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Consequences of energy crisis and climate change in the Middle East and proposed policies

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ABSTRACT

At present time, repetitive occurrence of destructive atmosphere phenomena has drastically affected the human's life both regionally and internationally. In recent years, due to the detrimental effect of some human's activities, we have witnessed numerous destructive atmosphere phenomena and climate changes in local, regional, and international levels. Some of these challenges are global warming, droughts, destructive storms and floods, heat waves and dust storms increase, and rising of sea water level most of which occur because of climate changes. Affecting the spread pattern of diseases, famine, water resources reduction, and conflicts over water and food resources, climate changes have seriously threatened the security of human communities in different political, economic, energy, social, and environmental dimensions. This descriptive-analytic study tries to look into the problems resulted from climate change and energy crisis in the Middle East and offer approaches to counter it.

Keywords: Energy, Energy crisis, Climate change, The Middle East

INTRODUCTION

1. Introduction

The earth temperature is not stable and might severely change depending on geographical conditions (horizontally), altitude (vertically), and time (seasons and decades) [1]. Climate change is a phenomenon that, according to pertinent evidence, has existed since many times ago. However, its speed and nature has varied at present and especially over the second half of the preceding century as it has taken a higher acceleration. Its trend has also changed compared with the past. According to one of the existing theories, climate change is partly due to excessive human activities especially industrial ones, which has resulted to Green House Gas (GHG) [2]. These activities entail extraction and combustion of fossilized carbon (charcoal, oil, and gas) for fuel, deforestation, forests fire, rice paddy cultivation, animal husbandry, garbage burial and chemical fertilizations. The outcome of these activities is severe increase in the density of green house gas and, consequently, potential heat increase (the ability of trapping heat) in the atmosphere [1]. Over the recent century, green house gas including CO₂, CH₄, and NO₂ has drastically increased in the atmosphere and it is predicted to increase in the future too.

Based on GSM results, which can predict the climate, the earth will encounter an average temperature increase of almost 1 to 3.5 degree in 2030 [2]. GWP is not a new concept as it dates back to the nineteenth century. Svante Arrhenius, the Sweden chemist, estimated that over the next 3000 years, fossil fuel combustion would double the CO₂ density in the atmosphere.

Accordingly, using fossil fuels is likely to affect the future climate. At present, fossil fuels are economically the main source of developed countries that provide energy either directly for fuel or indirectly for generating electricity, factories, agriculture, transportation, and heat. Emission of green house gas in the future and the resulted climate change is strongly dependent on fossil fuels consumption [1]. In recent years, the increasing rate of energy consumption has brought about the energy crisis in the world. Although the ever-increasing use of energy of fossil fuels causes fast economic growth of communities, the emission of its pollutants in the atmosphere and its associated outcomes have caused threatening changes to the world. On the other hand, fossil fuels shortage, their unrenewal nature, and prediction of prices increase in the future have caused the policy makers of energy domain seriously consider using clean fuels [3].

From the US research national council, there are valid evidence to state that the climate is changing largely owing to human activities. Many of scientific theories have meticulously been examined and tested and the probability of rejecting them in the future is low. These theories are typically taken as proved facts. One of these theories is the statement that the earth is becoming warm and its underlying reason is human activities [4].

It might be argued, with certainty, that the above-mentioned issue will be one of the most influential environmental factors nationally and internationally. Experts believe that climate change will be one important factor that governments need to take into account seriously; otherwise, they are likely to encounter serious or even unpleasant repercussions. Some also believe that the importance of this issue comes back to the concept of environmental stability and sustained development. On the other hand, other bigger environmental concerns such as air pollution, global warming, destruction of forests, and losing the biological variety of creatures are the factors that might highlight the climate change further. Thus, it seems that one of the most important technical social challenges in the 21st century will be countering climate change [5].

1.2. Energy Crisis and Climate Change

The Middle East zone has almost 30 percent of global oil productions and oil revenues are the main revenue source of the governments. It is obtained in two ways: either the countries themselves are producers of oil or provide the work force of oil exporting countries. Due to oil incomes, the Middle East governments have been able to employ a high percentage of their own population. As the world has started to mitigate its dependence on oil as the source of energy production, the Middle East economy will change considerably. Additionally, the area is under climate change outcomes as well. The Middle East is severely poor in terms of water resources as nine out of ten poor countries of the world (in terms of water) are in this area. Farmers abandon their farms because of water shortage, many of the coastal cities are threatened by sea level increase, and temperature increase in summer that is increasingly mixed with moisture jeopardize human survival. Generally, it may be asserted that the Middle East will considerably change in terms of both climate changes and global consumption patterns. Extensive awareness on climate change has engendered the governments and consumers to seriously consider abandoning hydrocarbons. Amid this, there are two scenarios: 1. One scenario highlights the use of renewable energy. Investors have spent billions of dollars on renewable energy. China considers renewable energy a national security necessity. Oil production will soon take over its



demand and oil price will continue to drop. Some experts believe that the necessity of considering renewable energy is even more important than war against terrorism. Martin Hoffert, physics professor at New York University, asserts, “terrorism does not threaten the life survival interwoven with technology. However, energy does it. It is time to look for a replacement for the hungry engine of humanity”. This scenario warns the countries depending on oil incomes that they should think about replacements for their endable resources. According to the International Energy Association report, daily demand for oil will reduce from 88 million barrels in 2020 to 72 million barrels in 2030 and 24 million ones in 2050. In other words, by 2050, demand for oil will decrease for 75%. This report is very moving and rings the danger bell for the governments that are highly dependent on oil. However, it seems that oil governments such as Iran do not feel the necessity of fast exiting of fossil fuels. The Middle East countries are still contingent on oil and gas export. Over 70% of export in Kuwait, Qatar, Saudi Arabia, and Oman are related to oil and gas. In Saudi Arabia’s outlook published in 2016, Muhammad Bin Salman, the king of the country, promised that its country would change Saudi Arabia into an industrial powerhouse. The World Bank statistics, however, shows that 75% of the country budget is still supplied via oil sale [6]. 2. In contrast, the other scenario states that paradigm change of energy lasts tens of years and prepared infrastructures for the use of hydrocarbon fuels can guarantee strong markets for a long time. While electric cars have attracted attention, gas-fueled cars still have around 90% of new cars sale. The present houses have heater and oven that require oil. In addition, almost all fuel of jets in the world is oil and the world becomes more and more contingent on oil-extracted plastic. These are all pertinent to developing countries (mostly in the Middle East) having the majority of the world population.

The consumption of these countries has markedly increases as their incomes have increased. They are then likely to depend on extant technologies and equipment for a longer time. Whereas the rich are not able to spend thousands of dollars for green products, for the majority of the world people, oil and gas are still the economical fuel. There are reasonable rationales for these two scenarios and no one can say with certainty how technology, rules, or consumers’ behavior would change in the future [7].

That which of the scenarios is closer to reality for the Middle East is of great importance. As it was above-mentioned, the economy of the Middle East is tightly related to oil incomes. The strategic attention of the world to this zone hinges on energy production. A remarkable volume of energy security in this zone is dependent on the investment of big countries including China. If Cina decides to supply its energy security from Africa, it is expected that the Middle East would become weaker [6].

Amid this, what is apparent is that the benefits of governors have always been in contrast with those of citizens. Governors hinge on oil for their survival but the long-term benefits of citizens depend on dwellable climate conditions. The unended demand of West to fossil fuel has caused that the gained incomes be spend on building cities teeming with car, skyscraper, and big attractive markets. Now, it is time the governors think of a solution for this self-destruction [3].

1.3. Climate Change in the Middle East

No zone of the world like the Middle East is not affected by the outcomes of climate change. Climate change affects the hydrologic cycle all over the world and this effect is relatively more tangible in dry and semi-dry areas. The Middle East is one of the biggest super dry, semi dry,



and dry districts in the world as its rainfall average would not exceed 166 mm per year. Climate change, decreasing water resources, and droughts on the one hand; and weakening of oil economy and tendency of the world to use renewable energy on the other hand are serious threats for the future of the Middle East.

The Middle East will be an area with much vulnerability in climate changes in the future decades due to its high temperature, sea level increase, and weather pattern changes. According to the “Foreign Policy” magazine, the Middle East will finally turn into an unresidential district in that it has received the most damage and has the least ability to counter this phenomenon. The magazine further states that “many of attractive countries in the Middle East have turned into the hell because severe temperature and drought has engaged the area and forests are being burned. Following the severe heat increase, the cities have turned into unlivable warm islands, it is only the beginning of the path, as the Middle East temperature will rise to double of the world average, and the temperature will increase for four degrees by 2050”.

Unprecedented heat increase in the Middle East is an alarm to its dwellers. In this summer around Basra in south of Iraq, the pressure on the network (due to the 50 degree temperature) led to permanent outage and the dwellers had to go to the suburbs to stay cool. The speed of warming in the Middle East is two times more than that in other parts of the world. If the dreadful predictions about the Middle East climate conditions come true, it is estimated that the Middle East turns into a desert like Afar desert in Ethiopia. High rate of population growth, fast growth of city dwelling, scarce water resources, instability in agriculture, and fishery reduction in the Middle East is obvious. These factors have exposed the Middle East to high risk of climate changes outcomes. On the other hand, the capacity of many of the governments in the area to deal with climate changes is low. It has been for one century that village population has moved to cities and its acceleration will result to instability. As water resources mitigate, temperature rises, and farmers move to cities, food import also increases and monetary sources may be affected. Brilliant cities built in the Middle East may find themselves under water in the next half of the century. It seems that no government in the area is ready to move its staff to private sector and the private sector does not seem to be ready to attract them. Additionally, emigration of millions of workers in the Persian Gulf may paralyze the economies for years [5].

Beside the worrying reports regarding the future of the Middle East, there is a hope that the conditions can not be as bad as it is depicted. If the Middle East uses the latest technologies and focus on smart investment to guarantee sustainable development, the district has high potential to counter with climate changes challenges and it can facilitate economy growth and more commitment to mitigate green house gas emission by 2030. It is necessary to run international collaborations about issues such as investment in economy, renewable energy use, examination of new energy resources, and carbon emission reduction [4]. More collaboration of the Middle East countries and the West can lead to a new era in weather diplomacy. For example, Saudi Arabia announced its purpose to run two ambitious weather plans: Saudi green innovation and Middle East green plan both of which promised to reduce green house gas emission by four percent. Other pertinent plans include the increase of renewable energy to generate electricity from 0.3% to 50% by 2030, planting of 10 billion trees in future decades, and implementation of clean hydrocarbon projects. If present commitments accord with other purposes, the Middle East will then manage the global movement in climate change. The biggest oil exports in the



Middle East can stay as exporters of clean energy in the world. UAE and Saudi Arabia have invested billions of dollars on sun farms all around the world. The skills that these countries will gain can potentially turn them the leaders of the world in establishing the sun energy [8].

1.4. Political-Social Outcomes of Climate Change and Energy Crisis in the Middle East

Global energy markets are not probably the only factors influencing the Middle East in that climate changes have also the capability of exerting remarkable effects on the people directly or indirectly. On 21 July in 2016, “Matrabeheh” in Kuwait experienced temperature of 54 centigrade degree (128 fahrenheit) and on 22 July in the same year, Basra in Iraq had the temperature of 50 centigrade degree (122 fahrenheit). If World Meteorological Organization (WMO) confirms these data, they were the hottest temperatures that Eastern hemisphere and Asia have ever experienced. In addition, the results of one recently conducted study indicate that according to the present pattern, the number of warm days will take a rising trend. It is expected that by the middle of the current century, temperature will reach from 43 centigrade degrees (109 fahrenheit) to 46 centigrade degrees (115 fahrenheit) and by the end of the century to 50 centigrade degrees (122 fahrenheit).

Such predictions have caused some researchers to conclude that temperature factor can cause some parts of the area to become undwellable. Climate changes can not only create irritating temperatures but also deeply affect water, food, and air resources and quality. The Middle East already has limited water resources. Arab countries include over 5% of the population and 10% of the land in the world. However, their annual portion from water is merely 1.2%. It is estimated that by 2020, their portion reduces to 20% as a result of temperature rise [4].

Intergovernmental Panel on Climate Change (IPCC) has warned that number of droughts has increased and around 80 to 100 million people of the Middle East will face water shortage by 2025. Any attempts to compensate it would result to an increase on underground water resources. Temperature rise along with unsuitable agriculture activities is involved in desertification and this, in turn, influences the quality of farming and air. Around 85% of water resources of the Middle East is used for agriculture. This indicates that water resources are being excessively used and most of countries do not have appropriate management on it. Some of the countries are experiencing severe dryness now. For example, in Yemen, the annual access of each citizen to water is only 88 cubic meters that is by far less than 500 cubic meters globally defined for water shortage [9].

According to IPCC, as temperature increases in the Middle East, we should not expect to have considerable rainfall in the area. Further, as population increases, the evaporation and shortage of water becomes more severe unless consumption patterns change. Climate change damages not only water resources but also air quality because desertification has increased pollutant dust. Over the last 15 years, dust in Iraq, Saudi Arabia, and Syria has reached more than 70 percent. Additionally, salty water rise from sea water level rise has created further problems by polluting the scarce water resources in the above-mentioned countries and has also caused floods in ports and non-residential districts of countries such as Iran, UAE, and Qatar. The Middle East countries have dealt with their potable water shortage by resorting to costly way of sweetening salty water. This often happens in the oil-rich countries in Persian Gulf that have almost 70% of water sweetening project [10].



The point, however, is that the process of sweetening water is so costly and environmentally detrimental that cannot be taken as internal strategies. As more water is desalinated, adjacent water becomes saltier. In order for water sweetening to become an economical project, further research needs to be carried out regarding renewable energy such as the sun and wind energy. The current tensions among the Arab countries and also non-arab ones are also involved in weakening the scarce water resources and can cause further problems in the future. A remarkable amount of potable water in the Middle East is from outside. Tigris and Forat rivers are from Turkey. Forat first passes Syria and then flows into Iraq. Turkey measures to create Ilisu dam in the width of Tigris River to control water energy has caused the neighbor countries such as Iran to be worried about reduction of water flow. This worry has caused a tension between Turkey and Iraq. But Turkish officials claim that their harvesting is not more than their right and half of its water flows in the river. In addition to Iraq media, people, and officials, Iranian media has also focused on the negative impacts of this dam on the life of Iraqi southern people and especially the increase of dust phenomenon in south of Iran. However, Turkish officials rejected these impacts and asked for comprehensive examination of the watershed of Tigris River by experts of the three countries [9].

It is hard to specify the political-social outcomes of climate change in the Middle East in that environmental impacts appear over time and optimally tens of years. There is evidence indicating that the drought in Syria, which lasted for one year, was influential in the social-economic unrest of the country in 2011. In the forthcoming years, temperature increase and water decrease can further complicate the dreadful problems of the area. This, in fact, foregrounds the necessity of intergovernmental collaborations. In absence of such collaborations, the increasing trend of lack of food, energy, and water security as well as the probability of pertinent conflicts is warning [1].

Jeffrey Sachs, the boss of the UN sustainable development strategies network, asserts that “there are numerous problem in this area, because on the one hand, the Middle East is the center of producing fossil energy that we have to stop their production; and on the other hand, this area is getting drier day to day and after experiencing war and political tensions for years, the whole area is suffering from water tensions and compulsory movement of population”. The professor of Columbia in New York highlighted that “a sweeping change needs to be done in the Middle East so that this highly sunny area would change into the center of generating sun energy and green economy in the world”. Sachs also contended that according to one theory, climate change was one of the reasons for the Syria war as in its unprecedented drought, more than one million farmers had to move to cities, which caused social pressure for the event of 2011. Laurent Fabius, the ex foreign minister of France, states that “catastrophic fires in Cybres, Greece, Turkey, and Lebanon, over 50-degree temperature in Kuwait, Oman, UAE, Saudi Arabia, Iraq, and Iran, and also drought in Turkey, and Water tensions in different countries of the Middle East especially Jordan are not parts of an unreal cinematic movie. Rather, they are a real tangible tragedy” [11].

2. Materials and Methods

Descriptive method was used to write this article. Since this research study describes the situation and conditions of a phenomenon at a specific time spot, this research method does not offer any hypothesis and does not look into the relationship among variables. It only examines the present



time and offers solutions for it. The theoretical foundation of the study is based on the security perspectives of Copenhagen. It is apparent that the researcher would also use some other theoretical and empirical evidence. The Copenhagen theory supporters believe that security is not limited to security and military issues and can be considered in other domains as well. The data collection method was document analysis mostly with literary sources.

3. Results

Climate change has always been a factor for destruction of natural ecosystem and economic, social, political, and security infrastructures in local, national, and international dimensions. Furthermore, the ever-increasing growth of energy and expansion of energy extraction especially in the Middle East, which is the center of energy generation, is a factor that can affect human communities in varying agricultural, hygiene, welfare, and other human issues infrastructures. The effects of climate change and energy crisis on the environment have been mentioned in different books and also by the UN and intergovernmental association of climate change. What follows is a description of the most important issues in the world and the Middle East.

Table 1. Environmental outcomes of climate change and energy crisis

Environmental outcomes of climate change and energy crisis in varying sources
1. Earth warming
2. Sea water level rise
3. Drought in areas with weak soil that cannot tolerate pressure
4. Threat and weakening of regional cultures and life styles
5. More severe climate change phenomena
6. Reduction of the ocean conveyor flow of south of Europe in Atlantic ocean
7. Destruction of biology and living beings
8. Reduction of oceans acidity
9. Rainfall increase in high altitudes and its reduction in semi-cylinder regions
10. Danger of sudden catastrophic changes such as sudden release of CH ₄ from oceans depth



These effects directly or indirectly create political and economic problems in the Middle East and world. The most important political, social, and economic outcomes of climate change and energy crisis are as follows.

Table 2. Political, Social, and economic outcomes of climate change and energy crisis

Political, Social, and economic outcomes of climate change and energy crisis in different sources
1. Movement and vulnerability of the population dwelling near much climate change regions such as the Middle East

2. Division of resources between derelict population and reduction of production resources
 3. Social unrests
 4. Threat and weakening of regional cultures and life styles
 5. Negative impacts on general health and hygiene and need to crisis management to prevent from disease outbreak
 6. Crisis and unrest in urban system
 7. Movement of coastal line in sea regions
 8. Destruction of communication paths and relocation of communicative paths
 9. Remarkable reduction of agriculture and fishery power along with seasonal change of crops cultivation
 10. Crisis in management of energy resources
 11. Endagering of extant food and food resources security
 12. Reduction of territorial ownership
 13. Fragile conditions for weak governments in correct management of the crisis
 14. Conflict over sea resources such as oil, gas, and hydrocarbon reservoirs
 15. Potable water shortage for millions of people
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4. Discussion and Conclusion

The most important issue is accepting the reality that there is a problem called climate change and energy crisis. After many years of addiction to fossil fuels in daily life and also in industrial consumptions, considerable CO₂ and other green house gas have been produced. It should be admitted that a remarkable part of the problem emanates from undue human activities and interferences in different domains. Climate change is largely due to human activities and it has been mentioned by many international conventions. Some experts believe that global warming and green house gas emission are the biggest challenges at present era. Accordingly, different associations have become active to deal with such challenges. The main challenge of the countries is the differences they have regarding the topic and domain of climate change. For example, while the issue of reducing green house gas emission is the main topic in developed countries, the problem of repetitive famines, desertification, destruction of vegetation, and shortage of water and food are the main issue in developing countries. Estimations indicate that the issue of food and human health crisis in poor and less developed countries will be the main problem [12].

Poverty and social inequalities are among the most influential components on the countries' vulnerability. The countries with lower income and trivial internal gross production are more vulnerable against climate change and energy crisis. In addition, compatibility power of these countries is by far less than that of countries with more economic power [5].

As it was already mentioned, the conditions of the Middle East countries are in a way that not only have some common worries with other countries (such as water dearth and increasing heat) but also have their own problems such as increasing rate of population, which is likely to remain unchanged in the future years. The problem of water resources shortage is likely to

increase considering the dearth of surface and underground water resources and also industrialization of developing world. In fact, the emission of green house gas in developing countries (mostly the Middle East countries) will overtake that in industrial countries. The global energy challenge involves many important issues including the environment, climate change, pollution, and also the issue of finishing oil, gas, etc. resources [1].

All the above-mentioned points can lead to conflicts affected by climate change and energy crisis. The decision making process in water and energy management domain might largely determine the future security of the environment and energy. The outlook if using new technologies and renewable energy in the Middle East countries is not clear. The transfer of energy efficiency and technology of replacement energy such as wind, water, biogas, and geothermal from developed countries to developing ones can help to reduce green house gas emission. This technology transfer requires international plans and collaborations. At present, there is no non-fossil energy resource to replace fossil fuels completely and the most viable strategy to mitigate the emission of green house gas is still making use of regional climate capacities to generate sun and wind energy. Given the increasing role of Iran, Qatar, and Saudi Arabia, as the main producers of green house gas in the region, it is vital for them to take suitable measures to reduce this emission in oil and gas industries. It should also be pointed out that if these countries do not regard their international commitments to decrease green house gas emission, their international status will be damaged. In general, in light of the above-mentioned concerns and points, the leaders of the Middle East countries should focus on removing the environmental problems to find suitable solutions and strategies in macro level to counter energy crisis. Hence, the pertinent experts should be consulted and their studies need to be taken into account so that appropriate security strategies would be taken to deal with the destructive effects of climate change and energy crisis by considering the environmental security [13].

Nowadays, the phenomenon of climate change and energy crisis has become one of the most critical issues that has preoccupied the policy makers' and planners' minds. Policy makers should think of dynamic preventive programs to mitigate the use of fossil fuels by investing on efficient energy technologies and strategies to counter energy crisis. Some of these strategies are as follows:

Table 3. Strategies to counter with climate change and energy crisis

Strategies to counter with climate change and energy crisis
1. Comprehensive programs to create national and international groups to increase the public awareness regarding different outcomes of climate change and energy crisis
2. Dedicating special budgets to university and academic sections to examine and evaluate climate change and energy crisis
3. Using renewable resources of energy
4. Energy use saving
5. Change in people's lifestyle
6. Using mixed energy to reduce the use of fossil fuels to increase their lifetime
7. Optimizing and increasing energy output to mitigate the world's energy consumption
8. Scientific, technological, and financial helps of powerful countries in varying dimensions to developing countries (mostly the Middle East ones)
9. Improvement of private sector and increase of private sector participation



10. Correct management of constructions on rivers

11. Increase of awareness of ecosystem and their reactions

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