

Midocean University
College of Management
Masters of Management



Utilizing Modern Water Desalination Technologies In Achieving The Initiatives of the Green Saudi Arabia and Green Middle East Projects

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Introduction:

Saudi Arabia is categorized as one of the most water-deficient countries globally. The threshold for absolute water shortage is typically defined as 500 cubic metres per capita. However, Saudi Arabia's per capita water availability stands at a far lower level of 89.5 cubic meters per year (Abdul Latif Jameel, 2022). In the United Arab Emirates (UAE), there has been a significant decline in the water table, averaging approximately one meter per year over the past three decades. As a result, several projections suggest that the country may see a depletion of its natural freshwater reserves over a span of 50 years.

The phenomenon of rural-urban migration, coupled with population expansion, inadequate water management, all exacerbate a significant problem. The Gulf Cooperation Council (GCC) shows a remarkable trend of population growth, positioning it among the most rapidly expanding regions globally. The consequential impacts of this population surge are predominantly concentrated within urban areas. In the year 2022, the Gulf Cooperation Council (GCC) member nations together possess a population exceeding 54 million individuals. The Kingdom of Saudi Arabia possesses a population size of approximately 36 million individuals (Secretariat General of the Gulf Cooperation Council, 2022).

Research Problem:

Desertification in Saudi Arabia has always been a major issue. Around 90% of the Saudi land is considered desert land (Eldeen, 2002). On the other hand, desalination technology serves as a crucial component in the endeavors of Gulf Cooperation Council (GCC) nations and the broader Middle East region to properly address their water shortage challenges. The aforementioned procedure entails the extraction of salts and other compounds from saltwater, leading to the generation of potable water. The clean water obtained may undergo further treatment processes to attain a level of ultrapure purity that is safe for human consumption or can be used as potable water in a range of industrial and agricultural applications. Currently, desalination plays a substantial role, over 90%, in meeting the daily water requirements of the Middle East area (Walton, 2019).

Saudi Arabia has implemented a strategic project with the objective of reforesting a total of 10 billion trees by the year 2030 (Saudi & Middle East Green Initiatives). This enormous undertaking presents notable obstacles in terms of its practicality and requires a considerable amount of water resources. In order to realize this prospect, it may be necessary to augment investments in desalination technologies, which allow this objective to be achievable.

This research project aims to examine the contemporary advancements in desalination technology, with a particular focus on its relevance to achieve the Green Saudi Arabia and Green Middle East initiatives. Given the increasing demand for water resources and the necessity for new methods of cultivation, along with the rapid population growth, it is imperative to explore

the potential of desalination processes in meeting these challenges. In addition, as a method of evaluation, it is essential to place an emphasis on the results that were produced as a consequence of the activities and convey that were carried out.

The Objectives of the Research:

A- Defining the Modern Desalination technologies on the Market to increase water production.

B- Investigating innovative agricultural practices and water resource management in an efficient and effective manner.

C- Integrating the Initiatives of Green Saudi Arabia to plant 10 Billions of trees in the upcoming decades using the modern desalination projects.

D- The subject matter of this paper will encompass all pertinent subjects associated with the Green Saudi Arabia and Middle East initiatives that arise from the implementation of the aforementioned concepts, as well as the resulting impact upon the future of Saudi Arabia.

Research Importance:

In pursuit of the Green Saudi Arabia objectives, this research paper will examine the necessity of establishing modern desalination industries throughout Saudi Arabia and the means by which water consumption can be reduced through the establishment of an integrated system.

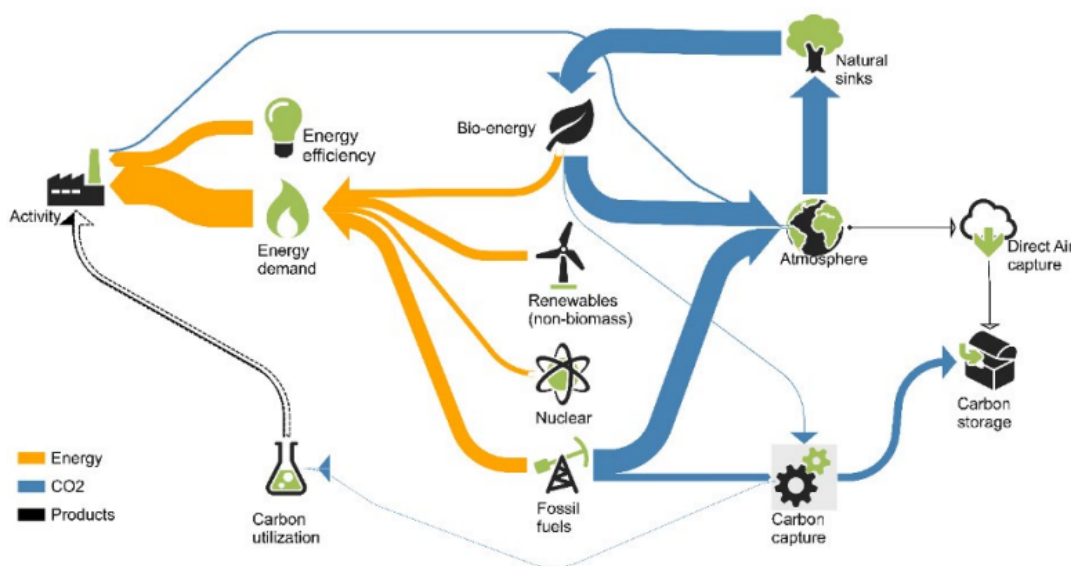
The objective of this study is to examine the areas that required attention in these endeavors, whether under the Saudi Vision or the General Middle East Vision, in order to guarantee utmost success and timely goal attainment.

The present initiative is currently in the process of being developed and implemented. It is expected that there will be further initiatives and changes during the next five years to ensure the successful implementation of green growth.

Research hypotheses:

- H0: The implementation of the new desalination technology fails to demonstrate a substantial association with the achievement of the Green Saudi Arabia and Green Middle East objectives.
- H1: The implementation of the new desalination technology exhibits a substantial association with the successful completion of the Green Saudi Arabia and Green Middle East programs.

Literature review:



Source: Williams, Eric. 2019. "Achieving climate goals by closing the loop in a circular carbon economy." KAPSARC Instant Insight, KS-2019-II10.

Sources: KAPSARC. com

One of the pillars of the Green Saudi Arabia initiatives to attain net-zero emissions in Saudi Arabia by 2060 is the Circular Carbon Economy. Saudi Aramco and SABIC were among the pioneering sectors in Saudi Arabia to adopt this program, with an anticipation of accomplishing a portion of the objectives within the subsequent decade. A workshop conducted by a group of KAPSARC researchers revealed that the implementation will have repercussions on numerous sectors, including energy efficiency, the use of renewable energy, and others. Therefore, considering Green Saudi Arabia and its economic ties will require a comprehensive approach (KAPSARC, 2020).

The workshop convened a diverse group of more than 40 professionals from academia, government, and industry to facilitate the exchange of ideas and experiences pertaining to the concept of green growth and development in Saudi Arabia to fulfill the 2030 vision. The discussions that arose highlighted the fact that Saudi Arabia's approach to achieving a sustainable economy will vary from that of other nations (KAPSARC, 2020). The participants acknowledged that the Kingdom possesses a significant competitive edge due to its abundant and readily available oil and gas resources, indicating that it would continue to be a prominent player in the oil industry for years to come. Nevertheless, there exists a counterbalancing factor that must be

taken into consideration in order to move from a heavily oil economy nation to a less dependent oil economy nation with other energy resources and options(KAPSARC, 2020).

Addressing oil production, the discourse underscores that Saudi Arabia exemplifies one of the most ecologically sustainable approaches to oil extraction, characterized by significantly diminished carbon emissions. The described potential benefit can be harnessed through the augmentation of carbon capture, use, and storage (CCUS) technology, hence facilitating the advancement towards attaining oil production characterized by net-zero carbon emissions. The term 'utilization' often refers to the conversion of carbon byproducts into valuable compounds, while 'storage' denotes the secure confinement of carbon within geological formations. Given the Kingdom's significant role as a leading oil supplier, the adoption of these technologies possesses the capacity to significantly contribute to the global decarbonization efforts in the transportation sector(KAPSARC, 2020).

The climate change movement is a global social movement that advocates for "climate action," which entails the implementation of actions by governments and companies to mitigate the effects of climate change. Environmental non-governmental organizations (NGOs) have been actively involved in climate advocacy initiatives since the late 1980s, with a primary objective of exerting influence on the United Nations Framework Convention on Climate Change (UNFCCC).The aim of this research is to examine the influence of these steps on behavioral patterns. The rise of climate activism has seen a consistent progression since the Copenhagen Summit in 2009, gathering pace with the implementation of the Paris Agreement in 2016. A multitude of countries are now enacting a wide range of initiatives, for which they consistently provide information to the United Nations Framework Convention on Climate Change (UNFCCC) about the progress achieved (United Nation Foundation).

Research Methodology:

The research will be substantiated by the latest published data relevant to the subject matter. To enhance the validity of our findings, we will seek guidance from or utilize data sourced from reputable research institutions or centers in Saudi Arabia that are knowledgeable in advanced scientific information and statistically significant data. One member of the group is presently employed by Saline Water Conversion Corporation (SWCC), whereas the other is an

employee of the Royal Commission of Jubail. Utilizing published or utilized authorized data pertaining to current desalination and irrigation/water recycling system practices, as well as future plans for both subjects, would be beneficial.

The General Perception of the research structure(will be updated based during the execution stage):

A- Cover Page:

1. List of Content Tables
2. List of Figures.
3. Abstract.

B- Theoretical framework of the study:

1. Research Introduction.
2. Research Problem.
3. Research Objectives.
4. Research Importance.
5. Research Hypotheses.
6. Research Questions.

C- Modern Desalination Technologies:

- 1- Desal Type 1.
- 2- Desal Type 2.
- 3- Desal Type 3.
- 4- Desal Type 4.

D- Green Saudi Arabia and Green Middle East Initiatives.

- 1- Initiative I.
- 2- Initiative II
- 3- Initiative III.

4- Initiative IV.

F- Other Initiatives:

- 1- Renewable energy initiatives.
- 2- Intelligent monitoring and management.
- 3- Water storage management.
- 4- Mitigating impact on finite natural resources.
- 5- Research & Development Center for the program.
- 6- Training Centers.

G- Research Findings such as the intangible and tangible benefits of green initiative implementation in Saudi Arabia.

H- Conclusion.

I- Appendix.

Research Limitations:

It is premature to assume that we possess an adequate understanding of the subject at the moment; thus, it is imperative that we conduct studies and research to identify reliable sources that can substantiate the information presented in our paper. Therefore, the research references at hand are initially considered objective and most likely to expand based on the needs. Furthermore, we exclude any data that could be deemed to be outside the project's scope. The project structure is open to alteration in accordance with our requirements, subsequent to consulting with our professor, Dr. Wassim.

Reference list (will be updated based during the execution stage):

- [1] Eldeen, A. (2002). Desertification in the Arab region: analysis of current status and trends. *Journal of Arid* . Retrieved November 10, 2023, from https://www.academia.edu/50661920/Desertification_in_the_Arab_region_analysis_of_current_status_and_trends
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- [4] *Saudi & Middle East Green Initiatives*. (n.d.). Saudi & Middle East Green Initiatives. Retrieved November 6, 2023, from <https://www.greeninitiatives.gov.sa/about-sgi/sgi-targets/greening-saudi/plant-10-billion-trees/> .
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- [6] Walton, M. (2019, January 21). Desalinated water affects the energy equation in the Middle East – Analysis. IEA. Retrieved November 8, 2023, from <https://www.iea.org/commentaries/desalinated-water-affects-the-energy-equation-in-the-middle-east>