

Changing the Energy Profile of the GCC States: A Review

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Abstract

The six Gulf Cooperation Council (GCC) States have an excellent geographical location as a point that link between East and West in addition to the vast wealth resulting from the extraction and export of oil and natural gas. Life has got up in the cities of the region that evolved dramatically. However, this progress accompanied with some drawbacks. The lavish increase in energy consumption caused an increasing in environmental pollution of the area, which became obvious fact affect the human, water, and marine animals. This study focused on a general review of what GCC countries environmentally suffer from, and the practical steps taken by these countries collectively and individually to get rid of those problems. The studies about the region countries have shown its trend towards the use of renewable energies to heal a large part of the environmental damage resulting from years of development and consumption of fossil energy sources. As it turns out from the study, the GCC countries are still lagging behind establishing renewable energies power stations except the UAE that carried out the initiative Masdar City and Oman initiatives in solar energy. All countries in the region are making plans for the future and build and produce renewable energies, which seemed its star rises, especially with the understanding and awareness of decision-makers in the region to its importance.

Keywords: Energy profile, renewable energy, fossil fuel, carbon strategy.

Introduction

Gulf Cooperation Council GCC comprised of six countries: Saudi Arabia, United Arab Emirates, Kuwait, Oman, Qatar, and Bahrain. The Arabian Peninsula region is very varied and cannot reduce it to a single cultural unit. Each country possesses its unique traditions, heritage and characteristics, except for some broad socio-cultural and religious commonalities.

All the GCC countries have a long coastline related to the Indian Ocean. Along the coast, the most fertile lands can be found and where most people live. It is easier to trade by sea

than by land; that is why the peoples of the coastal areas in the Peninsula worked in fishing, pearling and shipping. As well as, they were skilled in caravan trade between oasis villages linking communities across the desert [1]. The copper transportation from Magan (Oman) to Dilmun (Bahrain) considered as the earliest indication of maritime trade in this area (3400 BCE). The evidence of commerce between this region and India dates back to 2300 BCE [2]. For thousands of years, sea routes affected the tribes lived in GCC coastal region to the wider world. The Batinah coast of Oman served, for hundreds of years, as a crossroads of trade distributing goods between the Omani coast, Red Sea, Arabian Gulf, Arabian Sea, and the Indian Ocean. This ancient port linked variable civilizations including Egyptian, Abyssinian, Harappan, Persian, Somali, Swahili, Indian, Malay, and Chinese. Located between the Indian Ocean and the Mediterranean Sea as well as between the ancient Persian, Greek, Egyptian, and Roman Empires, made this region a significant way for trading [3].

During the first decade of the twenty-first century, The Gulf States became increasingly visible global actors. The important oil and natural gas reserves added to the excellent geographical position between West and East made the oil-rich GCC states as a primary motor that shifts the global economic landscape. The huge increase in the oil prices from US\$ 22 per barrel in 2002 to a level of US\$ 147 per barrel in 2008 and the tremendous capital inflows made this region has a special position in the global economic as well as policy. The six GCC states estimated to have attained about US\$ 912 billion in foreign assets over the period from June 2003 to June 2008 [4, 5]. In Saudi Arabia, the total increment in the oil income was from an estimated US\$ 42 billion in 1999 to US\$ 307 billion in 2008. In UAE, the increment was from US\$13 billion to US\$ 87 billion and US\$ 4 billion to US\$ 27 billion in Qatar, for the same period [6]. Qatar also benefited from a decade of far-sighted investment in its Liquefied Natural Gas (LNG) infrastructure, enabling it to maximize its position as the world's third-largest reserves of natural gas. This gas production level resulted in an average economic growth of 13% per year at the 2000s. When the gas

production attained the peak target of 77 million tons per year in 2010, its income nearly doubled its oil revenue [7]. This huge wealth added to the wise investment makes these countries individual and collectively very powerful economic and politically. The impact of the GCC attitudes and policies in the international relations become highly appreciates. It is critical to clarify that some of the GCC countries leaderships change, and a new nimble and ambitious leaderships become the decision makers. These leaders are highly educated and capable of taking and executing quick decisions. Qatar and the UAE were at the forefront of these shifting geo-economic patterns. These two countries governments moved towards investing in emerging economies in the Global South, after a poor performance of investments in Western economies in 2008 and 2009. As an example, the Qatar Investment Authority invested a US\$ 6 billion in the Agricultural Bank of China in 2010 [8]. Also, they ties with Asian partners through emerging energy interdependencies and in petrochemicals, plastics, and aluminum [9]. The six GCC countries represent the world's key energy suppliers for the present and coming decades. The foreign dependence on these resources originates not only from their reserves' size or their production level but their small populations and low levels of consumption. The GCC's comprehensive resource per capita allowed these countries to export most of its production and to become dominant suppliers in international oil markets. Today, this story is beginning to change. The populations rise as well as the consumption in these producer countries threatens assumptions about the sustainability of GCC energy exports [10]. If current rates of consumption growth continued in Saudi Arabia, it could see oil exports reduced by the end of the decade, much sooner than expected [11]. Oman and Bahrain, the GCC states with the smallest endowments, are already in depletion-led decline. This scenario brings up several inquiries. Exporting Petrol and gas formed the bedrock of the GCC political economies. The consumption dilemma came in a time of reformation has been constrained by Arab uprisings, presents difficult questions for these tribal-autocratic regimes.

The GCC States energy consumption had undergone a dramatic rise in the past four decades. At the 1970s, these countries were poor and underdeveloped, with sparse populations suffering from centuries of isolation. The energy consumption in Arabia rose demonstrating an error in global demand. Today after more than forty years later, the Gulf, with just 0.5% of the world's population, consumes 5% of the global oil output, which is high comparing with other countries in the world as shown in Fig. 1. Figure 1 represents a comparison of the average yearly growths in energy consumption for two periods of time. Figure 2 illustrates the GCC primary energy consumption, projections to 2020, which sound high increment in energy consumption due to the growth in population and industry.

The most GCC produced oil devoted for export. However, the domestic use of oil is on the rise. Between the years 2000 and 2009, the consumption of petroleum grew by an average of 6.5% per a year. The oil production consumed domestically percentage in 2009 varied from a low average of 13% in Qatar

to a high average of 26.5% in Saudi Arabia [12]. The Saudi Arabia increasing consumption has pushed the kingdom forward into the upper echelons of world oil consumers. Although Saudi has a small population, economy, and industrial base comparatively, in 2009, it surpassed Brazil and Germany to advance the world's No. 6 oil consumer, behind Russia [13].

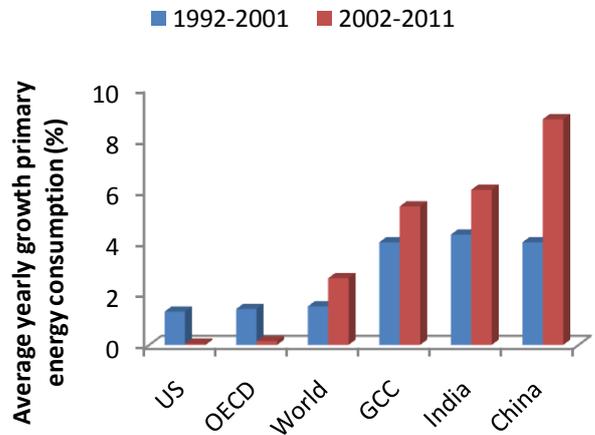


Figure 1. GCC energy consumption vs. others

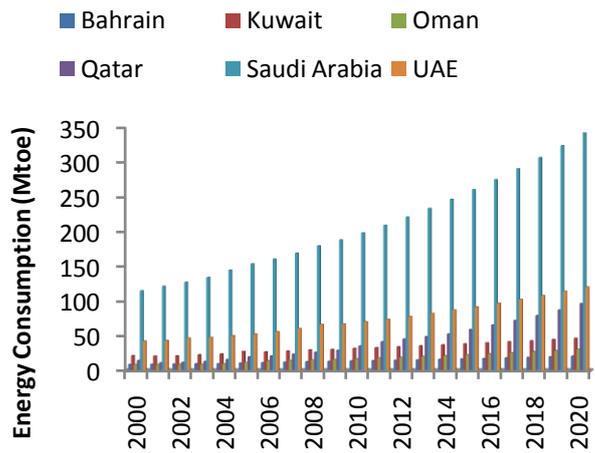


Figure 2. GCC countries energy consumption projection for the period 2000-2020

Both the yearly increases in domestic and global demand are eroding the Saudi reserve margin. Saudi Arabia was reported to be achieved the highest levels in 30 years of producing oil in April 2012. An important part of this production of the kingdom was preparing oil for use during peak summer months for domestic purposes, for air conditioning demand requirements [14]. Nowadays, the summer electricity demand leads the kingdom to import heavy fuel oil feedstock [15]. Also, in Kuwait; the demand for crude oil, diesel, and heavy fuel oil for domestic burning is reducing exports and state income. The consumption of fuels in power generation reached about 12% of the country's oil production in 2010. This consumption level expected to climb to 21% by 2030 [16].

The GCC countries are the near-total dependence on hydrocarbon export revenues. In 2008, the oil and gas exports economic contributions reached 39% of collective GDP, 79% of goods exports, and 83% of government revenues [17]. In economic terms, the one-sided dependence may cause economic hazards. Also, there is disconnecting between energy prices in the GCC and the value of energy to the six national economies. The low values of domestic energy caused a wanton consumption. The fuel prices in these countries, as an example, a liter of gasoline often being cheaper than a liter of bottled water. These low energy prices give signals to the consumer that energy is a resource that may waste. The low pricing encourages consumption with rates rises above the costs of these fuels on global energy markets. Also, low prices make the investment in generation power incentives [18].

Changing Energy Profile

Based on the level of production compared to the resources size they have, the oil exporting countries are facing depletion at different time horizons. As the oil production reaches its plateau, the exports levels tend to drop while the domestic consumption rises. This figure is the typical depletion trajectory of petroleum exporting countries. Resolving this dilemma come in two directions: first increasing the oil price to a level that drop in exports, which result in a decline in export revenues. The second adjacent solution is by a bit increasing fossil energy and fuels prices of domestic consumption and supporting the renewable energy investments. As depletion starts, both the production and exports are forced downward. When exports levels reduced below domestic consumption, the country becomes a net importer. This scenario declares that to attain maximum benefit from natural resources requires careful consideration of domestic use [19].

Several factors caused in delaying the progress in the regional integration of the GCC countries and slow it. The GCC countries can consider as competitors in oil and hydrocarbons production markets. The necessary coordination in industrial and economic policies in the region becomes difficult to be planned and actualized. The similar production structures result in very low rates of intra-regional trade. The internal trade (imports and exports) between the GCC countries averaged about 7% between 1995 and 2011, compared to its trade with the EU and Asian countries reached 63% and 23% respectively [20].

The reduction of hydrocarbons dependence can be one of the main key challenges for the GCC countries. The region governments have to take several well-studied strategies to meet this objective. For example, Saudi Arabia, the region's biggest oil producer, has chosen to develop manufacturing activities such as plastics, polymers, and fertilizers, via the state-owned SABIC Company. The United Arab Emirates and Bahrain elect to develop tourism, manufacturing, and financial activities. Qatar has selected another alternative method by strengthening its gas and financial sector [21].

Till now, these efforts have resulted in some outcomes, as the GCC countries are reducing their dependence on oil revenues and are less vulnerable to

fluctuations in the price thereof than before. Of course, there still some indications and special effects, as an example, the Kuwaiti, and Saudi Arabian manufacturing sectors started to disengagement from the oil sector. On the other hand, the Qatari economy is still affected by oil price swings (except its manufacturing sector) [22].

Despite their many common institutional characteristics, the GCC countries fail somewhat to behave as a unified bloc. This failure referred to the structural economic and geopolitical factors that made regional integration difficult. For example, in 2004, Bahrain individually from her other partners signed an FTA with the US [23]. This agreement reinforced the US military presence in the Gulf in a territory contained Iranian influence. The precious resources of the GCC region added to the weak economy and its growing importance in this part of the world resulted in the development of important political and commercial links with many countries, chiefly with the US. GCC States concluded several international agreements and participated in many regular international summits and negotiations [24].

New issues added for the stable economy development, increased energy requirements, fossil fuel resources depletion and the direct effect of fossil fuels on climate change due to the carbon emissions effects on the atmosphere. There are two fundamental ways to reduce fossil fuel dependence: energy consumption reduction by applying energy saving programs depends on energy demand reduction and efficient energy usage in the industrial and domestic spheres [25]. Secondly, by encouraging the dependence on renewable energy as it is an effective alternative energy to reduce carbon emissions.

Renewable Energy technologies possess many benefits include energy security, job creation, business opportunities, sustainable development and prevention of global warming [25]. Increasing Renewable Energy share is an effective approach for reducing fossil fuels share and climate change. Currently, the U.S., Japan, Germany, Brazil and other countries have started to develop their Renewable Energies plans as an important part in enhancing their environment for the future [27]. As Renewable Energy usage and development depend mainly in the GCC region on the political decision and support, this energy is expected to become progressively cheaper shortly. The deployment of renewables in GCC region has grown up at a very slow pace soon. Unclear plans for the future of energy in GCC countries with the fluctuations of oil and gas prices and depletion of reserves added to no strategic plan for renewables or a clear target.

The governmentally developed policies in renewable energy since 2008 still unable to compete with fossil energy and it depend on the government support only. The government subsidies for fossil energy hampered the development and support of renewables. With its strong solar and high financial resources, GCC countries have an opportunity to establish a world position in this energy. Also, these countries can carry out further development of relevant technologies. These technologies involve the development of an advanced professional skills base in science and engineering. It might logically be expanded to provide a specialization in modern solar-efficient architecture and energy management. The success of the renewable energy deployment in the GCC region depends on the well regulations and policies, fiscal

incentives [28, 29]. Table 1 illustrate GCC countries global sustainability ranking. It is found that energy quality and security is good globally. Qatar could be the best in GCC in term of energy quality and security. Also, GCC countries have acceptable energy environmental sustainability.

Table 1. GCC countries global sustainability ranking

Energy Security Rank	Countries	Energy Equality Rank	Countries	Energy Environmental Sustainability Rank	Countries
8	Qatar	1	US	86	US
12	US	9	Qatar	95	Qatar
23	Bahrain	12	Saudi Arabia	102	UAE
45	Saudi Arabia	19	Bahrain	120	Oman
49	UAE	20	Oman	122	Kuwait
73	Kuwait	28	Kuwait	124	Saudi Arabia
78	Oman	37	UAE	125	Bahrain

Switching to Green Energy

The investments in perennial power plants are accompanied by the large scale of uncertainties. The last thirty years were necessary to invest in the establishment of power plants, but some of the variables that appear from time to time caused fears of investment in this sector. The big risk for region governments is the dramatic changes in fuel prices, in addition to the increase in environmental pollution and changing laws and regulations to suit the times [30]. The evaluation of investment in new types of energy needs a comprehensive study to the annual income and incurred costs. The income comes from the sale of electricity to consumers. The distinction must make when the cost account between short- and long- term. As the short- term costs include variable costs such as fuel prices, in addition to the environmental taxes (meaning the costs of improving the part of the environmental devastation in the areas surrounding the stations), while the high costs term includes the cost of invested capital [31].

No electricity production technology avoids polluting the environment by harmful pollutants to the air, water, and soil, whether at the station during construction or operation. Many of these pollutants cause major problems on human health, and the ecosystem, natural plants, and these effects expressed as the external influences that do not pay compensation to the owners of power plants (GCC governments in this case), nor the consumer is a demand for compensation. The fossil fuels whether coal, heavy fuel oil, diesel, natural gas cause a significant environmental pollution. Natural gas is the least external cost that means the lower among fossil fuels impacts the environmental. Renewable energy remains less environmental cost from natural gas. The external costs imposed on society vary from state to state [32]. The capital cost of alternative energy technologies is higher than fossil fuels power plants. This difference in cost, at least, begins to reduce and decrease more in the future. From the other hand, the cost of energy is lower in comparison with that

for fossil fuel. However, this should give alternative energies greater attention and a place in the field of power production capacity. The Gulf States established its experience and its model individually to introduce the alternative energies to the power production sector. The most important steps followed by the GCC States is the liberalization attempt of the energy sector and to encourage the private capitals, and work on the entry in the financial market mechanical and choose the best technologies and producers of alternative energies. In general, there is no perfect experience, each has their advantages and disadvantages [33].

The biggest dilemma facing the alternative energies proliferation is the government support for the prices of fuel and electricity together, making the cost of producing energy technologies and renewable energy is expensive (see Figs. 3 and 4). The investment subsidies in the field of alternative energies reduce its cost and make the investment in this sector more desirable. Many international experiences in this area showed that the subsidized should link to production (kWh) instead of linking capacitive discretion of the station. So, the electricity pricing must fix whether produced from alternative energy sources or fossil fuels by governmental legislations [34].

The GCC interested in the climate change on several levels, as experienced several severe weather conditions, which will become more severe in the future. A greater understanding generates in the GCC States about the effects of climate change. As the high temperatures and steam, precipitation could have disastrous effects on productivity in the future. While there is evidence of adequate conditions for the Arabian Gulf in the past and the present, the territory lacks to studies on the future conditions concerning climate change [35].

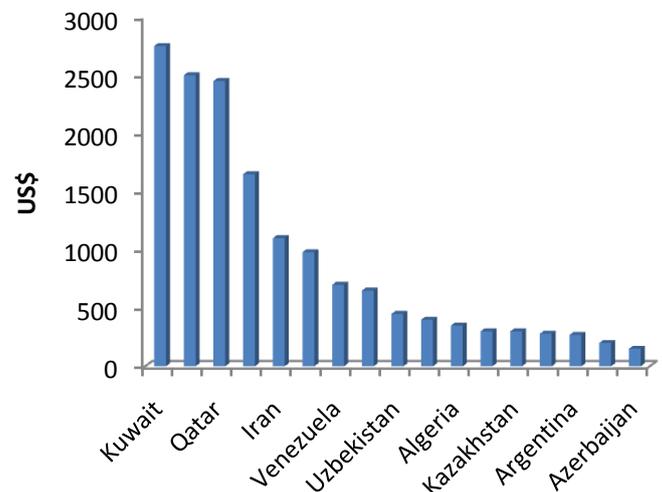


Figure 3. Fossil fuel subsidies per capita bases.

The Gulf Investment in the development of alternative energies gives these countries the ability to diversify their energy sources rather than relying on a single source (Oil or Gas). This diversification will increase the security of the power supply in the long-term and to reduce domestic consumption of fossil fuels, which means increased revenues from oil exports. The support of this sector means creating investment opportunities, resulting in increasing employments

in the region. The mutual relationship between the economic cost and environmental benefits will justify and support the development of alternative energy sector because the adoption of such energy has social benefits more important than the cost considerations. The GCC states have begun to assess the environment after its entry into the UNFCCC and the Kyoto protocol in 2005 and through them committed these same states to take steps to reduce greenhouse gases. The United Nations Conference on Climate Change organization in Doha in 2012 was the first initiative of the Gulf state of Qatar [36]. Also, the second initiative for GCC states is important participation in the climate conference in France, December 2015.

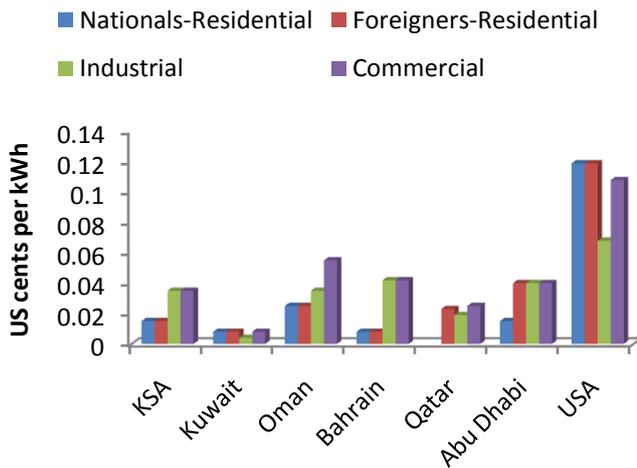


Figure 4. Comparison of electricity prices.

In 2011, the Saudi Arabia government established the King Abdullah City of nuclear and alternative energy (KCARE). This city aims to develop the understanding of these techniques in the developing state and to generate alternative energies and processing of 41,000 MW by 2032. This capacity planned to arise from the building a 16 GW PV station capacity, in addition to a CSP plant capacity of 25 GW. The Kingdom announced its plans to change the feed-in tariff (FIT) are a similar manner to what exists in Germany. As the use of certain European countries for the FIT, the policy has helped companies in the alternative energy sector for stability and competition. Besides, to the use of solar energy, the Kingdom plans to take advantage of wind, geothermal, nuclear, and waste-to-power plants. These plans are costing billions of US\$ aims to put Saudi Arabia in the ranks of the leading countries of the world in the alternative energies development [37].

The emirate of Abu Dhabi undertook significant steps in the renewable energy development. Masdar began as an eco-city project in 2008. It took its power from solar energy and cooled by the wind with the use of environmentally friendly vehicles. The Abu Dhabi authorities designed to make Masdar as the best low-carbon city in the world. This town will use several sources of renewable energies. A solar plant completed with a capacity of 10 MW followed by larger and new facilities to achieve a total of 130 MW. The wind field outside the city planned to produce a capacity of 20 MW. Also, geothermal energy may be used. Masdar City is

planning to create the largest hydrogen power station in the world [38, 39].

The wind turbines in the World Trade Center in Manama can be considered as an example of the Kingdom of Bahrain directed towards alternative energies. This system can generate wind energy from 1000 up to 1300 kW, equivalent to 11-15 % of the total need of the Center for electricity [40]. However, Kuwait did not live up renewable energies more than research carried out by the Kuwait Institute for Scientific Research (KISR), which reached up to the limits of today's 140 research cost about US\$ 50 million. The Institute has prepared plans to establish a wind plant with a capacity of 15 MW, and solar power station with a capacity ranging from 5 to 10 MW [41]. There are facilities in Oman about 235 kilowatt -producing ability of solar energy used for several purposes, such as street lighting, remote watering systems, television transmission, monitoring earthquakes and water heating. Also, the solar power is utilized in the oil industry for the operating of the equipment installed in remote areas, and in the production of steam utilized in the extraction of oil [42]. In addition, small photovoltaics PV project installed in Majan Electricity company (50 kW), Sultan Qaboos University (20 kW), Sohar University (5.3 kW) and Caledonian College of Engineering (3 kW). Finally, in 2013 GlassPoint Company install 7 MW solar thermal system for Petroleum Development Oman PDO to produce steam to be use in oil enhancement recovery. Also, recently they started installing 1024 solar trough system southern of Oman, which will be in operation in 2017.

The effect of low carbon strategy on the GCC alliance

Alternative energies market has begun to expand in the GCC States by announcing several projects, and policies to control the use of these energy sources and to improve economic growth and the energy security. In spite of the added power and investment in this region it is still lower than other regions. In the current years, a change in the government and private interest in this energy similar to the attention in the oil and gas markets [43]. The use of renewables enhances the diversification efforts for the state not to depend on a single energy resource. Until today, the GCC countries did not succeed to the decoupling the economic growth resulting from the oil production and export with the energy consumption and the emitted CO₂ pollutants. The GCC countries except the United Arab Emirates do not show enough interest in transforming its preferred current energy systems in spite of its environmental impacts as known. However, there is a beginning of the emergence of a stream of decision-makers interested in the green side of the economy through all the countries of the region [44].

Until today, the GCC countries determining its priorities in the field of energy and efforts are being made to increase energy efficiency and generating sources, sustaining energy prices, and government subsidy policy, the creation of citizens' employments, and improve the environment. These sectors have gained the attention of decision-makers and the academics. Recent scientific researches studies have shown that renewable energy supplies deep roots in the GCC region, slowly but surely [45]. No successive framework governs the

founders of renewable energy policy in the area, and there is no final date to make one, also. Any discussion of renewables should be directed to unilateral attempts for each country in the region rather than from the direction of a unified combines of these six countries. There are several factors combine GCC countries hinder the orientation of alternative energies. Since most of these countries are the greatest reservoirs of oil and gas, making it does not need renewable energies in the foreseeable future [46].

This theory has failed politically and economically. The leaders of these countries paid attention to the world trend to reduce greenhouse gases and diversifying sources of energy to enhance the energy security in the world. For economic terms, it has turned out to decision-makers of the Gulf that the addition of new sources of energy will supplement conventional generating capacity. In spite of all this, most of the generated electricity is still produced by natural gas that is produced locally by some GCC countries or imported from neighbor countries from other countries [47].

The high rate of switching to renewable energies will strengthen the Federation of GCC countries and increase the links between them, and reduces the adoption of natural gas imported by countries such as Oman and Bahrain in exporting countries such as Qatar. The increased reliance on renewable energy lessen the dependence on fossil fuels and thus increase the export capacity of these countries, which means increasing the national income and economic recovery, including improving social lives of its citizens [48].

Policy inclusiveness and niche development

The sociotechnical alterations for sustainable energy usage involve many actors and intricate change processes. As an example, there are increasing needs for electricity produced by renewable technologies as a result of global warming. This goal realized as a commutative inclusive. For example, the UAE aims to increase the share of renewable electricity generation and introduced new players in the electricity industry. Although the renewable sources electricity share is on the rise in the UAE, the fossil fuels, and conventional power generation technologies are still dominating in electricity sector [48]. In spite of the efforts to private and liberalize electricity markets, the alteration in the electricity sector has been modest. There are many differences between the GCC states that are quite clear regarding the use of renewable electricity generation and the liberalization and privatization of the market.

Searching into the renewable power generation in more detail by using the wind energy and PV as examples, the wind energy generation is limited for Bahrain while PV electricity generation used widely and confirmed its potential. The GCC countries also differ from each other considerably in the method the public electricity sectors markets have been liberalized and privatized [49, 50].

There are many differences in the scope of liberalization of the electricity sector of these countries. The socio-technical changes originate from niches strategy is slow because some groups inside the system are resisting the changes. First, the niches are protective spaces, temporary sites that allow experimentation with the co-evolution of technology, user

practices, and regulatory structures, outside the regime and its selection criteria. Second, the resisting regimes are influenced by their institutional and the criteria for innovations. This criterion refers to the established structures, the conventional technologies and infrastructures, conductor principles and socio-epistemic processes, political power, and the cultural importance of these regimes [51, 52]. These regimes can impede the niche development, and they can turn a niche into a growing innovation although the niche highly developed outside the regime's influence [53, 54].

The niche development depends mainly on the radical innovation and requires alterations in the selection criteria that require changes in actors [55]. Niches develop by its actors, who may be scientists, technologists, or various social people who are interested in niche development. Many early researchers concentrated on the niches' internal activities, such as the learning processes, building on social networks. In the recent researches the concentration on the improvement of the quality of learning and institutional is embedding to enhance the niche development [56].

The political support is crucial for the development of niche; by creating many changes in policy measures for the administrative role. The discussions about the theoretical ideas are rather far from the reality, and the government always involved in the politics of changing processes [57].

There are many shreds of evidence that the public interest and demand for renewable energy technologies exists [58]. The role of the public interest in niche development needs more information and studies. The sustainable changes studied as technological changes, and less attention was paid to other sustainable development, as citizen participation and increasing democracy [59]. Thus, for GCC states, more information is needed about democracy, citizen participation, and niche development.

If we take PV and wind energy as the niches that must be analyzed, there is no strategic niche management or free tools for evaluating the scope of sociotechnical changes. For example, if a change is called a regime change when it is an incremental change, we understand this change as a shift from traditional energy-based fossil fuels electricity generation to the use of renewables by small and medium-sized consumer-owned generation. This alteration kind would increase sustainability, including democracy and citizen participation, as the ownership of the generating capacity would be distributed among a large number of actors [60].

After the Arab Spring, the GCC governments perceived that it cannot ignore public opinion from that day and on. The influence of public opinion on policies is a very complex and contested issue [61]. It is tough for these governments with all of its resources to override public opinion and to get they want [62]. The social influence on policies becomes free from depending on the electoral system and political institutions [63]. The direct responsibility linked to the local policymakers makes them more incentives to represent public opinion and vice versa [64]. The important role of the public is the salience of the issues unless the public is interested in these matters. The public does not care about the policies or if they are not related to their lives. Renewable energy technologies revered to environmental problems and ideologies. The effect of environmental issues on the public is not constant influence

but fluctuating one [64]. For example, the nuclear energy has given a momentum to the green parties and the renewable electricity technologies development in many European countries. The salience of renewable energy technologies increased again from being an ideological or perfect alternative to nuclear power. It becomes commercially available to consumers, and more tangible and viable alternatives to buying electricity from the grid. Renewable energy technologies offer many advantages for private consumers, such as the ability to manage and control a private energy economy, e.g. against raising electricity and grid costs. Also, consumers would be less exposed to technical or market failures, such as blackouts and price hikes.

Conclusions

A review of the circumstances and actions taken by countries GCC conducted in this study. These conditions caused the deterioration of this region environment; show that the fact that this area is the richest area in oil and gas with missile development of the cities of the area coupled with an abnormal consumption and wasteful energy conditions. So, that the States of the area have become the largest energy consumers in the world, all of these variables met to raise the environment alarm in the area. Now, it becomes inevitable for the countries of the region audited and orientation to keep more on the environment and repair the damage of the past years.

The use of renewable energy provides clean and available energy and limits the pollutants associated with the fossil fuel burning and rising greenhouse gases. This approach will also increase employment opportunities and improve the environment. The approach to the production of clean energy from renewable sources is hampered effectively by the decision-makers stuck to the old proven formulas, but the emergence of new generation of decision-makers in the province with enlightened mentalities and conscious of the importance of renewable energy could open the prospects for these energies. The GCC countries projects of renewable energy are still in the planning stage, and its progress is slow and did not reach maturity that relates to the phase in Europe. Several future projects for renewable energy planned, but the work on these projects and completing it decide the success of the Territory in the transition to a free or low-carbon region.

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