments in renewables. They have more authority to direct the economic focus of the nation. Secondly, these rentier-autocracies have a quick approval process for projects as there are only a handful of key officials that must approve of it. Lastly, oil-reliant, non-democracies have, when they do decide to implement renewable energy systems, quick completion times and lower costs for projects than their democratic counterparts. The lower costs and quicker times are primarily a result of lower cost labor and decreased barriers to entry for renewable markets in autocracies. All three of these observable implications are how I expect an oil-reliant, autocratic regime to transition to renewable energy. Each method listed through which they may support or hinder renewable energy projects are generally unique to autocracies. As such, we will see them deployment most frequently, or at least to a higher degree, in autocracies as opposed to democracies.

Owing to the lack of existing research, testing my hypotheses— about how regime type influences transition to green energy – requires investigation into the experiences of oil-rich autocratic countries. In the following pages I present a research design that utilizes a comparative analysis of Saudi Arabia, Qatar, and Israel. Specifically, I examine how the implementation of renewable systems is being carried out in Saudi Arabia given the autocratic governance structure of the country, and compare that with the similarly-autocratic state of Qatar

and the democratic nation of Israel. By exploring the relationship between regime type and a state's methods for implementation, I can isolate the specific methods oil-reliant autocratic regimes use to support or preclude renewable energy systems and how that process differs from other regime types, specifically non-oil rich democracies.

IV. Research Design

To test my hypotheses, I carry out a comparative case-study analysis. Three separate case studies allow me to identify the variations in tools and strategies for green energy implementation that are employed by different nations, as well as how the regime type manifests itself in such variations. In doing so, I am taking a qualitative approach by examining the characteristics of the regime type and descriptions of the regimes processes. In essence, I focus on the state specific methods within the process of implementation and development, rather than statistical aspects, such as cost, of such an energy transition. For this study, I examine Saudi Arabia, Qatar, and Israel.

The primary focus of my analysis is Saudi Arabia where I go most in-depth regarding the government structures and functions that enable, and have allowed, the implementation of green energy within the last decade. This includes how the regime and government handles renewable energy, whether the projects are public or private, how they are permitted and approved, and if they receive government funding or not. Additionally, I assess if the process of implementing green energy is a top-down one, i.e. something stemming from a directive of the monarch, rather than an internal government agency. These are all factors that are critical to the development of new energy systems and are almost entirely dependent on the regime structure. Moreover, I look at projects that are actively being implemented to get an idea for their success rates in terms of

actually being deployed and put into use. By doing a deep dive into Saudi Arabia, I am able to clearly see the various factors at play and the government actions taking place.

To better isolate the governmental methods of implementation, I conduct two smaller, “shadow” case studies of both Qatar and Israel. Essentially, I look at Qatar to form a most similar case study between the oil rich nation and Saudi Arabia. The most similar study is one in which I compare two very similar nations, with both in this case being Middle Eastern, oil-reliant autocracies. This type of study allows me to establish the methods in renewable energy transitions that are shared amongst oil-reliant dictatorships. Israel, on the other hand, serves as a contrast when compared in the same way. The inclusion of Qatar enables variables specific to Saudi Arabia to be separated from those that are shared amongst all oil-reliant autocracies. On the other hand, the comparison with Israel allows for the comparison of regime type influence on the process of energy transition. By examining a major renewable action in Israel, I highlight the major differences seen in the renewable energy deployment process in the given democracy versus the process seen in the autocracies of Saudi Arabia and Qatar.

That being said, these studies are not nearly as robust as my analysis of Saudi Arabia. In both miniature cases, I chose one specific interaction to assess, better helping me pinpoint the major differences and similarities between how the two regimes and Saudi Arabia handle their renewable energy development. Accounting for another regime type and factors that are specific to Saudi Arabia leaves fewer variables at play and unacknowledged, allowing for the strengthening of my later conclusions on how oil-reliant, autocratic regime types transition to green energy.

I study Saudi Arabia, Israel, and Qatar because of the clear potential they all have in allowing me to ascertain the varying ways the regimes go about green energy deployment. Saudi

Arabia and Qatar have an extremely different government structure than Israel, making it very possible to control for the regime type and later highlight the similarities and differences in the implementation processes. While Israel is a parliamentary democracy with an elected Prime Minister, Saudi Arabia and Qatar are both absolute monarchies, headed almost entirely by a few powerful individuals. Additionally, the countries also have very distinct relationships to oil and fossil fuels. Saudi Arabia and Qatar are very good examples of oil-rich autocracies and are some of the world's top oil exporters. According to the Organization of the Petroleum Exporting Countries (OPEC) website, oil exports account for roughly seventy percent of Saudi exports and fifty percent of its GDP (2019). Qatar has a very similar economic make-up with fossil fuels constituting almost ninety percent of the nation's exports according to the Observatory of Economic Complexity. In contrast, Israel relies significantly less upon oil economically, exporting a negligible amount of the product (CIA World Factbook, 2019), and again making the distinction between the three more easily accounted for.

Despite the clear differences, the three nations also share some key characteristics that make a comparison of them appropriate. It is important to note that Saudi Arabia, Qatar, and Israel are all signatories of the Paris Climate Agreement, despite their differing relationships to oil, and have all stressed a public commitment to reducing carbon emissions. The countries also have similar potential for green energy. All are located in the Middle East and, therefore, share the same climate and have similar geographies, making the outlook for wind and solar productivity very similar. This is especially true of solar, which maintains a high degree of potential across all three nations. Due to these shared characteristics, I am able to account for the same types of technology because the feasibility of the various types of renewable energy is very similar and, in doing so, eliminate other less-certain variables.

	Regime Type	Industry Examined	GDP	Oil-Reliant Economy
Saudi Arabia	Autocracy	Solar	High	Yes
Israel	Democracy	Solar	High	No
Qatar	Autocracy	Solar	High	Yes

Table 1: The primary variables assessed in my case studies

Part of the logic in choosing Saudi Arabia, Qatar, and Israel stems from the easily accessible information about them, as sometimes it can be difficult to find, especially for autocracies. In order to properly explore the cases and answer my question, I gather information from a variety of sources, ranging from scholarly articles to government websites. I draw heavily from databases and peer-reviewed studies, notably the works of aforementioned theorists like Ross, to establish the theories of regime type and resource curse. Moreover, scholarly sources are also available which examine the potential strategies for clean energy implementation based on location and existing subnational factors. This is especially true of Saudi Arabia, which has numerous articles published about the feasibility and potential implementation of green technologies. Many of these works stem from reputable and frequently cited sources as well, such as Shafiqur Rehman. Likewise, scholars have also assessed the potential for large scale implementation of renewable energy, specifically solar, in Israel, and how such technology contrasts with that of oil and gas (Vinter and Slonim, 2009).

For the case studies, I also draw heavily from news sources and government communications that contain information not yet published in academic reports about the planning, approval, and realization of green energy projects. Outlets like the *Saudi Gazette* and *Times of Israel* both provide information about the progress of current projects, as well as other investigative research, such as funding sources. These news sources can also be beneficial in

uncovering statements from high-ranking government officials, which can inform my understanding of where the initiative for such projects originated within the regime structure.

National, state run websites further expand on government thinking. Documents linked to the sites outline the steps taken by the government to either dissuade or encourage development, as well as how to go about initiating a project, if possible. They can also reveal the tilt of the government, in terms of supporting climate change goals. Ultimately, the respective state-run websites for each nation, the Israeli Ministry of Energy, Qatari Ministry of Energy and Industry, and the Saudi Ministry of Energy, Industry, and Mineral Resources, all provide needed insight into state projects and sustainability goals.

The following pages lay out the case studies as follows. First, an in-depth analysis of Saudi Arabia, which establishes a clear idea of its government processes and their relationship to renewable energy implementation. It also includes a further review of the funding and permitting processes, and any other potential checks on development. Afterwards are two much smaller case studies of Qatar and Israel. These have a similar focus, just not as thorough as the Saudi Arabia case. All three cases run through the three hypotheses and subsequent observable implications to isolate the specific ways each regime handles renewable energy. Ultimately, the cases highlight the mechanisms used by oil-rich autocracies to help with the development of green energy making them much more apparent when compared to democracies.

V. Saudi Arabia

In many ways, the Kingdom of Saudi Arabia can be seen as a microcosm for the journey that oil-reliant, autocratic regimes must take if they hope to transition to renewable energy. The modern history of Saudi Arabia begins in 1932, though the history of the region goes back far

further. In 1932, two separate ruling families bonded together to form the Kingdom of Saudi Arabia. Recognized internationally almost immediately, the young nation began forming close relationships with western nations like the United States and Britain. Oil was discovered in the region in 1938, leading to an influx of foreign oil workers, wealth, and western ideologies. In 1944, the Arabian American Oil Company (Aramco) was established as a joint venture by various American oil companies and the Saudi government (Teitelbaum and Philby, 2020).

The rapid changes and incursion of foreign interests led to some tension within the country, especially as the oil wealth was disproportionately going to Americans. In 1958, the King's brother Faysal, who was considered a modernist, assumed all executive power from his brother. Faysal is credited with establishing the nation's first functioning and efficient bureaucracy. In 1960, Saudi Arabia helped in the foundation of the Organization of the Petroleum Exporting Countries (OPEC), an intergovernmental organization that coordinates the oil policies of its member nations. Moreover, under Faysal, Saudi Arabia began the process of nationalizing Saudi Aramco, bringing the company under complete Saudi government control by 1980. While Faysal did not survive to see the complete nationalization of the oil company, his actions began a period of social and economic development that would bring Saudi Arabia fully into the modern world (Teitelbaum and Philby, 2020).

Today, the Kingdom of Saudi Arabia is, by almost all metrics, still classified as an autocracy, with the governance structure reminiscent of the one established by the first rulers of the nation. According to regime data from the Polity IV Project, Saudi Arabia is given the lowest possible score of -10, meaning it is a full and total autocracy (2014). Other research backs up this notion, with the Kingdom consistently classified as an autocracy (Alvarez et al., 1996; Geddes et

al., 2014). In some cases, the nation is listed as a monarchy as well (Geddes et al., 2014), though that classification in of itself is considered a subset of autocratic regimes.

In addition to maintaining its autocratic system of government, the economy of the Kingdom of Saudi Arabia still relies very heavily on the production and export of fossil fuels. Currently, the country is the second largest oil-exporter in the world, with oil exports accounting for roughly seventy-five percent of Saudi exports and fifty percent of its overall GDP (OEC 2017; OPEC, 2019). That represents roughly 1.5 million barrels of oil a day (Domm, 2019), which gives the country around a 16 percent share of global oil exports (Twin, 2018).

This reliance on oil, along with the autocratic regime structure, ensure that Saudi Arabia meets the criterion of a rentier-autocracy. As aforementioned, a rentier state is one which derives almost all of its wealth from a single resource (Ross, 2001; Herb, 2005), a characteristic that correlates heavily with the development of autocratic institutions. Though in some cases the abundance of oil has led to weaker institutions, the Saudi royal family has been able to utilize the oil wealth to solidify and maintain its power through co-optive means. The institutions that exist in Saudi Arabia today would not survive in their current form if not for the wealth of oil, as it has allowed the government to keep democratic structures and desires from catching on.

The grip that oil has on the country's international economic outlook and governance structure is similarly tight around other aspects of the domestic sphere of the rentier nation. Not only is Saudi Arabia a major exporter of oil, but the Kingdom relies almost entirely on oil for its energy generation. According to a 2016 estimate by the CIA, zero percent of the country's electrical generation came from renewable sources, meaning Saudi Arabia has a long way to go to transition domestically. (CIA World Factbook, 2016). Moreover, as the Saudi economy swelled to 20th in the world, so too has its population and, in turn, its demand for energy. The

energy demand within the nation is expected to double by 2025 (Salam and Khan, 2017). As such, the country must work to rapidly expand their generation capacity, while also reducing their reliance on the current means of production if they hope to diversify. Current estimates state that if the demand does not decrease or the reliance on oil is not reduced, Saudi Arabia will be forced to start importing oil itself (Salam and Khan, 2017).

As the nation is so heavily reliant on oil both in terms of their energy generation and economy, Saudi Arabia has been forced to acknowledge the issue of climate change. With the threat of oil price deflation looming, the kingdom has been forced to “use its current wealth to prepare for a future with dwindling fossil fuels” (Hepbasli and Alsuhaiban, 2011). Essentially, the Saudi government has acknowledged this inherent risk of being overly reliant on a single resource and is actively seeking to diversify their existing systems. Yet, there is no clear path forward and there are multiple ways in which the kingdom is approaching the implementation of renewables, including through direction of the private sector and government investments in renewable energy technology and infrastructure.

Solar has been particularly important in their plans to wean off oil. The multitude of research and test projects that have been carried out have proven that solar has a wide array of practical uses for which it can be employed in the region (Alawaj and Hasnain, 1999; Hepbasli and Alsuhaiban, 2011). The outlook for solar technology in the nation is further enhanced due to its geography and climate, as “Saudi Arabia is located in the heart of one of the world's most productive solar regions” and has an immense amount of natural renewable energy potential (Dargin, 2009; Hepbasli and Alsuhaiban, 2011; Salam and Khan, 2017), should the country choose to pursue it.

All this information gives a much clearer image of Saudi Arabia. The country derives almost all its wealth and success from its natural oil reserves and, in turn, has used this money to solidify the power and standing of the autocratic government and the ruling family. The looming challenge of climate change and the collapse of oil revenues pose a substantial risk for the nations' leaders, as investing in other forms of energy may stabilize their country's economy, but also threatens their hold on power. At the same time, the country and its geography make it uniquely capable of implementing successful solar renewable energy systems. In the end, the Kingdom of Saudi Arabia, must, and is, acknowledging the issues facing them. The way that oil-wealth has shaped the regime and nation cannot be overlooked, however, as it shapes the country's response and actions going forward.

Observable Implications

As aforementioned, the Kingdom of Saudi Arabia has developed into a powerful petro-state, with a strong autocratic system of government led by King Salman bin Abdulaziz Al Saud, though the Crown Prince, Mohammed bin Salman, is the one who does the actual governing. Given this regime type and the reliance of the state on oil, I would expect several patterns to emerge in how the state operates with respect to renewable energy programs. First, I expect the nation to use the authority it has due to its autocratic regime structure to issue clear, top-down directives for how the private companies located within the country should, and will, invest in renewable energy. Second, the kingdom, also due to its regime type, should have a more streamlined process for deciding how to implement or invest in green energy. Finally, largely due to the streamlined decision-making process present in autocracies, I expect to observe fewer

barriers to project construction, resulting in more successful execution of clean energy projects, an aspect which coincides with reduced construction costs.

Forceful Direction of the Economy

One of the major ways that regime type manifests itself in a nation's transition to renewable energy is through the top-down policies issued by the government, with clear directives on how to approach and handle certain industries. This matches quite closely to the reality today in Saudi Arabia, underscoring the organizational and managerial capacity of autocratic states. As part of their plan to implement renewable energy, the Kingdom is controlling how the private sector invests and how they conduct business in the international sector, as well as investing billions to boost up nascent green technology industries at home and abroad.

To begin with, Saudi Arabia has issued clear directions for how it wants private companies within the nation to behave. Currently, companies are instructed to invest in and form relations with solar entities around the world, as collaboration is seen as key for the kingdom to achieve success and leadership in the sector (Estimo, 2014). This is further emphasized in *Saudi Vision 2030*, which is an ambitious plan of Crown Prince bin Salman's to enable the country to further develop and diversify, particularly in the energy sector.

As part of *Saudi Vision 2030*, the government acknowledges that its economy may not be the most attractive for investments and is actively exploring avenues like privatization (Salam and Khan, 2017) to make the state more desirable. The plan calls for the privatization, or partial privatization of many industry operations, as well as liberalization of the green energy market to increase competition (*Saudi Vision 2030*, 2016). *Saudi Vision 2030* also calls for “review [of] the

legal and regulatory framework that allows the private sector to buy and invest in the renewable energy sector”, in order to encourage further international investment (2016: p 49). Many of these legal changes are already going into effect, revamping existing structures - surrounding bankruptcy, for instance - in order to attract foreign investors and meet the goals of the *Saudi Vision 2030* (Torchia, 2018). Part of the reorganization efforts launched by Prince bin Salman involved consolidating multiple competing entities into a new Ministry of Energy, in order to create a more “central, top-down governance structure” (Borgmann, 2016) for the energy sector. By making these changes and boosting private corporations’ involvement in the economy, the country aims not only to diversify its portfolio, but also to alleviate itself of some of the burden of transitioning.

The Kingdom, for all intents and purposes, has “put its money where its mouth is” when it comes to renewable energy. In addition to encouraging private companies to invest in renewable energy systems and take part in the country’s transition, the Kingdom of Saudi Arabia has invested large sums of their own money into the sector. In total, the government has pledged over \$100 billion to developing and implementing solar energy initiatives (Parnell, 2019). This includes giving money directly to investment and development funds to partner with private and international companies. The authority granted to autocratic states allows the leaders to decide how to have broad control over the nation’s investments. Instead of any sort of budget that needs to be approved by another body, the government can decide which industries to prop up and support their needs. Crown Prince bin Salman has decided that it would be profitable to have a successful solar industry in the country and has directed government finances accordingly. The Public Investment Fund of Saudi Arabia (PIF), for example, has pledged money for research and development, as well as implementation of renewable energy systems and has entered into

international partnerships to do just that. Another fund, the Saudi Industrial Development Fund (SIDF), is offering loans for companies developing renewable energy projects (Nereim, 2019), making it easier for other countries to implement such projects.

In further keeping with the *Saudi Vision 2030*, the kingdom is trying to distance itself from the industry side of oil as well, and took part of the state-owned oil company, Saudi Aramco, public in late 2019. This effort raised approximately twenty-five billion dollars, money the kingdom plans to put towards funds like the PIF and SIDF, so they can continue to fund projects and further develop industries (Kelly and Reed, 2019; *BBC News*, 2019). To be clear, the state does not plan on halting oil extraction and exports, but is just doing what it can to lessen its dependence nationally.

The degree to which the Saudi government has been able to implement clear directives and investment priorities is partially due to the autocratic structure of government present within the Kingdom. The leaders, specifically Crown Prince bin Salman, have made clear the direction they wish the nation to go, stating “that [Saudi Arabia is] the only country that can make a breakthrough in the [solar] field and solar manufacturing field...because we have all the elements of success” (*TIME*, 2018). Whether it is through expedited legal revisions of old laws or the forceful direction of international investment, the rest of the country has responded accordingly and done their part to make the industry successful.

Unilateral Control of the Decision Making

Another way regime type is present in the renewable and clean energy sector in Saudi Arabia is through the streamlined approval process for green lighting projects, such as the Sakaka Solar Plant. Getting a project off the ground in a democracy can be a difficult process,

one that is significantly smoothed out in an autocracy. While the development of any project must go through multiple checks and reviews at a governmental level in a democracy, it has far less in an autocracy, in no small part due to the reduced number of veto players involved in any given decision.

Given the very nature of an autocracy and its presence in Saudi Arabia, there are far fewer veto players involved in decisions of how to invest and implement renewable energy. As aforementioned, veto players are actors whose approval is necessary for change to take place (Tsebelis, 2002). Currently in the Kingdom, the Ministry of Energy is headed by a member of the royal family, Prince Abdulaziz bin Salman Al Saud, who works directly with the Crown Prince. As Minister, he is the one who enters into any agreements on behalf of the Ministry of Energy and can execute major energy projects, including those related to renewables (Ministry of Energy, 2020). As such, the Minister is largely considered one of the more powerful figures in the country, overseeing a massive and important department for the government, with few checks on his power other than Crown Prince bin Salman. The Minister carries out the vision given to him by the Crown Prince, with next to no other veto players, besides the aforementioned Prince, with control over how he does so. Beneath the Ministry of Energy is the Renewable Energy Projects Development Office (REPDO), where all renewable energy projects are submitted and approved.

Even supposedly self-functioning departments ultimately report to the Crown Prince and/or Prime Minister. Take, for example, the King Abdulaziz City for Science and Technology (KACST), a Saudi scientific research organization that works on solar technology. While the KACST is technically an independent organization, it receives billions of dollars in funding from the Saudi government and delivers reports directly to the Prime Minister, as opposed to any

agency or department (Hepbasli and Alsuhaiban, 2011). As such, the Prime Minister and other senior members of the royal family have broad authority to implement any changes they see fit (Alsultan, 2013).

This authority does not just apply to starting projects either, but also to cancellations. Stopping a project in non-autocracies can be almost as difficult as starting one, due to political interests that are much less controllable in democracies. Most recently, in March of 2018, the Saudi government announced a massive and costly project to build the largest solar field the world had ever seen. Despite being touted by Crown Prince bin Salman as a “huge step in human history” (Safi, 2019), the project was cancelled by October of the same year (Deign, 2018), a decision that would not be made without the Crown Prince’s approval. Either way, there was likely little input on the project by anyone outside the oligarch’s sphere, something that can be a major factor in the execution of large infrastructure projects, like solar installation.

The autocratic structure of the rentier state of Saudi Arabia has given the government a large amount of authority in terms of deciding upon projects and strategies for implementing renewable energy systems. By their very nature, autocratic governments have fewer veto players, with just a few key individuals, like Minister Abdulaziz bin Salman Al Saud and Crown Prince bin Salman making almost all the key decisions, being able to start or cancel projects, with essentially all major departments and projects reporting directly to them.

Execution of Projects and Cost

Regime type also tends to manifest itself in the way in which energy projects are actually executed and implemented. Theoretically, and based upon experiences in other industries, renewable energy projects in democracies are subject to a large amount of review, frequent

delays, and alterations due to citizen input. Autocracies generally face fewer restrictions in their decision-making process, resulting in more timely execution of major infrastructure projects. Furthermore, the close alliance between the state governments and fund-backed investment groups, like the Public Investment Fund of Saudi Arabia (PIF), has allowed Saudi Arabia to maintain extremely low prices for their solar megaprojects.

The Sakaka solar project is one example of this. The Kingdom began construction on the 300 MW solar project called Sakaka in 2018 and, just a year later, the project was fully integrated into the national electrical grid (*Arab News*, 2019). The timeframe for construction and the on-schedule delivery of the solar plant is particularly impressive, given its relatively high cost and the fact that it is the first industrial scale solar farm to be installed in Saudi Arabia. This is even more noteworthy given that a comparable solar field, Agua Caliente in Arizona, took roughly four years to be completely operational (Chakrabarti, 2019). Agua Caliente is similar to Sakaka, especially in terms of electrical capacity, as both are solar photovoltaic plants. Agua Caliente produces 290 MW of energy while Sakaka produces 300MW of energy. Though Agua Caliente does cover more land area, coming in at 2400 acres, a little under 1000 thousand more than Sakaka, the timeline for Sakaka's completion is still impressive. From the start of the process, the Sakaka project moved far more quickly, as it was approved in 2017 and operational by 2019, while Agua Caliente was initially approved in 2009 (Campbell, 2019) and was not operational until 2014.

The speed with which the Sakaka project was developed can in part be contributed to the lack of public input required. While American companies must oftentimes hold public hearings on construction projects, especially if they impact citizens, the Saudi government does not hold itself to the desires of its people in the same way. This is further reflected in how utility websites

are laid out. In the United States, utility and energy company Eversource has an entire tab on their website dedicated to Public Hearings and Filings (Eversource, 2020) , an aspect that is completely absent from the company that carried out the Sakaka project, ACWA Power's, website.

Moreover, the cost of solar in democracies like the United States is far more expensive than in their autocratic counterparts. Saudi Arabia recently began accepting proposals for a variety of solar projects representing 1500 MW of energy for a total cost of around \$1.5 billion (Bridge, 2019) - \$300 million dollars less than it cost to construct the 290 MW Agua Caliente project in Arizona (Chakrabarti, 2019). Part of this price inflation stems from labor costs, which tend to be higher in democracies. However, a majority of the increase actually comes from “soft costs”, like permitting and financing, that account for 74 percent of the construction cost of solar in the United States (Energy.gov, 2020). Not only are costs like those reduced in autocracies, but, due to the fundamental involvement of the state, other barriers to entry can be reduced as well. Essentially, companies bidding to install solar in the nation are backed by powerful investment funds, like PIF, with close ties to the state rulers (Kenning, 2017). This process has allowed Saudi Arabia to install solar farms with record setting low prices, making solar renewable energy even more viable going forward.

Due to the lack of public involvement in autocracies, Saudi Arabia has been able to execute projects more quickly, and more cheaply, than comparable projects carried out in democracies, like the United States. The KSA has used its authority to keep barriers to entry and permitting costs low to help project estimates come in cheap. Moreover, because of the close relationship between the government and energy companies in an autocratic state, Saudi Arabia

has been able to maintain low prices for their solar projects, a factor that serves as a major barrier in many states seeking to carry out large green energy projects.

VI. Qatar and Israel

To isolate the unique variables in how autocracies, specifically Saudi Arabia, behave, I compare and contrast the nation with a very similar one, Qatar, and a polar opposite one, Israel. Both nations are located in the Middle East and have similar potential for green energy, yet their regimes types and their methods of green energy implementation are drastically different.

Qatar

Located in the Middle East and bordering Saudi Arabia, Qatar is a small country around the size of Connecticut and one of the youngest countries in the region, only gaining its independence from Britain in 1971. Oil was discovered in the area in 1939, with production and export of the product truly ramping up in 1949 (Anthony and Crystal, 2020). It is currently led by an Emir, Tamim bin Hamad Al Thani, who is the head of state and monarch.

Qatar is a constitutional monarchy that, like Saudi Arabia, functions as an autocracy. Though Qatar may consider itself more democratic than Saudi Arabia due to the existence of a legislature, according to almost all metrics their regime types are very much one and the same. The autocratic regime status is all but uncontested and is supported by the work of many researchers, such as Alvarez et al., all of whom classify Qatar as an autocracy (1996). Similarly, the Polity IV Project gave Qatar a score of -10, the same as Saudi Arabia's, and the lowest score possible, denoting it as a full autocracy (2014). Moreover, as previously noted, autocratic

regimes often coincide with oil wealth and Qatar, like neighboring Saudi Arabia, is also considered a rentier state (Herb, 2005).

Qatar's GDP and exports are dominated by petroleum. According to the Observatory of Economic Complexity, refined and crude oil make up a combined 87% of the country's exports (2020). As such, climate change and gradual movement away from oil is a major concern and movement into the green energy sector would be "advantageous" for the country (Doukas et al., 2006). Moreover, the climate and geography of the nation makes it well suited for renewable energy development. Located in a desert area with a warm and sunny climate, Qatar is a very viable location for green energy implementation (Jahangiri et al., 2016; Martín-Pomares et al., 2017), specifically solar power.

Given the autocratic regime structure and the oil- reliance of the country, we can expect to see very similar interactions of oil-wealth and regime type on the implementation of renewable energy in Qatar. First, most of the existing policies in Qatar are "state directed, top-down directives" that are decided by the ruling members, something that may have to change to diversify the economy (Ibrahim and Harrigan: p 22). The government has stated a clear commitment to diversifying its economy and plans to invest millions into renewable energy through its sovereign investment fund, the Qatar Investment Authority (*Gulf Times*, 2020). Much of this sentiment is laid out in *Qatar's National Vision 2030*, a plan which outlines a process for economic diversification (2008). Though this vision places less of a focus on renewable energy sources than it's Saudi Arabian counterpart, it still calls for economic diversification to avoid non-renewable resource (oil) depletion, and as a way to promote long term success (*Qatar's National Vision 2030*, 2008). As part of the National Vision, Qatar also issued a National Development Strategy, that provided the path forward on how Qatar would meet the "broad

economic, social, human and environmental attributes of sustainability” (Ibrahim and Harrigan: p 4) Through this vision, the government committed itself to exploring other options for energy including renewables.

Secondly, Qatar benefits from a streamlined autocratic government system that gives its leaders broad authority to enact their will, without the threat of veto players getting in the way. The Minister of State for Energy Affairs, Mohammed Saleh Abdulla Al Sada, is the supreme executive of that department and, along with the Emir and Council of Ministers, maintains supreme control of all “internal and external affairs” (Qatar Government Communications Office, 2020). Therefore, the Emir and the council are the primary veto players in the nation, with no energy project or policy going into effect without their knowledge and approval.

Lastly, the regime structure of the nation also contributes to the quick timetables and relatively inexpensive costs for construction that the nation has been able to achieve. The nations’ upcoming Al Kharsaah solar plant, which was announced early in 2020, is expected to be fully operational by 2022. Moreover, the country managed to secure relatively low prices for the project, again due to the autocracy’s lack of labor protections and its inherent relationship to the state energy companies. The entire project, which will produce 800 MW of power when complete, will cost around \$467 million to complete (*Al Jazeera*, 2020), or \$100 million less than it took the democratic state of Israel to produce a 310 MW plant.

Ultimately, Qatar and Saudi Arabia have many similarities in terms of their governance structures and their renewable energy strategies. Both nations boast an immense amount of solar energy potential due to their dry and sunny climates and both are autocracies led by a ruling family. This regime type manifests itself in the top-down initiatives for solar energy, including

the direction of investments, in the streamlined process for project approvals, and the expedited implementation of projects.

Israel

Though still located in the Middle East, there are few similarities between Saudi Arabia, Qatar, and Israel. Israel was established in 1948 when the state declared independence and created a Jewish nation (Ochsenwald and Elath, 2020). The new country was founded as a parliamentary democracy, meaning it is a democratic system of government where the executive derives their legitimacy from parliament, i.e. legislature (Editors of Encyclopaedia Britannica, 2019). It is led by a legislative branch and prime minister, with citizens given the right to vote. Israel is generally rated favorably in regime classifications and is normally listed as parliamentarian or democratic (Alvarez et al., 1996). Likewise, the Polity IV Project scored the country as a 10, meaning it is a full democracy (2014). Currently, Israel is going through a period of economic growth under the leadership of Prime Minister Benjamin Netanyahu.

Like both Saudi Arabia and Qatar, Israel is considered a high GDP country, however its export market is drastically more diversified. Currently, petroleum and oil products account for only 3.2 percent of the nation's exports, with the largest resource export of the state being diamonds (OEC, 2017). While the country will absolutely feel the impacts of climate change, movement away from oil as an export is not nearly as devastating a factor for Israel's economy, and therefore, the country may place less of an emphasis on the development of green industries.

That being said, Israel today remains very dependent upon oil imports, but maintains a high degree of potential to develop renewable energy, particularly solar. Like Saudi Arabia and Qatar, Israel is located in a geographic region with warm, sunny summers, though it does

experience more rainfall than its eastern neighbors. Ultimately, however, the renewable energy potential is still high and the government has begun to take action on solar deployment.

Given the democratic classification of government and the lack of oil wealth in the country, the transition to renewable energy in Israel looks markedly different than the transitions occurring in Qatar and Saudi Arabia. I expect to see more demand from citizens for action and involvement with less clear directives from the government, a much more rigorous and cumbersome approval process for projects due to the existence of more veto players, as well as a slower time frame, and higher costs, associated with solar energy projects.

These expectations are borne out in the analysis. First, there are different drivers for renewable energy initiatives. Though ultimately all of these projects must be approved by the government in some shape or form, there is a unique distinction in democracies about how policy changes begin. The people who implement renewable policies in the Israeli government are elected by the populace of the state, meaning their views on climate change and green energy can be seen as a reflection of citizen interest. Moreover, there is much more citizen demand for climate action in the state than what can be observed in Saudi Arabia and Qatar. For example, citizens of Israel took to the streets this past year to demand action on greenhouse gas reductions (TOI Staff, 2019), in a demonstration that matches others like the People's Climate March, which has become an annual event. As of the time of this writing, I have been unable to identify any comparable events occurring in either Saudi Arabia, or Qatar.

Secondly the way in which projects are approved differs from that in Saudi Arabi and Qatar, with Israel's regime type manifesting itself in the process through which initiatives and projects are approved. As a democracy, the country is intentionally and inherently filled with more veto players, which can have a significant impact on how quickly policy changes and

projects can be approved. As such, lofty policy goals that the country has set for itself have not been met, with the actual solar numbers being far below the 10 percent goal set for 2020 (Wacks, 2019). The inability of the nation to meet its goals is in no small part due to lack of proper funding for solar projects. The money must be approved by far more people than just a few oligarchs in order to be allocated towards green energy development, with the Ministry of Finance designing, and the parliament approving, of the budget. Therefore, there is a large group of individuals that are allowed input into where money is allocated. As of right now, lawmakers in Israel have been hesitant to invest in renewable energy, instead opting to wait until the cost to implement solar drops significantly (Wacks, 2019).

Lastly, the approval process is slower for clean energy projects in democratic nations like Israel, which contributes, in part, to far longer construction timelines. Take, for example, the Negev Energy plant, the largest one in Israel. The Negev plant began soliciting proposals for the project in 2008, with the project just coming online in 2019, a whopping eleven-year timeframe for a project that produces only 310 MW of energy (Solomon, 2019). At a price of around \$570 million, the project also cost millions more than similar sized plants in Saudi Arabia. On top of that, because the project took so long to complete, much of the technology used is outdated, leading to higher energy costs for the state.

Despite its location in the Middle East and its large potential for solar energy development, Israel is far different than Saudi Arabia and Qatar, as a result of its regime type manifesting itself in different ways. While the autocracy in Saudi Arabia has given clear top-down directives, Israel's democracy has been far less forceful in their messaging and has mobilized far less to help implement solar energy. As such, it has made little progress in meeting its renewable energy goals, as its projects take years to complete and grapple with issues of cost.

VII. Results and Discussion

After the congregation of this research, it appears as though my hypotheses about how oil-reliant, autocratic regimes transition to renewable energy have largely been proven correct. My first hypothesis, that autocracies issue clear top-down directives, was on the mark in terms of dictation of the market, which was generally observed as occurring in both Saudi Arabia and Qatar. That being said, I found that many oil-rich autocracies actually promoted investment in renewable energy systems far more than expected, especially the case of Saudi Arabia. Instead of stifling the growth of the renewable energy market, both countries are actively promoting it and attempting to make it easier to invest in the sector. The governments of both Saudi Arabia and Qatar have signaled their intent to take the issue of climate change and sustainability seriously, with both states issuing “visions” for their future that included goals for renewable energy and emission reduction. While democracies have also initiated plans to deploy renewable energy, it is often reactive toward growing citizen demand in the form of protests, something generally absent in autocracies. Moreover, the autocratic regime structure did indeed give the nations ways to act that are unlikely to be seen in democratic nations. This is most evident in Crown Prince bin Salman’s unilateral move to reorganize the government and restructure all the energy industries under a new Ministry of Energy. What the Prince says goes in Saudi Arabia and he has been the driving force behind the nation’s push towards renewables.

Having one or two key individuals, like the Crown Prince, make a majority of the decisions ties heavily into my second hypothesis. My second hypothesis, that autocracies have more authority to fast-track or stop projects, was corroborated in the case studies, as well. As expected, this was highly correlated to the amount of veto players present in autocracies. Saudi

Arabia and Qatar have much more streamlined governance structures than democracies like Israel. Decisions go back to a few key individuals, while in democracies many projects, or at least funding, must gain approval from a legislative body. Money driven issues specifically have bogged down many democracies, like Israel, with lawmakers hesitant to commit the needed funds to develop projects. Fundamentally, autocracies are much more streamlined, meaning there is more unilateral control of decisions, resulting in quicker approval, or cancellation, processes.

Based on the research, the speed with which autocracies are able to construct and implement projects appears to be quicker and more inexpensive, than similar projects in democracies. This lines up with the third hypothesis, that a speedier timeline for projects would be an observable implication of the regime type. Saudi Arabia has moved to reduce barriers to entry in the market, revamping legal operations to make investment easier. These oil-rich autocracies have also been able to construct projects like Sakaka and Al Kharsaah in time frames of a year or two, while democratic projects have had far longer construction times. On top of that, they have done so at a fraction of the cost of democracies, coming in at millions of dollars less than what is seen in democracies. Some of this is assuredly attributed to reduced labor costs, which in of itself is a manifestation of regime type. Autocratic regimes are less concerned with the needs of their citizens and more concerned about controlling them. As such, labor prices remain low. Building off of that, autocracies do not entitle their citizens with the power to comment on projects in the same way that democracies do, speeding up the project and likely reducing costs as well.

All three of these hypotheses assume and support the notion that these energy transitions are driven by the domestic regime. We generally see three different driving forces for energy transitions: domestic political and economic drivers, pressure to conform to international norms,

and internal mobilization through activism and protest. My research is almost entirely reliant on the first explanation, that energy transitions in autocracies occur because of the economic and political pressures posed from, most prominently, climate change. The way the government can lead this transition has been established throughout the paper, but it is beneficial to point out why the latter two alternative explanations for transitions are not as applicable to the cases examined.

Firstly, while international pressure absolutely plays a factor in state decision making, it is far from the deciding factor. Being able to tout climate related achievements can be very beneficial for the government's public image and standing at an international level, but countries have been more than willing to flout standards before, particularly with climate change and green energy. With the Paris Climate Agreement, some major oil producers and polluters such as the United States and Iran have notably opted out, withdrawing and refusing to ratify respectively (Apparicio and Sauer, 2020). On top of that, it is safe to say that a majority of the nations that have signed, including Israel, have failed to meet their goals. As it is a non-binding agreement, there are relatively few immediate repercussions for failing to meet climate goals.

Secondly, just as with news articles being unable to criticize autocratic regime environmental policies, autocracies do not allow for the type of environmental activism that drives energy transitions in other, less stringent states. While there is clear evidence of instances of protest in Israel relating to climate change and the implementation of renewable energy, no such records exist of any similar movements in Saudi Arabia and Qatar. This is largely because autocracies do not give their citizens the freedom to voice such opinions. Rentier-autocracies have notably poor records on human rights, which eliminates this explanation as a driver for change in autocracies.

Ultimately, what the hypotheses outline is that oil-reliant, autocratic regimes tend to have multiple tools at their disposal to aid transition. Driven by domestic economic and political pressure, the development of renewable energy projects in autocracies benefits from the unilateral authority of the regimes' rulers, from the small number of veto players in the countries, and from lowered barriers to entry, which reduces cost and implementation speeds for projects. The result is a much more expedient process than a similar transition in democracies. Renewable energy projects in democratic states are frequently faced with lack of monetary funding, must gain the approval from individuals who may idealistically disagree with the projects, and are bogged down by slow approval processes and cost overruns. Through the three hypotheses assessed, autocracies are able to avoid many of these drawbacks. Once an autocrat decides that the state is to transition its energy sources to renewables, they are able to restructure accordingly to fall in line with the states' wishes.

VIII. Conclusion

Looking at how oil-reliant, autocratic regimes transition to renewable energy was no small task. Facing the threat of climate change, many regimes around the world have been faced with the question of how to transition to renewable energy. Oil-reliant, autocratic regimes are no different, despite the fact that we may logically expect them to ignore the issue. The movement away from oil poses an existential threat to these states, imperiling the oil-wealth which forms the foundations of their economies and government. Surprisingly, I found that these countries were well aware of the threats they faced and were doing far from nothing. Throughout this research, it became clear that oil-reliant, autocratic regimes actually have more tools at their disposal to implement renewable energy and did not hold back in doing so. These rentier-

autocracies, like Saudi Arabia and Qatar, have successfully utilized their regimes to control the economic investment, make unilateral decisions on projects, and reduce construction time and costs, all in order to help move their nations towards a more sustainable future.

It is important to note that my research largely analyzed individual initiatives taking place in each country to implement solar. Given that the transition to renewable energy is one occurring in nations concurrently to this research, there is very limited data that can actually be assessed. Saudi Arabia, Qatar, and Israel are still in the early stages of solar development, having only constructed a few solar projects, if that. As such, my research uses the existing information from individual initiatives to form a picture of how the full transition may continue to occur in these nations' pictures. Essentially, it provides a roadmap for the tools we may see autocratic regimes deploy, versus those in democracies, to transition to renewable energy.

Though the overall research has resulted in a clearer picture of how oil-reliant autocratic regimes transition, it is not without its limitations. It is worth noting that many of the news sources used to find out information about autocratic states must be taken with a grain of salt. Some of these entities are based in the autocratic countries themselves, where free speech is more restricted. As such, they may be more hesitant to be openly critical of any actions the government is taking. Furthermore, when it comes to the case studies, not all regime types are acknowledged and compared. Neither oil-rich democracies, such as Norway, nor non-oil-reliant autocracies, like North Korea, are represented in this research. Additionally, I do not account for the variations in democracy type that may contribute to issues of implementation, such as federalist systems versus parliamentary democracies. Each country and its governance structure likely has its own set of tools used to facilitate, or hinder, the growth of green energy. Further studies should include these other examples, so as to separate the various methods that are

unique to oil-rich autocracies. Moreover, future studies should do full case studies of all three nations, so they can definitively identify the differences between them at all levels, be it through permitting, approval, or the granting of governmental money. Additionally, the work does not address the feasibility of a given renewable energy source in each region. Rather, it just compares the steps already being taken to promote or inhibit the implementation of general renewable energy types.

Another interesting fact that emerges from this case is how oil wealth provides needed capital to carry out the construction of renewable energy projects. In both Saudi Arabia and Qatar, much of the funding for renewable energy projects was provided through state sovereign funds, which themselves obtain their money from the development and exploitation of oil. So, while there is definitely a transition occurring, it is still reliant in many ways on the exploitation of fossil fuels. On top of that, in Saudi Arabia specifically, the country is deploying solar and other renewable forms of energy to assist in their resource extraction. The nations may see the need for change domestically, but they are not letting it affect their profitability at the moment and are continuing with oil production. Further research should examine this relationship, as well as the close relationship between autocratic regimes and their investment funds and banking system.

Despite these limitations and further questions, the research does leave us with a picture of how differing regime types transition to renewable energy, which has significant importance and comes with certain policy implications. Once an autocratic regime acknowledges the need to transition, they have been able to do so very expeditiously. Oil-rich, autocratic regimes transition to renewable energy through the control that inherently comes with their regime type. These states, like Saudi Arabia and Qatar, forcefully direct the national economy, make unilateral

decisions on projects, and reduce construction time and costs - all of which are very difficult to do in democracies. As such, autocracies are able to adapt much more quickly to changes in the global energy market, including that of renewable energy. Democracies have a much harder time transitioning, or at least a much longer process in order to transition, meaning they must actively seek ways to speed up the process if they hope to move towards green energy early enough to combat climate change. That being said, most democracies still maintain a more diversified portfolio, something these oil-reliant, autocratic regimes lack. Even with their investments in renewable energy, nations like Saudi Arabia remain wholly dependent on oil for export. They must further diversify their portfolios if they wish to maintain their economies through the risks of climate change. Even now, they are susceptible to swings in the global oil market, with drops in oil prices imperiling the very funding they are relying on to implement renewable energy systems.

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