

Fall 2018

# Black Gold in a Changing World: An examination of Saudi Arabia's dependence on oil and the possibility of a solar energy transition

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## Recommended Citation

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Black Gold in a Changing World: An examination of Saudi Arabia's dependence on oil and the possibility of a solar energy transition

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Fall 2018



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## **Abstract**

This paper examines Saudi Arabia's dependence on oil, considering the profound effects that the resource has on the domestic, socioeconomic, and international affairs of the Kingdom. It is determined, after examining the economic and environmental factors that make it necessary, that Saudi Arabia must reduce its dependence on oil and diversify its economy, ideally by pursuing solar energy. This conclusion is reached by considering Saudi Arabia's domestic challenges, which include unemployment and rising domestic energy demand, as well as factors such as the price volatility of oil and changing global energy trends. A Saudi transition to solar power is determined to be both plausible and beneficial for the Kingdom, although not without its challenges. This paper also emphasizes the importance of the Kingdom to increase the role of the private sector and attract foreign investment, which is necessary for the diversification process. The current development plan, Vision 2030, is critically assessed as ambitious-looking but somewhat limited, and next steps are recommended for Saudi Arabia to take in order to lay a sound foundation for diversification. Finally, it is concluded that whether or not Saudi Arabia will actually go through with this process depends on the ability of oil to continue providing the Kingdom with power and money.

## **Acknowledgements**

I would like to thank Dr. Mattila and Dr. Csurgai for meeting with me, helping me think through the initial stages of this project, and giving me valuable pieces of advice regarding networking and research. I would also like to thank those that I interviewed or spoke to about this project, including Mr. Giacomo Luciani, Dr. Simone Tagliapietra, UN environment specialist Elena Antoni, and Mr. Cornel Gavata. I would also like to thank my advisor, Mr. Marc Finaud, for taking the time to meet with me despite his busy schedule. I would also like to thank my parents for having taught me to work hard and the other SIT students for their empathy and encouragement during this process. Finally, I would like to thank Gettysburg College for preparing me for a rigorous academic environment and for reminding me to always be Gettysburg Great.

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## **Introduction**

### **Focus of the Study**

For Saudi Arabia, oil has been both a blessing and a curse. The resource was a driving force for the economy and brought much wealth and welfare to the country, and yet its presence comes with economic and environmental risks. These risks may soon become a reality, making it important for the Kingdom to manage its dependence on oil before it leads to economic problems and devastating environmental effects in the region that would only serve to exacerbate the already precarious situation in the Middle East. As Luay Al-Khatteeb of the Brookings Institution warns, “low oil prices, widening fiscal deficits, rising populations, political turmoil, terrorism, religious intolerance and high youth unemployment conjure up a recipe for economic disaster” in a region once set on an apparently promising economic trajectory (2015). The world is changing, and Saudi Arabia’s dependence on oil, combined with domestic challenges and regional turmoil, seems more problematic than ever. Therefore, my research question is: what factors make it necessary for Saudi Arabia to reduce its dependence on oil, and what are the possibilities for the Kingdom to diversify its economy and energy sources using solar energy?

It is important to ask these questions because as a key player in the region, Saudi Arabia’s economic and political stability has a direct influence on the countries surrounding it; any domestic unrest or instability in Saudi Arabia could lead to spillover effects in the Gulf region, the Middle East, and the global oil market. Studying the Kingdom’s dependence on oil specifically is critical because the resource is closely tied to Saudi Arabia’s economic and political stability: the resource not only legitimizes the regime but also dominates the economy, funds the budget, and plays a substantial role in the stability of the Kingdom. However, the ability of oil to continue stabilizing Saudi Arabia is increasingly in question, and it seems less

and less pragmatic for the regime to continue holding onto the resource as its main source of revenue. Therefore, it is important to explore ways in which Saudi Arabia could potentially diversify its economy, as well as to understand the challenges with which these possibilities come.

### **Literature Review**

The existing literature on the diversification of Saudi Arabia and other Gulf countries goes back to at least 1987, when *The Rentier State*, edited by Dr. Hazem Beblawi and Giacomo Luciani, was published. This book was very important in setting up the theoretical framework that scholars would use to study oil-exporting countries for years to come. It was one of the first scholarly pieces to study the effect of a rent-based economy on the cultural, social, and political structures of a state, and it even discussed the challenges facing oil states that make it important for them to transform their economies (Beblawi & Luciani, 1987). Luciani's comparison of allocation and production states, which informs the theory behind rentier states, was also foundational, and he is now recognized as one of the foremost experts in the field of the economic development of resource-rich countries.

A number of other scholars have also been integral in informing this research, including Simone Tagliapietra, a Research Fellow at Bruegel, who has more recently published relevant work on the political economy of the Middle East and North Africa (MENA) region, decarbonization policies, and renewable energy. Also integral to this research was Sebastian Sons of the German Council on Foreign Relations, whose work on Saudi Arabia's socioeconomic and political challenges provided an immensely helpful base of information about Saudi Arabia's domestic challenges, its relationship with oil, and its need to diversify and overcome its dependence on oil (2018). Indeed, there is a great deal of literature agreeing that

diversification is important, but scholars reach this conclusion in different ways; some attribute the need for diversification to economic factors, while others believe that it has more to do with environmental or domestic factors. Therefore, this paper will bring to light these different views and consider the importance of each. Finally, although there have been studies on the importance of diversification and studies on renewable energy opportunities for the MENA region, the literature was mostly focused on either one or the other instead of analyzing them both in a future-oriented manner. This paper is an attempt to fill in these gaps and analyze not only *why* diversification in the Kingdom is important but also *how* it could be achieved and *if* this will actually happen, given the specific challenges that Saudi Arabia faces.

### **Research Methodology**

A variety of sources informed this research, including primary data in the form of three formal interviews and one informal interview. Of the formal interviews, one was with a Professor at the Graduate Institute of Geneva, another with a Research Fellow at the Brussels-based think tank Bruegel, and the third was with a Professor at the Geneva School of Diplomacy. The informal interview took place with a Green Economy and trade specialist at the UN Environment Program. Two of these interviews were organized over email, the third formal interview was organized face-to-face, and the informal interview took place spontaneously. All of the interviews were conducted ethically and respected the Human Subjects Review guidelines: formal interviewees were informed of their full privacy rights, including the right to refuse to answer any questions or parts of questions, request anonymity, and to make any other privacy requests that would make them feel more comfortable. None of these rights were requested by the interviewees, but all were aware of their ability to do so. These interviews were used as a

way to gather information on diversification, energy, and Saudi Arabia from different academic and professional perspectives, as well as to fill in the information gaps in the existing literature.

This research was also informed by a great deal of qualitative literature on the economic, political, and energy context of Saudi Arabia. The sources used ranged from peer-reviewed journal articles to books to op-eds to articles from think tanks. Some of these sources were reviewed simply for context, but the majority dealt specifically with renewable energy reform, sustainable development, the political economy of Saudi Arabia and the MENA region, and economic diversification. Many of these sources were found at the Graduate Institute of Geneva, as well as through online databases, and several included qualitative data and statistics about the energy use or economy in Saudi Arabia and other MENA countries. In the collecting of all data and information, ethical considerations were taken into account and the sources were chosen for their relevance and credibility.

### **Definitions and the Analytical Framework**

This paper will make use of several technical terms that are defined in this section. The first is **rentier state**, a term that refers to states that derive their national revenues from external sources and foreign companies that exploit their resources, such as oil (Sillitoe, 2014, p. 157). Terms associated with solar power will also be used, including **photovoltaic (PV)**, which refers to a device that generates electricity from sunlight via an electronic process that occurs naturally in semiconductors. In this process, the sun frees the electrons, allowing them to travel through a circuit and power anything from small electronics to large businesses (Solar Energy Industries Association, 2018). Another term that will be used is **concentrated solar power (CSP)**, which uses mirror configurations to “concentrate the sun’s light energy onto a receiver and convert it

into heat", which can then be used to "create steam to drive a turbine to produce electrical power" (SolarPACES, 2017).

The theoretical framework will consider from both an economic and an environmental perspective the importance of diversification away from oil, an analysis that will be informed by a knowledge of Saudi Arabia's relationship on oil and its identity as a rentier state. This will then be contextualized globally in an examination of changing global energy trends and possible effects on the Kingdom's ability to continue exporting oil. The framework then becomes more future-oriented and theoretical, considering the benefits and challenges that would come with a transition to solar energy. To round out the analysis, the importance of the private sector and foreign investment will be considered, as will Saudi Arabia's current efforts to diversify its economy. Finally, the analysis will conclude by considering next steps for the Kingdom to take towards diversification and the factors that would drive the Kingdom to actually do so.

## **Analysis**

### **The Role of Oil in Saudi Arabia**

In Saudi Arabia, oil is more than just a resource. It defines the system of governance, affects its foreign policy, and "is part and parcel of the social contract" (Jalivand & Westphal, 2018, p. 2). Oil played a fundamental role in the development of the Kingdom: oil exports and revenues were the driving force that created the middle class, allowed the kingdom to implement a national welfare system, and significantly improved the living condition of Saudis in the 2000s. It was oil that gave Saudi Arabia an economy strong enough to join the World Trade Organization (WTO) in 2005, oil that led the country to become the 19th largest world economy by 2014, oil that allowed public spending to quadruple in a decade, and oil that provided the capital to fund programs focused on improving "education, health, social welfare, infrastructure,

and transport” (Sons 2018, p. 126). Socioeconomic development remains “heavily reliant on high oil incomes and is therefore vulnerable to oil price fluctuations”; when prices are low, economic progress is difficult and the Saudi welfare system is directly affected (2018, p. 127).

The effect of the oil price on the budget and social programs is particularly important because Saudi Arabia is a rentier state. As a rentier state, the Kingdom receives a flow of income from oil rents paid by external sources, allowing it to fund an extensive national welfare system without taxing its citizens. This creates a paternalistic relationship between the state and the subjects: the citizens relies on the state as a caretaker and energy provider and the state retains a great deal of power (Sons, 2018, p. 127). Saudi Arabia is the strongest absolute monarchy in the world, and its rulers use the allocation of oil revenues to legitimize this power. However, holding this amount of power also means that the Saudi leadership must continue to “provide future prospects in terms of job opportunities, welfare, and security for its own population”; if it fails to do so, “both its legitimacy and domestic stability may be damaged” (2018, p. 126). Thus, as a rentier state, the Saudi government is able to hold a great deal of power, but this power is largely dependent on its ability to fund programs for the people, which is in turn dependent on a continued flow of oil rents.

Unfortunately for the Saudi leadership, oil revenues do not flow at a constant level. For example, after the Arab Spring uprisings in 2010 and 2011, there was “a dramatic decline in the oil price following a period of high and stable prices” (Jalivand & Westphal, 2018, p. 3). Additionally, in the past when prices fell to below \$30 per barrel, many governments, including Saudi Arabia, were running deficits and had to draw from their foreign reserves (2018, p. 6). Fluctuating oil prices have a direct impact on the Saudi budget, and low or declining oil prices have resulted in historically high budget deficits in Saudi Arabia. This was illustrated about five

years ago, when the budget went “from a 6.5 GDP surplus in 2013 to a -2.3 deficit in 2014” as a result of declining oil export revenues and a decline in foreign exchange assets and savings (Sons, 2018, p. 128). There is no doubt that oil plays a very important role in the Saudi economy; however, although oil was fundamental to Saudi Arabia’s economic development, it seems reductionist to define its effect on the economy as entirely benevolent.

In addition to its domestic effects, oil directly affects Saudi Arabia’s foreign policy and defines its relationship with the rest of the world (2018, p. 125). As Marc Finaud, Senior Program Advisor at the Geneva Centre for Security Policy explained, Saudi Arabia uses oil as a major tool of influence in its foreign policy (personal communication, November 22, 2018). For example, the United States has historically been in favor of a free flow of oil, which has had a significant impact on its relationship with oil-friendly regimes like Saudi Arabia. As Jalivand & Westphal explain, this attraction to resources has allowed several leaders and regimes in the MENA region “to sustain their rule in part thanks to Washington’s political, financial, and military support” (2018, p. 3). According to Finaud, Saudi Arabia never really needed financial support, but it does need security guarantees and military support, and it can use oil as a tool to guarantee these. He also added that there always has been a connection between oil and the arms market, as the availability of oil resources is closely connected to the potential to buy and reexport weapons as a means of influence. Finaud also mentioned that Saudi Arabia has the power to keep oil prices down or let them go up, which can be a very powerful tool for the Kingdom because many countries in the oil market are dependent on a high oil income (personal communication, November 22, 2018). Therefore, not only does oil have a strong domestic effect on Saudi Arabia, it also plays a role in defining the extent of its international influence.

### **The Economic Importance of Diversification**

The existing literature on Saudi Arabia overwhelmingly agrees that the Kingdom needs to reduce its dependence on oil and diversify its economy. The International Monetary Fund (IMF) perceives danger in an economic reliance on oil, arguing that hydrocarbon prices are “a key source of macroeconomic volatility” (2016, p. 15), making the Saudi economy vulnerable to developments in the global oil market. After all, oil revenues account for around “90 percent of central government fiscal revenues and 85 percent of export revenues and the oil sector comprises over 40 percent of overall GDP”, meaning that when oil prices fall, this can significantly affect the Kingdom’s budget and socioeconomic situation (Sons, 2018, p. 128). In addition, Saudi Arabia’s dependence on oil poses a problem because “natural resources, above all, oil resources, impose a limit on growth opportunities” (Aoun, 2009, p. 152). Limited economic growth is the opposite of what the Kingdom needs right now, as it faces domestic challenges of a growing population, growing domestic energy demand, and a high unemployment rate. As Dr. Aoun, director of the Center for Energy at the French Institute for International Relations, calculated, if Saudi Arabia is to support its growing population, half of which is under the age of 25, it needs a growth rate of 6 percent, not economic stagnation (2009, p. 154).

In tandem with its growing population, domestic energy demand in Saudi Arabia is also rising at an unsustainable rate (Nachet & Aoun, 2015, p. 6). This means that the Kingdom must use more and more of its oil to satisfy domestic demand rather than exporting it (Jalivand & Westphal, 2018, p. 5), resulting in reduced revenues and a national budget under pressure. In fact, some scholars believe that domestic energy demand could outpace production and that Saudi Arabia might eventually become a net importer of energy if consumption continues at the current rate, which could pose a serious problem for the Kingdom (Nachet & Aoun, 2015, p. 6).

To add to these challenges, Saudi Arabia is faced with a high unemployment rate due to its growing population and its employment of a large number of expatriates. The IMF believes that greater economic diversification could ameliorate these problems, asserting that diversification “would unlock job-creating growth, increase resilience to oil price volatility and improve prospects for future generations” by broadening the government revenue base and reducing its reliance on oil (IMF, 2016, p. 3).

It is clear that a continued reliance on oil would be problematic for the Kingdom; as Sons warns, “long-term administrative inefficiency, rapidly rising domestic energy consumption, and an oil-reliant mono-economy have resulted in chronic socioeconomic problems characterized by rising youth employment and social frustration” in Saudi Arabia (2018, p. 128). There is no doubt that the Kingdom needs a “sustainable and full-fledged economic diversification to overcome oil dependency by strengthening the non-oil sector, creating job opportunities, and modifying domestic energy consumption” (Sons, 2018, p. 136). The IMF states that in addition to insulating the country from volatile prices, diversification would “create high-value-added private sector jobs for nationals” and establish a non-oil source of revenue that will be needed in the future. Indeed, as Anthony Cordesman of the Center for International and Strategic Studies asserts, “the time when SA could rely on oil wealth alone is over, and its current over-dependence on the petroleum sector is creating growing economic, political, and military risks” (2003, p. 218). The existing literature overwhelmingly agrees that for economic, environmental, global, and domestic reasons, Saudi Arabia must reduce its reliance on oil or face serious challenges in the future.

### **The Environmental Importance of Diversification**

Saudi Arabia's dependence on oil does not only affect the present, however; it also defines the possibilities of its future. After all, given that the wealth of a oil-based rentier state relies on a finite resource, rentier states are by nature a passing phenomenon. In 1987, Giacomo Luciani put forth two possibilities for the future of rentier states: In one scenario, "rentier states might structurally pursue a process of diversification of their domestic economic bases and gradually turn into production states", while in the other, "rentier states might continue unchanged until the last drop of oil is exported, and then simply fold up" (Tagliapietra, 2017, p. 11). In other words, a rentier state will eventually either shift away from a reliance on external rents to sustain its economy, or it will keep exporting oil as long as it possibly can. Either way, the rentier state will eventually end, whether it is by voluntary transition or collapse. According Simone Tagliapietra, this second scenario might be approaching more quickly than Luciani had anticipated. This is not because of the physical depletion of oil—as of 2008, Saudi Arabia held 264.3 billion barrels in reserves (Aoun 2009, p. 146)—but rather due to a global reorientation away from fossil fuels that could weaken demand for oil (Tagliapietra, 2017, p. 12).

Because of international decarbonization policies and technological advancements, Tagliapietra suggests that oil reserves might be stranded before they even run out (2017, p. 11), giving a country like Saudi Arabia even more of an incentive to diversify its economy as soon as possible. Indeed, the world is changing, and as countries are increasingly realizing the imminent dangers caused by global warming, some are willing to commit to decarbonization initiatives, such as the European Union, which Tagliapietra explained has committed to full decarbonization by 2050 (personal communication, October 1, 2018). If these agreements and initiatives become ambitious and are taken seriously, this could have a large effect on demand for fossil fuels. If at this time Saudi Arabia's economy remains dependent on oil revenues, such a decline in demand

could seriously harm its economy. Although the Kingdom 63 years to go before its oil reserves are physically depleted, by Bruegel's estimate, Tagliapietra suggests that demand for oil could become uncertain before this day arrives (2017, p. 12).

This conclusion is based on the implementation of international agreements such as the Paris Agreement, signed by 175 parties, which has the goal of keeping the global temperature "well below 2 degrees Celsius above pre-industrial levels" (United Nations Framework Convention on Climate Change, 2018). If the agreement is successful, a third of global oil reserves should remain unused from 2010 to 2050 in order to reach the agreement's temperature target, meaning that Middle Eastern oil exporters would only be able to exploit about 60% of their reserves (Tagliapietra, 2017, p. 13). Furthermore, this would cause global oil demand will sharply fall after 2020. Middle Eastern oil exports could remain stable until 2040, but after that time oil revenues would decline (2017, p. 14). Jalivand & Westphal agree that adherence to the Paris Agreement requires a "fundamental global energy system transformation" and that the 2 degree global warming target will have a substantial effect on energy systems, which make up two-thirds of global greenhouse emissions (2018, p. 3). Furthermore, Sons predicts that as the global energy transition gains more momentum, Saudi Arabia's role as a significant fossil fuel exporter could dwindle, making the need to reduce its dependence on oil "more urgent than ever before" (2018, p. 132). Of course, it may be too optimistic to assume that the world will actually achieve its emission targets, but it seems dangerous for Saudi Arabia to make this gamble if it seeks to ensure its economic stability in the future.

Furthermore, Saudi Arabia is by no means exempt from the effects of global warming and is in fact "highly vulnerable to the adverse effects of global warming thanks to its arid and dry climate." When this vulnerability is combined with the fact that Saudi Arabia contributes

substantially to CO<sub>2</sub> emissions, climate change becomes a double-edged sword for the Kingdom (Sons, 2018, p. 135). Energy efficiency levels in the MENA region are among the lowest worldwide, and a MENA resident emits more than twice the amount of CO<sub>2</sub> than does the average world citizen (Jalivand & Westphal, 2018, p. 4). In short, “MENA countries contribute substantially to climate change” (p. 5), and this could have devastating effects on the region; if climate change continues to worsen, the region could eventually become uninhabitable, leading to mass migration (p. 7). Furthermore, rising temperatures will lead to increased energy consumption, which will serve to exacerbate the problem, making it even more urgent for Saudi Arabia to pursue a diversified energy portfolio (Hamedi, 2014, p. 107).

### **Solar Power: Opportunities and Challenges**

There is little doubt that Saudi Arabia needs to diversify both its economy and energy sources in order to safeguard itself from economic and environmental disaster. Such a diversification strategy ought to be able to withstand changing global energy trends and the depletion of oil reserves; as Cornel Gavata of the Geneva School of Diplomacy explained, although Saudi Arabia might not be able to change the fact that it is dependent on energy exports, it can still begin exporting non-oil derived energy (personal communication, November 16, 2018). A diversification plan based on renewable energy certainly seems to be the ideal scenario for Saudi Arabia, as it would help prevent both the environmental and energy crises that are currently looming over the Kingdom (El-Saddik 2015, p. 26). Given the country’s location and resources, it seems that there is considerable potential for diversification based on solar energy.

For countries that have sufficient amounts of sun, such as those in the GCC (Gulf Cooperation Council), solar power can serve as a “non-diminishing alternative to fossil fuel for

generating electrical power” (Abdulla, 2015, p. 193). Kassem El-Saddik, PhD candidate at the School of Public Policy and Administration at Carleton University, agrees that solar resources are abundant and should be taken advantage of (2015, p. 26). Not only does the Kingdom has enough sun, he adds that it likely has enough wealth and could feasibly “invest in alternative energy technology and harvest the infinite solar energy that is available all year long in the region” (2015, p. 28). Dr. Mayami Abdulla of the Cavendish Laboratory in Cambridge agrees that the amount of solar radiation that the GCC region receives is unrivaled, and that the options for solar panels, such as PVs, are safe, freely available, only require a small cost for maintenance, and have a life expectancy of 20-30 years (2015, p. 198). Finally, as Gavata pointed out, the majority of region is desert and much of it is uninhabited, meaning that large areas could be used for solar panels without displacing very many people (personal communication, November 16, 2018).

Furthermore, as Abdulla points out, a transition to solar energy would help meet rising domestic demand while also addressing the social, economic, and environmental pillars of sustainability (2015, p. 193). Currently, the Kingdom is being forced to use its oil to satisfy domestic demand, but if it began to use solar power to satisfy domestic consumption, this would free up the amount of oil available for export, providing the Kingdom with more revenue (2015, 196). There seems to be a general agreement that it would be better for Saudi Arabia to use its oil for exporting rather than for satisfying its increasing domestic demand, and harnessing solar power would help the Kingdom achieve this. As Abdulla adds, a more diversified energy portfolio has the additional benefit of reinforcing the economy and helping it sustain its economic leadership in the world “by reducing the high cost of fuel subsidies” (2015, p. 197). Not only this, Panzer and Auer feel confident that “even the strong electricity demand growth

rate does not represent a significant challenge for CSP plants to meet future domestic electricity demand” (2014, p. 226). Additionally, because solar radiation is so strong in Saudi Arabia, they believe that CSP power generation has even been cost competitive since 2011 (2014, p. 231).

Furthermore, a transition away from oil and towards solar power could help provide jobs for the large number of unemployed Saudis. As Tagliapietra explains, “The development of large-scale renewable energy projects in the MENA region could generate thousands of new jobs”, making a transition to solar potentially very beneficial for the Kingdom (2012, p. 53). Indeed, the International Renewable Energy Agency, headquartered in Abu Dhabi, has indicated that “all available studies show that renewable energy is associated with significant gross job creation” (2012, p. 53). However, as Luciani explained, if these benefits are to be realized, the government must stop employing large numbers of expatriates as a source of cheap labor, which takes jobs away from the Saudis who refuse to work at such a low wage (personal communication, November 5, 2018). Therefore, while a focus on solar energy would help create jobs, it is also important for the government to rethink its labor strategy if it really wants to see the unemployment rate go down, specifically by “increasing productivity, wages, reducing the number of expatriates and increasing the capital intensity in the economy” (personal communication, November 5, 2018).

Although the benefits of a transition to solar are notable, is it actually feasible for the Kingdom to make this kind of transition? Some scholars like Panzer and Auer say yes, arguing that “renewable solar power production is an economically and technically feasible remedy” and that using CSP plants for power generation may even be attainable today (2014, p. 232). Despite this confidence, it is important to recognize that a transition to solar energy would not be without its challenges. The Kingdom would have to consider the logistical complications of harnessing

solar power, the restrictions of its current economic situation, and the barriers to implementation inherent in the Saudi system of governance.

For instance, as Luciani cautioned, the desert is dusty, and solar panels are vulnerable to the sand that frequently gets lifted into the air. They also need to be constantly, carefully cleaned, otherwise they can get scratched; this is especially important when one makes use of concentrated solar power panels, whose mirrors are especially vulnerable. For example, humidity can pose a problem because it deposits on the mirrors and affects the ability of the solar panels to function well. Furthermore, Luciani explained that the sun does not shine so much during the summer in Saudi Arabia, and that there is in fact usually a light cover of very high clouds; not only this, Luciani noted that photovoltaic solar panels work best at lower temperatures and might not work very efficiently if used in a region that warms up to 50 or 60 degrees Celsius (personal communication, November 5, 2018).

Additionally, scholars disagree on whether or not Saudi Arabia has the financial capacity to heavily invest in solar panels. According to UN trade and green economy specialist Elena Antoni, Saudi Arabia does have the money to invest quickly in new projects, but the problem is that any action requires a state decision, which might prove difficult to obtain (personal communication, October 18, 2018). Tagliapietra echoed the fact that Saudi Arabia has “plenty of money” to invest in research and development for solar energy solutions, and added that the Kingdom could additionally make use of “sovereign wealth funds, public money they earn through oil export, to invest in new technology” (personal communication, October 1, 2018). Additionally, the costs for solar photovoltaics have come down significantly in recent years, making a transition to solar energy even more financially possible (Jalivand & Westphal, 2018, p. 3).

Although some are confident about the Kingdom's ability to finance a solar energy transition, Gavata believes that Saudi Arabia does not have sufficient financial resources to make such a transition happen. He argued that if the main energy consumers like the European Union, China, Japan, South Korea, and India do not contribute and share resources, such a transition cannot be achieved at all. Gavata added that for solar energy to become more cost competitive, it must be mass produced, which would require international cooperation; only then, he says, will a large number of countries begin exploiting solar energy. In his view, the world can only make an energy switch if existing large consumers cooperate in mutually beneficial, global ways (personal communication, November 16, 2018).

Before global cooperation can be conceived of, however, the Kingdom must first commit to a solar energy transition. At the moment, the Kingdom lacks a coherent, integrated, and comprehensive plan for the exploitation of solar energy (Bryde & Mouzughy, 2015, p. 12). This is not to say that the Kingdom has been completely uninterested in harnessing solar energy; on the contrary, it has planned to install 41 gigawatts of solar energy by 2032 (El-Saddik, 2015, p. 26) and had already installed 23.2 MW of solar energy by the end of 2015 (Damoom et al., 2018, p. 26). However, El-Saddik has criticized the Kingdom for failing to put in place "any new regulations to influence energy consumption behavior" and promote small scale renewable schemes (2015, p. 26). Additionally, Saudi Arabia has not put in place policy or legislation supporting extensive deployment of renewable energy (Abdulla 2015, p. 200), indicating that although the Kingdom has some plans in place to install solar energy, it remains either disinterested in or uncommitted to a serious energy diversification process. As Luciani concluded, the actual implementation of a diversification plan or an uptake of alternative energy sources is lagging (2014, p. 8).

## **The Private Sector and Foreign Investment**

Part of the reason that Saudi Arabia has not committed to an ambitious diversification plan is because it has not fully realized the importance of the private sector and foreign investment. In order for the Kingdom to secure its future economic, environmental, and domestic well-being, it must diversify its economy, and for that, it needs the private sector. As Son explains, “the private sector needs more support to transform Saudi Arabia into a non-fossil fuel, industrial-based economy that attracts foreign investors” (2018, p. 136). Luciani adds that if a country is to diversify its energy sources and pursue greater energy efficiency, this will “inevitably entail much greater involvement of the private sector” (2014, p. 17). Furthermore, although GCC countries have been doing well with a state-led model, challenges lie ahead, including employment for nationals, sustaining a high economic growth rate, and funding development projects. The private sector “can significantly contribute to meeting and addressing these challenges” by helping to reduce the reliance on oil revenues (Bryde & Mouzoughi, 2015, p. 7). Cordesman agrees that “if Saudi Arabia is to cope with its political, demographic, and social challenges”, it needs a diversified economy that depends on the private sector for success (2003, p. 218). He argues that it is “absolutely critical” for Saudi Arabia to expand its private sector in order to ensure its welfare as a nation and its future stability (2003, p. 388). Not only do scholars agree that privatization would benefit the Kingdom, Callen et al. of the IMF warn that unless more nationals are employed in the private sector, unemployment will likely rise (2014, p. 9).

Unfortunately, the precarious relationship between the public and private sector in Saudi Arabia makes a private sector expansion rather unlikely. Luciani explained that because the Saudi government feels that it should always be in control, it restricts the private sector to doing what it tells it to do. Naturally, the private sector does not appreciate this. “It’s not an easy

interface to navigate.” Luciani admitted. At the moment, he sees little sign that the government is ready to genuinely widen the scope for the private sector. However, he acknowledges that this could change, as the pendulum has swung in favor of the private sector in the past. He concluded that whether or not this will occur has to do with the power structure at the top (personal communication, November 5, 2018). It is also worth noting that the rentier model of governance naturally inhibits private sector growth and innovation, revealing another hurdle over which the Kingdom may have to pass (Bryde & Mouzughy, 2015, p. 5). All in all, it does not seem likely that the Kingdom will relinquish much power to the private sector any time soon, ensuring that its attempts to diversify the economy will be missing a key piece and therefore less effective.

Additionally, Saudi Arabia cannot ignore the importance of foreign investment in the diversification process. The Kingdom will have to work to improve the current business environment, as investors are put off by the “geopolitical nightmare posed by ISIS”. This caused foreign direct investment in Saudi Arabia to fall from \$39.5 billion in 2008 to just \$8 billion in 2014 (Al-Khatteeb, 2015). Not only this, Saudi Arabia is tainted by corruption, which is common for rent-seeking states given that “a significant part of hydrocarbon rents is diverted from official flows and often goes directly to individuals or groups in power positions” (Aoun, 2009, p. 157). In an opacity index conducted by the Kurtzman group analyzing the “the cost to businesses of a lack of transparency in a country’s legal, economic, regulatory and governance structures”, Saudi Arabia scored 46/100, meaning that doing business in Saudi Arabia requires a return of 5.52 percent above the US rate of return in order to offset the risk (Aoun, 2009, p. 158). These risks comprise anything from fraudulent transactions to bribery to regulatory complexity to unforeseeable contracts (p. 158)—anything that might impact business and deter investment.

Although Callen et al. consider the business climate in the GCC relatively favorable, they acknowledge that challenges remain, including “restrictive labor regulations, an inadequately educated workforce, inefficient government bureaucracy, and, to some extent, lack of access to finance as key factors inhibiting private sector activity” (2014, p. 21). Al-Khatteeb adds that investors are put off by overly bureaucratic laws that often impose restrictions on ownership and employment, restrictions that “seemingly discourage diversification and the growth of the private sector” in many countries (2015). Because a strong private sector is necessary for diversification, Saudi Arabia should seriously consider changing some of these laws. More generally, the Kingdom “must move to diversify its economy, strengthen its private sector, and encourage foreign and domestic investment as aggressively as possible” (Cordesman, 2003, p. 218).

### **Current Diversification Efforts**

Saudi Arabia has indeed begun taking steps in the direction of decreasing its dependence on oil, increasing foreign investment, and increasing the role of the private sector. These priorities are reflected in its development plan, Vision 2030, which boasts the goal of “a full-fledged diversification of the Saudi economy away from oil dependency”. The Kingdom claims that ‘within 20 years, we will be an economy or state that doesn’t depend mainly on oil’ and that by 2030 the share of oil and gas in overall GDP should decrease from 47% to 11% (Sons, 2018, p. 132). According to Bruegel, the plan also looks to increase foreign direct investment from 3.8 percent to 5.7 percent by 2030, to increase the private sector’s contribution from 40 percent to 65 percent of GDP by 2030, to raise the share of non-oil exports in non-oil GDP from 16 percent to 50 percent by 2030, and to increase non-oil government revenue from SAR 163 billion to SAR 1 trillion by 2030 (Tagliapietra, 2017, p. 17). The plan also intends to shuffle personnel in the energy administration, privatize the oil company Saudi Aramco, and increase energy efficiency

(Sons, 2018, p. 133). Furthermore, it looks to cut energy subsidies, which the Kingdom hopes will decrease domestic energy consumption, as well as to increase its renewable energy to 9.5 GW by 2030, diversify the petrochemical industry, and become a reliable partner in the United Nations Framework Convention on Climate Change (UNFCCC) (2018, p. 134).

Despite its impressive appearance, many scholars are critical of Vision 2030. Sons is skeptical of the Kingdom's ability to actually achieve its goal of increasing renewable energy, and he has noted that the plan fails to support or subsidize energy-efficient industrial and residential behaviors or seek to change the mentality of energy consumers (2018, p. 133). While the Vision appears to be an ambitious strategy, Sons explains that "it is (thus far) lacking in details and can at present be characterized as old wine in new bottles rather than as a new and innovative reform agenda" (2018, p. 135). Luciani agrees that the plan is not exactly groundbreaking. "I've personally been skeptical of Vision 2030 from the start," he says, "and you know, I think so far, skepticism has proven to be well justified." Furthermore, Sons doubts that Saudi Arabia will be able to institute any substantial renewable energy reform, given that the Kingdom's potential progress in this field is "limited by a lack of know-how and expertise, technological difficulties, and the mentality of energy users accustomed to subsidized fossil resources rather than alternative energy" (2018, p. 34).

Although the goals of Vision 2030 indicate that the Kingdom understands the importance of diversification, it remains to be seen whether or not Saudi Arabia will stay on track with all of its goals. In truth, it does not seem like Saudi Arabia is ready to commit to diversification or an energy transition. Even though the Kingdom has put forth a diversification plan and participated in relevant UN events, Sons believes that these are likely just attempts to be accepted as a responsible and reliable part of the multilateral community; he doubts that these actions really

represent a commitment to the implementation of sustainable climate policy (2018, p. 135).

Tagliapietra adds that economic diversification plans “have been a part of MENA oil exporters’ rhetoric for a long time” (2017, p. 16); these plans are usually put in place when oil prices are low and quickly abandoned when prices recover (personal communication, October 1, 2018). Because of this, Tagliapietra recommends that oil-exporting countries adopt a structural path towards diversification, pursued without deviation “in order to ensure both political stability and socio-economic prosperity” (2017, p. 18). Unfortunately, it does not seem that Saudi Arabia has adopted this kind of focus; as Antoni explained, the Kingdom even skirts away from conversations about trade and the environment in WTO forums (personal communication, October 18, 2018). This hardly seems like the attitude of a country that is ready to make a substantial commitment to economic and energy source diversification.

Saudi Arabia’s unwillingness to reduce its reliance on oil, despite the obvious benefits of a transition to solar energy, might be attributable to its identity as a rentier state. As earlier mentioned, the Kingdom derives its power from redistributing oil rents to the population in the form of social programs; it is an unspoken agreement that citizens receive rent in return for loyalty and little or no taxation (Mishrif, 2018, p. 3). In this way, it is the exact opposite of a democracy, which exalts the principle “no taxation without representation”—a rentier state mirrors this principle with its own, “no representation without taxation”. Because of this, citizens do not demand political participation or representation, and the rulers can continue to hold a great deal of power without legitimizing it through democratic representation (Tagliapietra, 2017, p. 10). Given that its power is largely dependent on its ability to continue distributing oil rents, it makes sense that the Kingdom would not be overly eager to make a serious transition away from the oil market.

Even if the Kingdom were to overcome this power-based unwillingness to take on solar energy initiatives, the structure of the Saudi government makes it difficult for the Kingdom to actually implement any such initiatives. Luciani explains that although he considers the Saudi government committed to investing in clean energy, it runs into a problem when decisions have to be made; not only is the decision-making power concentrated at the top, the attention of the top is difficult to get, making the government not well-suited to decision-making. A solar energy transformation would, of course, require numerous decisions to be made, and the power structure of the government would make this a cumbersome process. Therefore, the Kingdom's continued dependence on oil for revenue and energy, despite the economic and environmental risks this poses, can be attributed to a power-and-logistics-based unwillingness to commence a diversification process based on solar energy.

### **Next Steps**

Although the Kingdom's current diversification plans leave something to be desired, it is still possible that the Kingdom will more fully realize the importance of reducing its dependence on oil. If this happens and Saudi Arabia becomes ready to transform its economy, there are several things that must be done in order for it to succeed. As the IMF states, economic diversification requires "sound fiscal policy and framework, effective liquidity management and prudent monetary policy, supportive financial sector policies and a fairly valued exchange rate" (2016, p. 3). Additionally, in order to unlock the potential of the private sector, the Kingdom must put in place strong regulatory and institutional frameworks and improve the business environment (2016, p. 3). In order to achieve the latter, the Kingdom could focus on political reform and increasing accountability as a way of making a more "predictable and business-friendly environment for investors" (Sons, 2018, p. 136). Other important steps in improving the

business climate include “streamlining procedures, strengthening economic governance and transparency, and reducing regulatory barriers to competition”. These are foundations that must be laid before the private sector can become a driver of the diversification process (IMF, 2016, p. 3-4).

Additionally, as Al-Balushi explains, for domestic and foreign investment to grow, the Kingdom must seek structural policy reforms; this will also allow areas of comparative advantage to naturally develop (2015, p. 91). As the IMF recommends, oil-exporting countries should focus on reorienting public spending and implementing labor reforms “to incentivize private sector employment of nationals and improvements in productivity” (Callen et al., 2014, p. 4). This is important because as Tagliapietra explained, a low level of labor productivity is “one of the major barriers for economic diversification in MENA oil exporters”, given that it “prevents the development of an internationally-competitive private sector” (2017, p. 6). It is also important for the Kingdom to encourage firms to develop export markets, as this will contribute to export diversification, as well as to help workers acquire the skills and education that will make them more productive (Callen et al., 2014, p. 4). Finally, Finaud pointed out that an energy transition requires a scientific and industrial base, which Saudi Arabia currently does not have, so it should also focus on research, development, and education (personal communication, November 22, 2018). The Kingdom has a lot of work ahead of it, but if it puts in a substantial amount of effort, it can lay down the foundations for economic diversification.

### **The Future of Saudi Arabia**

What, then, is the future of Saudi Arabia, an oil-dependent rentier state with an ambitious-looking development plan and a seeming lack of motivation towards actual implementation? Although the economic and environmental risks of a continued dependence on

oil are clear, will Saudi Arabia actually achieve a transformation? The answer depends on what factors truly motivate the Kingdom, and those factors seem to be power and money. Therefore, it seems that Saudi Arabia will continue exporting oil until the triangle between oil, power, and money is broken. It appears that an evaporation of global oil demand could drive a Saudi decision to reduce its dependence on oil, given that this would cause the “money” side of the triangle to be broken. As Cordesman explains, Saudi Arabia will continue exporting oil as long as the world remains dependent on it for much of its energy (2003, p. 383), given that an oil-dependent world means economic prosperity for the Kingdom. As Gavata pointed out, the Kingdom is a business, and as long as global prices and demand remain high enough, it will continue exporting oil (personal communication, November 16, 2018).

Although it seems likely that falling global oil demand will drive Saudi Arabia to diversification, it does not appear that this process will come about because of global decarbonization, at least not in its current form. Although decarbonization theoretically represents an incentive for Saudi Arabia decrease its dependence on oil and switch to solar energy, the current global initiatives remain limited by self-interested countries that are unwilling to commit to more ambitious initiatives. Luciani also believes that current efforts are not determined enough to affect demand anytime soon. “It’s difficult to envisage in the current political environment,” he agrees (personal communication, November 5, 2018).

However, it seems plausible that demand for fossil fuels, specifically oil, would begin to fall should solar and other clean energy sources become less expensive. Luciani believes that Saudi Arabia will continue producing oil as long as it is in demand in the world, but that if the world develops alternative energy sources that are “truly competitive with oil”, the price of oil may decline, giving Saudi Arabia more of an incentive to diversify its energy sources and

economy. Ultimately, however, Luciani acknowledges the conveniences of oil and believes that new alternatives are not likely to very well compete with fossil fuels (personal communication, November 5, 2018). At some point, however, it seems likely that prices for solar and other renewable technologies will become economically competitive with oil, but as Cordesman stated, a “massive shift in energy technology” will have to occur before this can happen.

Also possible is that the “power” segment of the oil-money-power triangle will break, perhaps due to a worsening of domestic problems in Saudi Arabia. As earlier discussed, it is the objective of a rentier state to keep hold of its power, but this power could start slipping from the Kingdom if unemployment continues to worsen and domestic energy demand continues to strain the budget. Additionally, as Finaud explains, ever since the Arab Spring, the people have wanted more freedom and more rights, and this is partially why the Kingdom put in place reforms—not for the benefits of development, but to placate the people. The regime is very vulnerable, and its choices are driven by its desire to survive (personal communication, November 22, 2018). Therefore, if at some point the Kingdom realizes that oil is no longer an effective way to do this, it might be more inclined to more fully diversify its economy and invest in solar power.

## **Conclusion**

This study has examined the role of oil in Saudi Arabia, noting its importance in the Kingdom’s socioeconomic development, domestic programs, economic well-being, and international influence. It has been made clear that oil is a source of power for the Kingdom, as it legitimizes the regime’s distinctly non-democratic authority over its citizens. The economic importance of diversification was explained on the basis of oil’s price volatility and effect on the Saudi budget and social programs, which is again tied to the regime’s power. It was also explained that Saudi Arabia’s domestic challenges, including growing energy demand,

population, and unemployment cannot be solved by oil, and instead require investment in the private sector and solar energy. Changing global energy trends and global warming may also require Saudi Arabia to export less oil, making a transition to solar energy still more beneficial. This transition is certainly possible and could provide a significant amount of benefits for the Kingdom, should it be willing to work through some potential challenges. Finally, Saudi Arabia must realize the importance of increasing the role of the private sector and attracting foreign investment, and it should begin to take the necessary steps toward these goals. Although Vision 2030 does not seem like a plan that will transform Saudi Arabia, the Kingdom can still change its mindset and start on a path towards diversification and solar energy.

It is important to point out that this study does not include an analysis of nuclear energy, another renewable energy option that the Kingdom has been exploring. Future research on this topic should include this aspect of the diversification problem in order to present a more comprehensive analysis of the situation. Furthermore, recent political events could be taken into account in the discussion of the Kingdom's power, specifically the Khashoggi murder, which has had a significant effect on the Kingdom's international and domestic image. It remains to be seen what effect this will have on the oil-power-money triangle, but it may very well have an impact on the Kingdom's ability to retain power, a question that could be studied by future scholars in the context of oil dependence and foreign relations.

Even if Saudi Arabia does not begin to seriously diversify its economy or embrace solar energy, the Kingdom will be forced to stop relying on oil eventually. Whether this comes about voluntarily, because of evaporating demand, or because the oil simply runs out, serious economic changes will eventually have to be made in the Kingdom. It would be advisable for Saudi Arabia to be prepared for this day, even if it seems far off, in order to avoid an economic catastrophe

that could lead to domestic unrest and spillover effects in the Gulf region and Middle East. This is a transition that will take a substantial amount of time, so the Kingdom should begin the process as soon as possible in order to avoid this potential economic, domestic, and environmental crisis. Will the Kingdom realize these risks and make a voluntary transition away from its dependence on oil, or will it face the end of a stubborn rentier state that simply withers away when its oil reserves dry up? What will come to pass cannot yet be seen, but it appears that the Kingdom will make its choices on the basis of power and money. Although the future is unclear, Saudi Arabia has the power to determine its fate. Now is the time for action.

### **Abbreviation list**

CSP = concentrated solar power

EIA = Energy Information Administration

EU = European Union

GCC = Gulf Cooperation Council

IEA = International Energy Agency

IMF = International Monetary Fund

ISIS = The Islamic State of Iraq and Syria

MENA = Middle East and North Africa

PV = photovoltaic

UN = United Nations

UNFCCC = United Nations Framework Convention on Climate Change

WTO = World Trade Organization

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**ISP Work Journal**  
**Chronology of ISP Research**

Monday, October 1

While in Brussels, I prepared a few questions and visited the think tank Bruegel. There I asked for Dr. Simone Tagliapietra, who I had previously emailed. He agreed to see me, and I recorded our interview, the transcription of which can be found in the “Interview Transcripts” section of this journal.

October 5

While in Paris, I scheduled an interview with Emilie Magdalinski, a research fellow and expert on European energy policy at the Jacques Delors Institute. However, this interview was more for background knowledge about the energy choices of the EU than about Saudi Arabia, and I did not directly use it for my paper, so I have not included the transcript for it. It did help to inform me about European energy trends, but again, it was not directly applicable to my ISP, since my focus shifted more towards Saudi Arabia as I continued my research.

Tue. Oct 17

I worked on centering my topic and figuring out what I really wanted to focus on. After several false starts, I was able to carve out a better research question. I also searched for a greater literature and for people to contact, and I found several potential interviewees at the Graduate Institute of Geneva. I also submitted my ISP final proposal.

#### Thurs. Oct 18

We went to the “Environment House” of the UNEP and heard Elena Antoni speak about the green economy and trade. Afterward, given the relevance of her lecture to my topic, I asked Ms. Antoni some questions about my ISP topic. This spontaneous brainstorming process helped guide some of my thinking about my research topic; this informal interview was thought-provoking and helpful, as I was in the beginning stages of the research process. Ms. Antoni also indicated her interest in my research and gave me her email so that I could email her my ISP once it was finished.

#### Mon. Oct 29

I went to the SIT library and looked through almost all of the old ISPs in the sections for development, energy, and economics in search of a topic similar to mine. I came across one that was on a topic relevant to development and oil, so I flipped through it for some ideas. After I was finished consulting the SIT library, I continued the brainstorming process and continued searching for sources online.

#### Tue. Oct 30

I went to the library in Geneva and sent out several emails. I emailed interview requests to Dr. Joelle Noailly and Mr. Giacomo Luciani from the Graduate Institute. I also emailed Marc Finaud asking him to be my advisor, and he replied back affirmatively. I then read over the rubric for the ISP so as to better understand which qualities I should strive to embody in my paper. I also familiarized myself with the format of the ISP and continued to develop my topic.

#### Fri. Nov 2

I went to the library of the Graduate Institute of Geneva to look for additional sources. I found a number of helpful books, eight to be specific, and spent the following six and a half hours going through and taking notes on each of them. I made great strides in my examination of existing literature, and wrote down relevant quotes and ideas that the various authors put forward. I absorbed much information and left feeling much more informed on my topic. This was probably the most helpful and productive day of the entire ISP session; I covered a lot of ground, found and read through my most important sources, and finally pinpointed what aspects of the problem I wanted to focus on in my project.

#### Mon. Nov 5

In the morning, I had an interview with Giacomo Luciani, one of the foremost experts in the field of the economic development of resource-rich MENA countries and energy. We spoke for half an hour, and he provided me with some very helpful information. The transcript of the interview can be found in the “Interview Transcripts” section. Following this interview, I went to the SIT office to speak with Dr. Csurgai about my paper and the research and networking process. Then, in the afternoon, I had an advisor meeting with Mr. Finaud. We spoke about the basics of my paper and some possible routes I could take. I do not have a record of the questions I asked him,

as they were more general and spontaneous, but a description of this meeting can be found in the “Advisor Meetings” section.

#### Tue. Nov 6

At the library of Geneva, I went through all of my sources and cited each one. This was to both to mentally account for all of my sources, as well as to ensure that I did not have to complete the citations at the last minute. I continued to take notes on these sources and began to consider my outline for the ISP.

#### Thur. Nov 8

I completed my mid-ISP documents, including my title, outline, sources, and networking strategies. I also found two more potential interviewees and tried to find their contact information. Since I could not find their information, I emailed the general information email address. I then emailed Dr. Csurgai asking him if he had any knowledge of how to contact professors at the Geneva School of Diplomacy, and he recommended someone to call.

#### Mon. Nov 12

I was able to call the Geneva School of Diplomacy, and after some miscommunication, they gave me an email address that could get me in contact with the professors. I sent an email and awaited a response.

#### Tue. Nov 13

In the morning I went to my mid-ISP meeting. I spoke with Dr. Mattila about the content of my paper, networking, and some other strategies. In the afternoon, since I had not gotten an email back from the School of Diplomacy, I took the bus there and talked to the office worker. He informed me that they had sent Mr. Gavata an email asking for permission to share his contact information, and that they would get back to me by tomorrow, latest. He added that he would be extra diligent about this since I had taken the time to come to the office. I then went to the UN library to work on my paper and ended up color coding all of my notes since there were so many of them that it was overwhelming. I gave a different color to the information and quotes dependent on what part of the paper I would use them in. This was extremely helpful to the organization of my notes, my thoughts, and would prove very helpful as I began the writing process.

#### Wed. Nov 14

I began the writing process by typing out my general thoughts and ideas, and I followed my outline as best as I could. I typed approximately four pages out and contemplated the format that I would take for the rest of the paper.

#### Thur. Nov 15

I went to the library in Geneva and continued drafting out my paper, writing six more pages. I reached a bit of a dead end and went back to revise and rethink what I had written. I spent several hours in this process, trying to get my bearings in the paper.

#### Fri. Nov 16

I went to the UN library briefly to work on my paper, continuing to revise what I had previously written. I then went to Chateau de Penthes for an interview with Mr. Cornel Gavata. Our meeting lasted a total of three hours, 30 minutes of which I recorded. This half-hour segment contained my prepared questions, while the other 2.5 hours was spent talking more freely about issues related to my ISP. A summary of the half-hour can be found in the “Interview Transcripts” section.

Mon. Nov 19

I went to the SIT office to do some work on my paper, after which I went to the UN library and spent the afternoon continuing to write my draft.

Tue. Nov 20

I went to the University of Geneva library and continued writing and editing my draft of the paper. It felt very disorganized, which was frustrating, so I tried to rethink my strategy of approaching the paper, but this did not help very much.

Thur. Nov 22

I had my second advisor meeting with Mr. Finaud, during which I asked him more specific questions about my topic and ISP, which can be found in the “Advisor Meetings” section of this work journal.

Fri. Nov 23

I worked on the train to and from Zurich, writing my ISP and finding the flaws in my logic. This process was helpful, but the latter portion of my paper remained fairly disorganized. At this point, I had written about twenty pages.

Sat. Nov 24

I spent a good deal of time adding to my paper and finally completed a full draft, which I emailed to Mr. Finaud. This work was done at home and took several hours. I also sent the recording of our interview to Mr. Gavata, who had requested it.

Sun. Nov 25

I worked both on the train from Brig and also once back at home editing my draft. I cleaned up my sentences and logic, and completed all of my citations. I spent from late afternoon to bedtime reading over and revising my ISP.

Mon. Nov 26

I reworked the structure of the paper, which I had realized was not flowing appropriately, and completely revised my literature review. I made some necessary changes to the paper, finished up my work journal, and worked from the morning until dinnertime editing and rewriting my ISP.

### **Advisor Meetings**

My first advisor meeting with Mr. Finaud took place on November 5th. During this meeting, I explained my topic to him and described my research process up until that point and asked him questions about the research process. He also spoke about Saudi Arabia and its relationship with the region around it, as well as opportunities and politics of using nuclear energy. We spoke about diversification and the political economy of the region, and it was more of a general meeting than one to address specific problems I was having. My second advisor meeting took place on November 22nd, since Mr. Finaud had been out of town. This time, I had more specific questions for him regarding the context in Saudi Arabia and its international relationships, such as: I was reading that Washing has provided financial, political, and military support to Saudi Arabia; can you expand more about the forms that this support has taken and how it is connected to oil? Finaud talked about security guarantees and military support and the connection between oil and weapons. I also asked: How does the instability in the region affect Saudi Arabia's ability to focus on its development, and how might the Kingdom begin to focus

more on its national and regional development instead of power plays and proxy wars? Finaud spoke about the domestic unrest in Saudi Arabia and how the Khashoggi murder has tarnished the image of the Crown prince and made the regime vulnerable. I then asked about which allies could help Saudi Arabia make an energy transition happen. Finaud explained that Saudi Arabia doesn't need to turn to governments, they can just start building and offering a good salary, and that will attract investors. The question would be if they could build something reliable. I also asked about the role of ISIS, and Finaud spoke about Saudi Arabia's funding of radical islamists, its international image, and its direct influence on radical Islam in the US and Europe.

### **Interview Transcripts**

FORMAL INTERVIEW ONE with Simone Tagliapietra, Oct. 1 2018 (transcript)

Sofia: So, the IMF has urged SA and other Gulf countries to diversify their economies away from oil dependency. But in your opinion, how much should these countries diversify their economies given that comparative advantage suggests that, you know, it is rational to export what comes naturally to you in terms of resources. So essentially, right now, if an economy is not diverse enough, when does it become too diverse and stop taking advantage of its plentiful resources?

ST: Well, I mean, SA like other countries in the Gulf, all these are countries extremely focused on oil and gas production and export. Diversifying the economy, it is an imperative for macroprudential reasons, because it's always better to have a diversified economic basis that allows you to also manage also external shocks in a more safe way. And in the case of the Gulf countries, it is also very important to consider that with climate change policy becoming more and more, like incisive at the global level, with the unpredictable rise of electric vehicles, the demand for oil in the future is a question mark. So these countries cannot be inprepared [sic] in the case something goes wrong from their perspective on oil demand. So they should be able to have an alternative, otherwise they will simply close down the country one day and leave. So for these reasons, all countries have put in place actually— I have a paper that I wrote a few, I think last year, and I can share it with you, exactly on this topic. So I have a table with all the policies that these countries are putting in place to diversify, but I am also mentioning that these countries often put in place such policies when oil prices are low. And then when oil price starts to go up, they all of a sudden forget about this issue and go back to the business as usual. So in my view, these countries should pursue what they themselves plan to do, and the first step in that direction is certainly a progressive phase-out of energy subsidies, which remain very important in these countries. And which are very inefficient under the economic perspective, because that's how a lot of money at the state is spent, and it is also very ineffective under an energy perspective

because energy subsidies lead to an inefficient use of energy, of oil and gas. So energy subsidy reform is a major issue in these countries for diversification.

Sofia: Certainly. And you're talking about how countries, that the future of dependence on oil in European is uncertain, and so sort of following on that, with regards to the EU's 2020, 2030, 2050 plans to cut emissions and increasing energy efficiency, how soon do you see them decreasing their dependence on oil, specifically?

ST: Well, I mean, the EU has clearly a strong policy to decarbonize the economy. In November we will have a new road map 2050 from the EU on the energy and climate issue, and the idea is to fully decarbonize the economy by 2050. So by 2050, ideally, we should have zero oil and gas around. That tells you the time frame. So it's not that much into the future, it is really around the corner.

Sofia: Certainly. Okay, thank you. And... there's also the dimension of— the EC has said that Europe has increasingly been dependent on importing oil, so that might be, even as they are decreasing dependence in the later future, in the near future, as dependence on *imported* oil increases, how do you think that may affect the oil market or the energy market specifically, given that Europe is increasingly becoming dependent on importing? So, essentially, before we make the switch to clean energy and are still somewhat dependent, do you think that will lead to, you know, a brief spike in oil prices, or, how do you think...

ST: No, but first of all you have to contextualize. It's not just Europe, Europe is a part of the global market. So, I don't think what happens in Europe necessarily leads to spikes in prices, but for Europe itself it's an issue. Because if you have a rising oil price, then the economic competitiveness of Europe decreases and remember that there is always a security of energy supply issue which is always very important, and that's particularly related to the dependency of Europe on Russian gas. So Europe is concerned by its over-dependency on Russian in energy terms and wants to diversify, how? Renewable efficiency, to not to use the amount of resources that we currently import.

Sofia: I see. And, given that the international energy market seems to be moving, happily, towards sustainable energy, do you think it's possible that nations like SA, that previously were so dependent on exporting oil could switch to more like, being a very important player in clean energy?

ST: Yes, of course. And all of them are trying to invest a lot, particularly into the RND\*\*, the research and development, for solar energy and other clean energy solutions. So I think that if they put in place the right investments, they could have a role to play there because they have plenty of money. And they could make use of sovereign wealth funds, so public money they earn through oil export, to invest into new technology, so there can be of course a role.

Sofia: And you did mention solar, and a lot of people point to solar as a way for the Gulf countries specifically to get involved. Do you think that that will play a very large role in the future, given how that just makes sense for that particular region?

ST: Yes, I mean, the sun is very strong there, so they can actually produce a lot of electricity with it to consume domestically or also to export it. So that is certainly something that is a feasible option and with the declining cost of the solar technology, that is really declining very strongly, that becomes more and more possible in the future.

Sofia: Okay. And finally, many experts point to lack of investment as one of SA's key issues. And there's lots of talk about how the government is going to help invest for the economy to grow, but of course, some doubt that the government can be a reliable investor in the economy given that its spending is so dependent on—you know, if oil prices fall, so does government spending. So how do you think that SA or other countries like it could better utilize the energy market itself in order to stimulate investment in particular?

ST: I think that today the prices of oil are up to \$82 per barrel; that means that SA is doing a lot of profits. I think they should make a very good use of their SWF in order to invest this money wisely into clean energy companies around the world, and then they should try to really engage more with them, also to do joint partnerships with Saudi companies, for example Saudi Aramco, to make together projects not only in the Gulf but also in the region, in the Middle East. And I would point out that the real potential is Africa. Because Africa has a huge problem with energy access, lack of energy access. Many people do not have access to electricity. And renewable energy particularly at the rural area can provide a great solution. What is needed is the investment. The Gulf has the money to do that, Africa provides a great market potential, so there is a perfect match between the two. So that's a possible synergy for the future that I would see.  
END OF INTERVIEW.

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FORMAL INTERVIEW TWO with Giacomo Luciani, Nov. 5, 2018 (transcript)

Sofia: So, in my research of this topic, it seems fairly evident from both an economic and an environmental standpoint that Saudi Arabia should diversify its economy. But given its resources, what kinds of jobs and sectors would it make the most sense for Saudi Arabia to invest in?

GL: It has been evident for a long time that SA needed to diversify. You have to keep in mind that SA when oil was discovered was a very simple economy based on growing dates and camels and goats. I think it has been very clear in the minds of the Saudi government that they needed to do something to diversify. And they have done a lot to diversify and obviously until now they have tended to diversify mostly, but not exclusively, based on the available resources, which means diversifying based on oil and gas. In fact the diversification drive in SA started with the devaluation of gas. At the beginning, we are talking about the 1960's, okay? Most of the gas was being simply flared because it had no commercial value. So the Saudi government moved towards the oil companies, primarily Aramco that held the largest concession at the time and told them, because you are doing nothing with this gas we are going to take it for free. And so they built this gas gathering system, which has been a crucially important early initiative, and utilized the gas for power generation for beginning the petrochemical industry and ever since, this has continued. And the Saudis have made huge strides, especially petrochemicals, they are one of the

major producers and exporters of petrochemicals in the world, so the country is not just a crude exporter and the situation has much evolved. Of course, as this process of diversification continued you have moved, you have had all sorts of other initiatives, perhaps primarily devoted to satisfying domestic demand. So you have the production of construction material you have construction, the building of cities, you have a financial system that has developed banks, the stock exchange and so on and so forth, so plus also other manufacturing industries especially in areas that are ancillary for the oil industry, so for examples pipes, vessels... this is a process that is ongoing and has, and will continue, so you have to look at the different point of view of integration from the oil and gas business both downstream, meaning, you know, adding value to oil and gas as it is produced, and so producing more and more downstream petrochemicals, sophisticated petrochemicals or materials for industry. And upstream, so more and more attracting and developing within the kingdom the kind of industry which is needed for the oil and gas industry. So in addition the kingdom also has other resources which are not related to oil and gas. It has resources of bauxite, that are already allowing an integrated producing of aluminum, it has resources of sand, which allows for the production of silica, and so on and so forth, I might continue, there are several other minerals available in the kingdom, so there is considerable potential for diversification based on these resources.

Sofia: How feasible do you think it is for the Kingdom to move towards clean energy as a way in which to diversify? What challenges and opportunities would Saudi Arabia face, if it decided to go that route, to enter that market?

GL: There are considerable opportunities for clean energy and it is clear that the kingdom relies excessively on the use of oil and gas for electricity production. In the end, eventually, you know, this oil and gas could be more fruitfully utilized for industry, okay, rather than being used for power generation. Obviously the kingdom has potential for solar energy, although there are, you know, complications, and it is too simplistic to say that because there is a lot of sun it is easy to do solar. There are plenty of complications, but certainly, you know, solar energy is a possibility. There is also along the coast the possibility for wind energy, and I believe that the kingdom offers strong potential for the development of nuclear power, just as the UAE are doing, as especially Abu Dhabi is doing, I think that they have expressed an interest in doing the same, they are just moving very cautiously in this direction, but eventually they will be.

Sofia: You mentioned challenges to moving towards solar. What specifically do you think those would be?

GL: Well, you know, when you look at the details, you will find several problems, first of all, the desert is dusty, and when the wind blows it lifts lots of sand in the air, and solar panels are vulnerable to that, they need to be constantly cleaned, cleaning has to be done carefully because otherwise they get scratched, and depending on whether you are talking about photovoltaic or concentrated solar power, concentrated solar power is based on mirrors, mirrors are especially vulnerable. So, you know, a recent major project in Oman which will deliver steam to an oil operation, it's a huge project, solar project, has the mirrors, the concentrating mirrors enclosed in a, basically a hot house, in glass, so the cost of that is of course to be added because in Baghdad it is necessary because otherwise the mirrors would be useless after a year. Also along the coast in both the Red Sea coast and the Gulf Coast, humidity is a problem, and humidity is a problem

because it deposits on the mirrors of the photovoltaic panels and does not allow it to work well, it also, in fact during the summer, the sun doesn't shine so much in SA, you always have a light cover of very high clouds, so it is a misconception to believe—it is very hot, but in terms of irrigation, it is not as clean and effective as one might wish. And finally it is a simple fact that photovoltaic panels work best lower temperatures. So when they heat at 50, 60 or even more degrees, they don't work very efficiently.

Sofia: Okay. Even if the kingdom didn't choose to go the route of clean energy, it seems that oil is closely tied to the power of the Kingdom, given that oil revenues fund the budget that funds the welfare systems that keeps citizens happy. So what kind of impact do you think this has on the Kingdom's ability to really invest in clean energy, or even any market aside from oil? What would have to change for real concrete implementation to take place of a new market?

GC: Oh, I think the benefit of investing in clean energy is already evident and the Saudi government is committed to this policy and has been committed for a long time. It is the implementation that is difficult, it is difficult because typically, solar and wind energy is based on smaller projects, okay, so it is complicated from the point of view of decision making. You need to make numerous decisions, select locations, decide what kind of plant you are going to do. The government is not well-suited for that, okay, the government, bureaucracy has difficulty making decisions. Decision making power is concentrated at the top, and the attention of the top is difficult to get, so if you need a hundred decisions on a hundred sides, you never get it. It's something that the system finds difficulty dealing with. So the private sector should be doing it, but this contains the relationship between the public and the private sector and that is always very difficult. The attitude is that the government should always be in control, the private sector should be restricted to doing what the government tells them to do, the private sector of course doesn't very much like this. They want to have freedom of initiative, freedom of choice, freedom of making profits, and so, it's not an easy interface to navigate.

Sofia: Do you think that attitude would change anytime soon, between the government/public sector and the private sector? What do you think would make the kingdom more encouraging of the private sector to step in some situations?

GL: It's not easy to predict. At the moment I see little sign that the government is ready to allow, genuinely allow, widened scope for the private sector. has moved in the direct of even more clearly subjecting the private sector to government control and direction. So at the moment I don't see an evolution. There have been, in the past, moments when the pendulum has swung in the favor of the private sector. This is not at the moment what is happening, but then of course it can change again. It has to do with the power structure at the top.

Sofia: Right. So, you were talking about how SA understands that it needs to diversify, and you can sort of see that in its Vision 2030 plan. That plan seems ambitious on the surface; do you think that it will really have the kind of impact that it says it will? Does it really put the country on a transformative trajectory? How effective do you think that plan will be?

GL: SA has been planning for development and diversification since 1970. The first development plan was in 1970. So there have been a succession of development plans frequently

discounted as being ineffective but in fact in my opinion they have been very useful tools to avoid initiatives that were not well thought-out. Frequently when initiatives, projects were undertaken outside of the plans, they have turned out to be wrong or ill-considered. So a large number of wrong investment or ill-considered investment has been made. The 2030 is nothing new, okay, Vision 2030 is nothing new, it's not the first vision. And it does not contain much that is really remarkable except the tendency to shift the emphasis from two\* economic diversification, which means industrial diversification, this is continuing but you know what's in 2030 is a vision of *financial* diversification of creating a large sovereign fund that will invest outside of the country, globally. Now this is new because until now, until two or three years ago, the kingdom has always pursued a policy of diversifying its own economy, not seeking financial diversification. It's the like of Abu Dhabi or Qatar that are seeking financial diversification, much smaller countries with smaller populations which can visualize themselves living off accumulated global investment in, way into the future. But SA is much too big and complex and has much too large a population to live off financial rents accumulated in the SWF. It has to produce value added itself, and so it needs economic diversification through diversification rights of its economic activities. So I think that, I've personally been skeptical of Vision 2030 from the start, and you know, I think so far, skepticism has proven to be well justified.

Sofia: What role do you think SWFs, specifically SA's, will play or should play in these coming years?

GL: Well, exactly. The question is whether it makes sense for SA to build a large SWF. You see, a SWF is expected to invest internationally, okay, if you are investing domestically you are just creating an investment fund, and fine. But the idea is that you are investing internationally that's what. That is justified when, if you don't have enough good opportunities for investing domestically in you own country. In the past we used to speak about absorption capacity in profitable investment, then okay, you may consider investing internationally. Or if you are an economy like Norway, which is already advanced, industrialized, diversified, and you are afraid of creating a Dutch disease effect, you are essentially sterilizing these funds into a SWF. And then at some point you like to decide what to make with them, how to use them, because Norway keeps accumulating funds, their so-called pensions fund, but it is not clear when they will make use of this money, they are just sitting on top of this pile of cash, invested internationally, very successfully invested internationally, for the time when oil will run out. But this is not any time soon, so it's not clear what benefit Norway derives from this. A country like SA has multiple opportunities still for investment in the country itself, so it's not clear why they should prioritize international investment.

Sofia: You did also mention the population in SA. Demographic growth has proven a challenge, it seems. Not only are there a lot of young people who need to be employed, there is also growing domestic energy demand. How do you think that Saudi Arabia could use the diversification process to its advantage in order to both reduce its dependence on oil and also create jobs for its young and growing population?

GL: Okay, the issue of employment in SA is very peculiar because in fact SA employs a very large number of expatriates, okay, so there are very large number of temporary immigrants that are employed, that have jobs, and Saudi's don't have, there are not enough jobs acceptable to

Saudis. The reason for that is that SA, in order to protect its private sector, in order to avoid the Dutch disease, has always followed a policy of low wages, of keeping wages low, okay, and you can do that if you rely on expatriates. By relying on expatriates essentially what you're creating is a condition of practically infinite supply of labor and you end up importing the wage rate of Bangladesh or Sri Lanka, okay, which is a wage rate that no Saudi will accept, because it's not, it's acceptable to people from these countries, but not to a Saudi. So the real question is that, they have to shift from a model that is based on low wages, cheap labor, to a model that progressively allows for higher wages and fewer workers, higher productivity, greater mechanization, greater use of capital, so in the mix between labor and capital you have to increase the role of capital and decrease the number of workers. And in that process, drastically reduce the number of expatriate workers, and if wages increase, and protect the expatriate workers, allow them to earn salaries in line with the salaries of the nationals instead of being much lower and taking jobs away from the nationals. We are in Switzerland and Switzerland is a very clear example of a country that is also largely dependent on immigrant labour, because if you look around, there are plenty of foreigners in this place, who work here. But these foreigners make very good wages and they are not allowed to work for less than a national and the level of wages in this country is extremely high in international comparison, much higher than in any of the neighboring countries, including Germany, and yet the country is competitive. So you can — you can, and you should— put through a policy of *quality* rather than quantity, okay? Productivity defined as value added by a worker in SA has been declining over the years. How can that be? It can be because it is so cheap to hire another Bangladeshi, another Sri Lankan, another Pakistani, that people don't care about investing in any capital at all. And the productivity of the marginal hired expatriate is very low. But you have to aim at increasing productivity, wages, reducing the number of expatriates and increasing the capital intensity in the economy. That's what needs to be done.

Sofia: Right. And finally, I realize that it's hard to tell the future, but I do wonder... what do you think the ultimate push factor will be for SA to eventually get away from oil? Economic, environmental, global pressures? What do you think will really have the most impact on that real transformation?

GL: SA will produce oil for us as long as oil is in demand in the world. And oil is expected by most people to be in demand for many decades to come. So, the value, the economic value, the price of oil may decline if we find ways of developing alternative energy sources that are truly competitive with oil. The global drive towards improved living standards, the wish to have greater mobility, access to ownership of cars, demand for transportation generally, independently of cars. You know cars, light duty passenger vehicles, only account for 25% of global oil demand. The rest is, to a large extent, trucks, airplanes, ships, and so on and so forth, so in a world of globalization, of intensification, of global trade, demand for transportation will increase, and oil has some characteristics that are very difficult to substitute for. Because it is liquid, it is easily handled, stored, and it packs a huge amount of energy in a very small volume. So in terms of powering a transport unit, a means of transport, it's unparalleled in its convenience. So you may give up on some of these things and find alternatives, but they are not likely to very well compete with oil. So we need a much more determined global effort to decarbonize, which [inaudible] is not happening. It is difficult to envisage in the current political environment. END OF INTERVIEW.

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FORMAL INTERVIEW THREE with Cornel Gavata, November 16, 2018 (summary)

**Question 1:** I am researching the possibility of the Saudi oil-based economy to transition to one that is largely based on sustainable, clean energy. What do you think are some challenges that any country that is in this sort of transition might face, and if you are versed in Saudi Arabia, what challenges might it specifically face?

What kind of clean energy? Solar? Well, it's the right country for solar. 90.5% desert, most of it uninhabited, large areas can be used for solar panels without displacing populations, and very high solar radiance so the panels would be very effective there. What is lacking is the infrastructure. With hydrocarbons they can continue with what they are currently doing. In a few years they might find an oil peak, in 5-10 years, I don't think the oil peak will be beyond that if it hasn't already plateaued today. And many say, when the Saudi peaks, the world will peak, and some countries already have. This is probably true, when Saudi peaks the global decline is certain. So it's a necessary transition. But oil will peak, energy might not. The large empty desert means they can use a lot of panels with minimal displacement. And they can remain in the energy business exporting electricity, perhaps by high voltage direct current lines which can transport energy very long distances. Hydrogen could also be used to power some types of vehicles. Vision 2030, it did not specifically address this, but it should include something like it. Such a high dependency on energy export cannot be removed, but perhaps it can be a different kind of energy, electricity and hydrogen, they can remain an exporter. The investments would have to be really vast for solar funds. Yes, the world can be powered in solar power, infrastructure would have to be vast, but I don't think an individual country can afford it, it would have to be a global portrait, but they could be a major part of that.

**Question 2:** What kind of measures and steps does a country and its government have to take before it can begin a meaningful energy transition?

It's ultimately a political decision. They don't *need* solar power, they have enough energy. However, if they want to maintain a large export of energy, it will be necessary to switch to exporting electricity and hydrogen. They already consume around 30% of the oil they extract. Also there is a rising population, and the current plans for providing some employment for the nationals will involve some degree of industrialization, which means consuming more energy. So internal consumption will increase, they might eventually have very little to export, but this is not happening right now.

**Question 3:** Can you please describe the role of the private sector in these kinds of energy transitions?

I do not see how SA can become a producer of solar or hydrogen produced electricity alone. First, the power lines would have to cross a lot of regions into several other continents. One of the things that needs to be done is to ensure security over the length of the lines. Either you deal with the issues or you have to make a large, expensive detour. Every extra thousand miles adds an extra 3-5% loss, which adds up. If you're forced to bypass certain regions, there might not be much left when it reaches the destination. And the panels can be done; the costs are immense, and the benefits have to be shared. First of all, how do you make the panels? They have a lot of embedded energy and require energy to create them. Right now the most abundant source of fuel is coal. It cannot be done with oil, natural gas even worse, so coal would have to be used to create the panels. But then you have clean energy for the future. There has to be a big spike in coal consumption to make the panels. But then you may not need coal again.

**Question 4:** Can you please talk about the time frame for this kind of transition? Although it seems that it would certainly depend on the specific situation of the country, how long do you think this sort of transition would take?

SA does not have sufficient financial resources to build on its own. It can only be done with foreign help. But the countries that need energy, the biggest industrial consumers are also interested in having a secure and stable source of energy. Maybe not oil, maybe electricity of hydrogen for some transportation, but the sun will still shine and if the transition is not done well you can still expand the construction for building panels. Can SA do it? It doesn't need it, for itself, and if the main consumers do not contribute and share resources, it cannot be done at all. EU, China, Japan, South Korea, India, and any country aspiring to industrialize. You can't have increased consumption with decreased extraction of fossil fuels. Global peaks in oil, gas, and coal are just around the corner, so it's about time.

**Question 5:** In the context of current changing global energy trends and norms, how do you think the process of a transition from an oil-centered energy base to a sustainable energy base is affected by initiatives such as the Paris Agreement?

Well, decarbonization—so, natural gas has less carbon than oil and oil less than coal. The only way to decarbonize is to shift from cheap coal to oil, which has almost peaked, to natural gas, which is expensive. So how can decarbonization occur based on fossil fuels? Many developing countries use coal because it is abundant and very cheap compared to natural gas. So to ask poor developing countries to switch is not designed to help. It's unaffordable. You can't ask the poor to feed themselves with caviar. The cost of solar can only be cut in mass production. Industry can cut these costs, but right now very little energy comes from solar power, so if you don't make the scale larger I don't think it will ever become cheap. Mass production must kick in. China is the largest consumer of energy, so it should be very interested in having a secure source of energy that will last after fossil fuels. So it would make sense for them to be a main player. So

the world can only make a switch by cooperation between existing large consumers and a mass production that makes it cheap and available for countries to develop in the future.

**Question 6:** Realistically, what do you see as being the push for oil-dependent countries to actually commit to a full energy transition? What do you think will have the most impact among environmental concerns, demand for oil, global norms...?

SA is looking out for its own interests. The countries of transit for power lines, etc., they all have to benefit otherwise it will not be done. A mutually beneficial global portrait.

**Question 7:** When do you see these transitions happening? Quite soon, or later in the century?

We don't have that much time. There are some insanely optimists, but most calculations and forecasts are foretelling a peak rather soon. And not all the fossil fuels will peak at the same time. Maybe oil, then natural gas, then coal, but the peak will come rather soon, even for coal. This doesn't necessarily mean running out; Iran peaked in oil extraction, but they are still extracting, they just never again have that high point. And the existing price will play a role. There is some price fluctuation, but I don't think actual price is a good indicator of peak, prices have gone up and down and they continue to do so. With global demand, recession, boom cycle... I don't think that watching the prices will give you any indicator that we are at a peak.

**Question 8:** What do you think are some possible scenarios for the future of Saudi Arabia or other oil-based economies?

To put it this way, it is impossible to decarbonize, impossible to change if the consumption of fossil fuels is increasing, and that will happen if we have no alternatives to that. Self-interestedness is a driving force, economically if you're still making money it makes sense that you would continue. As long as it's still feasible, with global prices and demand and so on, of course they will remain in the business. No profitable business is ever a bad one. Regardless of commitments and so on, commitments can be broken. And some countries don't want to enter in commitments as long as they don't really have an alternative. The world won't commit to stagnated growth if they can resist international pressure, only if they have no alternative. I think it's not that emissions rise because some countries prefer to be *masochist*, but what alternative do they really have? Any commitment is an agreement to abide by international rules. Some sacrifices are required, true, but if there are only sacrifices and no alternatives, then all the commitments will be broken.

In my discussion with Ms. Antoni, a UN expert on the Green Economy and Trade, we talked about Saudi Arabia's unwillingness to talk about trade and the environment in the WTO, about how they have the money to invest quickly in substantial ways, that any sort of greening of the Saudi economy requires a state decision through public procurement, and that incentivizing production might be a good road to go down. We also spoke about China's environmental standards, as China is a main importer of Saudi oil. This spontaneous brainstorming process helped guide some of my thinking about my research topic, and this informal interview was thought-provoking and helpful, as I was in the beginning stages of the research process. Antoni also indicated her interest in my research and gave me her email so that I could email her my ISP once it was finished.

### **Research Locations**

Bibliothèque de la Cité  
Place des Trois-Perdrix 5, 1204 Genève  
Geneva

United Nations Archives at Geneva  
Avenue de la Paix 8-14, 1211

Library at the Graduate Institute of Geneva  
Chemin Eugène-Rigot 2, 1202 Genève

University of Geneva Library  
Boulevard du Pont-d'Arve 40, 1205 Genève

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### **Human Resource List**

Dr. Simone Tagliapietra, Research Fellow at Bruegel; [simone.tagliapietra@bruegel.org](mailto:simone.tagliapietra@bruegel.org)

Areas of expertise: International energy and climate issues, international energy markets, European energy and climate policy and Euro-Mediterranean energy relations.

Mr. Giacomo Luciani, Adjunct professor and co-director of the Executive Master in Oil and Gas Leadership at the Graduate Institute; giacomo.luciani@graduateinstitute.ch

Areas of expertise: Economic development of resource-rich countries, global governance of energy, the political economy of the Middle East and North Africa.

Elena Antoni, Green Economy and Trade Specialist at UN Environment; elena.antoni@un.org

Areas of Expertise: Environment and renewable energies, Green Policy and Trade, International Investment Agreements, the Green Economy, Fisheries policy, UN Environment and WTO collaboration.

Mr. Cornel Gavata, Assistant Professor at the Geneva School of Diplomacy and consultant for the Globecraft Institute; cornel2006@yahoo.co.uk

Areas of expertise: Resource Scarcity, geopolitics, transition to a sustainable energy portfolio.

Emilie Magdalinski, research fellow and expert on European energy policy at the Jacques Delors Institute; magdalinski@delorsinstitute.eu

Areas of expertise: EU energy policies

Marc Finaud, Senior Program Advisor and Arms Proliferation Cluster Leader at the Geneva Centre for Security Policy; m.finaud@gcsp.ch

Areas of expertise: Arms control and disarmament, the Middle East, international humanitarian law

**SIT Study Abroad: Switzerland**

*International Studies and Multilateral Diplomacy*

**ISP INTERACTIVE RESEARCH**

**INTERACTIVE LOG**

**(4 interviews are required: 3 formal + 1 informal)**

Name     Sofia Mouritsen     Semester     Fall 2018

<b>Organization</b>	<b>Contact name</b>	<b>Address/email</b>	<b>telephone</b>	<b>Date(s) &amp; time of interview</b>	<b>Formal/informal interview</b>
Bruegel	Simone Tagliapietra	simone.tagliapietra@bruegel.org	n/a	October 1, 2018, 2pm	Formal Interview
UN Environment	Elena Antoni	elena.antoni@un.org	n/a	October 18, 2018	Informal Interview
Graduate Institute of International and Development Studies	Giacomo Luciani	giacomo.luciani@graduateinstitute.ch	+41 22 908 57 48	November 5, 2018, 10:30am	Formal Interview
Geneva School of Diplomacy	Cornel Gavata	cornel2006@yahoo.co.uk	076-521-6761	November 16, 2018, 12pm	Formal Interview