

Master's Thesis Project

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ABSTRACT

Departing in a case study, informed by the theoretical approach of late rentierism, the objective of this thesis is to answer the following research question: *What are the challenges and opportunities for a sustainable development of the energy consumption in the late rentier state of the United Arab Emirates?* The analysis departs in the specific rentier characteristics of the late rentier state of the UAE, argued to be determining for the challenges and opportunities. The analysis focuses on opportunities and challenges characterized in the demand side and supply side of energy consumption respectively. The role of subsidies is emphasized in relation to demand, while the interests and agency in the implementation of clean energy are emphasized in relation to the supply side. It is concluded that the rentier characteristics of the UAE present both challenges and opportunities for a sustainable development. The biggest challenge is the subsidization of energy, as seeking to change consumer behavior could challenge the political status quo. The greatest opportunities are on the supply and technical side as the leadership's agency here provides the potential to ensure the political status quo.

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INTRODUCTION

The energy consumption in the United Arab Emirates are among the highest in the world. The socio-economic development in the UAE over the last four decades, has been achieved at an unprecedented pace, and it has been enabled by hydrocarbon¹ resources. However, the development has taken place without calculating the political, economic and environmental impact. The essential role played by hydrocarbons for development and revenues in the socio-economic transformation of the UAE has affected the way energy impacts the state-society relation. The UAE are increasingly consuming bigger shares of their hydrocarbon resource to fuel their compounding growth, threatening their export ability and ultimately the political status quo. Rentier characteristics² have had implications for the energy consumption of the UAE, as these has contributed to a wasteful and inefficient energy consumption that is among the world's highest per capita (Luomi 2012; 3, Krane 2019; 1).

The high energy consumption fueled by hydrocarbons, has placed the UAE among the world's highest emitters of carbon dioxide per capita in the late 2000s, with emissions growing yearly (BP 2019; 57). With a focus on sustainable development and an increasing focus of climate change and environmental concerns on the international development agenda, the high consumption risks are threatening the image of the UAE (Ulrichsen 2017b; 114). In order to accommodate this, the late rentier state of the UAE has sought a sustainable development of their energy consumption taking new measures related to the social contract and alternative energy sources.

PROBLEM STATEMENT

It is within this context of economically and politically unsustainable energy consumption, that the leadership in the late rentier state of the UAE have pursued a sustainable development of the energy consumption. It is assumed that a sustainable development of the energy consumption is determined by the political and economic context. This leads to the further assumption that the specific rentier characteristics of the UAE present both challenges

¹ Henceforth hydrocarbons will refer to oil and gas.

² Rentier characteristics will in this thesis refer to the social contract between state and society, the state's political autonomy and financial resources, enabled by externally derived rents. These characteristics will be elaborate in the theoretical framework.

and opportunities for a sustainable development of the energy consumption. Thus, it is important to investigate the context-specific opportunities and challenges the leadership in the UAE faces in their pursuit of a sustainable development.

RESEARCH QUESTION

The reflections above have resulted in the following research question:

What are the challenges and opportunities for a sustainable development of the energy consumption in the late rentier state of the United Arab Emirates?

It is the ambition of this thesis to explore what challenges and opportunities the specific context of the rentier structures in the UAE presents for a sustainable development of the energy consumption. The scope of this paper includes opportunities and challenges characterized in the demand side and supply side of energy consumption respectively. The role of subsidies is emphasized in relation to demand, while the interests and agency in the implementation of clean energy are emphasized in relation to the supply side.

The point of departure in these perspectives is based on an assumption that the rentier characteristics of the UAE are determining for the decision-making and impacts the domestic political economy. The focus is thus on the domestic perspective. This thesis and the research question are informed by a theoretical framework of late rentierism. It is acknowledged that other perspectives and factors could contribute with relevant perspectives, in example a regional perspective on cooperation and regional energy grids (Poudineh et al. 2019), or a security perspective related to climate change and resources (Luomi 2012) would provide different but relevant perspectives on the challenges and opportunities for a sustainable development of the energy consumption. Nevertheless, the scope of this thesis is limited to the above-mentioned perspectives on the demand and supply side of energy respectively. The analysis is guided by an analytical framework that emphasizes the late rentier characteristics as well as the unique context-specific features of the UAE.

In order to answer the research question, the thesis is structured in three chapters. The first chapter will present important perspectives from the research question. Thus, the case of energy in the UAE will be introduced including the current energy consumption of the UAE as

well as the energy situation in the UAE. Furthermore, the developmental context of the UAE will be introduced, highlighting the differences in the two largest emirates of Abu Dhabi and Dubai. The chapter concludes with a review of the concept of sustainable development and a definition of the concept for this thesis. The second chapter outlines the analytical framework for the analysis and introduces the theoretical framework of late rentierism and an operationalization of concepts from the theory. Additionally, the methodological considerations related to the qualitative case study, the sources utilized and the argument for the importance of context is presented. The third and final chapter constitutes the analysis. The analysis will be guided and structured by three sub-questions, departing in the determining factor of the rentier structures and contributing to answering the research question. The questions are:

- 1) How has the rentier state's decision to subsidize energy placed the UAE on a path of inefficient consumption and wasteful demand behavior?*
- 2) How does the interests in clean energy expressed by the decision makers in UAE manifest itself in the efforts to create a sustainable development of the energy supply?*
- 3) How does the UAE seek to 'green' the high energy consumption and low efficiency in the built environment in the UAE?*

The aim of the first question is to provide perspectives on the demand side of energy consumption and the role played by decisions made in the development process, including subsidies and the structural and behavioral paths created as a result. The second question aims at providing a supply side perspective, focusing on the interest and ability of the leadership of the UAE to diversify the domestic energy mix. The third question departs in perspectives and findings from the previous two, when considering how a of 'greening' the high energy consumption and low efficiency is sought in the UAE's built environment and exemplifies this with the initiatives Estidama and Masdar City. Since the agenda of sustainable development is relatively new, this thesis is limited to the time period from the 1990s to the present. However, this thesis does not take into account changes resulting from Covid19.

CHAPTER 1: THE CASE, THE CONTEXT AND THE CONCEPTS

The objective of this chapter is to elaborate on important perspectives from the research question and provide a point of departure for the analysis. Thus, this chapter will first present the case of energy in the UAE. Second, the chapter offers a contextualization of the development strategy of the UAE, focusing on Abu Dhabi and Dubai respectively as examples throughout will be from the two emirates. Along with the theoretical framework, it is within this context that a sustainable development of the energy consumption should be understood. Third, a review of the concept of ‘sustainable development’ is presented. This will include the history on the concept on the international development agenda, as well as critiques related to the definition of sustainable development and will conclude in a definition of the concept for this thesis.

THE CASE OF ENERGY IN THE UAE: AN OVERVIEW OF THE ENERGY SITUATION – RESERVES, PRODUCTION AND UTILIZATION

It is important to account for the energy situation in the UAE as it provides significant perspectives on the energy consumption, which is under investigation in this thesis, and because energy play a central role in shaping the internal and external policies in the UAE (UAE Government 2020a). Thus, this paragraph will provide an overview of the energy reserves, the production of energy including the introduction of clean energy sources in the domestic energy mix, and the utilization of energy. This will serve as a point of departure from which to understand the present unsustainable energy consumption (the status quo) and the opportunities and challenges for a sustainable development of the energy consumption. Hence, perspectives highlighted in this paragraph will serve as of point of departure for the analysis. The oil sector will be presented first, this is followed by a presentation of natural gas, including the import of natural gas to meet growing demand and the recent discovery of a gas field on the border of Abu Dhabi and Dubai. A presentation of the diversification of energy production and supply to include alternative clean energy³ sources will conclude this paragraph.

³ Clean energy is understood as energy that is produced through methods that do not release greenhouse gas (GHG) or other pollutants. Thus, this thesis will emphasize solar energy and nuclear energy, both viewed as clean energy.

1. OIL

The energy situation, consumption and production, in the UAE is one dominated by hydrocarbons. The UAE holds large reserves of oil and is a major producer and exporter of oil. The UAE has 97.8 billion barrels of proven oil reserves which is the equivalent to 5.7 % of the world's proven reserves and the seventh largest proven reserves (OPEC 2019; 8; 26; BP 2019; 14). The UAE is also the seventh largest producer of oil in the world, producing around 3 million barrels of crude oil per day in 2018. Of these, little less than 2.3 million barrels are exported and approximately 885.000 barrels a day is consumed domestically (OPEC 2019; 31; 48). Thus, the majority of the oil produced is exported. The oil consumed domestically is prioritized for transportation fuel that in the UAE is centered around personal vehicles rather than public transportation (despite investments like the Dubai metro system and plans for a light rail system in Abu Dhabi) and transport related to logistics and trade (industrial free zones and ports) (Masdar Initiative/IRENA 2015; 12).

The majority of the oil reserves are located in Abu Dhabi with 94 % of the total reserves located at both onshore and offshore fields and the emirate also represents 94 % of oil production in the UAE. Thus, both oil reserves and the production are highly unevenly divided among the UAE's seven emirates (Hvidt 2018; 313) with a clear majority located in Abu Dhabi. Dubai found oil offshore in 1966 but after assessment of the oilfields it became clear that Dubai's oil did not have the same potential as Abu Dhabi. Nevertheless, Dubai holds the second largest reserves in the UAE although small, less than 4 % of the UAE oil reserves, and decreasing as the emirate reached its peak oil production in 1991 with 420.000 barrels per day (Krane 2019; 103-104). Consequently, the share of oil of the emirates' GDP are significantly different. Oil revenues dominated the economy of Dubai in 1975 and contributed with the majority of the emirates GDP. Since then the contribution of oil to the emirates GDP has been falling and contributed with approximately 1 % in 2017 (OBG 2020a). In comparison the contribution of hydrocarbons to GDP in Abu Dhabi was just above 50 % in 2019 (OBG 2020b).

As the emirate with the majority of oil reserves, Abu Dhabi has developed their oil sector

significantly. After the creation of the UAE in 1971, Abu Dhabi created the state-owned Abu Dhabi National Oil Company (ADNOC) to manage and operate the hydrocarbon sector in the UAE's most oil rich emirate. ADNOC holds the controlling state in concessions related to the industry but unlike other oil exporters in the Gulf, Abu Dhabi has welcomed foreign companies and several holds stakes in the emirates oil sector. ADNOC continues to hold the majority stake but the technological input and expertise offered by the foreign companies is continuously welcomed (Davidson 2009; 70). The oil output has grown due to new discoveries and the oil sector has diversified both upstream and downstream to produce both oil and gas as well as a number of activities related to the hydrocarbon sector under ADNOC (Hvidt 2018; 314). Outside the diversification of the sector, the UAE has historically been able to continuously increase production of oil and plans to further invest in the sector in order to maintain an increasing oil production. With little prospects for new major oil discoveries, increased production will come from enhanced oil recovery techniques (in which a significant amount of natural gas is needed) of the existing oil fields in Abu Dhabi (US EIA 2020; 3). The revenues from the oil sector has enabled the UAE, particularly Abu Dhabi, to make substantial savings. The emirate has the world's fifth largest sovereign wealth fund and the Abu Dhabi Investment Authority (ADIA) is valued at US\$ 792 billion (Hvidt 2018; 313).

2. NATURAL GAS

Additional to the oil sector, the UAE holds the seventh largest gas reserves in the world and produces 47.624 million standard cubic meters of marketed natural gas yearly, of which 7.087 million cubic meters is exported primarily as liquid natural gas (LNG) through long-term export agreements to Asia and Europe. Again, Abu Dhabi holds the majority of reserves, 93 % of the gas reserves. However, much of the UAE's domestic gas reserves is costly to find and develop as the gas is sour and high on sulphur which requires processing (OPEC 2019; 115-118; Luomi 2012; 35). Nevertheless, the UAE exports LNG to Asia, primarily Japan, in long-term contracts in order to stabilize export earnings (Hvidt 2018; 314). The challenge of the natural gas of Abu Dhabi being uneconomical and difficult to develop, as well as the deficit between consumption and production, might be mitigated by the discovery announced early this year of a gas field on the border of Dubai and Abu Dhabi. The discovery might hold a potential 2.7

trillion cubic meters⁴ of natural gas reserves in Jebel Ali, making it the largest find in fifteen years and currently the fourth largest gas field in the world. The development and exploration will be carried out in collaboration between ADNOC and Dubai Supply Authority (DUSUP) and as such the Jebel Ali Project is a joint venture between the two emirates. The field has great potential as it is high quality organic gas located at a shallow depth which makes it easy to extract and presents low development costs (Gnana 2020b, Gnana 2020a). The Jebel Ali Project will first and foremost be prioritized and developed to achieve partial or full self-sufficiency for the UAE, and the gas produced will be supplied to Dubai. The economic incentives of relatively expensive imported gas from Qatar⁵ and the political incentives of long-term energy security makes the discovery important for the UAE. Furthermore, it presents a real potential to remove the need to import LNG in Dubai and reduce the dependence on gas imports from Qatar, potentially channeling the gas produced into industry or look to develop an export market (Augustine 2020, Gnana 2020b).

2.1. WHEN GAS CONSUMPTION EXCEEDED PRODUCTION

Despite large investments in the sour gas fields in Abu Dhabi, including a recent investment of US\$ 11 billion development of the onshore Shah gas field, the UAE became net importers of natural gas in 2008, at a time of financial crisis. The country is expected to remain importers in the near future⁶ (Hvidt 2018; 315). While production and export of oil has underpinned the state budget in the UAE and thus financed a lot of the development and projects in the UAE, it is natural gas that has enabled the development and expansion of the infrastructure and lifestyle, particularly in the consumption of electricity. Jim Krane point to the fact that natural gas *“took on the role akin to that of a Hollywood stuntman: performing dramatic roles but getting little of the credit.”* (Krane 2019; 72). The gas sector in the UAE has largely been developed to satisfy the increasing domestic energy demand, only secondarily for the purpose of export. Natural gas has been preferred and prioritized for *“generating freshwater and electricity, supplying industries, providing feedstock to petrochemical projects and stimulating reinjections in the oilfields as they mature”* (Hvidt 2018; 315).

⁴ Authors own calculation: 80 trillion cubic feet at a conversion rate of 0.028.

⁵ The import of natural gas is priced according to international market prices which is higher than the price paid previously for domestic resources.

⁶ The assumption is that the UAE will stay net importers in the near future as sufficient output from the Jebel Ali Project to cover domestic demand will take time.

Dubai, with its low reserves, was previously able to count on neighboring Abu Dhabi to supply cut-rate natural gas for Dubai's power generation and industry. However, by 2008 Abu Dhabi was in a demand crisis of their own and was no longer able to supply Dubai with energy, forcing Dubai to import at international market prices. (Krane 2019; 104). The UAE's increasing domestic demand for power is further straining the gas deficit as the power market in the UAE is defined by natural gas, with a large share used for electricity generation. Nearly all electricity generation in the UAE, 98 %, is gas-fired (Masdar Initiative/IRENA 2015; 10; Luomi 2012; 36). The UAE is among the largest electricity consumers per capita in the world, consuming 127.00 GWh in 2017 (UA EIA 2020; 7) primarily on cooling, lightning, refrigeration and other appliances. The high consumption of electricity for cooling, the largest post of electricity consumption, is correlated and exacerbated by the local climate in the UAE with high temperatures, even greater in the summer season, as well as the quality of insulation, air gap tightness and air-condition units in buildings (Masdar Initiative/IRENA 2015; 10). Furthermore, the gas demand is exacerbated by the use of natural gas in the process of desalinating water which often is produced in cogeneration plants utilizing waste heat to produce electricity (Krane 2015; 6).

In order to accommodate the gas deficit between production and consumption, the UAE has developed and established facilities and agreements for import of additional natural gas from Qatar through the Dolphin Project (Hvidt 2018; 314-315). The Dolphin Project is a cross-border gas transmission project between Qatar, UAE and Oman. Gas is produced in Qatar and transported through a subsea pipeline to UAE and Oman. The Dolphin project is developed and operated by the Abu Dhabi-operated Dolphin Energy Limited and is the first cross-border energy-related project in the region (Masdar Initiative/IRENA 2015; 28). The pipeline transports approximately 610 million standard cubic meters per day from Qatar to UAE and Oman. The pipelines transport capacity is approximately 975.4 million standard cubic meters per day and subject for future agreements (Dolphin Energy Limited 2020). The pipeline became operational in 2007 and supplies all emirates of the UAE and meets around 26 % of

UAE's natural gas demand (US EIA 2020; 6)⁷. Furthermore, due to limited growth in domestic production, Dubai began to import expensive LNG from Qatar in 2010 to meet the demand, at around \$10/MMBtu which is five times the price from Abu Dhabi (Krane 2019; 104). Thus, the UAE became the paradox of being both an importer of LNG from Qatar and exporter of LNG to Asia. However, as mentioned above, the discovery of the gas field on the border between Dubai and Abu Dhabi, the Jebel Ali Project, has the potential to render imports of LNG to Dubai and a new agreement of gas imports through the Dolphin pipeline unnecessary.

The demand and consumption of natural gas, having proceeded domestic production, presents insecurities and has economic and political implications for the UAE. Before the discovery of the gas field at Jebel Ali, the cost of increasing natural gas imports, pushed the leadership in the UAE to pursue options for reducing consumption through difficult reforms on energy subsidies and a strategic diversification of the energy mix to include clean energy sources (Masdar Initiative/IRENA 2015; 9-10).

3. RENEWABLE AND CLEAN ENERGY ALTERNATIVES

Up until the late 2000s three options was realistic for electricity generation in the UAE. The preferred option was domestic gas, however, as mentioned above this option has not been able to cover demand; imported gas that have political and economic implications which makes it an unsustainable option; and domestic oil which will result in lost export revenues and an arguably unacceptable high opportunity cost⁸. Cumulatively the government of UAE has since 2006/7 been outspoken about the ambition to diversify the domestic energy mix, dominated by oil and gas, with alternative clean energy sources. In the *UAE Energy Strategy 2050*, the UAE government envisions the total energy mix to comprise 44 % clean energy (solar, wind and biofuels), 38 % natural gas, 12 % clean coal and 6 % nuclear energy by 2050, as well as a sustainable infrastructure for generating power through renewable sources (UAE Government 2020d). Ambitiously, in 2008 Abu Dhabi set a target, as the first in the region, to

⁷ The supply agreement from 2010 is for Qatar to supply gas at less than USD 2/MBtu via the Dolphin pipeline and the agreement is through 2030 but is it unlikely to be renewed under such favorable terms. Furthermore, the cost of LNG is more expensive than what UAE historically have paid (Masdar Initiative/IRENA 2015; 9).

⁸ Due to the finite and non-renewable nature of oil, as production reaches a plateau exports typically falls as domestic demand rises (Krane 2015; 9).

achieve 7 % capacity by clean energy renewable energy by 2020 and Dubai followed by announcing a 7 % of total power output to be clean energy by 2020 and increasing to 25 % in 2030 and 75 % in 2050 (Masdar Initiative/IRENA 2015; 13, DEWA 2019). Today, clean energy for power generation (predominately for electricity) is cost-competitive in the UAE with nuclear and solar energy is understood as desirable alternative sources. Currently there is no realistic and viable alternatives to oil in transport and the focus regarding clean energy sources has been on power consumption (Luomi 2012; 39-40). The addition of domestically produced clean energy sources to meet the energy demand will improve the energy security and avoids the utilization of high-cost imported natural gas for generation of electricity, proving an economic case for diversification of the domestic energy supply.

The most notable addition to the energy market in the UAE has been nuclear power. The UAE government envisions nuclear power to become the main clean source for electricity, besides gas-fueled generation, with the expectation that the reactors *“will be able to provide an estimated 25 per cent of the country's electricity demand by 2020”* (UAE Government 2020a). Currently, nuclear power is yet to become a part of the domestic energy supply due to delays. The first reactor the Barakah nuclear plant, located in Abu Dhabi began operations August 1st, 2020 (UAE Government 2020c). Additional power generation will most significantly come from solar power, arguably the most attractive renewable alternative for the UAE due to its stability, the abundance of solar resource potential from the country's many hours of sunlight, and as technology have become more cost-competitive (UAE Government 2020a, IRENA 2016; 13). According to the International Energy Agency the percentage of renewable energy sources in the UAE's final energy consumption in 2016 was 0.2 %, this being electricity generation from solar energy⁹ (IEA 2020b). Thus, the percentage is significantly lower than the government-stated *“need(s) to generate 27 percent of energy requirements from clean sources”* in 2021 as part of the national development plan Vision 2021 (UAE Government 2020a). With the integration of solar and nuclear schemes to the generation of electricity, the UAE's demand for natural gas for power generation is expected to start falling, and the demand for gas is likely to peak this year (Gnana 2020b). The diversification of the energy mix

⁹ In 2017 the renewable electricity generation was from photovoltaic (PV) solar energy and thermal solar energy generating 535 GWh and 257 GWh respectively (IEA 2020a).

to include clean energy, is therefore an important step to a sustainable development of the energy consumption in the UAE.

THE CONTEXT: THE UNITED ARAB EMIRATES – ABU DHABI AND DUBAI

The purpose of this paragraph is to provide an introduction to the UAE in order to present the context for the opportunities and challenges for a sustainable development of the UAE. Thus, this paragraph will present an overview of the characteristics of the UAE and emphasize the development strategies in the two most powerful emirates, Abu Dhabi and Dubai, as they will be utilized as examples throughout the thesis. Thus, the following will point to developmental and economic key characteristics of the UAE and its two leading emirates departing in the extensive academic literature on the UAE¹⁰. The political and economic context will further be elaborated in the theoretical framework of late rentierism.

The United Arab Emirates is a federation established in 1971, constituted by seven emirates¹¹ with individual leadership, economies and policies. The rapid socio-economic development of the UAE has largely been facilitated by the revenues from oil exports and other sources of external rent. There exist significant wealth and development differentials among the emirates of the UAE, particularly between Abu Dhabi and Dubai, and the five Northern Emirates. Abu Dhabi and Dubai are by far the largest, wealthiest and most populous emirates of the UAE and the development in these two principal emirates have most directly contributed to the overall socio-economic and political development, thus constituting the *“two poles of political and economic gravity in the UAE”* (Ulrichsen 2017b; 4). Important differences are present in the two emirates, highlighting how the disproportionate oil resources among the emirates in the UAE, with Abu Dhabi holding some of the largest reserves in the world and Dubai having reached peak production decades ago, have led to a different although dual development strategy and approach (Davidson 2005; 154-155, Ulrichsen 2017b; 86).

¹⁰ See for example Davidson 2005, Young 2014, Ulrichsen 2017.

¹¹ The seven emirates are: Abu Dhabi, Dubai, Sharjah, Ajman, Umm al Quwain, Ras al Khaimah and Fujairah.

Abu Dhabi is the largest emirate and also the wealthiest principally due to its large oil resources. The emirate contributes with the majority share to the national GDP and supports development of the other emirates in the UAE. Abu Dhabi have over the years, supported by the significant hydrocarbon reserves, sought a diversification into energy-intensive manufacturing industries such as petrochemicals, aluminum, fertilizers. This diversification strategy has in recent decades been complemented by efforts towards a 'new economy' of knowledge-intensive and service-based sectors such as high-technology heavy industries, future clean energy industries, cultural tourism and an exclusive real estate market (Davidson 2009; 69-73). Despite diversification efforts, Abu Dhabi derived little more than 50 % of its GDP in 2019 from the hydrocarbon sector, and more than 90 % of government revenues (OBG 2020b).

The second largest emirate of Dubai, on the other hand, has been the most active emirate in its attempts at diversification and infrastructural and industrial development, partially as a result of the relatively small hydrocarbon resources and oil production peaking decades ago (Ulrichsen 2017; 4). Martin Hvidt points to a *"historical commitment to a business-friendly environment, with openness towards foreigners in business and in society in general, as well as a strong belief in the proactive role of the 'state' in the economy"* as central in placing the emirate as a frontrunner in income-generating activities, trade and logistics and building designs (Hvidt 2013; 32). He further highlight *"(1) government-led development, (2) fast decision making and 'fast-track' development, (3) a flexible labour force through importing expatriates, (4) bypassing industrialization and creating a service economy, (5) internationalizing service provision, (6) creating investment opportunities, (7) supply-generated demand, (8) market positioning via branding, and (9) development in cooperation with international partners"*, as key development elements of the 'Dubai Model' (Hvidt 2013; 32-33). In Dubai, hydrocarbon activities accounted for approximately 1 % of the GDP in 2017, and government revenues derives primarily from services such as tourism, real estate, trade and transport as the state is the owner of service providers in these sectors (OBG 2020a, Hvidt 2009; 408).

Further characteristic for both of the emirates is that the economic development and diversification, besides the dependence on external demand for oil and services, have been

dependent on foreign technology for their industries, and for skilled and unskilled expatriate labor. The latter have resulted in a 'demographic imbalance' where national citizens are outnumbered by expatriate residents who is not extended welfare benefits to the same degree as national citizens¹². Along with the large hydrocarbon reserves, the small national population provides explanation for the relatively high GDP per capita (43,103.3 current US\$ in 2019, World Bank 2019) in the country.

This unexhaustive introduction to the socio-economic context of the UAE, highlight the different development approaches and strategies in the UAE, as manifested by Abu Dhabi and Dubai. The disproportionate distribution of hydrocarbon reserves, the diversification strategy, and the reliance on external demand, technology and labor is characteristic for development in the UAE.

THE CONCEPT: SUSTAINABLE DEVELOPMENT

This paragraph will provide a review on the concept of 'sustainable development' in order to define what will be understood as a sustainable development of the energy consumption in the UAE. The literature on the concepts of 'sustainability', 'development' and 'sustainable development' is extensive and thus, this review will not attempt to provide an exhaustive review of the literature on the concepts¹³. Rather it will provide a review of the history of the concept of sustainable development from the Brundtland Commission in 1987 to the Sustainable Development Goals (SDGs) in 2015. The paragraph will then present the definition of sustainable development in the context of this thesis.

1. A 'HISTORY' OF SUSTAINABLE DEVELOPMENT

Sustainable development (and sustainability) have been a standard feature in the public and political discourse since the United Nations (UN) adopted the concept in a series of conventions and reports in the 1980s. The concept of sustainable development is thus a result

¹² This is because of the rentier social contract between the state and national citizens where state-financed benefits are extended to citizens by the state in return for lack of political participation and the political status quo. This will be elaborated in the theoretical framework.

¹³ For literature reviews on these concepts see for example J. Caradonna (2014) "Sustainability: A History", Oxford University Press, Mensah (2019) "Sustainable development", Purvis et. al (2017) "Three pillars of sustainability".

of the growing awareness of the global interlinkages between the socio-economic issues of inequality and poverty, increasing environmental problems and the concerns for a healthy future for humanity. Thus, the concept links the socio-economic development agenda with environmental issues (Hopwood et al. 2005; 39). The first significant use of the term 'sustainable development' was in 1980 in the World Conservation Strategy (IUCN et al. 1980)¹⁴. However, it was the World Commission on Environment and Development (WCED) in their 1987 report 'Our Common Future' (also known as the Brundtland Commission), the interlinkage between the environment and socio-economic concerns was expressed in the definition of sustainable development as meeting *"the need of the present without compromising the ability of future generations to meet their own needs"* (WCED 1987; 43). The report emphasized the need to integrate economic, environmental and social aspects and thus, sustainable development is typically presented as three interlinked circles based on the trichotomy of environment, economy and equity¹⁵. This placed the environment on the international development agenda (Kates et al. 2012; 10-12). The definition has become the most widely accepted starting point and definition of sustainable development. Additionally, the notion that present development should not be at the expense of future development have gained traction (Drexhage & Murphy 2010; 6).

The Brundtland report provided momentum for the milestone 'Earth Summit' in Rio de Janeiro in 1992, that laid the foundations for a global institutionalization of sustainable development. The key outcomes were the publication of the *Rio Declaration*, presenting principles to guide future sustainable development and *Agenda 21*, articulating an action plan for implementing the principles (Purvis et al. 2017; 684). The lack of progress in turning *Agenda 21* into actions for sustainable development lead to the 2002 World Summit in Johannesburg. However, financial resources for implementation of agreements was never mobilized and the 2002 World Summit *"failed to turn agenda into action"* (Shah 2008; 3445).

In 2000, an unprecedented step was taken by world leaders in setting concrete 2015 goals related to the priority challenges of sustainable development identified in the Brundtland

¹⁴ The strategy was published by the International Union for the Conservation of Nature (IUCN) in cooperation with World Wildlife Fund (WWF) and the United Nations Environmental Programme (UNEP) (Borowy 2013; 3).

¹⁵ The wording differs in literature but refers to the same three aspects.

report, namely poverty, education, gender, health, environmental sustainability and a global partnership for development (Kates et. al 2012; 12-13). In 2005, eight concrete Millennium Development Goals (MDG) were presented with associated targets and indicators. However, the progress and implementation were slower than anticipated (Drexhage & Murphy 2010; 8-9) and in 2012, participants at the Rio+20 conference reviewed discussions from the last 20 years since UNCED. The outcome was the decision to replace the MDGs with Sustainable Development Goals (SDG) for 2030, *“thereby returning sustainability considerations to the center of development thinking”* (Borowy 2017; 159). The MDGs provided the impetus, the vocabulary and the infrastructure for the new development goals that officially came into force in January 2016. The SDGs has a broader scope compared to the MDGs and a greater commitment to linking the socioeconomic development with the environmental context. Thus, the targets for the 17 SDGs, voiced the same aspects as advocated for in the MDGs, Summits and many already in the Brundtland report (Borowy 2017; 159).

2. DEFINING SUSTAINABLE DEVELOPMENT – A BROAD DEFINITION

The review of the history highlights the difficulties of turning the broad idea of sustainable development as a policy goal into successful policy implementation. Several critiques points to the broad consensus-based definition of sustainable development provided in the Brundtland report in 1987 as a cause of hereof. The following will present some of the debates of the concept and argue for the broad and vague definition of sustainable development as appropriate for this thesis, as it allows for the UAE to pursue a sustainable development of the energy consumption.

Acknowledging the pervasiveness of the WCED’s definition, this will be the point of departure. The WCED’s definition of sustainable development has been greatly debated and critiqued as a result of the ‘vague nature’ from the multiple definitions of the term, the ambiguities related to the many definitions, and the fundamentally oxymoronic character of the terms ‘sustainability’ and ‘development’. The vague nature of the concept, as it is defined in Brundtland, leaves a certain ambiguity in order to bridge the gaps between different ideas to meet a consensus based on compromise (Borowy 2017; 155). The all-encompassing nature of the concept allows for multiple individual interpretations which is a common critique of the

definition. The critique is that the proliferation of definitions and interpretations has limited the credibility of the concept, questions the practical applicability of the concept, and risks for it to become a meaningless catchphrase (Bolis et al. 2014; 7, Purvis et al. 2017; 685 Hopwood et al. 2005; 40). Hopwood et al. points to the fact that the ambiguity of the Brundtland definition allows *“businesses and governments to be in favor of sustainability without any fundamental challenge to their present course”*, and thus the concept is utilized to justify a number of policies and practices (Hopwood et al. 2005; 40). Thus, the vague nature and the ambiguities that follows the many definitions risks a ‘business as usual’ approach under the term ‘sustainable development’ (Purvis et al. 2017; 685). Additionally, the interpretation and implementation of sustainable development, particularly under the SDG framework, is expected to differ across contexts and countries as tradeoffs are made based on priorities and resource availability but as a part of sustainable development (Mensah 2019; 12).

Another perspective highlighted by several authors is the arguably oxymoronic nature of ‘sustainability’ and ‘development’. ‘Sustainable’ implies a relatively steady state and can be explained in descriptive terms as *“the capacity of any given system to exist and reproduce on a long-term basis”* whereas ‘development’ implies change and adds a value judgement in suggesting a desirable progress of human society (Borowy 2013; 2). Thus, the argument is that this perspective has added to the confusion surrounding the concept (Sillitoe 2014; 20-21). This critique has been met with the argument that sustainable development is the process to achieve the state of sustainability (Gray 2010; 53, Mensah 2019; 6).

While recognizing the deep debates and ambiguities (this review has only scratched the surface) about the meaning of sustainable development, the concept will in this thesis be defined as *the process* and attempts at meeting *“the need of the present without compromising the ability of future generations to meet their own needs”* (WCED 1987; 43) . The broad and vague nature of this definition is argued to be appropriate for the context of this thesis, as it allows for the UAE to pursue a sustainable development based on the specific context and priorities. Furthermore, Mari Luomi have introduced the concept of ‘natural sustainability’ in research on Abu Dhabi and Qatar and defines it as *“the use of natural resources in a way that allows for prosperity for humans and the environment, at present and*

in the future” (Luomi 2012; 3). Thus, the definition encompasses the same thinking as the definition from ‘Our Common Future’ and will in this thesis complement the concept of sustainable development to explain the energy consumption of the UAE.

CHAPTER 2: THE ANALYTICAL FRAMEWORK

The objective of this chapter is to present the analytical framework for answering the above-stated research question and sub-questions. The analytical framework will take its point of departure in the descriptions and reviews presented in the previous chapter and will comprise of the theoretical framework of late rentierism and methodological considerations regarding the qualitative case study approach. Thus, the analytical framework departs in the mapping of the development context and the case of high energy consumption in the UAE, as well as the review and definition of sustainable development. Further included in the framework, and first presented, is the theoretical framework and the tools derived from rentier state theory as presented by Hazem Beblawi and Giacomo Luciani as well as late rentierism presented by Matthew Gray. The theoretical framework of late rentierism informs the thesis and is consequently an essential element enabling the analysis, and ultimately the answering of the research question. This is followed by the methodological considerations for this thesis, including the emphasis on context specifics.

THE THEORETICAL FRAMEWORK: RENTIER STATE THEORY AND LATE RENTIERISM

“In the case of the oil-producing countries, the role of oil revenues is so overwhelmingly obvious that it can be approximated to be the cause of other activities.” (Beblawi, 1990; 87).

The following paragraphs will present the theoretical framework and related concepts that will be utilized as analytical tools and as the point of departure for answering the research question. The theoretical framework departs in late rentierism, as it is the objective to explore what challenges and opportunities the rentier structures of the state presents for a sustainable development of the energy consumption in the UAE, and the UAE is argued to be characterized as a late-stage rentier state. This theoretical approach, as presented by Matthew Gray, takes its departure in rentierism and the basic characteristics of rentier state theory (RST)¹⁶. It is argued that late rentierism enables a more nuanced approach, accounting for the classical rentier dynamics but also how domestic and external factors has impacted

¹⁶ Although RST is referred to as a theory, it does not fit the characteristics of a coherent theory but are rather a number of hypotheses on the impacts of oil on politics and development in developing countries (Hvidt 2019b; 30).

these dynamics, and consequently the political economies of the Gulf in the last four decades. However, late rentierism departs in the principles of RST and thus, a review of the main characteristics of RST is essential and will therefore be presented. This is followed by a review of essential aspects of the late state rentier in the late rentierism approach, namely the responsiveness of the state, the support for development and the entrepreneurial character of the state. Finally, the paragraph concludes with an operationalization of the theoretical concepts that will be applied throughout the paper. The operationalization will depart in the concept of structure and then operationalize the concepts of agency, interests and social contract.

1. A NEW PHASE OF RENTIERISM: FROM CLASSICAL RENTIERISM TO LATE RENTIERISM

The states in the Gulf have all experienced dynamic changes in their political economy over the last decades. Consequently, the political economy of the Gulf states today, is arguably a different type of rentier state than when the term ‘rentierism’ was first developed by Hossein Mahdavy in 1970, and later in 1987 when RST was popularized by Hazem Beblawi and Giacomo Luciani to explain the political economy of oil exporting states. There is a general acceptance of the validity of RST’s basic characteristics and its ability to explain how wealthy oil exporting states act, but the argument is that it is no longer sufficient to explain the specific political dynamics of these states as *“both the context of rentierism and its characteristics have changed”* (Gray 2011; 19). Matthew Gray therefore argues for a framework in which to understand the changing and compliant political dynamics, but with the paradoxical continuity of the basic characteristics of rentierism and the political order as presented in RST (Gray 2011; 23; 37). As it is recognized that the basic characteristics of rentierism remain relevant, a brief account of the basic characteristics of RST, as presented by Beblawi and Luciani, will be offered. This is followed by a presentation of the drivers from classic RST to ‘late rentierism’.

1.1. THE FUNDAMENTALS OF RENTIERISM AND CLASSIC RENTIER STATE THEORY (RST)

The term and concept of rentierism was first conceived by Mahdavy in 1970 in writings on Iran. It was elaborated and popularized to RST focusing on the oil-producing Arab states by

Beblawi and Luciani in 1987 in their respective chapters in *The Rentier State*¹⁷. Subsequently RST have become the dominating theory to explain the political economies and state-society relations of the Gulf, as these present as rentier states per excellence because more than 80-90% of the states' income is derived from hydrocarbons, and thus can be categorized as 'unearned income' (Beblawi 1990; 89; Hvidt 2019b; 30).

The essential aspect of RST is to analyze the effect of externally derived rents, essentially 'unearned' income, on an economy. According to Beblawi, there is a number of characteristics significant in the definition of a rentier state, that is also a rentier economy by definition. First, a rentier economy is defined as an economy where rent is predominating since there exists no pure rentier economy. Second, a rentier economy relies on substantial external rent. The externality of the rent is an important aspect as, if substantial enough, the rent can sustain the economy without a strong domestic production sector. Thus, a rentier economy is independent from the strength of the domestic production and economy. Third, in a rentier state few are engaged in the generation of the rent, in this case the extraction and production of oil, while the majority is engaged in the distribution or utilization of the rent. Fourth, in a rentier economy the external rent accrues directly to the government that controls the rent and consequently the economic power. Accordingly, a central role of the rentier state is the distribution of the wealth accrued from the rent to society (Beblawi 1990; 87-88). The consequence, as the state does not receive its income from taxes, is that it has no vested interests in building productive activities.

Luciani elaborates on the distributive role of the rentier state as he differentiates between productive and allocative states, and highlights the relationship between state and society. The important aspect is the origin of the income, domestic or external, not the income itself. The essential aspect in an allocation state is that the *"impact of oil production and exports is that they free the state from the need of raising income domestically [e.g. though taxation]."* (Luciani 1990; 71). As noted by Luciani and Beblawi, the fact that state income is constituted by externally derived rents influences the 'basic rules of political life' (Luciani 1990; 65). An

¹⁷ The chapters were reprinted in *The Arab State* in 1990 and are identical to the chapters from 1987. The reference made throughout the thesis will be to the 1990 version of the two chapters.

allocation state is economically sustained by external sources and can be defined as all states whose revenues predominately is derived from oil exports, or other rent-like sources of revenue, accruing directly to the state and whose expenditures is a substantial share of GDP. Furthermore, the predominant function of an allocation state is the allocation of rent, whereas the predominant function of a production state is production and reallocation through taxation (Luciani 1990; 70-72). Hence, Luciani's term allocation state is parallel with the above-mentioned characteristics of Beblawi's concept of a rentier state.

The most basic assumption of RST is therefore that, the state is relieved of having to impose taxation, since the state receives its income from external sources and allocates the revenues to society. This in turn 'separates' the state from having to offer concessions to society and leaves the state with a high political autonomy (Gray 2011; 1). This has created a paradigm of 'no representation without taxation' as the rentier states co-opt socio-political support by allocating wealth and benefits to society, and in return the state enjoys a relatively high degree of political autonomy in decision-making and from societal pressures and demands (Ulrichsen 2017a; 212). This is the fundamentals of the implicit 'social contract' between state and society: the state allocates the wealth in return for political passivity and lack of inclusion in the decision-making process. Additionally, Beblaw and Luciani makes the argument that the externally generated rent disrupts the economy as it decreases the productive efficiency in society, and has not created incentives for a development based on productive and diversified economic sectors and activities (Hvidt 2019b; 30). This is amplified by a particular rentier mentality where the causation between work and reward is broken. It manifests in a national workforce that seeks employment in desirable public sector jobs, cheap labor migration as a 'gift' from the state to benefit the private business community, and subsidies, among others on energy (Beblawi 1990; 87-88, Gray 2019; 41). It is further assumed that, owing to the 'unearned' characteristic of rents and the fact that benefits and welfare is distributed independent of work effort and based on citizenship, a specific mentality is created. Hence there is little incentive for citizens and society to pursue efficiency or improvement of circumstance, as they are already provided with benefits from the state (Beblawi 1990; 88).

1.2. THE DRIVERS FOR THE TRANSITION TO LATE RENTIERISM

The argument for late rentierism is based on observable and significant changes in the contemporary Gulf states from the prescriptions of classic rentierism. The idea is that these Gulf states are moving from classical rentierism, with some of the basic characteristics remaining, to a more sophisticated 'late rentierism' *"as the state has matured and new threats have emerged"* (Gray 2011; 19). Gray outlines the confluence of the impacts of globalization, new state development and economic imperatives (including a long-term perspective), population growth, employment pressures particularly from the well-educated youth, and the consciousness of oil as a finite resource. These new and arguably more complex features has changed the context and characteristics of rentierism in the Gulf and has created political pressures, placing the traditional social contract under strain (Gray 2011; 19-20). Thus, the argument is that the transition to late rentierism is driven by external and domestic factors that has changed the societies and the context of rentierism as they were when RST was developed and thus, a 'late' version has developed in the Gulf states.

1.3. SCOPE AND LIMITATIONS

Late rentierism is a theoretical approach, not a theory, that explains a particular political dynamic and strategy rather than seeking to explain the state structures as in classical RST (Gray 2019; 30). The scope of late rentierism remains a theoretical approach that seeks to explain the dynamics of the rentier state in the Gulf in recent decades (1990s, 2000s and 2010s), and does not provide any structural explanations of the political economy. As such, it accommodates the criticism of oversimplifications, the static nature and the absence of other perspectives and contexts besides oil that followed RST, by introducing a dynamic element (Gray 2011; 1-2; 10).

The argument of late rentierism, as put forward by Gray, is that rents and rentierism is central to an understanding of the political dynamics, but that RST no longer is sufficiently nuanced, detailed or adaptable enough to understand the Gulf states today. To accommodate this, late rentierism argues that *"The idea of a late rentier state has, at its core, a set of explanatory principles and shared characteristics of the rentier state of the present day."* (Gray 2011; 37). In other words, the idea of the late rentier state is based on the changes and the observable

current characteristics of the rentier states in the Gulf today. Thus, the theoretical approach of late rentierism is able to provide explanatory insight to a specific phase of rentierism in the rapidly changing Gulf. However, this also highlights the limitations of late rentierism, as this approach is dynamic and departs in what is observable at this moment and current context (Gray 2019; 34).

2. LATE RENTIERISM: THE LATE-STAGE RENTIER STATE

As mentioned above, late rentierism takes its departure in rentierism and the basic characteristics of RST but accounts for the new requirements for a more nuanced, engaged and complex approach the rentier states of the Gulf are facing. Matthew Gray argues for a framework in which to understand the changing and adaptable political dynamics but with the paradoxical continuity of the basic characteristics of rentierism and the political order, as presented in RST and the paragraph above (Gray 2011; 23; 37). In doing so Gray presents essential aspects that distinguishes the late-stage rentier states of the Gulf at this 'phase', namely the responsiveness, the support for development and the entrepreneurial character of the state. The following sections will present late rentierism with the departure in Gray's text from 2011 'A Theory of 'Late Rentierism' in the Arab States of the Gulf'.

2.1. A RESPONSIVE STATE

The first aspect relevant is the responsiveness of the state including the relationship between state and society and the role of globalization. Important to mention is that, like the basic characteristic of rentierism/RST presented above, the state still hold some degree of autonomy as they are not dependent on income from the domestic economy (no taxation) and as long as they keep their part of the social contract (Gray 2011; 5-6, Beblawi 1990; 87-88, Luciani 1990; 71-72). However, the argument in late rentierism is that although the rentier state is still non-democratic, it is not completely autonomous from society but must be responsive to basic societal needs. As a result of new threats emerging, the late-stage rentier state acknowledges "*the need to appear open to change, and in a more concrete sense to actually be somewhat responsive...*" (Gray 2011; 25). Thus, the late-stage rentier state must be prepared to introduce reform but has the possibility to make the legislation or reforms relatively weak. This duality of *appearing* and *being* enables the rentier state to appear

inclusive and consulting with society while serving the practical aim of maintaining the political status quo, as the state only is responsive in instances where the primary concerns of society is impacted by policy (Gray 2011; 23; 25).

According to late rentierism, the state is more responsive to the new social pressures, such as globalization, new technology and the realization of oil as a finite resource, for reform and development, than classic RTS claims. Significant aspects that creates current social pressures on Gulf states is, among others, the insecurities related to the prices and the longevity of oil, as well as the demography and particularly the gap between educated national youth and good well-paid jobs (Gray 2011; 19, Ulrichsen 2017a; 211). Consequently, the argument is that there is more to the state-society relationship than a one-directional economic-allocative link as presented in RST, and that the late-stage rentier state does exercise agency and has developed a more nuanced approach to society and policy making (Gray 2011; 25, Hvidt 2019b; 33). However, the state is still neo-patrimonial, and the power is confined to the ruler and carefully managed elite relationships thus, maintaining the states largely autonomy over political decision-making.

Another important aspect the state needs to be responsive to is the impact and dynamics of globalization as it presents challenges of societal and political pressures, and opportunities for external investments (FDI). The argument is that the paths of globalization and the impacts on the political economies are evolving differently but nevertheless presents a political appeal for the late-stage rentier states in the Gulf, to make a selected globalized economic opening although cautiously as to ensure that the authority of the state is not undermined. An illustrative example of the globalizing late rentier is the UAE, with Dubai's response to globalization as the most progressive (Gray 2011; 25-26). Dubai has developed into a key regional trade and transport hub as well as an attractive business and tourist destination. The emirate has ultimately developed a diversified economy with the aim to develop rent-like income and rentier-like characteristics in a predominately non-oil economy, known as the 'Dubai model' (Gray 2011; 26-27, Hvidt 2009). Others in the Gulf has to some degree adopted or rejected this model as it presents a prominent change in strategy and envisions a different

role for hydrocarbons in the economy (Hvidt 2013; 33). The recent diversification in Abu Dhabi suggests that the emirate has to some degree adopted the model.

2.2. A STATE IN PURSUIT OF DEVELOPMENT

Another essential aspect is an active economic and development policy that are energy-driven rather than energy-centric. The argument presented by Luciani and RST is that the state's autonomy made it unnecessary to engage in economic strategy or economic activities beyond the allocation of rents (Luciani 1990; 86). This however is currently not the case, as the Gulf states has both economic policies as well as development policies and plans, actively aimed at creating predetermined outcomes. Thus, the late-stage rentier state of the Gulf are active and strategic actors exerting agency (Gray 2011; 28). Furthermore, they have ambitious socioeconomic development plans and has consequently developed a comprehensive set of policies (trade, economic, finance) related to these plans. These development plans are argued to be pursued not only as part of the state's survival strategy but that the state also *"seeks out development opportunities because of the rentier-like political outcomes [and income] that may accompany economic development and diversification."* (Gray 2011; 29). Thus, politics underlies these plans as they are seeking predetermined outcomes that are politically beneficial to the state. (Gray 2011; 28-29). However, the late rentier state does not have one single development model behind it, as it is difficult to transfer any model to the different economic, political and cultural contexts in the Gulf states. Rather, it is characterized as hybridist, with flexibility and adaptability as favorable aspects to the development plans and models adopted by the late-stage rentier state (Gray 2011; 30). The late-stage rentier state is therefore an active actor, with an active and strategic economic and development agenda that are supported by external rent. Like the East Asian developmental states seeking to 'catch-up' to colonial powers as a central motivation, the Gulf states has engaged in an ideological 'from nothing to something' catch-up thinking, with a resemblance, particularly in Dubai, to the developmental states of East Asia (Hvidt 2009; 398-399).

The economy and the development in the Gulf have been, and still is, dominated by oil with a large percentage of the GDP and export revenues from hydrocarbons and therefore the economy and development has been centered around energy with diversification attempts

and welfare initiatives financed by oil rents. A defining aspect however, of the late rentier economies and the policies of the late rentier state, is that it is 'energy-driven'. In other words, while oil income still dominates the economy in the majority of Gulf states, the revenues are utilized with more consideration for policies that promote economic diversification. Such 'energy-driven' policies focus on oil-related sectors in order to benefit from comparative advantages and are *"aimed at catching more opportunities deriving from the oil and gas sector"* (Gray 2011; 31). Consequently, it is assumed that the state-owned enterprises will be operated efficiently in order to maximize the opportunities derived from oil and thereby the income earning capabilities for the state. Late rentierism thus point to the hydrocarbon sector, the energy sector, as providing funds for investment in other sectors and thus funding *"a state-led but efficiency-conscious diversification that is very different from the previous one a generation ago."* (Gray 2011; 31). The strategic investments in socioeconomic development initiatives has been driven by the revenues from the energy sector and thus, the late-stage rentier state has transitioned from simply being 'energy-centric' to strategically utilize the energy sector to drive diversification and development.

2.3. AN ENTREPRENURIAL AND STRATEGIC STATE

In addition to the abovementioned aspects, the state in late rentierism is more entrepreneurial, strategic and long-term thinking in its pursuit of ensuring regime survival and socioeconomic development. As in RST, late rentier states are principally state capitalist and the most powerful actor in the economy with autonomy over certain sectors, including the energy sector, and the power to regulate the private sector. However, the state capitalism in the late-stage rentier state in the Gulf is argued to be more entrepreneurial as *"the state has been an activist and ambitious actor keen to engage economically with the outside world."* (Gray 2011; 32). Thus, this new state capitalism is defined by states having strategic goals and visions, focus on tertiary sectors of the economy and prioritizes investment attraction and export-led growth. In other words, the focus of the state capitalism is more strategic and entrepreneurial in that it actively seeks to develop opportunities that achieves both economic and political goals. What is furthermore considered to be characteristics of this new state capitalism in the Gulf is more efficient operations of state-owned oil companies and the management of hydrocarbons as strategic assets, for political goals such as regime

maintenance and branching out to other sectors of the economy. Thus, highlighting the fact that these states are still inherently rentier but is more strategic and entrepreneurial in maintaining the rentierism. Additionally, this new state capitalism is favoring state-supportive private sector actors, mainly firms operated by the elite, and creates a prosperous business and investment environment, as long as it does not challenge the political authority of the state (Gray 2011; 32-33).

An important driver for the new state capitalism and development focus is lessons learned. Gray argues that the late-stage rentier state has learned from previous experiences and strategically utilizes lessons learned. Hence the late-stage rentier takes the uncertainty of oil prices and the finite nature of the resource into account when planning for the long-term survival of the regime. An example to accommodate this is a strategically managed economic diversification, as part of the new state capitalism and development plans that focus on longer-term political, societal and economic needs (Gray 2011; 34).

The entrepreneurial characteristic of the state in terms of the state capitalism also extends to innovative foreign policy initiatives of the late-rentier states in the Gulf. Late rentierism argues that while the traditional foreign policy agenda of seeking strategic relationships with the international powers has been the strategy for many decades, a new set of innovative dynamics has been added to this strategy (Gray 2011; 35). Gray highlights how especially soft power initiatives aimed at potentially attracting and creating stronger trade and investment ties, has become part of the late rentier states foreign policy. Furthermore, soft power and branding plays an important role in raising global awareness in foreign policy, the business environment, but also as tourism destinations and hosts to international events. Hence, soft power and branding initiatives *“have become core strategic elements of the late rentier state’s development and diplomatic postures.”* (Gray 2011; 36). The argument is that the late rentier states recognizes the importance of foreign relations and external linkages in order to ensure the long-term survival of the state and its long-term economic basis.

3. OPERATIONALIZATION

This paragraph will provide an operationalization of concepts from late rentierism, relevant to the analysis of the challenges and opportunities for a sustainable development of the energy consumption in the UAE. The operationalization departs in the concept of structure, explicitly rentier structures, as a point of departure for the operationalization of the concepts of agency, interests and social contract, that will constitute the theoretical toolbox.

As mentioned, the concept of structure is significant and will serve as a point of departure for the other concepts, as it is assumed to provide the frame in which the other concepts are understood/condition the other concepts. The concept of structure is defined closely to the elements of a rentier state presented by Beblawi in the previous paragraphs. Thus, *structure* or *rentier structure* refers the rentier elements of externally derived rents as income accruing directly to the state, a state autonomy from the domestic economy, the primary function of the state is distribution/allocation of rent wealth to society and this as ensuring the political autonomy of the state. The concepts of agency, interests and social contract are born out of the rentier structures in the Gulf states and thus, these concepts have explanatory value separately but is enabled and understood by the structure. Agency will refer to the late rentier state's will and ability to make decisions and to implement these decisions. Agency is considered to be conducted under the opportunities and restraints of the rentier structures and to be guided by the interests or objectives of the state. Hence, the concept of interests is related to the concept of agency and refers to the drivers and rationale behind the states decision-making. These are conditioned by a number of things, including the rentier structures as well as both domestic and external socioeconomic aspects and will be utilized to understand the agency of the state of the UAE's decision-making on sustainable development of the energy sector. The concept of the social contract is understood as a political tool to obtain the political objective of regime survival (the political status quo), thus making it politically sensitive. The social contract is a product of the rentier structures. Within this concept the focus will be on subsidies, namely on energy, as an important part of redistributing rents under the social contract between state and society to ensure regime survival and the political status quo. The concept is directly attracted to the rentier state and will be utilized to understand the energy consumption in the UAE.

These concepts: structure, agency, interests and social contract will provide the theoretical perspectives in which the challenges and opportunities for a sustainable development of the UAE's energy consumption will be analyzed, as the UAE is characterized as a late-stage rentier state.

THE METHODOLOGICAL CONSIDERATIONS

The objective of this thesis is to present the challenges and opportunities for a sustainable development of the energy consumption in the UAE and in order to do so, the qualitative case study has been chosen as the approach. The UAE are chosen as a case and will be analyzed with a point of departure in the theoretical framework of late rentierism. The case study is chosen as this thesis is concerned with the *"complexities and particular nature"* of a specific case. The case is the object of interest in its own right and the aim is to elucidate the unique characteristics of the specific case (Bryman 2012; 66-69).

The case study is further characterized as a qualitative study, emphasizing the importance of context and detail *"because of their significance for their subjects and also because details provide an account of the context within which people's behavior takes place"* (Bryman 2012; 401). This is due to the understanding that behavior cannot be understood in other ways than in terms of the specific environment in which they operate. Hence, the study is theory informed as the theory provides the basic assumptions about, and tools to understand, the environment. Thus, as the aim of this study is to present the context specific opportunities and challenges for a sustainable development of the energy consumption in the UAE, it is relevant to emphasize context. Furthermore, particularly among the Gulf states there are some structural similarities, such as their autocratic monarchies and continued dependence on externally generated revenues from hydrocarbons, but there are evident divergences and differences in behavior among states that strongly influences their individual domestic political, social and economic context (Loumi 2012; 2-4, Zaidan et al. 2019; 671). Hence, while there are studies that focuses on the structural similarities in the region, this study argues that it is relevant to emphasize the unique domestic characteristics of each of the Gulf states. Consequently, the rationale for choosing this particular case is the understanding that it is a

unique case due to the political, economic, and historical context (Bryman 2012; 71, Ulrichsen 2017b; 10).

The empirical data utilized will consist of different types of documents. These will include 'official' documents deriving from the state, published on the website of the government in the UAE, 'private' documents deriving from individuals, organizations and non-state actors primarily academic literature and other research, and internet articles (predominately Gulf-based or national webpages) (Bryman 2012; 543-554). These documents will be complemented by statistics on energy and energy consumption preferably derived from international organizations and agencies when available.

As the ambition of this thesis is to provide explanations and understandings which is limited to the specific case of the UAE, it does not aim to make broader generalizations. Furthermore, the choices related to the methodological considerations, the empirical data, the theoretical framework, and the reviews of the context, case and concepts that comprises the analytical framework, are determining for the analysis and consequently the conclusions to be drawn. Nevertheless, these are chosen based on the understanding that it will provide important perspectives on the challenges and opportunities for a sustainable development of energy consumption in the UAE.

CHAPTER 3: THE CHALLENGES AND OPPORTUNITIES FOR A SUSTAINABLE DEVELOPMENT OF THE ENERGY CONSUMPTION IN THE UAE

This chapter comprises the analysis and the primary objective of this chapter is therefore to examine challenges and opportunities for a sustainable development of the energy consumption in the UAE. This will be informed by the theoretical framework of late rentierism, as it outlines the specific context of the political economy of UAE assumed to be determining for the challenges and opportunities related to a sustainable development of the energy consumption. The analysis takes its point of departure in the fundamental assumptions that maintaining the political status quo is driving decision-making in the late rentier state of the UAE. It is further assumed that the rentier structures have impacted the political economy by creating structures and behaviors that leads to a high energy consumption.

The analysis will be structured according to the three sub-questions presented earlier. Thus, the first question analyses the demand side of energy consumption, emphasizing the role of subsidies, the social contract, and distorted price signals that places the UAE's energy consumption on a path that locks-in wasteful and inefficient consumption. The second question offers perspectives on the supply side of consumption, as it is understood to greatly impact a sustainable development of energy consumption. This question analyses the interests and agency of the UAE as a late rentier for 'greening' the energy supply and implementing clean energy in long-term development plans and projects such as solar- and nuclear energy. The third question concludes the analysis, and considers perspectives and findings of the two previous questions in relation to the approach for 'greening' the high energy consumption and low efficiency in the built environment.

QUESTION 1: A PATH OF UNSUSTAINABLE ENERGY DEMAND

The UAE has one of the highest energy consumption per capita in the world and the main factors for this high consumption includes low, subsidized pricing of energy, rapid economic growth, improved living standards and the harsh climatic conditions (Krarti & Dubey 2018; 14). This working question analyzes the rentier features in relation to energy consumption by focusing on the demand side of the energy dilemma and the role played by energy subsidies.

The argument is that subsidies, and the strategic political and economic rationale behind subsidies, have enabled and incentivized a wasteful and inefficient consumption of energy, particularly of electricity, and placed the UAE on an unsustainable consumption path. The high consumption has in turn placed significant financial pressures on the state funds, potentially effecting the economic ability and potential for initiatives that contributes to a sustainable development of the energy consumption in the UAE (Afshari et al. 2014; 453).

Thus, this section seeks to answer the question: *How has the rentier state's decision to subsidize energy placed the UAE on a path of inefficient consumption and wasteful demand behavior?* This will be done by first presenting the factors impacting energy demand in the UAE. Second by looking at the economic and political rationale for subsidies on energy in the late rentier state of the UAE, and the subsequent path dependence¹⁸ this has created. Third, structural and behavioral aspects of the path dependency and incentives, with emphasis on the role of pricing, will be presented and provides perspectives on the lock-in of high energy consumption in the UAE. The perspective of reforms on subsidies in the UAE concludes this paragraph.

1. FACTORS EXACERBATING DEMAND IN THE UAE

There are several factors in the UAE, besides energy pricing, that affects the demand for energy. The UAE have experienced a significant growth in population and economic growth which expectedly will have the effect of an increased demand for energy as there simply are more people that can afford to spend more on energy. Moreover, there are other structurally determined factors that presents as exacerbating factors for demand in the UAE, namely the hot and humid climate and the water scarcity in the emirates (Krane 2019; 73-76).

1.1. POPULATION AND INCOME GROWTH

Population growth in the UAE has been a significant factor for energy demand. The population in the UAE has increased from 277,471 in 1971 to 9,770,529 in 2019, an annual growth rate of 1.4 %. Furthermore, the urban population in the UAE has likewise increased to 8,479,744

¹⁸ Path dependency is understood as the notion that 'history matters' and therefore the contextual features of a given situation is constrained or determined by past decisions and events (Hall & Taylor 1996; 941). In other words, decisions and events in the past will create a path that determines current options.

in 2019 (World Bank 2019). The growth in population is a result of an influx of expatriates to accommodate the economic development, higher birthrates, and better health care (as part of the welfare state scheme) (Krane 2019; 74). The economic growth and drive for diversification in the UAE have increased the general need for labor. The construction boom and the growth in the tourism and services sector, among others, provided economic demand and opportunities for expatriate workers. As a result, the expatriate population constitutes 88.4 % of the total population in the UAE in 2015 (World Bank 2019). Naturally, more people will result in a rise in demand of energy as nationals and expatriates share a collective mindset that produces a naturally unsustainable energy consumption (Luomi 2012; 28-29). The economic growth in the UAE has also presented a rise in the individual income, as rent is distributed to its citizens, and the rise in individual income is another key factor for energy demand growth. Per capita GDP in the UAE has grown at an average of 0.2 %. GDP per capita in the UAE in 2019 was \$43,103.3 in current US\$ (World Bank 2019). With a rise in income people are expected to purchase more fuel and energy services as well as energy-consuming devices. In other words, more money creates the demand for more energy which in turn *“has compounded the effect of rising population”* (Krane 2019; 74).

TABLE 1. Population, urban population and GDP per capita

	Population, total	Population growth (annual %)	Urban population	Urban population growth (annual %)	GDP per capita (current US\$)	GDP per capita (annual %)
1975	548,301	16.0	373,026	16.9	26,847.8	N/A
1980	1,019,509	9.0	822,846	9.2	42,764.5	13.2
1990	1,828,432	5.8	1,445,394	5.6	27,729.5	11.7
2000	3,134,062	5.5	2,514,646	6.0	33,291.4	4.9
2010	8,549,988	7.7	7,189,428	8.1	33,893.3	-5.9
2019	9,770,529	1.4	8,479,744	1.7	43,103.3	0.2

Source: “World Development Indicators” interactive dataset (Washington: World Bank, 2019), <https://databank.worldbank.org/source/world-development-indicators>

1.2. DESERT CLIMATE AND WATER SCARCITY

The emirates of the UAE are located in one of the most climate stressed regions and the effects of the modern habitation in the hot and humid climate have encouraged a high energy demand, particularly the use of cooling. In combination with the rise in income and

population (a large proportion of these being expatriates) the preferences of UAE residents have changed, and enabled residents to accommodate the desert climate with air conditioning and cooling in swimming pools (Krane 2019; 74). Furthermore, the absolute water scarcity¹⁹ in the UAE presents an additional exacerbating factor for the energy consumption. The UAE is reliant on the availability of cheap energy (oil and gas) to power the more than twenty-five energy-intensive desalination plants in the UAE that produce freshwater to meet the domestic water demand (World Bank 2018; 171). As such, the basic need for water is more directly tied to energy consumption in the UAE and distorts the perception of water availability due to the desalination and subsidization of water (Krane 2019; 75, Luomi 2012; 26).

The combination of these factors: growth in individual income, a significant increase in the population and the less than optimal living conditions provided by climate and water, has exacerbated the demand for energy in the UAE. However, the fact that energy is offered at low, subsidized prices, is arguably the most significant factor for the high rates of energy demand (Krane 2019; 75), as this has incentivized 'energy wasteful' tendencies and behavior as well as inefficient choices regarding industries and infrastructure.

2. DEFINING SUBSIDIES – THE PRICE-GAP APPROACH

The definition of subsidies differs among the major international organizations and there is not a commonly agreed upon definition (Fattouh & El-Katiri 2012; 11). The IEA defines subsidies as: *“any government action that concerns primarily the energy sector that lowers the cost of energy production, raises the price received by energy producers or lower the price paid by consumers”* (IEA 2006; 1) and OECD as: *“any measure that keeps prices for consumers below market levels”* (UNEP 2008; 11). The most applicable definition for this thesis is the 'price-gap approach' that compares the domestic selling price and the exportable selling price against a certain reference price²⁰. The gap presents the opportunity cost of subsidies (Krane 2019; 57). Consequently 'low-priced energy' will refer to prices set below international market prices. As rent are defined by economists as: *“the difference between the market price*

¹⁹ Absolute water scarcity is *“defined as less than 500 m³ of available renewable water resources per capita per year”* (Luomi 2012; 26).

²⁰ In this case the reference price is the international market price (as opposed to the cost of production).

of a good or factor of production and its opportunity cost" (Cammett et al. 2015; 45), it is relevant for the purpose of this question to choose a definition focusing on the opportunity cost. Given the scope and focus of this working question, this definition is chosen for the simplicity it offers and the inclusion of the opportunity cost, while also recognizing that it is not a perfect measure²¹.

3. THE (RENTIER) RATIONALE FOR SUBSIDIES

The rationales for subsidizing energy in the UAE are closely related to the rentier structures. First and foremost, it is the energy advantage enjoyed by the UAE, due to its large hydrocarbon reserves, that has enabled the emirates of the UAE to set the domestic price on energy, electricity, transportation fuel and water²², below international market levels (Charles et al. 2014; 1). The UAE leadership's utilization of energy subsidies for the past four decades has greatly impacted the pricing system and played an important role for the state in meeting its policy interests (Fattouh & El-Katiri 2012; 7). Furthermore, since energy plays an essential role in the economic and social development in the UAE, and because the large energy reserves have become closely interconnected with the political survival strategies as part of the social contract, it provides the state with arguments for subsidizing energy prices (Fattouh & El-Katiri 2012; 7, Luomi 2012; 26). The focus will be on rationales for subsidies to meet the interest of political stability and economic development and diversification. First, the arguments for subsidizing energy is to provide a comparative advantage in the economic development and diversification is presented. Second, the rationale of subsidies, extended as part of the social contract and as a tool to maintain political stability and ensure the interest of regime survival will be provided.

The overall economic rationale for energy subsidies in the UAE has been to meet the interests and objectives set forward by the state in long-term development plans of economic growth and the diversification of the economy (Charles et al. 2014; iii). Arguably, a significant

²¹ For additional perspectives on defining and measuring subsidies see for example Fattouh & El-Katiri 2012, Charles et al. 2014.

²² Most of the water in the UAE is produced by the energy-intensive desalination processes. Thus, water is an energy commodity in the UAE.

economic rationale for subsidies is to provide the manufacturers²³, energy-intensive industries, financial firms and other commercial companies in the UAE with a comparative advantage of cheap energy. The development of the hydrocarbon sector (downstream, midstream and upstream) in the UAE and the development of energy-intensive industries, primarily in oil-rich Abu Dhabi, particularly benefits from energy subsidies. Since energy subsidies are in-kind resources²⁴, the industries where energy constitutes an important element of the intermediate cost, are presented with a lower production cost, thus providing them with a comparative advantage (Fattouh & El-Katiri 2012; 14). This fact has incentivized the development of energy-intensive industries favoring a development of cement, aluminum, fertilizer, and petrochemicals industries (Fattouh & El-Katiri 2017; 66). The rationale of subsidies also extends to the state's interest of diversifying the economy. The cheap energy has likewise provided a comparative advantage in the diversification process into other sectors, including energy-intensive service sectors such as logistics, real estate and tourism. More specifically the economic rationale behind energy subsidies is the encouragement of affordable consumer prices on goods and services; to help protect the local industries from foreign competition; and to enhance export competitiveness as pointed out by Bassam Fattouh and Laura El-Katiri (Fattouh & El-Katiri 2012; 14). Furthermore, the creation of FTZ's indicates that subsidies on energy also plays a role in attracting foreign business and investment. In a broader perspective, energy subsidies provided to industry and business in the UAE, is part of the industrial and economic development and diversification planning (Fattouh & El-Katiri 2012; 14) and the utilization of the hydrocarbon advantage in creating an 'energy-driven' economy. Furthermore, the economic growth following the hydrocarbon industry called for a comprehensive and rapid structural development of infrastructure and service, industry, and residential buildings in the UAE. The subsidization of energy allowed the developers to cut costs on material and make decisions on planning without regard to energy utilization (Krane 2019; 79). Thus, the economic development and diversification rationale behind energy subsidies is to boost the economic development underway by providing the new sectors and industries with the advantage of cheap energy. Thus, there is an argument to be made for subsidies to provide the comparative advantage

²³ Manufacturing sectors are mainly either oil-based such as fertilizer or petrochemicals or import substitution industries such as construction (Beblawi 2010; 186).

²⁴ In-kind resources are exportable commodities.

that allowed the UAE to 'catch-up' in economic and development terms. However, the result was that development and the economy became dependent on the availability of subsidized energy.

Additional to subsidies boosting the economic development already underway in the UAE, energy subsidies became a political tool to allocate the state wealth to society and citizens (Krane 2019; 59-60). The allocation of in-kind resources by the means of subsidies was incorporated by the state into its social welfare practices (Krane 2019; 65). The low domestic energy prices have historically formed an important element of the unwritten social contract, in which the state compensate society for their lack of political influence by providing subsidies and other welfare benefits to the citizens. Thus, it is the social contract that underpins the state and as such, energy subsidies play an important role in the state-society relationship. The rationale is that the state is provided a degree of political stability because energy subsidies 'buys off' society, and because an introduction or increase in subsidies require relatively little administration, it can rather quickly be initiated to alleviate popular dissatisfaction (Fattouh & El-Katiri 2017; 59, Fattouh & El-Katiri 2012; 15). Thus, the energy subsidies, widely perceived as a social and economic benefit, plays an important role in the state's political interest of regime survival. However, the implications of the social contract and the expectations of subsidies once in place, have locked-in subsidies and a relatively inflexible pricing system in the UAE (Charles et al. 2014; 9), highlighting the *"easy to hand out, much tougher to retract"* nature of subsidies in the UAE (Krane 2019; 62).

4. THE LOCK-IN OF HIGH ENERGY CONSUMPTION

The rationale of subsidies to meet the objectives of political stability and economic development and diversification have locked-in the political economy of the UAE onto a path of high energy consumption. The argument is that while the political and economic interests of the rentier state are partly met by the subsidization of energy in the short-term, the current pricing policies are presenting a long-term challenge as it incentivizes, facilitates and 'locks-in' a path of high domestic energy consumption. Fouquet points to the fact that energy systems are subject to path dependency owing to technological, behavioral, infrastructural and institutional lock-ins. From the very start, the development of the UAE has depended on,

and enabled by the availability of cheap hydrocarbons, which in turn resulted in heavy investments in technologies, behavior, infrastructure and institutions that was anchored in hydrocarbons as the energy system. Thus, a 'lock-in' of high energy consumption refers to the commitment to specific technologies, infrastructures, behaviors, and industries for a medium and/or long timeframe due to the heavy investments required. This locks an economy onto a specific consumption path (Fouquet 2016; 1). An example of a lock-in is the decision to prioritize export of oil and consequently rely on imported natural gas for electricity generation. The heavy investments made in infrastructure and technology to support this decision ultimately locks-in natural gas as the source for electricity generation. Changing this path would require additional heavy investments. The subsidies provided by the late rentier state of the UAE play, according to Fouquet, "*a critical role in placing economies on energy-intensive pathways*" that are likely to be unsustainable for the economy in the long-term, as it increases the vulnerability of the economy to political pressures and the price volatility of energy (Fouquet 2016; 3-4). As such, the low, subsidized price of energy set by the state, provides a significant explanatory perspective for the high energy demand and subsequent consumption in the UAE. Thus, it is argued that decisions made in the development process of the UAE, particularly the subsidization of energy, have incentivized and favored investments in technologies, behaviors, infrastructures and industries, that are energy intensive based on the assumption of available and subsidized energy. This have created an unsustainable path for energy consumption in the UAE.

The lock-in implications of hydrocarbon dependence and the social contract have, according to Luomi, produced a pattern of 'natural unsustainability'²⁵, which is a dynamic built-into the rentierism of the contemporary political economy of the UAE (Luomi 2012; 3; 26). The essential role played by hydrocarbons in the rapid socio-economic transformation to modern states in the UAE, has affected the way in which energy plays an important role in the state-society relationship (Fattouh & El-Katiri 2017; 66). In other words, the dependence on energy subsidies (financed by rents), to meet the political and economic objectives, has contributed to an energy extreme path in the UAE in which the energy consumption is naturally unsustainable (Luomi 2012; 26). This path is "*determined by growing 'energy wasteful'*

²⁵ See 'The Concept' on p. 17 for a definition of natural sustainability.

tendencies influenced by the demographic, living patterns and lifestyle of society on one hand, energy inefficient consumables and products on the other, as well as cheap and subsidized energy supplies” (El-Saddik 2015; 18). These are primarily driven by low-cost and subsidized energy. Luomi argues that energy subsidies *“has come to form practically insurmountable barriers to energy efficiency, to using cleaner energy sources, or to incentivize energy... conservation”* (Luomi 2012; 26). The short-sighted energy policies driving development was less problematic when the energy consumers were fewer and had lower income. Today, energy consumption has grown beyond the ‘expected’ growth following economic and population growth. The low-priced energy has, over time, locked-in the energy consumption in the UAE onto an unsustainable path (Fattouh & El-Katiri 2017; 66, Krane 2014).

4.1. THE STRUCTURAL LOCK-IN: THE ECONOMIC DEVELOPMENT AND DIVERSIFICATION

The economic development and diversification in the UAE over the past four decades have been achieved at an unprecedented pace, enabled and defined by the hydrocarbon endowment and the establishment of a subsidized energy system. The consumption of energy is argued to be locked onto an unsustainable path, as the subsidies and availability of cheap energy have influenced the development and diversification of the economy in an energy-intensive direction (Fattouh & El-Katiri 2017; 66). In the emirates of Abu Dhabi and Dubai, the cheap energy provided by subsidies have incentivized economic models based on energy-intensive industries and energy-intensive service sectors such as tourism, transport, trade, and real estate, significantly adding to the energy demand (IRENA 2016; 31).

The assertion is, that the state-funded economic diversification has created a lock-in of energy-intensive economic structures in the UAE based on the comparative advantage provided by cheap, subsidized energy. The subsidization of energy incentivized the economic diversification in the UAE into energy-intensive industries and service sectors. This in turn encouraged the kind of growth in construction and development of infrastructure that is energy-intensive and with no concern for efficiency, to underpin and support the diversification (Krane 2019; 65). An additional argument is that the diversification into energy-intensive industries and service sectors becomes more unsustainable due to the rentier structures of the UAE, namely the dependence on externally generated state income. Thus,

the economic model in Dubai is based on hosting of the expatriate community that utilizes state-owned service providers such as housing, transport, electricity and water, and so forth. The lock-in of these arguably makes the economic structures more unsustainable. Essentially, the economic basis for the state, the service sectors, is locked onto an unsustainable path due to the high energy consumption of such services. The same argument is valid for Abu Dhabi, as the economic basis is the export revenues from energy-intensive industries such as petrochemical and aluminum products; the hydrocarbon industry which is an energy-intensive activity in itself²⁶; and the diversification and development of new economy sectors including real estate and tourism (Davidson 2009; 69-80). Altogether, this makes the emirate economically dependent on high energy consumption.

Furthermore, the demand structure that governs energy behavior in the UAE is also determined by the rentier structures and the economically irrational pricing of energy. The UAE has as energy exporters²⁷ experienced an increase in demand and reduced efficiency at times of high international oil prices, as the windfall profits pressures rulers to share the extra wealth. This is done in a way that exacerbates demand for energy and increases the per capita consumption – e.g. by increasing the individual income through government salaries, social spending and investing in infrastructure development. The expansionary policies at high international prices makes the leadership in the UAE more dependent on external rent to fund these policies, thus making them more dependent on hydrocarbon revenues. However, consumer price of energy is maintained at a low, subsidized price (Krane 2019; 5, Fattouh, Moerenhout & Sen 2016; 5). This means that high international oil prices *“incentivizes wasteful energy consumption... because residents receive different signals [due to government spending] than those that moderate consumption elsewhere”* (Krane 2019; 5). Hence, the subsidization of energy does not instill in consumers a clear understanding of the actual value of energy.

²⁶ The energy sector in itself is a high energy consumer. In example, natural gas is utilized in oil fields for reinjection and enhanced oil recovery, in order to maintain production levels (Luomi 2012; 34-35).

²⁷ The UAE are also energy importers as they import natural gas to meet domestic demand. However, as it is the state that yields the expense as little of the cost is transferred to the consumers.

4.2. BEHAVIORAL LOCK-IN: WASTEFUL BEHAVIOR, INCENTIVES AND DISTORTED SIGNALS

An important perspective on energy consumption in the UAE is the behavior of consumers and the misperception of the value of energy due to distorted price signals from low, subsidized prices. This has created a behavioral lock-in of wasteful energy tendencies and consumption (Fouquet 2016; 2). There are a number of aspects that are regarded as relevant in influencing the behavior of consumers in the UAE, providing explanatory value for the wasteful demand habits and consumption. Thus, the following paragraph will look at the influence of low, subsidized prices on demand and the incentive structure for energy use, including the impact of a distorted price signal on consumer behavior.

Basic economic theory assumes a correlation between price and demand. The argument here is that subsidies on electricity, transportation fuel and water provide distorted economic incentives as they encourage a high consumption of energy. The argument is that subsidies creates a distorted price signal that in turn incentivizes a wasteful and inefficient behavior of high demand and consumption. Krane points to three important ways energy prices affect behavior: first, price influences the decisions made by consumers regarding how much energy to purchase. At low prices consumers are likely to purchase more *“sometimes deliberately, sometimes through careless behavior”* (Krane 2019; 75). Low prices allow consumers to buy more electricity for air-conditioning, transportation fuel for personal vehicles, and water to green gardens in the desert cities. Second, and more indirectly, price influences the purchases of energy-consuming appliances and equipment, and the efficiency of these. There are little, if any, incentives present to replace or purchasing energy efficient vehicles, air-conditioners, washing machines etc., if the price of utilizing these are low because of low energy prices. Third, price influences how often or how much consumers will utilize and operate energy-consuming appliances and equipment. Low prices allow consumers to utilize appliances and equipment, such as air-conditioning and personal vehicles, more and for longer periods. The utilization of energy-consuming appliances and equipment are less costly for the consumer at low energy prices, and wasteful consumption, such as letting air-condition run at home while at work, is therefore incentivized (Krane 2019; 75-76). Thus, the subsidized energy prices influence the basic consumer decisions regarding how much, what kind and how often to consume energy. The influence of the rent-financed subsidies *“have created wasteful*

consumption practices and mentalities” (Luomi 2012; 26) and provides no economic incentive for consumers to change behavior.

The ‘business as usual’ expectation of cheap energy is highly embedded in the unwritten social contract between state and society and impacts the value of energy since subsidies on energy are widely perceived as an expected economic and social benefit. The subsidies in the UAE are arguably maintained for political interests rather than economic ones, as the standard of living and the economic growth have rendered subsidies on energy economically unnecessary (Fattouh & El-Katiri 2017; 66). However, the subsidization of energy provides consumers with a price signal that does not reflect the actual costs and has distorted the perception of energy’s value among consumers in the UAE. Since energy is offered so inexpensively to consumers, the general perception is that it is inexpensive to produce. In reality the production of electricity is highly dependent on imported natural gas, and water desalination requires fossil fuel that otherwise could have been exported (Gallaher et al. 2017; 2). Furthermore, the irrational price signals and the assumption of cheap production has allowed “*consumers to use energy without concern for efficiency or the environment – or really without much thought at all*” (Krane 2019; 76). This leaves the consumers with little incentives for changing their demand behavior. The mismatch between the dependence on hydrocarbons for economic and political objectives and the valuation and utilization of energy by consumers has left the leadership of the UAE under fiscal pressure. The wasteful energy behavior and unsustainability of the fiscal aspect of subsidies are difficult to change as the demand behavior is locked-in and wasteful behavior is incentivized by the low and irrational pricing.

5. REFORMING SUBSIDIES

The description of energy subsidies provided up until now have indicated that they are static and inflexible. As presented above, energy subsidies have become significantly embedded in the social contract in the UAE and as a consequence, it has become politically and economically challenging to reform them. Nevertheless, the leadership of the UAE has displayed agency by implementing reforms on subsidies, primarily targeting the expatriate community. This has arguably motivated by fiscal pressures related to rising domestic energy

demand that diverts exportable hydrocarbons to the domestic market, and the increasing need for import of natural gas to meet the domestic electricity and water demand (Fattouh & El-Katiri 2017; 59, Boersma & Griffiths 2016; 1-2). The reforms on electricity and water subsidies in Dubai and Abu Dhabi²⁸ display a greater flexibility in regards of the social contract and subsidies than assumed by classic RST and by policy makers, further underlining the cautiousness of introducing reforms that will impact national energy prices. Thus, the emphasis will be placed on the fact that, due to the context of a majority expatriate population, the focus of the reforms has been higher prices for expatriates and business rather than national residents.

5.1. REFORMS ON ELECTRICITY, WATER AND FUEL

In the context of low oil prices on the international market, and substantially reducing state revenues from exports, the subsidies on energy are increasingly unsustainable (Krane 2019; 91). Thus, the leadership in UAE have responded by implementing reforms on energy subsidies. Nevertheless, reforms on electricity and water prices in both Dubai and Abu Dhabi have been characterized by focusing on the large expatriate community and shielding the national population in the UAE.

5.1.1. ELECTRICITY AND WATER REFORM IN DUBAI AND ABU DHABI

The emirate of Dubai was the first to introduce reforms on electricity and water, as a system of four tariff slabs²⁹ was introduced in 2008. The reform was a result of the financial pressures facing the emirate at the time. Dubai was indebted due to large infrastructural projects – artificial islands and glass-covered skylines – aimed at attracting foreigners. This approach was exacerbated by the global financial ‘crisis’ that greatly impacted Dubai’s service sector-based economy, and the domestic demand exceeding production, necessitating increasing imports of relatively expensive natural gas. However, the increased energy prices were aimed at industry, business and expatriate residential consumers, exempting the small national population, representing only 5 % of the overall population (Krane 2019; 103-104). Additional

²⁸ While petrol and diesel prices are set at a federal level, prices on electricity and water are set independently by the electricity and water authorities in the emirates. That is Abu Dhabi Electricity and Water Authority (ADEWA) in Abu Dhabi and Dubai Electricity and Water Authority (DEWA) (Boersma & Griffiths 2016; 9)

²⁹ In this system, the costs rise per slab and is designed to reward efficient utilization, and rising prices for higher consumption (Boersma & Griffiths 2016; 10).

reforms were introduced in 2011³⁰, following the need to import more expensive LNG in 2010, again shielding the national population from significant increases. Thus, the electricity tariff introduced was approximately three to four times lower than for the expatriate population (Boersma & Griffiths 2016; 10). Krane highlights the lack of debate surrounding the political decisions regarding reforms as well as the agency of the leadership in Dubai in accommodating the fiscal pressures. He further points to the dissatisfaction for the increased prices displayed by the population despite the still internationally comparative cheap pricing, especially for nationals. Nevertheless, the dissatisfaction did not challenge the political status quo or the legitimacy of the Dubai leadership as RST would assume. This points to reforms of the social contract to be best pursued *"when a budgetary crisis or external pressure shelters leadership from blame"*, and that in the case of Dubai, the financial pressures provided an advantageous cover for the reforms (Krane 2019; 104-108).

In contrast to Dubai, the fiscal urgency for subsidy reforms has historically been less in the emirate of Abu Dhabi. Nevertheless, the increasing domestic energy demand, population growth, decreasing oil export revenues from lower and volatile international oil prices, and increasingly lower supply of low-cost natural gas, have motivated and enabled subsidy reforms. In 2015, following the falling international oil prices, the leadership in Abu Dhabi exercised agency and implemented price increases on electricity and water³¹, handing the largest increases to expatriates and modest price increases for nationals. The political sensitivity around subsidies, as part of the social contract, is highlighted by the two-tiered tariff structure for all residential electricity and water consumption in Abu Dhabi, with expatriates paying between four to six times more (Boersma & Griffiths 2016; 11-13, Krane 2019; 147). Building on the reforms from 2015, additional reforms was introduced in 2017 by the leadership of Abu Dhabi. Again, the majority expatriate population received the highest increase with prices for nationals remaining greatly subsidized (Boersma & Griffiths 2017; 24). Arguably, the incentives for the leadership in Abu Dhabi are less urgent than in neighboring

³⁰ Before implementing these reforms, Dubai launched a public relations campaign aimed at explaining the necessity of price reforms to society and encouraging the efficient energy consumption (Boersma & Griffiths 2016; 10), arguably in an attempt to prepare the consumers and lessen the dissatisfaction.

³¹ Similar to the approach taken by Dubai, the leadership in Abu Dhabi preceded the implementation of reform with a public relations campaign, presenting the need for reforming prices and a message of conservation (Boersma & Griffiths 2016; 11-12).

Dubai, but especially the combination of rising domestic energy demand and the falling revenues from oil export, have spurred the reform. The low international oil prices serve as a political cover for such reforms.

Noteworthy for the reforms in both emirates is that the price increases for the national population is modest by all standards. Considering the political sensitivity of these reforms, Tim Boersma and Steve Griffiths argues that this might be *“a missed opportunity”*, since the first round of reforms suggested that reforms on energy subsidies are possible and more flexible than first assumed. Furthermore, the context of a considerable disparity in the population, with a large majority being expatriates, the targeted price savings for electricity and water can be achieved while maintaining heavy subsidies for nationals and thereby uphold the social contract and political status quo (Boersma & Griffiths 2016; 13-14).

5.1.2. UAE FUEL REFORM

Different is the reform on fuel subsidies, where prices are set at the federal level and the reform have had uniform application for both expatriates and nationals. In the summer of 2015 fuel prices (for transportation) were significantly and structurally reformed to be set monthly based on international prices. This was motivated by lower export revenues as a result of declining international oil prices and the rising fiscal burden of subsidies. Thus, the reform was implemented in an environment of low international oil prices, that arguably facilitated the agency of the UAE leadership and provided political cover for the reform, ultimately contributing to create an acceptance of the changes by both expatriates and nationals. An additional aspect for the acceptance by citizens is that fuel prices was initially reduced following the reform because the international market prices was lower than the pre-reform fixed prices, highlighting the economic pressure of subsidies on the state (Boersma & Griffiths 2016; 14, Boersma & Griffiths 2017; 24, Krane 2019; 147).

5.2. DIFFERENT PERCEPTIONS

The reforms on fuels, electricity and water indicate that the social contract is more flexible than classic RST suggests and that a reform of benefits, while it might spark dissatisfaction, does not present a real threat to the political status quo. However, reforms have been modest

and implemented at strategic times where the context have provided the leadership with political cover. In survey research conducted by Jim Krane on prospects for subsidy reform and willingness to pay full cost of electricity in the Gulf, the findings suggest that citizens do not feel instinctively entitled to subsidized energy or is as opposed to paying higher prices as assumed by leaders in the Gulf and academia³². Thus, citizens would not be opposed to paying a cost-reflective price for electricity is informed that the national interest dependent on higher prices. Furthermore, it is a minority of citizens that maintains a view of entitlement to energy subsidies³³, but the results were not definitive and Krane argues that for citizens in the Gulf *“the door to subsidy reform was partly open”* (Krane 2019; 110). Interestingly, different results were produced when asking policymakers about the prospects for reforms. The view held by experts and elites is that citizens expects the state to provide subsidized energy, as this is a ‘citizenship right’ and the governments duty to do so. Thus, the research points to different perceptions of the social contract and understanding of the flexibility/inflexibility of benefits such as subsidies (Krane 2019; 110-111). The implication is that the modest reforms regarding electricity and water subsidies in Dubai and Abu Dhabi, might be an expression of the unwillingness of the leadership to risk the political status quo.

Thus, it is argued that the reforms implemented at strategic times, although modest for nationals, suggests agency by the leadership, based on the need to respond to the economic pressures from subsidies. It further suggests that the subsidies and consequently the social contract are more flexible than initially claimed. However, research conducted by Krane suggest that reforms challenging the political status quo, is still perceived as difficult among the political leadership, highlighting how the rentier structures in the UAE still presents as a challenge for a sustainable development of energy demand and consequently consumption.

6. SUMMARY

Reforms that affect the demand-side of energy consumption are difficult given the political nature of energy subsidies and the economic dependence on energy consumption created by cheap energy, as a result of the rentier structures. It is difficult to change because the demand

³² For more details and numbers related to this research, see Krane 2019.

³³ Nevertheless, a significant minority of 42 % of respondents (Krane 2019; 110).

and consumption are locked in. The current energy-intensive sectors and industries were constructed with large capital investments at a rapid pace based on the assumption of available cheap energy. The development into a more sustainable infrastructure and industries will require similar heavy investments. The behavioral patterns of energy consumption are also somewhat locked-in, as the consumers have little understanding of the value of energy and because subsidies are still understood as an important element of the political stability, ensured under the social contract. However, as pointed out by Krane, it is not necessarily the consumers that are unwilling to pay more for energy (pricing energy according to the international market or in accordance with the socio-economic dependence on energy), but the leadership that are unwilling to risk the political status quo and survival of the regime. Reforms of energy subsidies in Dubai and Abu Dhabi suggests that it is possible to introduce increased prices on electricity, transportation fuel and water. These reforms are necessary as energy subsidies places a growing fiscal pressure on the state by hollowing out the ability of the UAE to export their hydrocarbons. Thus, it further threatens the energy security and ultimately the sustainability of the leadership's economic base. Nevertheless, the change of inefficient and wasteful tendencies in the consumer behavior and the economic structures present a significant challenge that requires more aggressive subsidy reforms. The reason for this is that the current system of energy subsidies incentivizes and locks-in a continuously high energy demand and consumption. Thus, energy demand in the UAE are still highly embedded in the rentier structure of perceived political sensitivity of reforming elements of the social contract, despite the positive experience from current reforms.

QUESTION 2: THE INTERESTS IN 'GREENING' THE ENERGY SUPPLY

Traditionally, the UAE has relied on hydrocarbons or 'black' energy sources in their domestic energy mix due to the availability and low pricing of hydrocarbons, with the result that alternative clean energy options have largely been overlooked (El-Katiri 2014; 1). However, since the mid 2000s the leadership in UAE have actively pursued a strategic diversification away from hydrocarbon dependence in their energy supply. This second question moves the focus to the supply side of energy consumption and analyzes the interest and agency of the leadership in the UAE in diversifying to a 'greener' domestic energy mix³⁴. The ambitious

³⁴ A 'green' energy source is in this thesis synonymous with clean energy.

implementation of clean energy in long-term development plans and projects is argued to be an expression of the strategic and entrepreneurial agency exerted by the leadership of the UAE. This has been done to meet its economic interest in diversification, greater energy self-sufficiency and lower costs, and most fundamentally the political interest in maintaining the political status quo that is behind the agency. The diverse interest driving the diversification of the energy supply have incentivized the leadership, to exert agency, which in turn is expected to have a positive effect for a sustainable development of the energy consumption. Thus, the commitment and action by the leadership of the UAE to 'green' the energy supply, have the potential to contribute to a sustainable development of the energy consumption by locking-in a more sustainable supply.

Thus, the following section seeks to answer the question: *How does the interests in clean energy expressed by the decision makers in UAE manifest itself in the efforts to create a sustainable development of the energy supply?* This will be done by first presenting the strategic, political and economic drivers for diversifying the domestic energy mix to include clean energy sources. This is argued to be based on the interests of economic diversification, maintaining the political status quo, and greater energy self-sufficiency. Second, it will be argued that the leadership in the UAE, based on these interests and the rentier structures, have exerted agency by adopting long-term development plans and strategies and made heavy investments in clean energy.

1. POLITICAL AND ECONOMIC INTERESTS: THE DRIVERS FOR 'GREENING' THE ENERGY SUPPLY

There are a number of diverse strategic drivers for the leadership in the UAE to seek a diversification of the domestic energy supply to include clean energy sources. These are based on concerns related to the current and long-term energy consumption patterns and the potential it presents for politically beneficial economic development. Pursuing a strategy for clean energy, particularly for electricity generation, presents the leadership with an opportunity to ensure the interests of increased long-term energy security, economic development and diversification, minimized costs, and reducing carbon dioxide (CO₂) and other greenhouse gas (GHG) emissions to fulfill international commitments (Akhonbay &

Smith 2018; 1-2, Malik et al. 2019; 20806-20807, Ferroukhi et al. 2013; 98-101). Thus, the following will elaborate on the drivers of increasing energy demand and costs; the opportunities for economic diversification and the creation of new industries and job opportunities; the potential of solar power; and environmental concerns.

1.1. RISING DEMAND AND INCREASING COSTS

As highlighted in the previous question, the UAE is locked onto a path of high energy consumption with demand being exacerbated by the low, subsidized pricing of energy, increasing population- and economic growth, and structural factors such as climate and water scarcity. The rising demand is expressed in increased hydrocarbon dependence and increased costs for the state, that in turn has both economic and security implications that presents as drivers for 'greening' the energy supply. A consequence of the rising demand is (as presented in question 1) significant pressures on the state funds from natural gas imports to meet demand, particularly for electricity, and the system of energy subsidies (Ferroukhi et al. 2013; 99, Malik et al. 2019; 20807). The state faces rising energy costs related to state-financed subsidization of energy that in turn allows for high demand (again resulting in increased costs), that sets the consumer price far below the costs of natural gas imports endured by the state. Furthermore, in the context of low oil prices on the international market the state revenues are considerably reduced, underpinning the long-term unsustainability of subsidies³⁵ (Lilliestam & Patt 2015; 8266-8267). In addition, the UAE's dependence on hydrocarbons have long-term security implications related to external dependence on natural gas supply and the finite nature of hydrocarbons. Thus, substituting hydrocarbons with clean energy sources in the domestic consumption is essential to meet the rising demand and achieve a higher degree of energy self-sufficiency (Luomi 2012; 33-24). Furthermore, it would 'free' hydrocarbons for export, thereby minimizing the costs of rising demand for the state while still promoting development (Akhonbay & Smith 2018; 2).

³⁵ See 'Reforming subsidies' on p. 43ff.

1.2. ECONOMIC DIVERSIFICATION: CREATING NEW INDUSTRIES AND EMPLOYMENT OPPORTUNITIES

The diversification of the energy supply to include clean energy presents the opportunity to meet national aims of diversifying the economy and create new industries and employment opportunities, as well as a new source of rent-like income (Poudineh et al. 2018; 136, Ferroukhi et al. 2013; 100). The diversification of the energy supply is likely to benefit from a ‘parallel economic diversification’ by which is meant, that the deployment of clean energy technologies would benefit from the presence of a local supply chain for these technologies and vice versa. The deployment of clean energy initiatives in the UAE would require the development of new industries along the value chain (R&D, manufacturing, installation and maintenance of clean technologies) (IRENA 2019; 107). In turn, the new industries create new employment opportunities in various segments of the value chain with the potential to create a wide range of jobs, that require different skills and knowledge, to satisfy the gap between educated nationals and good, well-paid jobs. An IRENA analysis of the renewable energy market in the GCC points to the potential presented by clean energy, particularly solar, for value creation and high-value jobs in scientific research, technological innovation and in manufacturing and installation of renewable energy projects (IRENA 2019; 105-107). Thus, renewables have the potential to create high-value job opportunities for the growing population, something that the hydrocarbons sector have not been able to (Hvidt 2019a; 37).

The new industries in clean energy compliment the ambitions of economic diversification and technological innovation, emphasizing knowledge-intensive and future-oriented energy technologies, in the UAE’s long-term development plans and strategies. The clean energy sector presents the UAE with the opportunity to become a global hub and regional/world leader, as well as a center for export and re-export of clean energy technologies and products (IRENA 2019; 24). The new industries have the potential to dovetail with existing well-developed infrastructure and policy frameworks that could enable the UAE to “*build on a stronger competitive advantage and institutional track record*” (Hertog & Luciani 2011; 249).

Thus, the ‘parallel diversification’ of energy supply and the economy to focus on clean energy, present great potential for the UAE to meet national aims of economic development based

on knowledge and innovation, a wide segment of employment opportunities and the potential for rent-like income from being a global hub and leader in clean energy.

1.3. THE POTENTIAL OF SOLAR POWER

The great potential for clean energy, particularly solar, in the UAE also presents as a driver. The UAE holds an advantage for the development of solar energy from the high solar irradiation and statistically many hours of sun,³⁶ combined with land available for large-scale facilities, and a reliably low risk of precipitation during the summer months (El-Katiri 2014; 1). In other words, the solar potential in the UAE is immense. Furthermore, solar energy has become a more cost-competitive source of power generation as a result of growing costs of natural gas to meet demand, the falling costs of associated technologies, and its renewable nature makes solar energy a strategic and long-term investment. Particularly, the falling costs of technology serves as an impetus for solar energy as it makes it cost-competitive with hydrocarbons and other clean energies such as nuclear energy (IRENA 2019; 44-48). Thus, realizing its solar power potential presents the UAE with a second chance at energy leadership for the UAE, this time in solar energy, and as a cost-competitive substitute for hydrocarbons in meeting rising demand (Ferroukhi et al. 2013; 100).

1.4. ENVIRONMENTAL CONCERNS AND COMMITMENTS

The UAE are among the highest per capita emitters in the world, with a rising energy intensity as a result of high hydrocarbon-based energy consumption fueled by hydrocarbon production, rapid energy-intensive economic growth, and a substantial population growth (see table 1 on p. 34). Moreover, the Gulf and the UAE are highly vulnerable to the negative effects of climate change due to risks of desertification, rising sea-levels, higher temperatures and water stress, that in turn will have the effect of increased energy consumption for cooling and water desalination (Ferroukhi et al. 2013; 99-100, Lilliestam & Path 2015; 8269). The UAE have committed to the global agenda of sustainable development and tackling climate change, thereby committing to the global objectives of the Paris Agreement of which reducing GHG is central element (Akhonbay & Smith 2018; 2). Thus, clean energy in the domestic energy supply would contribute to reducing emissions and meeting international

³⁶ The Gulf region is placed in the 'global sunbelt' which refers to countries that are situated geographically between 35°N and 35°S and receives a high solar irradiation (IRENA 2016; 13).

commitments. Furthermore, a commitment to clean energy will send a signal to the international community, that the UAE are responsible members and provide the leadership with the possibility for a branding as a global and responsible leader in clean energy initiatives, despite the high energy consumption (Hertog & Luciani 2011; 248).

2. FROM INTERESTS TO AGENCY: ECONOMIC INCENTIVES FOR IMPLEMENTING CLEAN ENERGY

The drivers above presents a clear case for the political and economic interest of the leadership in the UAE, to pursue a diversification of the domestic energy mix to include domestically produced clean energy. However, the UAE have previously not needed to diversify their energy supply. The hydrocarbon endowment, primarily in Abu Dhabi, have previously ensured a cheap energy supply for the domestic demand in the UAE, providing little economic incentives for pursuing alternative energy sources. Furthermore, the UAE have been able to brand itself as an attractive destination for the expatriate community due to the cheap and available energy that their energy-intensive service sectors is built upon. This is challenged as the high energy consumption in the UAE creates economic incentives for a diversification of the energy supply. It is the economic incentives for clean energy that is argued to be the fundamental driver motivating the leadership of the UAE to exert agency and move from interests to implementation.

2.1. RE-BRANDING ENERGY IN THE UAE

As mentioned above, the leadership in the UAE are facing growing costs of natural gas to meet the rising demand while solar energy is becoming a cost-competitive and thus economically attractive alternative (IRENA 2019; 84-88). Additionally, the economic development and diversification in the UAE into service sectors, makes the leadership dependent on remaining competitive and an attractive destination – something that the country's naturally unsustainable consumption and high emissions might challenge. The consolidation of sustainable development and climate change mitigation on the international agenda have thus created an element of economic uncertainties for the leadership in the UAE. This uncertainty is based on the dependence of external rents to maintain their economic basis and ultimately the political status quo (Luomi 2012; 1-2). A diversification of the energy supply

to include clean energy, and subsequent new clean energy industries, offers the leadership the opportunity to meet their long-term ambition of creating a knowledge-intensive and innovative economic diversification, while achieving the short-term benefit of a positive re-branding of energy in the UAE (Young 2014; 83-84). This will in turn enable the UAE to remain an attractive destination for foreign companies, industries and tourists and ensure the long-term economic basis for the leadership. The UAE, particularly Dubai and increasingly Abu Dhabi, have in previous diversification efforts been able to strategically brand and establish itself as a global leader in logistics and service sectors and recognizes the importance of maintaining its attraction. This is potentially threatened by the increased focus on environmental concerns and climate change on the international agenda that has highlighted the UAE as high emitters and great consumers. A diversification towards a clean energy supply and industries would enable the UAE to brand the leadership as responsibility-takers and provide a second chance at global leadership in energy, this time in clean energy, and distinguish the UAE from regional competitors (Sim 2012; 84; 88, Hertog & Luciani 2011; 248-249). Thus, the argument is that, besides the growing costs of natural gas to meet demand, the increased focus on environmental concerns and emissions on the international agenda have provided economic incentives for the leadership in the UAE to *“strategize green competitiveness in order to keep up with the international competition to attract talent and other global resources”* (Hasbani 2016).

It is further argued that the economic incentives for pursuing clean energy in the domestic energy supply has served as the fundamental driver, motivating the leadership to exert agency and move from an interest in clean energy to clean energy implementation. The following paragraphs will highlight the economic and political commitment to clean energy implementation in long-term development plans and long-term investments made by the leadership in the UAE and enabled by the rentier structures.

2.2. LONG-TERM DEVELOPMENT PLANS AND STRATEGIES

The success of a major change initiative such as the diversification of the energy supply is expected to require a long-term strategic vision and plan (Akhonbay & Smith 2018; 2). The late rentier state of the UAE has launched a number of different long-term development plans and strategies to support the strategic and state-managed economic diversification agenda

for clean energy. These strategies and plans demonstrate the UAE's broader commitment to sustainable development with an emphasis on the energy supply. The country's *Vision 2021*, *Green Growth Strategy*, and *Energy Strategy 2050* (MoCA n/d, Vision 2021, 2018, UAE Government 2020d) highlights clean energy production as well as technology innovation and knowledge creation, also in clean energy, in addition to the traditional focus on economic diversification. The emirates of Abu Dhabi and Dubai have furthermore launched long-term development plans for the emirates respectively and individual targets for implementation of clean energy in the energy supply³⁷.

The *UAE Energy Strategy 2050* launched in 2017, states national targets³⁸ to increase the share of clean energy in the national energy mix that necessitates the implementation of ambitious large-scale clean energy projects (IRENA 2019; 55). The emphasis on sustainable development and long-term stated targets for the introduction of clean energy in the domestic energy supply points to a long-term political commitment to clean energy by the leadership in the UAE, an aspect otherwise highlighted as a barrier for implementation (Ferroukhi et al. 2013; 101-102, Gelil 2015; 43). This is done relatively easy as the leadership in the UAE holds autonomy in the political decision-making ensured by the social contract and because the investments and strategies are not directly impacting the UAE citizens. The following will highlight some of the long-term and heavy investments made to support the political commitments in the UAE's development plans and argues that these investments and agency have the potential to lock-in a sustainable development of the energy supply in the UAE.

2.3. LONG-TERM INVESTMENTS

In the realization of the targets stated in the energy strategy, the leadership aims to invest AED 600 billion (approximately US\$ 160 billion) (UAE Government 2020d) on energy projects, which have led the UAE to become the leader in implementation of clean energy in the region (IRENA 2019; 12-14). In the last decades, the leadership of the UAE have made significant investments in domestic initiatives aimed at diversifying the energy supply with clean energy

³⁷ See 'Energy situation' on p. 5ff.

³⁸ The strategy aims to increase the capacity of electricity generation capacity from clean energy sources to 50 % (44 % from renewables and 6 % from nuclear) (UAE Government 2020d).

sources, expectedly driven by the interests and economic incentives mentioned above. This paragraph will present the energy projects of Shams 1 Solar Power Plant in Abu Dhabi, the Mohammed bin Rashid Al Maktoum Solar Park in Dubai, and the Barakah Nuclear Power Plant in Abu Dhabi in order to highlight how the UAE leadership's approach to clean energy implementation meets their diverse interests, but focusing on the 'import' of foreign expertise, the scale and the ambition of the projects.

Abu Dhabi's 100 MW Shams 1 became the first concentrated solar power (CSP) plant and biggest clean energy project in the region when it was commissioned in 2013. The project was completed with an investment of US\$ 765 million and developed as a joint venture led by state-owned Masdar, in collaboration with French Total and Spanish Abengoa Solar. The state holds the majority share of the project through Masdar (IRENA 2019; 56, Ferroukhi et al. 2013; 103). The plant provides electricity for more than 20,000 homes in the UAE and contributes to minimizing the country's carbon emissions (Masdar n/d a). The project provided the opportunity for key stakeholders in the emirate, including the project developer (Masdar), the utility (ADWEA) and the regulator (Regulation and Supervision Bureau) to gain important experience in the many stages of a large-scale energy project, from construction, connecting, regulating and operating (IRENA 2019; 56). The implementation of Shams 1 includes 66 local companies, with the majority not existing before the project (MoFA et al. 2013; 34).

The Mohammed bin Rashid Al Maktoum photovoltaic (PV) solar power park in Dubai completed its first phase of 13 MW when it became operational in 2013. The project was taken up by the state-owned utility company DEWA. The success of the pilot phase triggered the development and implementation of additional phases. The second phase (capacity of 200 MW), the third phase (800 MW) and the fourth phase (950 MW of solar PV and CSP, including storage) have since been implemented based on an independent power producer (IPP) model, auctioning the projects for record low bids to make the price the cheapest at the time³⁹. The scale and capacity of combined and planned phases amounts to a 5000 MW capacity by 2030 with investments totaling AED 50 billion (approximately US\$ 13 billion)

³⁹ For more detailed information of the phases, including the consortia and the auction price, see IRENA 2019.

making it the world's largest single-site solar park based on the IPP model (DEWA 2019b, IRENA 2019; 56-57, DEWA 2019a).

The Barakah Nuclear Power Plant is the first nuclear power project deployed in the Gulf region⁴⁰, comprising of four reactors of a total 5,600 MW when all is operational. The project was commenced in 2012 and began operations of the first reactor earlier this year after delays. The state-owned Emirates Nuclear Energy Cooperation (ENEC) signed a US\$ 20 billion agreement in 2009 with an international consortium led by the Korean Electric Power Corporation (KEPCO) to design, build and operate the four reactors at the plant (Ulrichsen 2015; 119, World Nuclear Association 2020). The agreement includes “*extensive training, human resource development and education programs*” to enable the UAE to develop the capacity to staff its nuclear industry (ENEC n/d). Due to the political complexity of nuclear energy, Abu Dhabi established an advisory board, chaired by former International Atomic Energy Agency (IAEA) director Hans Blix, as a measure to create transparency and gain support from the international community by complying with international standards (Hvidt 2018; 320).

The abovementioned projects in solar- and nuclear energy highlights the ambition and scale of the implementation of clean energy projects in the UAE and presents an opportunity for the leadership to re-brand energy. The projects follow an approach of contracting external partners in order to benefit from the technology, expertise and manpower that international partners will bring to the development, implementation and operation of large-scale clean energy projects (Hvidt 2018; 320-321, Hertog & Luciani 2011; 243-244)⁴¹. This enables a faster implementation, that will be economically beneficial for the UAE, taking the growing costs of natural gas to meet demand into account. Furthermore, the inclusion of foreign partners in the investments provide the potential for the UAE to strengthen its international competitiveness and attract foreign industries, actors and investments to the country. The import of technology, expertise and manpower are likely to attract additional interest in the clean energy industries and support the economic diversification. Further supporting the

⁴⁰ Iran is not considered as part of the Gulf region.

⁴¹ This follows the approach taken in the development of the hydrocarbon sector – see ‘Energy’ on p. 7.

diversification is that fact that the UAE, due to the large-scale implementation of ambitious projects including the only nuclear power plant, the largest single-site solar park and the first large-scale CSP power plant in the Gulf region, have been able to brand itself as the regional leader in implementation of clean energy (IRENA 2019; 14-15; 105-112). The 'import' of technology and experience are expected to be transferred, as indicated in the nuclear project, to new industries, R&D and employment opportunities for nationals⁴². The heavy investments made, highlighted by the financial resources spend on the three projects, suggests that the agency of the UAE have made steps towards a lock-in of clean energy technology, infrastructure and institutions for a sustainable development of the energy supply.

Thus, the pragmatic utilization of financial resources to engage in international cooperation for the development, implementation, and operation of the clean energy projects shows agency from the leadership in the UAE. The large-scale and ambitious character of the projects in clean energy shows a long-term commitment, driven by political interests and economic incentives aimed at creating rent-like income and boost the political status quo. The argument is that the leadership of the UAE have exerted agency by moving from interest to implementation of clean energy and that this is enabled by the rentier structure of political autonomy, financial resources and the fact that these investments does not directly impact citizens and thus do not threaten the social contract.

3. SUMMARY

There are a number of political and economic interests driving the UAE's diversification and investments in a clean energy supply. These range from minimizing costs, to environmental concerns, to the opportunity to respond to social pressures of the finite nature of hydrocarbons and employment opportunities by diversifying the energy supply and economy beyond hydrocarbons. However, it is economic incentives of growing costs for natural gas to meet demand and the challenge high energy consumption and emissions poses to the UAE's brand, that is understood as the fundamental driver moving the leadership from interest to implementation. The diversification of energy on the supply side does not directly involve citizens or challenges the social contract and thus, the leadership views a diversification of

⁴² For more details on employment and value chain related to clean energy implementation see IRENA 2019.

the energy supply as a means to strengthen its economic basis and ultimately ensuring the political status quo. In these aims, the leadership in the UAE have committed to a 'greener' energy supply by targets for the implementation of clean energy in their supply and by making heavy technological, institutional and infrastructural investments in clean energy projects. Thus, the fact that it is essentially the interest of political survival that drives the sustainable development of the domestic energy supply, suggests that the leadership will continue to prioritize 'technical' investments and exert agency for sustainable development of the energy supply.

QUESTION 3: 'GREENING' THE BUILT ENVIRONMENT

The built environment in the UAE is locked onto a path of low efficiency and high energy consumption. This is a result of the rapid construction and short-term perspective in the development of the built environment in the UAE based on the assumption of available and subsidized energy. This assumption has in turn resulted in buildings being designed and built with emphasis on aesthetics and cost, without taking energy efficiency into consideration and locking in a high energy consumption (Afshari 2013, Krane 2009; 225). The rising energy demand, particularly for electricity, and the growing urban population (see Table 1 on p. 34), has prompted the leadership of the UAE to consider the long-term performance of the built environment and to pursue a 'greening' by introducing regulations and make heavy investment in 'sustainable city' projects (Alraouf & Clarke 2014; 330).

This section departs from perspectives and findings from questions one and two, and seeks to answer the question: *How does the UAE seek to 'green' the high energy consumption and low efficiency in the built environment?* Hence, it will be done by first highlighting the role of subsidies in the lock-in of high consumption in the built environment. Second, the initiatives of the green building framework Estidama and the 'sustainable city' initiative Masdar City in Abu Dhabi will be introduced. This is based on the argument that these are the most notable policy and project initiatives respectively for 'greening' the built environment in the UAE.

1. LOCKED-IN: HIGH CONSUMPTION AND LOW EFFICIENCY

The first sub-question highlighted how subsidies have incentivized and locked-in a structural and behavioral high energy consumption in the rapid development of the UAE. The subsidies

provided on energy allowed for the built environment in the UAE to be based on aesthetics and cost, rather than considering energy efficiency: *“these allowances [subsidies] for utilities in turn have led to a most inefficient building era, which was based on the overt, unintentional, basic idea that usage of water and electricity should not be taken into account in the design, construction or operation of a building”* (Silva 2015; 150). This manifests itself in inefficient glass-covered office buildings, lack of insulation, shading and energy-saving appliances in homes, and green gardens in the desert (Krane 2019; 82, Krane 2009; 224-225). This results in extensive cooling and water usage, with electricity in buildings accounting for over 80 % of the total consumption (Masdar City n/d a). Since the built environment has a long lifetime, the investment decisions made in the development have created a structural locked-in of a low efficiency and high energy consumption in the UAE’s built environment (Fouquet 2016; 1, Poudineh 2017; 10). The inefficient design and construction are further exacerbated by the poor understanding of the value of energy that incentivizes demand and an energy wasteful consumer behavior. Arguable, the inefficiency of the existing built environment in the UAE is continuously increasing as demand rises and subsidies remain in place.

As a result of inefficiency and high consumption, related to the design, construction and operations of the built environment, the UAE have stated the development of green construction codes and guidelines as a national development priority incorporated in long-term national development plans and strategies (De Jong et al. 2019; 9-19). Examples of this are ‘Dubai Plan 2021’, with a theme specifically focusing on *“A Smart & Sustainable City”* (UAE Government 2019a), and more abstract in ‘Plan Abu Dhabi 2030 – Urban Structure Framework Plan’ focusing on ‘environment’ and ‘image of the capital city’ (UAE Government 2019b)

2. ‘GREEN’ INITIATIVES IN THE BUILT ENVIRONMENT

This priority has manifested itself as initiatives for ‘greening’ the built environment and progress in the development of ‘green’ buildings. The UAE ranked eighth in 2015 among the top 10 nations in the world outside the United States in adopting green building practices and

increased the total amount of LEED-certified⁴³ space by 72 % since the year before (USGBC 2015). Thus, the leadership of the UAE have exerted agency by investing and implementing several initiatives aimed at 'greening' the built environment. The fundamental driver behind this agency is, similar to the findings in question two, argued to be the branding opportunity it presents. Christopher Silva makes the argument that the investments made in 'greening' the built environment was, and still is, not simply to reduce the high energy consumption and accommodate low efficiency. More so, it is the aspiration to surpass standards and gain recognition to the organization or building owner and ultimately the UAE that is fundamental driver (Silva 2015; 149). This is not to say that there is no real interest in reducing consumption and increasing efficiency in itself but, as argued in question two, the increased focus on environment, climate change and sustainable development on the international agenda have created economic incentives for the decision-makers in the UAE to seek a 'greening' of the built environment.

Initiatives have varied from policy to projects and the UAE has introduced green building regulations, most notable the regional building code Estidama, and made heavy investments in sustainable city projects with Masdar City in Abu Dhabi being the most significant. The following will present the initiatives of Estidama and Masdar City in order to illustrate how the UAE seeks to 'green' the high energy consumption and low efficiency in the built environment.

2.1. ESTIDAMA AND THE PEARL RATING SYSTEM

Abu Dhabi launched the Estidama framework ('sustainability' in Arabic) in 2008 that sets a number of driving principles for constructions in the built environment. The framework is influenced by the BREEAM and LEED codes but is the first of its kind to take the region-specifics of hot climate and arid environment into consideration and the first mandated sustainability rating system in the region. In 2010, the green building code Estidama Pearl Rating System (PRS) was developed based on the four pillars of sustainability: environment, economy, social and culture. The code makes the distinction between five types of buildings

⁴³ The two most commonly known and used green building codes is the US developed *Leadership in Energy and Environmental Design* (LEED) and the UK developed *Building Research Establishment Environmental Assessment Methodology* (BREEAM) (Silva 2015; 147).

(office, retail, school, multi-residential and mixed-use) and awards ‘Pearl credit points’ from 1 to 5 and seeks to address the sustainability of a given development throughout its lifecycle from design, to construction and operations. The PRS is mandatory for all new buildings in the emirate of Abu Dhabi and all new buildings must meet the 1-Pearl requirement whereas all government funded developments must attain a 2-Pearl rating (EGBC 2019, De Jong et al. 2019; 17). Thus, Estidama and PRS can be seen as the most successful initiative in the region to *“transform simple construction standards into integrated legislation that takes into account green building codes”* (Silva 2015; 151). Furthermore, the ‘first of its kind’ aspect of the initiative can be understood as an attempt to make the UAE stand out amongst competitors as a regional leader in green buildings and send the signal that the emirate can *“create knowledge, as opposed to just being simple users or copiers of Western countries [referring to LEED and BREEAM]”* (Silva 2015; 150). In accordance with findings of question two, it can be argued that Estidama have the dual aim of seeking to ‘green’ the high energy consumption and efficiency in the design, construction and operation of the built while also promoting the UAE as a leader in ‘green’ buildings.

2.2. MASDAR CITY

Perhaps the most well-known sustainable city project is Abu Dhabi’s Masdar City. The state-funded project was virtually launched in 2008 with the ambition to be the world’s first carbon-neutral, zero-waste and car-free city, serving as a ‘greenprint’ for sustainable urban developments. The city has several functions as; an economic free zone to attract businesses and industry, the host of The Masdar Institute of Science and Technology (MIST) in order to contribute to knowledge creation and innovation, the site for clean energy projects to power the city, and neighborhoods for living (Masdar City n/d b, Luomi 2012 121-122). This is aimed at creating a *“pioneering sustainable urban community and innovation hub”* (Masdar n/d b). A combination of clean high-tech solutions and traditional regional architecture is the point of departure in the design, construction and operation of Masdar City’s built environment. The city is home to the largest cluster of high-performance buildings and buildings in the city must meet a minimum 3-Pearl rating under Estidama PRS. The buildings in the city employs sustainable materials such as low-carbon cement and recycled aluminum and together with clean tech like solar panels and architectural shading and cooling the design, construction and

operations utilizes 40 % energy compared to similar local buildings (Masdar City n/d b, Alraouf & Clarke 2014; 332-333). However, the progress in Masdar City has slowed down and the ambition of a carbon-neutral city has been revised to a low-carbon city (De Jong et al. 2019; 18). Nevertheless, it is argued that Masdar City has been able to maintain its sustainable reputation and branding the city based on the architectural and engineering achievements, and the hosting of the headquarters of the International Renewable Energy Agency (IRENA). Karen Young highlights that, while the Masdar City project has the potential to increase the efficiency of the energy consumption, it is *“more likely symbolic of a willful status claim”* (Young 2014; 83) or a political project. This suggests that while the city is part of a long-term strategy to ‘green’ the built environment in the UAE, the ambition and scope is the short-term benefit of a positive sustainability image (Young 2014; 83).

Thus, it can be argued based on the scope and ambition that the two initiatives, Estidama and Masdar City, have the dual aim of both seeking to ‘green’ the design, construction and operation of the built environment to accommodate the low energy efficiency and high consumption as well as highlighting the UAE as a leader in ‘green’ buildings and sustainable communities.

3. SUMMARY

This question departed in perspectives and findings from questions one and two and an introduction to the initiatives of Estidama and Masdar City. The built environment in the UAE is designed, build and operated under the assumption of low, and subsidized energy. The long lifetime of buildings and energy-consuming appliances has structurally locked-in a high and inefficient energy consumption in the built environment. As a result, the leadership in the UAE have prioritized and implemented initiatives aimed at ‘greening’ the built environment. It is argued that the ambition and scope of the initiatives suggests that the agency exerted by the leadership in their implementation serves the dual aim of a more sustainable and efficient energy consumption and the potential to gain international recognition in the branding of the UAE. Furthermore, both the policy initiative Estidama and the Masdar City project highlights how the leadership of the UAE have sought initiatives in the technical domain of the built environment (design, construction and operation), which does not directly impact citizens or challenge the social contract.

CONCLUSION

Departing in a case study approach, informed by the theoretical approach of late rentierism, the objective of this thesis has been to answer the following research question: *What are the challenges and opportunities for a sustainable development of the energy consumption in the late rentier state of the United Arab Emirates?* The research question has been addressed and answered based on three sub-questions, namely: *1) How has the rentier state's decision to subsidize energy placed the UAE on a path of inefficient consumption and wasteful demand behavior?; 2) How does the interests in clean energy expressed by the decision makers in UAE manifest itself in the efforts to create a sustainable development of the energy supply?; and 3) How does the UAE seek to 'green' the high energy consumption and low efficiency in the built environment in the UAE?*

In relation to question one, it has been concluded that the rentier structures and particularly the social contract presents a challenge for a sustainable development of the energy consumption in the UAE. The subsidies have incentivized inefficient consumption and locked the UAE onto an unsustainable path. Given the political nature and economic dependence on energy subsidies, much needed reforms are understood by the leadership to challenge the political status quo. However, it is further concluded that previous reforms suggest an opportunity depending on the leadership's willingness to exert agency. The answering of the second question concludes that the leadership has exerted agency in the implementation of clean energy projects based on economic incentives. The diversification of energy supply does not directly involve citizens or challenge the social contract but is argued to be a means to strengthen its economic basis and ensure the political status quo. The third question supports the arguments made in questions one and two, as it is concluded that the leadership of the UAE has prioritized initiatives for a 'greening' of the high energy consumption and low efficiency in the built environment, thus aiming at the technical domain rather than initiatives impacting citizens' demand.

The analysis, informed by the theoretical approach of late rentierism, has highlighted the fact that the rentier characteristics of the UAE present both challenges and opportunities for a sustainable development. It is concluded that the biggest challenge for a sustainable

development of the energy consumption in the UAE is the subsidization of energy. The leadership's unwillingness to challenge the social contract, and ultimately the political status quo, makes it difficult to change the behavior of consumers. Departing in this, it is further concluded that the leadership has exerted agency and ambition by implementing projects and initiatives for a sustainable development focusing on the supply side of consumption. As such, the greatest opportunities for sustainable development of the energy consumption are on the supply and technical side, as the leadership's agency in this regard provides the potential to ensure the political status quo.

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