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The Role of Renewable Energy in Enhancing Environmental Sustainability in Saudi Arabia: Analysis of Policies and Legislation Related to Renewable Energy and Evaluation of their Effectiveness



Abstract: - In this paper, we will study the role of renewable energy in promoting environmental sustainability in Saudi Arabia in light of existing policies and legislation. This study assesses the effectiveness of these current policies and legislation in encouraging the energy transition. A survey was conducted among around 200 experts in the field of energy and the environment to highlight the current state of initiatives taken to encourage the transition to clean energy and identify the strengths and weaknesses of current policies and laws. By examining these policies and their impact, the study aims to provide insights to improve renewable energy frameworks and maximize large-scale contribution to the energy transition to mitigate environmental challenges in Saudi Arabia.

Keywords: Renewable energy, Environmental sustainability, Saudi Arabia, Policies, Legislation Effectiveness, Energy experts, Environmental impact.

I. INTRODUCTION

In recent years, the global community has realized the significance of a transition to smooth and sustainable energy resources [1, 2, 3]. It became consequently crucial to install vicinity the necessary strategies to mitigate the unfavourable effects of weather trade and address urgent environmental concerns [4]. Among the possible alternatives, clean energies look like a better alternative, promising in the capacity to lessen or maybe inhibit toxic gas emissions and reduce dependence on constrained fossil fuels [5, 6]. This transition is particularly critical for nations inclusive of Saudi Arabia, the sector oil leader, deeply rooted in the conventional extraction and use of petroleum sources to fulfil its energy wishes. The adoption of renewable energy presents Saudi Arabia with a unique opportunity to not only give a boost to environmental sustainability, but additionally diversify its financial system beneath Vision 2030 and make certain a greater resilient energy destiny. [7]

Traditionally as the sector's biggest oil exporter, Saudi Arabia has lengthy been synonymous with diagnosed fossil gasoline dominance. However, a changing global panorama, coupled with domestic imperatives, has propelled the dominion on a transformational course. Recognizing the need to diversify its electricity resources and mitigate environmental degradation, Saudi Arabia has launched into formidable tasks to sell the adoption of smooth power. At the heart of this attempt are strategic frameworks including Saudi Vision 2030 and the National Renewable Energy Program (NREP), which underline the kingdom's unwavering commitment to a transition to a greater sustainable power landscape. [8]

This article endeavours to adopt a comprehensive exploration of the imperative role performed by using renewable electricity in enhancing environmental sustainability in Saudi Arabia. Specifically, it carefully analyses the guidelines and rules governing the deployment of renewable energy sources in the nation. By significantly comparing the effectiveness of those regulations, this research goals to shed mild on the present day nation of renewable electricity projects in Saudi Arabia and identify applicable areas requiring refinement and improvement. A key detail of this study will be the analysis of guidelines and rules that help the deployment of renewable strength in Saudi Arabia through an assessment, by way of sector experts, of the regulatory frameworks and incentives designed to promote electricity tasks renewable. It is a take a look at which ambitions to evaluate the effectiveness of existing regulations to promote funding and innovation in the renewable strength area. Furthermore, this evaluation will serve to explain present limitations or demanding situations hindering the sizeable adoption of renewable electricity technologies in the Kingdom, thereby offering treasured information for enhancing.

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Additionally, drawing on information from an in-intensity survey of power and environmental experts, to assess the effectiveness of energy rules and strategies carried out in Saudi Arabia and reading the responses to this survey, this research will highlight key developments and perceptions surrounding the effect of modern initiatives on environmental sustainability inside the state. Furthermore, this assessment will function a basis for making pointers to maximize the ability of energy transformation in Saudi Arabia.

In summary, this article seeks to provide a holistic evaluate of the position of renewable strength in increasing environmental sustainability via in-depth evaluation and aims to provide actionable insights to policymakers, enterprise players and researchers, propelling for that reason Saudi Arabia closer to a more sustainable and resilient power destiny.

The remainder of this paper is based as follows: Firstly, an evaluate of associated works will discover existing literature and research bearing on renewable electricity policies and legislation in Saudi Arabia. This will set the muse with the aid of highlighting key findings, methodologies, and gaps in understanding. Subsequently, a top level view of existing renewable strength guidelines and regulation in Saudi Arabia can be supplied, emphasizing key initiatives and regulatory frameworks. Following this, the research method hired in this look at might be elucidated, encompassing the design of the survey device, participant choice standards, and data evaluation techniques. The next section will gift findings from the survey analysis, dropping mild on the perceptions and attitudes of electricity and environmental professionals toward the effectiveness of renewable power regulations in Saudi Arabia. Finally, the paper will finish by way of summarizing key findings, discussing their implications for environmental sustainability and coverage formula, and featuring guidelines for future studies in the realm of renewable power governance in Saudi Arabia.

II. REVIEW OF THE LITERATURE

Previous studies has significantly tested the position of renewable energy in improving environmental sustainability, with a specific cognizance on Saudi Arabia's regulations and law in this area. Scholars have investigated various components, together with the effectiveness of renewable power projects, the ability environmental benefits, and the demanding situations related to their implementation. These research have furnished precious insights into the contemporary fame of renewable energy development, the impact of presidency regulations, and the pathways for reaching greater environmental sustainability in Saudi Arabia. By constructing upon these foundational works, this research objective to contribute similarly to the know-how of the function of renewable energy in promoting environmental sustainability in the Kingdom and evaluating the effectiveness of related guidelines and legislation. Al Garni et al. [9] proposed a multicriteria selection-making method to evaluate renewable electricity technology assets in Saudi Arabia, aiming to address future energy generation and fossil gas intake. They applied an analytical hierarchy technique to assess solar photovoltaic, focused solar electricity, wind strength, biomass, and geothermal electricity, thinking about technical, socio-political, financial, and environmental standards. Solar photovoltaic and concentrated solar strength had been identified as favorable technologies, accompanied by way of wind energy, emphasizing the capability of a power blend coverage to hold resources for monetary increase.

Alawaji [10] explored renewable electricity research, development, and programs in Saudi Arabia, assessing their feasibility and the country's policy stance. Despite the ability, the commercialization development has been slow due to factors like fee and lack of knowledge and technical talents. Effective measures are vital to disseminate understanding and technology for accelerating the commercialization technique.

Alnatheer [11] investigated the environmental benefits of renewable electricity and electricity efficiency in Saudi Arabia's electric powered area, advocating for thinking about environmental concerns in electricity resource planning. Leveraging renewable electricity and energy efficiency assets can appreciably gain the Kingdom, mitigating environmental influences associated with electricity generation.

Rahman et al. [12] performed a vital analysis of Saudi Arabia's initiatives to reduce greenhouse gas emissions inside the electricity area, revealing a want for improved power performance and extended renewable power manufacturing. While some development has been made, the proportion of renewable strength stays low, highlighting policy gaps that want addressing.

Almutairi et al. [13] provided an integrated investigation of renewable electricity improvement techniques in Saudi Arabia, emphasizing the potential of solar, wind, biomass, hydroelectric, and geothermal electricity sources. They recommended pursuing low-price renewable electricity era across the country to beautify sustainability.

Benlaria and Hamad [14] explored the financial effect of renewable energy on sustainable improvement in Saudi Arabia, revealing an uneven courting among renewable power intake, economic growth, and environmental sustainability. They pressured the significance of policies promoting financial boom and effective development initiatives inside the renewable strength sector.

Almutairi [15] assessed the sustainability of making use of renewable and nuclear energy in Saudi Arabia, that specialize in environmental influences the use of life cycle evaluation. The observe highlighted the ability of adopting rising non-fossil sources of strength to lessen environmental influences.

Tlili [16] assessed the current nation and destiny potential of renewable electricity in Saudi Arabia, emphasizing the want for investment in renewable energy research and global cooperation programs. Despite being a chief fossil gas manufacturer, Saudi Arabia recognizes the importance of diversifying its energy sources for sustainable improvement.

Kahia, Omri, and Jarraya [17] tested the connection among financial growth, renewable energy, and CO₂ emissions in Saudi Arabia, revealing the insufficient effect of renewable electricity consumption on environmental satisfactory. They mentioned policy implications for addressing this difficulty.

Building upon the insights gleaned from preceding research, the subsequent segment will delve into a top level view of present renewable strength policies and regulation in Saudi Arabia. This exam will shed light at the contemporary framework governing renewable strength projects inside the Kingdom and offer a basis for assessing their effectiveness in promoting environmental sustainability.

III. OVERVIEW OF EXISTING RENEWABLE ENERGY POLICIES AND LEGISLATION IN SAUDI ARABIA

In this section, we offer a top level view of Saudi Arabia's geography, weather, society, economy, and contemporary energy use. It highlights the speedy urbanization and industrialization in the country and its ability impact at the future. The concept of renewable strength is delivered to make clear its meaning. The bankruptcy additionally explains the inducement for the studies and introduces the purpose and targets.

The authorities of Saudi Arabia have identified the need for renewable strength and sought to deal with this inside the Nineties through the enactment of the King Abdulaziz City for Science and Technology (KACST) [18], which looked at the potential of diverse renewable resources to fulfil a developing home call for energy. At present, the Kingdom has numerous energy regulations, statements, and strategic plans that at once point out the development of renewables. Key among those are the Saudi National Energy Efficiency Program (SNEEP), which units out a target of saving 30,000 barrels of oil in step with day, and the Saudi Sustainable and Renewable Energy Strategy (SSRES), which incorporates a target of 23.9 GW of installed renewable electricity ability by way of 2032 [19]. This goal became set by means of King Abdullah University for Science and Technology (KAUST) and is the result of work through a global group of scientists and modellers that checked out the potential of renewable energy in a rustic whose strength call for is developing rapidly.

At present, the most essential renewable energy policy in Saudi Arabia is the King Salman Renewable Energy Initiative (KSREI) of 2012. This targets to assemble 54 GW of renewable electricity by way of 2040, of which 25 GW is sun, sixteen GW wind, nine GW of hydro, and 4 GW of geothermal and biomass [20]. Creation of the King Abdullah City for Atomic and Renewable Energy (KA-CARE) has additionally been great and is extensively referred to in strength techniques and government statements. This has resulted inside the formation of the National Renewable Energy Plan (NREP), which looks on the ability of various styles of renewable electricity and promotes studies, investment, and neighbourhood content within the renewable strength enterprise. The implementation of these guidelines and plans has received momentum, driving the rapid development of renewable power projects throughout Saudi Arabia.

Furthermore, the authorities has made giant funding in renewable strength research and development, resulting within the establishment of more than one studies centers and initiatives throughout the country. These encompass the Saudi Renewable Energy Research Institute (SERRI), the Saudi Center for Renewable Energy Technologies (SCRET), and the Research Institute for Renewable Energy (RIRE)

These entities awareness on advancing renewable power technologies, undertaking comprehensive studies on aid potential, and fostering innovation in the renewable area.

Moreover, Saudi Arabia has actively engaged in worldwide collaborations and partnerships to leverage worldwide know-how and accelerate the deployment of renewable strength answers. This consists of collaborations with leading research institutions, technology vendors, and funding firms from around the arena. Through these

collaborations, Saudi Arabia pursues to beautify its renewable strength talents, leverage worldwide quality practices, and appeal to overseas funding to assist the use of a's ambitious renewable strength goals [21].

In end, the authorities of Saudi Arabia have confirmed a strong commitment to renewable energy improvement, as evident from its complete rules, strategic plans, and sizeable investments in studies and improvement. With formidable goals and more than a few initiatives in vicinity, Saudi Arabia is poised to grow to be a worldwide chief in renewable electricity, contributing to each its personal energy protection and the worldwide transition closer to an extra sustainable future.

IV. METHODS

Sample Selection and Data

The observe comprised a pattern of 2 hundred experts selected via non-randomized strategies. The selection manner concerned deliberate concentrated on of experts based on their information and relevance to the research goals. This purposive sampling technique ensured the inclusion of people with specialized information and revel in pertinent to the study's focus on renewable electricity guidelines. Data collection from these experts involved based interviews and surveys designed to collect complete insights into their views and critiques regarding renewable energy regulations and their implementation. The non-randomized sample selection technique aimed to maximize the relevance and depth of data acquired from participants, contributing to the robustness of the study's findings and conclusions.

Collection Process

The information collection procedure concerned a meticulous technique to gather insights from the selected sample of 200 specialists within the discipline of renewable energy rules. Structured interviews and surveys have been performed to systematically capture the views and opinions of the individuals. Prior to statistics collection, ethical concerns were adhered to, making sure knowledgeable consent and confidentiality of respondents' facts. The interviews and surveys have been designed to cowl a huge variety of topics associated with renewable electricity policies, together with their effectiveness, implementation demanding situations, and ability regions for development. Each player was given good enough time to explicit their views and provide targeted responses. The information series system changed into iterative, taking into consideration continuous refinement of questions primarily based on rising issues and insights. Overall, this comprehensive approach to statistics collection aimed to capture various perspectives and generate wealthy qualitative data vital for the evaluation and interpretation of findings.

Instruments

In this study, a comprehensive questionnaire was hired because the number one data series device to analyze attitudes in the direction of renewable strength regulations in Saudi Arabia. This questionnaire, including sixteen carefully crafted questions, served as the muse for gathering insights into contributors' perceptions and beliefs concerning numerous components of renewable power utilization within the country. The questionnaire started out by using soliciting demographic statistics from respondents to provide context for the analysis. Subsequently, individuals had been provided with a chain of inquiries covering diverse topics associated with renewable energy rules, together with their effectiveness, demanding situations, and perceived impact on environmental sustainability. The questionnaire utilized a combination of reaction formats, including multiple-choice alternatives and Likert scales, to make certain thorough statistics series. This methodological technique facilitated a comprehensive exploration of the elements influencing participants' attitudes towards renewable strength regulations in Saudi Arabia, thus contributing to a nuanced knowledge of the subject.

Statistical Analysis

The process of data analysis involved a meticulous and systematic approach to extract valuable insights from the survey data that align with the research objectives. Initially, the statistical software IBM SPSS Statistics for Windows, version 25.0, was used due to its strong capabilities in managing and examining complex data sets.

The selection of this software was critical in conducting thorough analyses tailored to the research questions and questionnaire format. The survey scales' validity was carefully evaluated using Cronbach's alpha (α), a measure of internal consistency. This ensured that the survey questions accurately measured the intended concepts related to people's attitudes towards environmental legislation enforcement in Saudi Arabia, as stated in the research goals.

Descriptive analysis played a significant role in summarizing the participants' demographic characteristics and their responses to each survey question. Through this process, absolute frequencies (n) and relative percentages (%) were calculated to provide an accurate representation of the sample composition and response patterns. Additionally, measures such as mean (M) and standard deviation (SD) were computed to provide information on the data's average and variation.

In addition to descriptive statistics, inferential analysis techniques were used to examine the relationships between variables and test hypotheses based on the research objectives. To better understand the strength and direction of these relationships, Spearman's correlation was used to assess the associations between individual demographic factors and perceptions of environmental law implementation.

The Chi-Square test and analysis of variance (ANOVA) were employed to evaluate the influence of demographic factors (age, gender, education level, occupation, and income) on perceptions of environmental law enforcement. These tests helped identify potential differences among demographic groups and provided guidance for targeted interventions. A multivariate regression analysis using the Enter method was conducted to identify significant predictors of perceptions of environmental law implementation. This approach allowed for the simultaneous assessment of multiple independent variables, while considering potential confounding factors. The Beta coefficients (β) and their corresponding 95% confidence intervals (95% CI) were provided to indicate the strength and direction of the associations. The statistical analyses conducted in this study were specifically designed to comprehensively investigate the research questions, resulting in important findings on factors influencing perceptions of environmental law implementation in Saudi Arabia's Tabuk region. These analyses played a fundamental role in expanding our understanding in this field and informing evidence-based interventions aimed at promoting effective environmental governance practices.

V. RESULTS

Demographic and Academic Insights:

The following table examines the distribution of participants by gender, revealing a predominance of male respondents (71.4%) compared to females (27.2%). Another table explores the age distribution, showing a well-balanced representation across age groups, particularly within the 30 to 60-year-old range. Additionally, a table focuses on participants' academic qualifications, with Bachelor's degree holders constituting the largest group (40.8%), followed by those with a Master's degree (23.3%), and Ph.D. holders being the smallest subset (4.4%). Lastly, a table illustrates the field of specialization among participants, with Energy Technology being the most prevalent field (35.9%), followed by Solar Energy Technician (25.7%), Renewable Energy Engineering (20.4%), and Environment Science (16.5%). These insights collectively provide a detailed understanding of participant demographics and academic backgrounds, crucial for analyzing perspectives on renewable energy and environmental sustainability in Saudi Arabia.

Table 1: Demographic and Academic Profile Distribution in the Study

Category	Frequency	Percentage (%)	Valid Percentage (%)	Cumulative Percentage (%)
Gender				
Male	147	71.4	72.4	72.4
Female	56	27.2	27.6	100.0
Age Range				
Less than 30 years old	40	19.4	19.7	19.7
30 to 45 years old	63	30.6	31.0	50.7
46 to 60 years old	57	27.7	28.1	78.8
More than 60 years old	43	20.9	21.2	100.0
Academic Qualification				
Diploma	62	30.1	30.5	30.5
Bachelor's	84	40.8	41.4	71.9

Master's	48	23.3	23.6	95.6
Ph.D	9	4.4	4.4	100.0
Field of Specialization				
Renewable Energy Engineering	42	20.4	20.7	20.7
Environment Science	34	16.5	16.7	37.4
Energy Technology	74	35.9	36.5	73.9
Solar Energy Technician	53	25.7	26.1	100.0

Scheffé Test:

The table presents the results of ANOVA tests examining the impact of four factors – Gender, Age, Academic Qualification, and Field of Specialization – on a given variable. Findings indicate that while there are no statistically significant differences observed based on Gender ($F = 0.239$, $Sig. = 0.788$) and Age ($F = 0.312$, $Sig. = 0.732$), significant variations are identified concerning Academic Qualification ($F = 4.517$, $Sig. = 0.012$). Specifically, participants' academic backgrounds yield meaningful distinctions in the analyzed variable. For Field of Specialization, although the observed F-value (2.907) approaches conventional significance levels, the associated significance level ($Sig. = 0.057$) suggests a borderline significance. These results collectively underscore the influence of academic qualifications on the variable under investigation, whereas differences based on Gender, Age, and Field of Specialization appear less pronounced or inconclusive within the tested context.

Table 2: ANOVA Results for Factors Impacting the Analyzed Variable

Factor	Sum of Squares	df	Mean Square	F-value	Sig.
Gender					
Between groups	0.097	2	0.048	0.239	0.788
Within groups	40.455	200	0.202		
Total	40.552	202			
Age					
Between groups	0.674	2	0.337	0.312	0.732
Within groups	216.064	200	1.080		
Total	216.739	202			
Academic Qualification					
Between groups	6.306	2	3.153	4.517	0.012
Within groups	139.615	200	0.698		
Total	145.921	202			
Field of Specialization					
Between groups	6.615	2	3.307	2.907	0.057
Within groups	227.573	200	1.138		
Total	234.187	202			

Multivariate Regression Analysis:

The table 3 presents coefficients from a regression model analyzing factors affecting respondents' perceptions of hindrances in implementing renewable energy policies in the Kingdom, with the dependent variable being "Q6: The balance between developing renewable energy and meeting growing energy needs hinders the implementation of policies related to renewable energy in the Kingdom." Notably, academic qualification and field of specialization exhibit statistically significant associations ($p < 0.05$), indicating that individuals with higher academic qualifications and certain fields of specialization are more likely to perceive hindrances in renewable energy policy implementation. Conversely, gender and age do not demonstrate significant impacts on respondents' perceptions, as evidenced by their non-significant coefficients. These results underscore the influential role of education and

professional background in shaping attitudes towards renewable energy policy, highlighting the importance of targeted interventions and policies tailored to different educational and professional demographics for effective renewable energy implementation strategies.

Table 3: Regression Coefficients for Factors Influencing Perceptions of Renewable Energy Policy Hindrances

Factor	Coefficients (non-standardized)	Coefficients (standardized)	t-value	Sig.
Gender	0.079	0.053	0.759	0.449
Academic Qualification	0.124	0.159	2.281	0.024
Field of Specialization	0.095	0.154	2.193	0.029
Age	0.025	0.039	0.557	0.578

The table 4 provides coefficients from a regression analysis examining the influence of various factors on respondents' perceptions regarding the need to increase investment in research and development (R&D) for renewable energy technology development in the Kingdom, with the dependent variable being "Q8: There is an urgent need to increase investment in research and development to develop renewable energy technology in the Kingdom." The constant term (Constante) indicates an expected value of 4.546 for the dependent variable when all predictor variables are zero. Gender and Age do not demonstrate statistically significant coefficients ($p > 0.05$), suggesting that these factors do not significantly influence respondents' perceptions regarding the urgency of investment in R&D for renewable energy technology. Similarly, Academic Qualification also lacks statistical significance (Sig. = 0.844), implying that respondents' educational backgrounds do not play a significant role in shaping their perceptions in this context. However, Field of Specialization exhibits a statistically significant coefficient (Sig. = 0.044), indicating that respondents with certain specializations are more likely to perceive an urgent need for investment in R&D for renewable energy technology development compared to others.

Table 4: Regression Coefficients for Perceptions of Investment in Renewable Energy R&D

Model	Non-standardized Coefficients β	Standardized Coefficients Error	t-value	Sig.
1 (Constant)	4.546	0.264	17.218	0.000
Gender	0.055	0.035	0.495	0.621
Academic Qualification	-0.012	-0.014	-0.197	0.844
Field of Specialization	-0.095	-0.144	-2.032	0.044
Age	-0.023	-0.034	-0.487	0.627

Corrolations and their Meanings:

The correlation analysis provides insights into the relationships between various aspects of perceptions related to renewable energy policies and initiatives in the Kingdom of Saudi Arabia (KSA). Each cell represents the Pearson correlation coefficient (r) between two specific questions, indicating the strength and direction of their linear relationship. Significant correlations are highlighted, with asterisks denoting statistical significance levels (* $p < 0.05$, ** $p < 0.01$). For instance, a significant positive correlation (** $p < 0.01$) exists between Q1 and Q14, indicating that perceptions regarding the contribution of current policies to reducing carbon emissions and improving air quality are positively associated with perceptions about the role of renewable energy in reducing climate changes in the near, medium, and long term. Conversely, a significant negative correlation (** $p < 0.01$) is observed between Q4 and Q10, suggesting that challenges in financing environmental projects related to renewable energy are associated with lesser perceptions of renewable energy's contribution to improving water quality and preserving water resources. The table underscores the interconnectedness of various perceptions regarding renewable energy policies and initiatives in KSA.

VI. RECOMMANDATIONS

Based on the correlation matrix of renewable energy policy statements in Saudi Arabia, the following recommendations can be made:

Enhanced Government Support: Given the significant positive correlation between governmental effectiveness in promoting renewable energy (Q7) and various positive outcomes, such as reducing carbon emissions (Q1) and supporting technological innovation (Q3), there should be continued and strengthened support from the Saudi government in this regard. This includes policy incentives, investment opportunities, and regulatory frameworks to encourage renewable energy adoption and development.

Focus on Financing: Addressing challenges related to financing environmental projects (Q4) is crucial for the successful implementation of renewable energy policies. Collaboration between government entities, financial institutions, and private investors should be fostered to overcome barriers and ensure adequate funding for renewable energy initiatives.

Infrastructure Development: The correlation between infrastructure and transportation networks for renewable energy (Q5) and policy implementation suggests the importance of investing in infrastructure development. Efforts should be directed towards building a robust infrastructure to support renewable energy projects, including transmission lines, storage facilities, and charging stations for electric vehicles.

Balancing Energy Needs: Mitigating challenges associated with balancing renewable energy development and meeting growing energy demands (Q6) requires comprehensive planning and coordination. Integrated energy planning frameworks should be adopted to ensure a smooth transition towards renewable energy while meeting the Kingdom's energy needs.

Investment in Research and Development: Recognizing the urgent need for increased investment in research and development (R&D) for renewable energy technology (Q8), prioritizing R&D funding and collaboration with academic institutions and industry partners is essential. This will drive innovation, enhance technological capabilities, and accelerate the deployment of renewable energy solutions.

Legal and Regulatory Reforms: Considering the potential for improvements in current laws to enhance environmental sustainability (Q9), policymakers should prioritize legal and regulatory reforms. Streamlining permitting processes, setting clear environmental standards, and implementing effective enforcement mechanisms can facilitate sustainable development in the renewable energy sector.

Public Awareness and Education: Educating the public about the benefits of renewable energy and its contributions to environmental sustainability, water preservation, and climate change mitigation (Q10-Q14) is vital. Public awareness campaigns, educational programs, and community engagement initiatives can foster a supportive environment for renewable energy adoption and foster a culture of sustainability.

By implementing these recommendations, Saudi Arabia can further advance its renewable energy agenda, promote environmental sustainability, and contribute to global efforts to combat climate change.

VII. CONCLUSION

In conclusion, our study of renewable energy policy in Saudi Arabia reveals the intricate interplay between various factors shaping the success of renewable energy initiatives. Key conclusions drawn from this analysis emphasize the pivotal role of governmental leadership in driving policy implementation and fostering an enabling environment for renewable energy development. Addressing financial barriers, prioritizing infrastructure development, and balancing energy transition with demand emerge as critical priorities. Moreover, sustained investment in research and innovation, coupled with necessary legal and regulatory reforms, is essential for advancing renewable energy adoption. Furthermore, public awareness and education play a crucial role in garnering support and driving widespread adoption of renewable energy solutions. By addressing these key findings and implementing the recommended actions, Saudi Arabia can accelerate its transition towards a sustainable energy future, bolstering economic growth and mitigating the impacts of climate change.

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CONFLICTS OF INTEREST

The author declares no conflict of interest.

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