

**A Strategic Framework for an Innovative Transformation of
Water and Energy in the Kingdom of Saudi Arabia
Water. Power. Life**



(The Kingdom – May God protect – is among the countries with the scarcest water resources, and depends- after God – on the water produced by the desalination plants, in addition to groundwater sources, most of which are non-renewable. This reality requires, of us all, the strict maintenance and careful preservation of this precious wealth and to set an example for the whole world in the economy of its use)

The Custodian of the Two Holy Mosques
King Abdullah Bin Abdul-Aziz Al Saud
(May Allah Protect Him)



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1 Introduction

1.1 Preface

Al-Aghar Group, a non-profit think tank focusing on the study of economic, social and cultural issues, has developed the strategy for transforming the kingdom of Saudi Arabia into a knowledge society and its vision; «for us to be a highly productive and internationally competitive knowledge society by the year 1444 AH». From this perspective, we recognized that water and energy are two of the most critical elements for our transformation into a knowledge society; Al-Aghar group in collaboration and agreement with Al-Bushnaq Academy, which is considered one of the leading intellectual centers in regards to the water industry in the kingdom and one of the main organizers of the Saudi Water and Power Forum that is now in its fifth year, have prepared this report based on clear foundations that are associated with an assessment of the current situation and future visions for the needs of the kingdom, in light of available resources on the one hand and constraints that influence them on the other.

In preparation of this report, Al-Bushnaq Academy and Al-Aghar Group made several initiatives to study the current situation of available water and energy resources, in relation to quantity and quality. Al-Bushnaq Academy launched the initiative of «The Spring Of Knowledge And Innovation» for water and energy in Riyadh on 13 \ 2 \ 2010 under the patronage of H.E. the Minister of Water and Electricity. Al-Aghar Group followed suit by conducting a workshop entitled «The Spring Of Knowledge And Innovation» on 26/ 5 / 27-2010, which was kindly hosted by (King Abdullah Economic City in Rabigh). The format of the workshop included brainstorming sessions and engaging the stakeholders, decision-makers and intellectuals to be contributors to this study. 65 experts and professionals from across the Kingdom participated in the workshop, through the kind invitation of HH Prince Faisal bin Abdullah bin Mohammed Al Saud, head of the Permanent Steering Committee of Al-Aghar Group. The workshop dealt with discussions and the study of the main aspects or core elements of both the water and energy sectors.

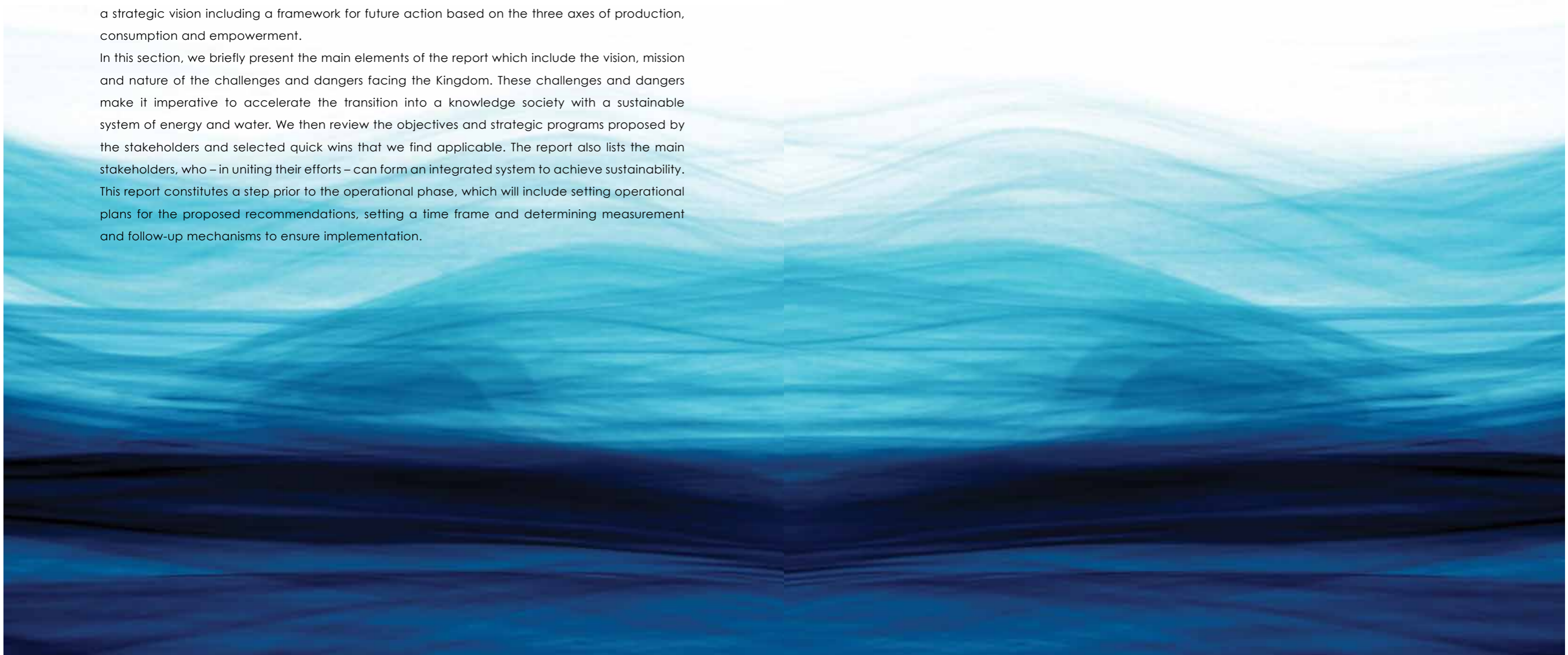
The participants were divided into six workgroups, each assigned one of the main aspects in the study for the two sectors. One of the aspects they focused on was human development, which was worked on by two teams due to its importance in building and developing the sectors. The other four workgroups focused on the financial, technical, legislative and legal aspects; and the private sectors contribution to the development of these sectors in the Kingdom. Furthermore, all of the groups were involved in the task of developing the vision and mission for the future of these sectors; in addition to defining the goals and strategic programs to achieving this vision.

Scope of the Report

This report is a preliminary paper for the strategy. It provides an overview of the current situation and a strategic vision including a framework for future action based on the three axes of production, consumption and empowerment.

In this section, we briefly present the main elements of the report which include the vision, mission and nature of the challenges and dangers facing the Kingdom. These challenges and dangers make it imperative to accelerate the transition into a knowledge society with a sustainable system of energy and water. We then review the objectives and strategic programs proposed by the stakeholders and selected quick wins that we find applicable. The report also lists the main stakeholders, who – in uniting their efforts – can form an integrated system to achieve sustainability. This report constitutes a step prior to the operational phase, which will include setting operational plans for the proposed recommendations, setting a time frame and determining measurement and follow-up mechanisms to ensure implementation.

2 ■ ■ Current Situation



2.1 Key Definitions

Water Security

Ensuring the availability and distribution of the quantity and quality of water needed for maintaining the basic needs of human life, living creatures, a healthy environment across different times and situations and protection of all the above from the risks of rains and flash floods.

Food Security

Exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life.(7)

Smart Grid

A form of electricity network that employs bi-directional digital communications between suppliers and consumers, and integrates, intelligently, the behavior and actions of all users connected to it providing them with additional information and options. It also enables them to control devices and equipments in a way that increases reliability and transparency, increases the level of efficiency, and provides economic, safe and sustainable supply. It also leads to a significant reduction in the environmental impact of the electricity supply system. (14)

Comprehensive Water System

An integration of all local water systems that covers all sources of water (i.e., groundwater, surface water, desalination, and treated water). The system focuses on and sets regulations for users' rights, property rights of groundwater and environmental protection.

Energy

Unless otherwise specified, the term 'energy' is used, within this report to refer to the energy required to meet the needs of household, industrial, and agricultural sectors in the Kingdom, regardless of its origin – whether fossil, renewable , or any other .

2.2 Water Challenges

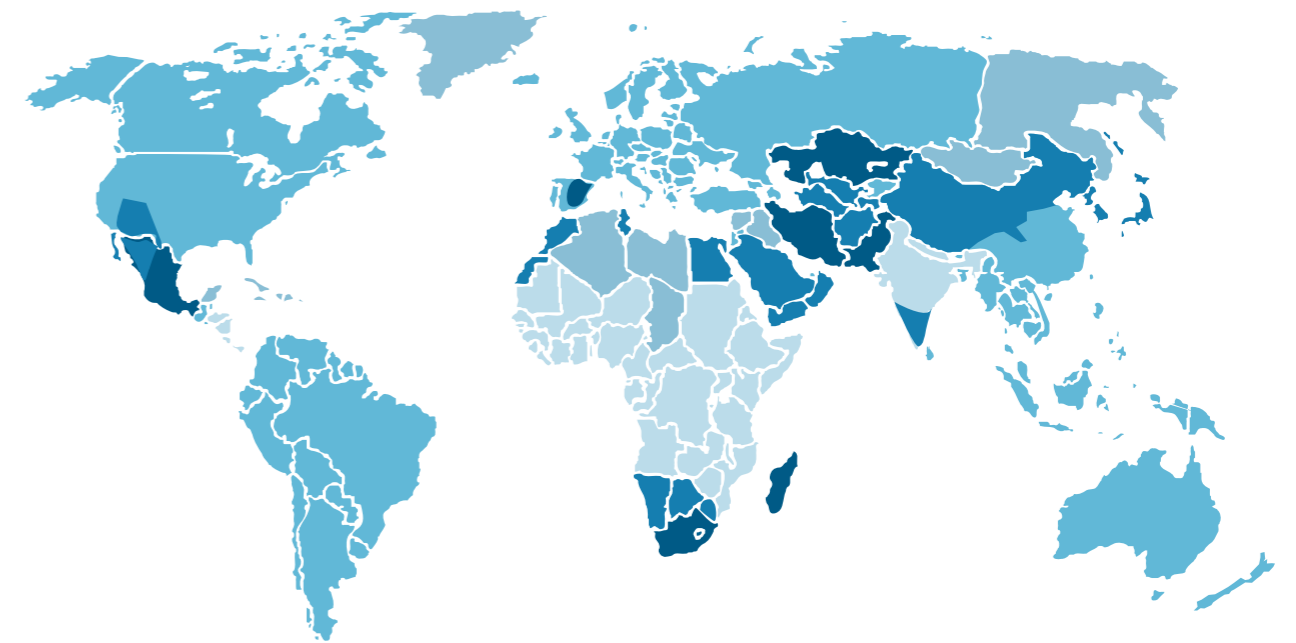


Figure 2.1: Levels of Water Scarcity Around the World

Source: Annual Report IIWM (2007-2008)

Water is the source of life that connects all life forms. No sooner had water resources – which are invaluable – proven their great ability to regenerate than we started to feel the threat of this source beginning to deplete and becoming increasingly endangered. The increasing need of the world's population for water – to provide food, raw materials and energy – directly competes with nature's own water needs to sustain the already threatened ecological system. (See Figure 2.1)

Yet day after day, we continue dumping millions of tons of untreated sewage, industrial and agricultural waste into our water systems. Pure water has become scarce and its scarcity will increase as environmental changes continue to change our lives. The poor are still the first and most to suffer from pollution, shortage of water and the lack of proper sewage systems.

Water security is globally considered a 'silent enemy', which today has become a greater threat than food security, the energy crisis or the financial crisis. At a global level, the per capita share of water by the year 2060 will constitute only 10% of the share of 1950. (See Figure 2.2)

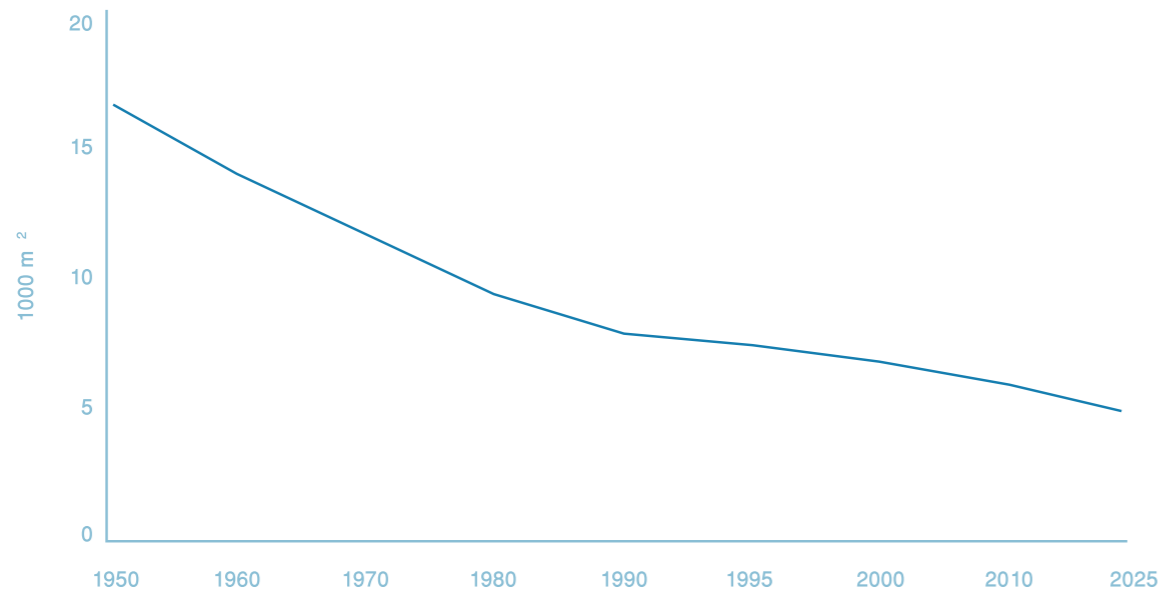


Figure 2.2: Levels of Water Scarcity Around the World

SOURCE: MIAHONA (1)

In addition, more than 1.1 billion people in developing countries do not have access to safe drinking water, while more than 2.3 billion others lack adequate sanitation. As a result, 2 million deaths occur annually, not to mention the fact that 80% of diseases are water-related and statistics indicate that half of the population at any single time suffer from water-related diseases(1). This situation has prompted the World Summit on Sustainable Development to include provision of safe water and sanitation in the Millennium Development Goals. It is a call addressed to the entire world to work to reduce by half the proportion of people without access to safe drinking water and basic sanitation by 2015.

However, locally the Kingdom faces significant challenges in regards to the production, desalination and preservation of water in the shadow of current regional and international water shortages. These water shortages have caused an urgent need to implement plans and strategic studies while recognizing the importance of establishing research and applied research centers to contribute towards managing the development of the water desalination industry and enhance our innovation technology.

The lack of renewable water sources – in addition to weather changes – and the severance of rain in the region and the rise in water production costs per square meter due to the conventional technology used in water centers all have the kingdom facing very challenging choices. These circumstances will become especially acute if the current waste of water continues and immediate correctional procedures and critical reform decisions are not taken.

Looking more closely, we can see that the Kingdom of Saudi Arabia is no exception to the problem of water security. The average per capita share of water from renewable resources amounted to about 240 cubic meters per person in 2010. According to the indicator of water scarcity, this means that the Kingdom is already below the water scarcity line adopted globally which is 1500 cubic meters per year. As the population growth is increasing (see Figure 2.5), the average per capita of renewable water decreases on an annual basis (see Figure 2.3). As for the non-renewable sources, it suffices to note that the rate of annual extraction of groundwater in the Kingdom is over more than four times the rate of renewal.

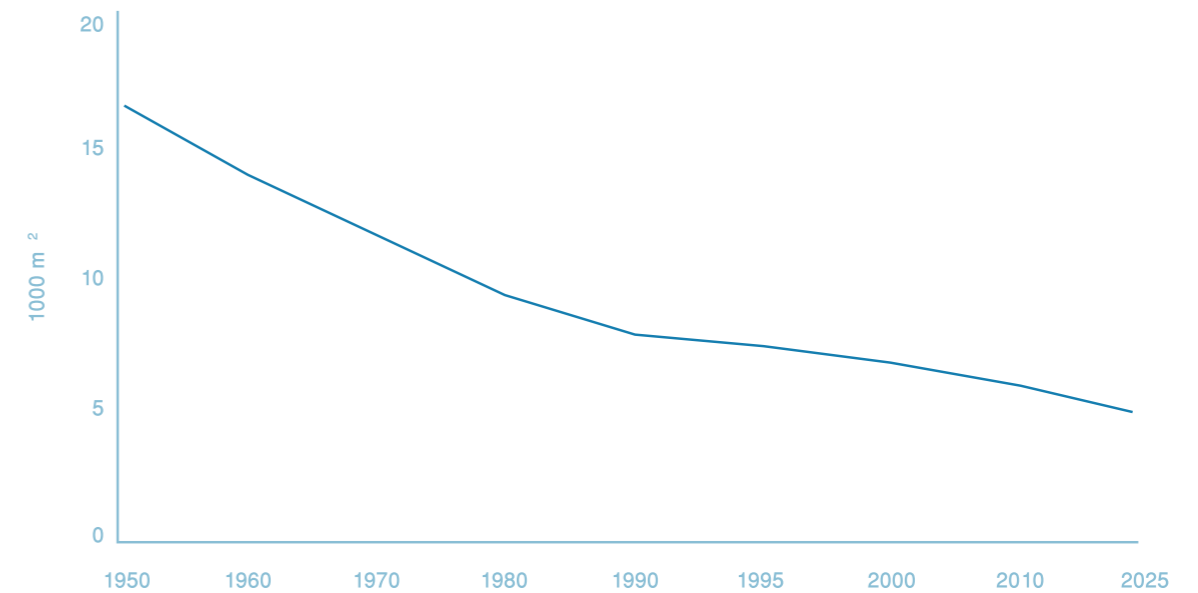


Figure 2.3: Average Renewable Water Share

SOURCE: MIAHONA (1)

In terms of consumption, the rate of per capita consumption of water and energy in the Kingdom is among the highest globally. Also, the increase in the proportion of agricultural consumption exhausted 88% of the Kingdom's total water consumption, which in turn led to the depletion of non-renewable groundwater resources.

All this indicates that, where water sources are limited, the Kingdom of Saudi Arabia will face a large gap between supply and demand and that water security challenges will only increase over time to reach an alarming level while population growth and the rates of water consumption continues to increase. (See Figure 2.4)

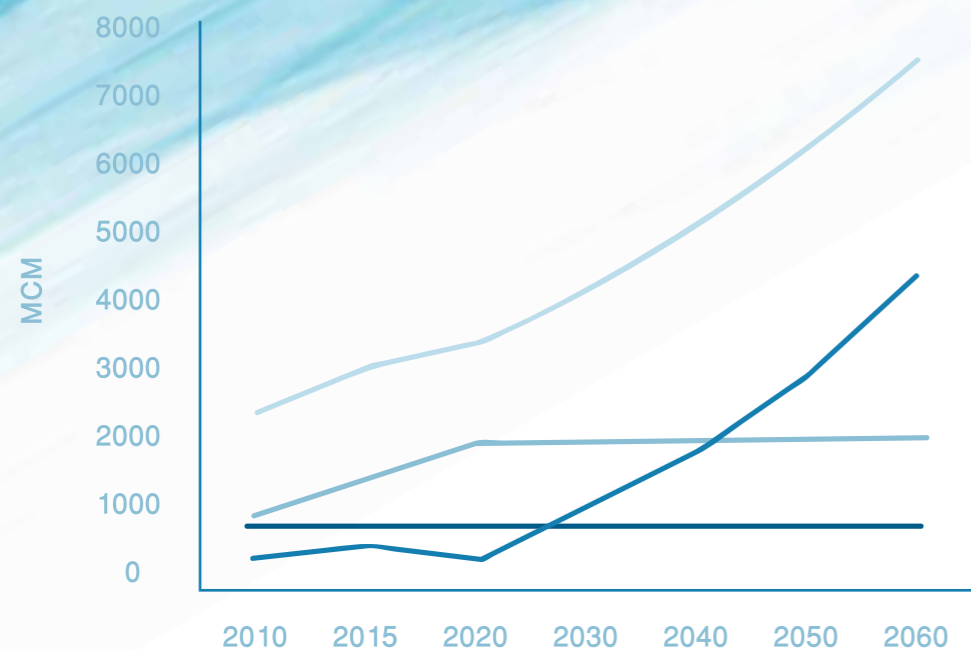


Figure 2.4: Water Demand Vs Deficit

Source: Miahona (1)

The Kingdom of Saudi Arabia is considered to be one of the major consumers of water and electricity. The ministry of water and electricity expects the investment rate in these sectors to increase within the next 15 years to reach 200 billion Saudi riyals. However, the size of investment would have to be increased by up to one third, at the least, in order to meet the growing domestic demand for water and electricity – particularly in light of the increase in production costs that have exceeded 50% in comparison to the cost of production per cubic meter in other countries. This increase is due to the high cost of energy used by more than 35 desalination plants across the Kingdom. It is for this reason that it is crucial to use solar energy technology in water desalination to help lower the energy production & hence water desalination costs. (Currently, the cost of desalinating water ranges between SR 2.5 – SR 5.5 per cubic meter, whereby if solar technology is applied, this cost would decrease to SR 1.5 per cubic meter).

It is shown here that the transformation of the water sectors in the kingdom require not only the financing of large projects to expand the productive capacity but also a comprehensive plan for reform and development, which takes into account the developmental and environmental needs necessary to achieve a balance between supply and demand and preserve their natural resources.

Food Security

Globally, it is estimated that more than a billion people of the current population of 6.8 billion, or nearly one in every six human beings, may be suffering from under-nourishment.

In the Arab region, the crop production can meet about 50% of the required food, and the remaining is imported from international markets with an import ratio ranging from 35% to 87%.

On a local level, the agricultural development in the late 70's and 80's has contributed to partial food security, socio-economic developments and increase in national Gross Domestic Product (GDP) in the Kingdom. Yet, the vast unplanned agricultural expansion and excessive pumping of non-renewable groundwater resources resulted in serious deterioration of groundwater conditions in several regions to alarming levels.

Consequently, several corrective policies were adopted by the government in mid-1993, such as reducing the support for wheat crop by 75%, banning the export of fodder by year 2008 and phasing out wheat by 12.5%. These adopted policies have resulted in positive impacts on ground-water conditions; however, more corrective actions are needed once the future food and water issues are deeply analyzed.

It is observed that at a growth rate of 2.3%, water consumption for agriculture will reach 23,868 MCM in year 2060, which exceeds sustainable level (estimated at 13,800 MCM). Similarly, water consumption for agriculture at 2% G.R. is expected to reach 21,793 MCM in year 2060, which means the Kingdom has to adopt a more aggressive policy to achieve sustainability.

Under the present weak agricultural and irrigation practices, poor financial and technical support and water deficit, it will be difficult for the Kingdom to reach self-satisfaction in food production.

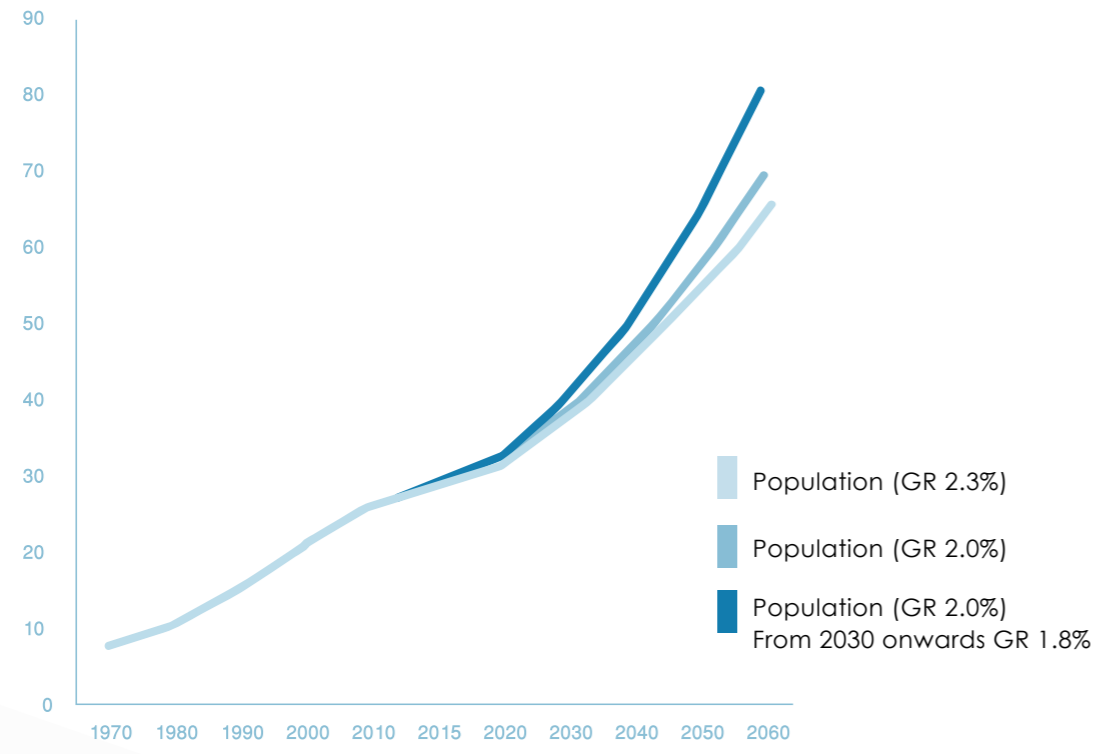
Unless serious measures are taken, water and food security in KSA is going to face increasing and serious challenges during the coming 50 years due to large increase in population and the related water and food demands. These challenges will aggravate with negative climate change impacts. The supply of ground water has depleted with irreversible consequences. The Kingdom needs to re-think food-security policy.

2.3 Power Challenges

KSA Power provisioning is unsustainable financially, as the demand is expected to grow. The mismatch between supply and demand is widening exponentially.

Power is currently the most capital-intensive sector with low residential tariff (8 halalah/kwh), insufficient and old generating assets and high consumption rates.

As population growth shows little sign of slowing and the economy continues to grow and bring more electrical goods into more homes, power use per person is likely to increase and continue on its inexorable and steep path. High growth in demand will continue at 7%-8%, creating a long-term problem. Demand is expected to nearly double in 10 years and peak demand is estimated to grow by 60% between 2008 and 2022 – in other words, tripling demand in 25 years (1998 – 2022). (See Figure 2.6)



2.5 POPULATION GROWTH IN KSA

Source: Miahona

Today, there is an urgency to control the increasing percentages of domestic demand on energy, particularly that which is needed to produce electricity. It is also vital for the kingdom to adapt policies to reduce local consumption to narrow the gap between local supply and demand on energy.

With regard to using energy resources to produce electricity and water desalination, oil assets deployed to support the production of water and power has net negative asset yield (asset-to-asset). The Kingdom relies heavily on using fossil fuels (natural gas & oil) to produce electricity, which in turn has put a lot of pressure to use these two resources for domestic consumption rather than exporting.

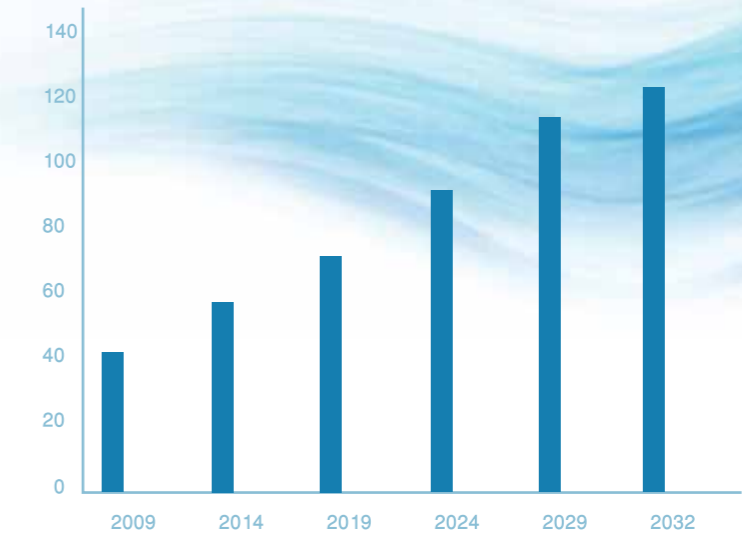


Figure 2.6: Growing Demand for Energy in KSA

Source: Electricity and Co-Generation Regulatory Authority (2010)

Furthermore, our natural gas reserves are being exhausted by industries competing and depending on it as a main feedstock, increasing the added value of gas. (See Figure 2.7)

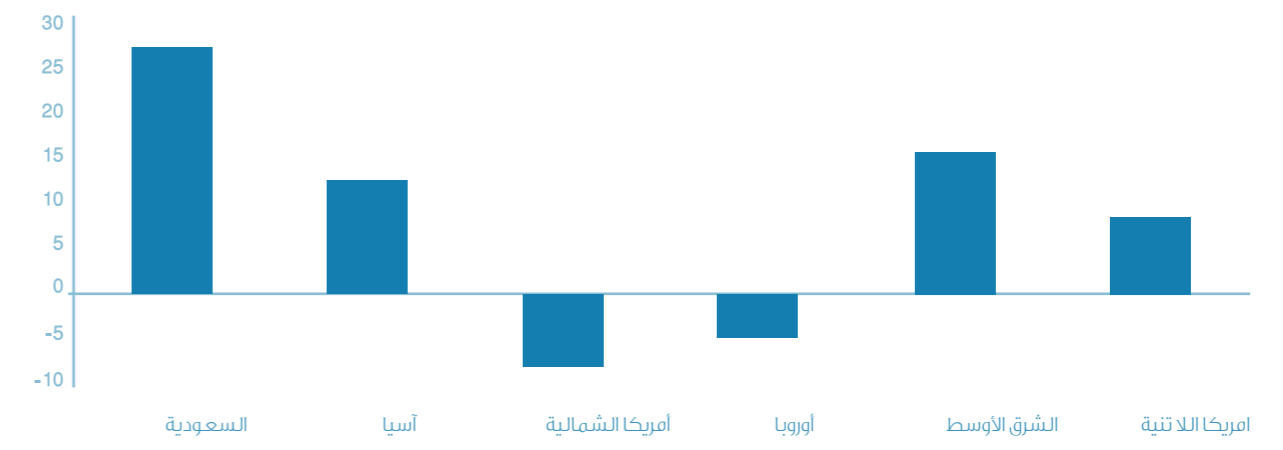


Figure 2.7: Growing Demand for Oil in the Kingdom

Source: International Atomic Energy Agency (2010)

Moreover, KSA's current business model anchored on power industry production and consumption has distorted innovation and competitiveness of power-dependent industries and provides disincentives to the power (renewable energy) industry innovative capacity.

Even though the Kingdom plans to use all forms of renewable and atomic energies, these efforts are still at a very early stage and need to be expedited to alleviate the increasing pressure on fossil fuel usage. This calls for efficiency of fuel utilization as the Kingdom cannot simply continue to burn fossil fuel at an ever-increasing rate. A sustainable national energy mix in which nuclear and renewable energies are viably integrated is necessary to transform the Saudi economy – which is currently based on low energy cost and cheap imported labor – into a knowledge-based innovative economy.

2.4 Current Challenges

A number of findings that reflect the need and reality of the current situation were also identified during the “Spring of Knowledge and Innovation” Workshop, some of which are:

1. The inability of the current pricing rates to facilitate the improvement of current water and electricity services and to ensure their continuity.
2. The existence of a gap between the strategic direction of the country in the area of water and energy as opposed to the public's response and compliance.
3. The lack of state-subsidized funding for the development of technology in the water and energy fields and limited incentives for private sector participation.
4. Weak presence and poor activation of control systems and the necessary legislation to maintain water resources and energy consumption.
5. Lack of clarity on the priorities of water and energy consumption in the absence of a comprehensive national plan, clear legislation and government bodies tasked with monitoring consumption.
6. Limited renewable drinking water sources.
7. The ineffective treatment of sewage and waste water and its lack of utilization in agriculture.
8. The waste of non-renewable water resources in agricultural production.
9. Insufficient data regarding the quantity of groundwater.
10. Insufficient production costs are a direct result of outdated desalination plants and the lack of standards and specifications for efficient devices.
11. The limited number of qualified technical crews necessary to achieve sound management of water resources.
12. Consumption is driven by the culture of (individual need) rather than a culture of (societal prosperity).
13. The absence of smart networks to ensure the efficient distribution and consumption of electricity.
14. The rise in pollution levels due to the use of dirty fuels and the absence of environmental standards.



Figure 2.8: Factors Affecting Water and Energy Sectors

Source: Spring of Knowledge and Innovation Workshop, 2010

2.5 WATER AND ENERGY NEXUS AND THE NEED FOR AN INTEGRATED FRAMEWORK

Given the above, it is clear that the world and the Kingdom in particular stand on the threshold of a critical phase regarding the future of water and energy. It is also clear that both sectors are interrelated in a way that makes it imperative to consider them together as a single intertwined system. (See Figure 2.9).

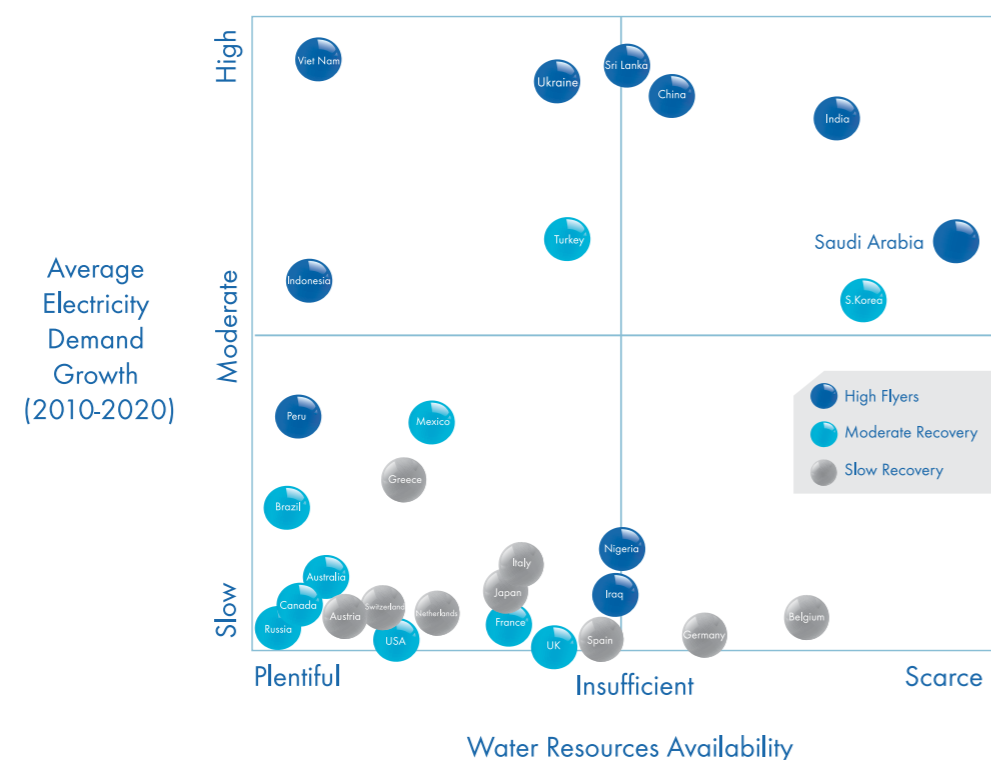


Figure 2.9: Status of the Kingdom and other countries in respect to the axis of the water and energy

Source: GE Energy, 2010

Both sectors share common factors contributing to the high demand. Those factors include the increasing consumption rates, economic development, and population growth, which affect the sectors in parallel. The two sectors also share their reliance on natural resources and the impact their management policies have on environmental pollution and public health.

There is also the fact that the generation of energy and fuel extraction depends partly on water while water desalination and treatment simultaneously requires the use of large amounts of energy.

3 A NEW DAWN FOR WATER AND ENERGY SECTOR IN THE KINGDOM



3.1 AN OPPORTUNITY FOR TRANSFORMING INTO AN INNOVATIVE SYSTEM

Despite the challenges faced by the Kingdom, the unique combination of water and energy it has presents a great opportunity. If the resources the Kingdom has are managed thoroughly and effectively, it will not only cover its internal needs but will also qualify it to join the ranks of exporting countries.

The Kingdom has a comparative advantage through its distinctive geographical position and its experience in water desalination in addition to its natural resources such as oil, gas and renewable energy resources, particularly solar energy. Additionally, the Kingdom has a great opportunity in using renewable energy to diversify energy mixture and subsequently provide water at affordable prices, achieve sustainability and water and food security, and become an exporter partaking in global competition.

Diversifying the energy mix will also contribute to transforming the Kingdom into a knowledge-based society by encouraging innovation through the private sector, investment in development and research, attaining the aggregate economical benefits derived from the local added value and creating new job opportunities through new technologies.

So, it is possible, by adopting suitable policies and integrated strategies, to transform water and electricity from an economical threat into a mean to stimulate innovation, knowledge production and diversify local economy.

3.2 VISION AND MISSION

Vision

For the Kingdom to become, by 2025, a global Islamic role model in the production, use and export of sustainable solutions for water and all types of energy and a catalyst of change towards becoming a knowledge society.

Mission

To develop water and energy systems to meet the increasing future demand and to reach knowledge-based society in the Kingdom, through employing international standards and technologies, spreading awareness and creating a legal, economic and social environment that encourages the development of scientific research and the formulation and implementation of supporting legislations

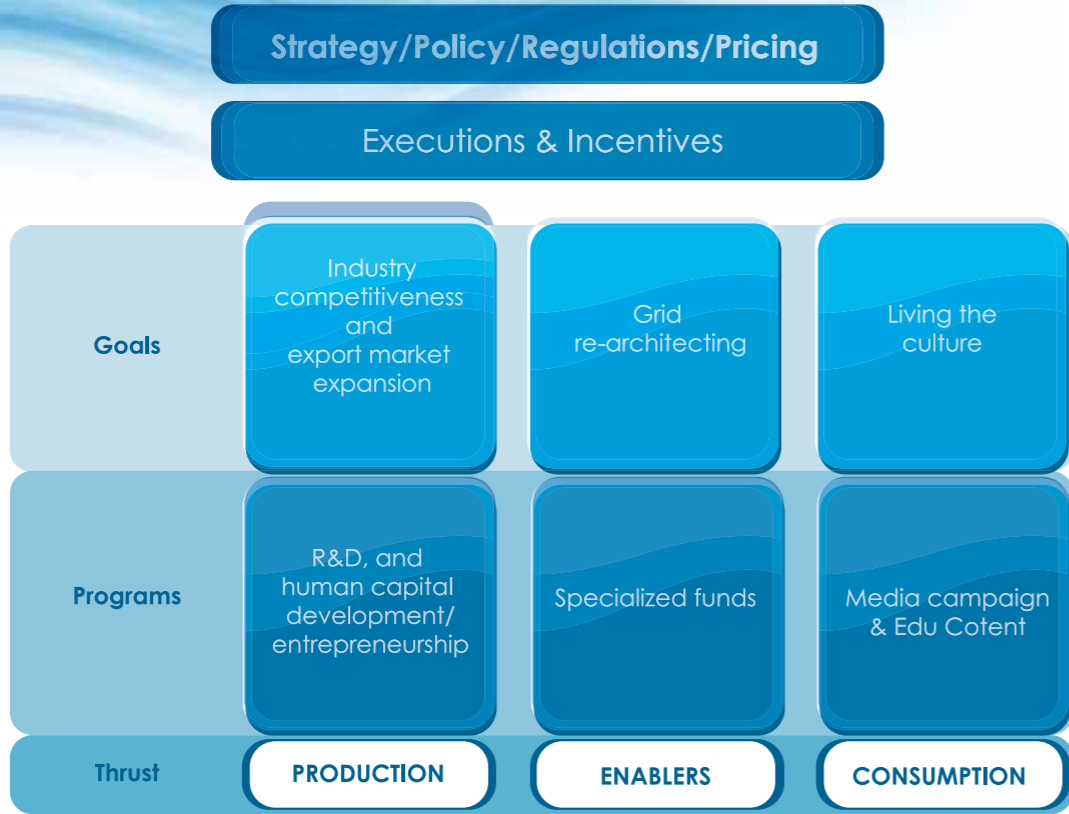
3.3 STRATEGIC FRAMEWORK

The framework of the strategy can be divided into three thrusts: enablers, production and consumption. These frameworks represent the roadmap to developing and creating a balance between supply and demand in the water and energy sectors. This will not be achieved merely through focusing on the configuration of policies and strategies but also through concentrating on the structures of both the legislative and pricing systems to influence the industry and consumer behavior. In order to achieve this, a motivational environment, conducive to productivity, must be created.

Under each of the frameworks, there falls a distinctive set of programs that focuses not only on the development of industry, but which are also involved in enabling industry partners, infrastructure, and the consumer. The industry development agenda must include global development standards, not only to cover the Kingdom's needs of water and energy internally, but also to make the Kingdom a global competitor in the field of innovation and investment for this sector.

When we discuss consumer market development programs, we notice that attempting to change consumer behavior must be done gradually, in order to reflect the needs of an advanced community, which is concerned with the management and conservation of its water and energy resources. It is also required that we activate the role of education, awareness-raising campaigns and promotional programs to promote the formation of this behavior over time.

Thus, we see that the main objective of these frameworks is the attainment of the most effective methods in which to connect and balance the producers and consumers of this sector. To achieve this, a national plan with international standards that supports long-term production must be developed in order to meet the growing demand for water and energy. Hence, in the following diagram, we display the suggested strategy framework and the cornerstones of each thrust, which will result in programs for the implementation of the future development plans in this sector.



First: **Enablers**

- 1. The creation of a 10 year master plan.
 - 2. Restructure based on the targeted consumer segments.
-
- 1. Grants for research, development and innovation in the water and energy fields.
 - 2. Grants for Export Facilitation.
 - 3. Grants for technology transfer and the support of direct foreign investment.

Grid Re-architecting

Specialized Funds

Second: **Production**

- 1. Adopt industry standards
 - 2. Awards for industry excellence
 - 3. Strict Privatization policies and plans
 - 4. Open competition – build more plants through the private sector.
 - 5. Incentives for Tech-transfer – start with local spare parts.
 - 6. Enhance Customer Service and Delivery Service (Based on international standards).
-
- 1. Achievement Awards.
 - 2. Industry-linked business incubators.
 - 3. Grants allocated specifically for R&D and Post Graduate education.
 - 4. R&D into Green Energy, Nanotechnology, Water Desalination, Water Treatment, Water Management and Innovative consumption awareness methods.

Industry Competitiveness and Export Market Expansion

R&D, and Human Capital Development/ Entrepreneurship



3.4 PROPOSED GOALS FOR ACHIEVING FUTURE VISION

Third: Consumption

- 1. To begin the training of 2000 leaders in the consumption awareness and conservation field.
- 2. The Activation of Non-Governmental organization's role to participate in consumption awareness and conservation campaigns.
- 3. The allocation of Awards & Incentives for organizations and institutions that excel in supporting consumption awareness and conservation programs.

Culture & Society

- 1. Media campaigns that target the different segment of the society in multiple languages.
- 2. Include in school curriculum.
- 3. Follow the "Sunnah" and example of the prophet "peace be upon him" in regards to water conservation and usage.

Media Campaigns & Educational programs

Investment in Human Resource Development

Water	Energy
1. To raise society's awareness of the importance of water and its conservation (Consumption Awareness)	1. Spreading awareness about the importance of energy conservation in society
2. Establishment of leading research and scientific centers in the field of water in order to stimulate innovation and generate qualified personnel	2. Investment in human capital to build a generations of specialists and researchers in the various fields of energy
3. Promote a culture of water security	1. Promote a culture of green technology
4. The provision and specialized training of competent personnel and cadre	4. Training specialized and competent personnel

The Financial Aspect

Water	Energy
1. A 20% increase in conservation of water by 2015	1. Diversifying energy sources used in electricity generation and reduce dependency on fossil fuels in order to take advantage of natural gas and its added value while maximizing the return from oil investments
2. Encouraging investment in water technology to increase commercial production by 20% by 2015	2. To maximize the economic benefits of petroleum and natural gas through a diversified range of products that can maximize our economic return, instead of exploiting it as a form of cheap energy.

The Legislative Aspect

Water

1. Reprioritize water usage allocation
2. Organizing the water sector
3. Issue and update legislations for pricing, investment, production, consumption, regulation of the sector, collection of dues, stimulation of research and development and the development of competent human resources and renewable energy

Energy

1. Enable the industry regulator
2. Develop a clear policy for fuel in terms of type and price
3. Issue and update legislations for pricing, investment, production, consumption, regulation of the sector, collection of dues, stimulation of research and development and the development of competent human resources and renewable energy

The Private Sector Aspect

Water

1. Contribution of the private sector towards the provision of the Kingdom's drinking water needs within five years
2. The contribution of the Private sector to the expansion of sewage treatment plants by no less than 10% per year

Energy

1. Ensuring that solar energy makes up at least 20% of overall energy use during the next ten years
2. Encourage the private sector to contribute to sustainable energy production

The Technological Aspect

Water

1. Encourage research in water technologies and discover innovative methods and techniques
2. Localizing and developing water technologies appropriate to the our environment

Energy

1. Use of modern technologies for energy production and saving
2. Promote scientific research in the use of alternative and renewable technologies for power generation and water desalination

3.5 KEY PARTNERS

NUMBER	ENTITY
1.	Supreme Economic Council
2.	Ministry of Water and Electricity
3.	Ministry of Petroleum and Mineral resources
4.	Ministry of Finance
5.	Electricity Regulatory and Co-Production Authority
6.	Saudi Electricity Company
7.	National Water Company
8.	Saline Water Conversion Corporation
9.	Ministry of Commerce & Industry
10.	Ministry of Telecommunications
11.	Ministry of Education
12.	Ministry of Higher Education
13.	Ministry of Culture and Information
14.	Ministry of Municipal Affairs
15.	Ministry of Health
16.	Ministry of Planning
17.	King Abdullah City of Atomic & Renewable Energies
18.	King Abdulaziz City for Science and Technology
19.	The General Presidency of Meteorology and Environment
20.	Shura Council
21.	King Abdullah University of Science and Technology
22.	Saudi Standards, Metrology and Quality Organization
23.	Research Centers in Saudi Universities
24.	Institutions of Civil Society

3.6 RECOMMENDATION

NUMBER	RECOMMENDATIONS
1.	Coordination with competent entities to set a national comprehensive system to move from a securing-demand policy to a managing-demand policy in all the local uses of water, electricity and energy, so that the system achieves the following objectives:
•	Achieve financial sustainability through setting and implementing a plan and identifying mechanisms to ensure the provision of 500 billion Saudi Riyals required within the next ten years to provide local water and electricity needs provided consisting of private sustainable financing, including endowments and bonds as well as the government's support.
•	Identify the minimum standard for the efficiency of using water and energy for all purposes, develop existing production stations, set global standards and specifications for all projects, devices and buildings to prevent the waste of water and energy and follow up on implementation.
•	Using international fuel prices as the trade-offs between alternatives regardless of the nature of the contract, direction of usage with identifying available types of fuel for producers in all regions of the Kingdom; and the minimum standard for the efficient use of each type.
	Subsequently, assign a dedicated team to follow up the implementation and promotion of the national system for future generations.
2.	Reconsidering water tariff to achieve justice in providing and distributing water, directing the governmental support of water and electricity sector to needy groups in society, re-amending electricity tariff to be equal to the cost of production and distributing and utilizing the difference in financing renewable or atomic energy programs in the Kingdom.
3.	Management of water sector through:
•	Establishing a management and control entity for the water sector services, the first mission of which is preparing and issuing a comprehensive water system that identifies rights and duties of those responsible for all resources, consumers and those who cause its pollution.
•	Request stakeholders to set a comprehensive and renewable system to achieve water and food security for future generations and identify responsibilities of each entity to implement it.
•	Provide strategic ground inventory near huge desalination plants adequate to provide the needs of close cities and villages for 180 days. Development and test water distribution system in emergency cases to make each citizen or resident aware of the amount dedicated to him/her and the place and method of delivery.
•	Request Agricultural Development Fund to support agricultural holdings that use treated water, and ask National Water Company to deliver treated water to agricultural and industrial areas surrounding cities and pumping the surplus of treated water in groundwater tanks.
•	Establishing a renewable information center of water in the Kingdom to support decision-making entities and setting a policy for the management of underground water that includes:
•	Measure and advertise quantity and quality of the remaining water annually in underground water tanks and other resources of water.
•	Identify the standard for efficiency of production of each square meter of water that qualifies for the government's support of the selected corps. This is to urge water conservation in the agricultural production and choosing corps that gain support.

NUMBER	RECOMMENDATIONS
4.	Development of electricity sector through:
•	Enabling ECRA with powers of imposing fines and determining prices while taking into consideration costs of production and consumable segments' system.
•	Setting an identified plan to transform the electricity grid into a smart grid to support implementing demand-management programs.
5.	Developing national competence to meet global competition and transforming into a society and economy of production and knowledge through:
•	Establishing specialized electronic gates to facilitate communication and cooperation in scientific innovation, requesting the latest in science and skills through the internet by establishing renewable databases technically and industrially in the settlement of knowledge-based industries and services and increasing commercial exchange and scientific cooperation between Arabic and Islamic countries.
•	Enabling the national center of training and water research – the establishment of which the National Water Company is working on.
•	To be a global model that improves capabilities of Arab and Islamic youth by establishing disciplines in water techniques in university and professional stages, and establishing specialized scientific sections in the field of clean and renewable energy in universities.
•	Establishing a national fund to support projects of achieving water and food security, programs of sustainable energy and programs of demand management on the use of water and electricity, programs of supporting knowledge-based and innovation-based small industries and programs of researches and training to enhance national capabilities.
•	Requesting governmental entities and water and electricity companies to execute multi-projects across the Kingdom to produce water and electricity using renewable energy during the next decade while giving priority to national companies and factories to establish a commercial and industrial base to use the renewable energy.
6.	Requesting King Abdullah City for Atomic and Renewable Energy to accelerate in setting and executing a national system for energy sources while taking into account the need to:
•	Providing increasing amounts of petrol for exports.
•	Increasing the participation of national, human and industrial capabilities for the purpose of maintaining global leadership in targeted techniques and maximize the development of the national added value chain.
•	Announcing stages of reaching the production of 25% of electrical energy and 50% of desalinated water using renewable energy to attract investments and establishing the necessary industrial power to achieve the above.
7.	Expanding the national program to prevent the waste of water and electricity and provide dedicated advertising for the society to adopt the new message using all available means while building a culture of conservation through educational programs, school researches, incorporating materials specialized in energy conservation, environmental awareness and consumption awareness in all study stages.

3.7 STRATEGIC QUICK WINS

Below are some of the quick win initiatives, which are programs that can be executed within a short time-frame yet have a significant impact upon the water and energy sectors, requiring relatively low investments:

1. The establishment of an investment fund with the government's participation for the purchase of technology and global intellectual property rights in the fields of renewable energy and water to localize it.
2. Establish an information center regarding the water situation in the Kingdom that is independent of executive entities.
3. Restructuring of water tariff to direct government support towards the disadvantaged groups in society and developing tariff for agricultural consumption.
4. Identification of incentives offered by the state in order to raise the efficiency of energy use above the minimum which should exceed 50%.
5. To identify and publicize the minimum standard of efficient energy use when building or renovating power plants and types of fuel available in various regions of the Kingdom.

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APPENDIX (1): NAMES OF THE PARTICIPANTS IN “THE SPRING OF KNOWLEDGE AND INNOVATION” WORKSHOP

الرقم	الاسم	جهة العمل	القطاع
١	معالي الدكتور / أحمد محمد علي	رئيس البنك الإسلامي للتنمية	دولي
٢	معالي الدكتور / سعود المتحمي	وزير دولة لشؤون مجلس الشورى	حكومي
٣	معالي الدكتور / وليد أبو الفرج	نائب رئيس مدينة الملك عبد الله للطاقة الذرية والمتجددة	حكومي
٤	معالي الدكتور / عبد الله الشهري	محافظ هيئة تنظيم الكهرباء والإنتاج	حكومي
٥	الدكتور / عادل بشناق	مجموعة البشناق	خاص
٦	الدكتور / أحمد العريفي	جامعة الملك سعود	حكومي
٧	الدكتور / محمود نقادي	نائب أمين عام مؤسسة الملك عبد العزيز ورجاله للموهبة والإبداع	أهلي
٨	الدكتور سعد حاج بكري	جامعة الملك سعود	حكومي
٩	المهندس / فهد الرشيد	الرئيس التنفيذي لمدينة الملك عبد الله الاقتصادية برباغ	خاص
١٠	الدكتور / عبد العزيز الجزار	مجموعة الملز التجارية	خاص
١١	الأستاذ / طلعت قاري	مجموعة بشناق	خاص
١٢	المهندس / أحمد لنجاوي	مدينة الملك عبد الله الاقتصادية برباغ	خاص
١٣	الأستاذ / صلاح الشريبي	البنك الإسلامي للتنمية	دولي
١٤	المهندس / جمال الدبل	أرامكو السعودية	خاص
١٥	الدكتور / عبد العزيز البسام	جامعة الملك سعود	حكومي
١٦	المهندس / زياد با سمير	مجموعة با سمير التجارية	خاص
١٧	المهندس / توفيق الغشام	جامعة الملك عبد الله للعلوم والتقنية	حكومي
١٨	الأستاذ / احمد عثمان الخويطر	أرامكو السعودية	خاص
١٩	الأستاذ / أسامه كربي	مجلس الشورى	حكومي
٢٠	المهندس / حلمي نتو	شركة ICI	خاص
٢١	الدكتور / الحسين عسيري	جامعة الملك سعود	حكومي
٢٢	الدكتور / باسم عمر قاضي	معهد خادم الحرمين الشريفين لأبحاث الحج والعمرة	حكومي
٢٣	الدكتور / أحمد حبيب صلاح	وزارة الاقتصاد والتخطيط	حكومي
٢٤	الأستاذ / الشريف خالد آل غالب	البنك الأهلي	خاص
٢٥	الدكتور / حمد البريش	جامعة الملك سعود	حكومي
٢٦	الأستاذ / أحمد عبد الرحمن السعدي	أرامكو السعودية	خاص
٢٧	المهندس / فؤاد الشريبي	الشركة السعودية للكهرباء	حكومي
٢٨	المهندس / رضا اسلام	شركة أمواج المستقبل	خاص
٢٩	الأستاذ / جمال خاشقجي	إعلامي	خاص
٣٠	الدكتور / محمد حسن اخوان	شركة صافولا	خاص
٣١	الدكتور / محمد السعود	وزارة المياه والكهرباء	حكومي
٣٢	الدكتور / سليمان مرداد	هيئة الاتصالات	حكومي

الرقم	الاسم	جهة العمل	القطاع
٣٣	المهندس / عادل سعيد السحيمان	شركة اسمنت اليمامة	خاص
٣٤	الدكتور / ماهر العودان	جامعة الفيصل	خاص
٣٥	الدكتور / بكر خشيم	مجلس الشورى	حكومي
٣٦	لدكتور / بدر الشيباني	رجل أعمال	خاص
٣٧	الدكتور / عبد الغني مليباري	جامعة الملك عبد العزيز	حكومي
٣٨	المهندس / فريد خلاوي	مجموعة اميانتيت	خاص
٣٩	الدكتور / جعفر صباغ	مكتب الصباغ للاستشارات	خاص
٤٠	الأستاذ / أحمد رضا	مجموعة استثمارات الملكية الخاصة كابيتال	خاص
٤١	الأستاذ / محمد أبو نيان	مجموعة أبو نيان التجارية	خاص
٤٢	المهندس / سامي بكري	رجل أعمال	خاص
٤٣	الأستاذ / عبد الله النويصر	رجل أعمال	خاص
٤٤	الدكتور / فريد الياقوت	الشركة الوطنية للطاقة	خاص
٤٥	المهندس / محمد الصوفي	شركة الشريك المقيم	خاص
٤٦	الدكتور / سلمان الركيان	معهد الملك عبد الله لتقنية النانوارامكو السعودية	حكومي
٤٧	الدكتور / أحمد الخليفة	وزارة المياه والكهرباء	حكومي
٤٨	الدكتور / عبد الملك آل الشيخ	جامعة الملك سعود	حكومي
٤٩	الدكتور / خليل نيازي	الشركة الدولية	خاص
٥٠	الأستاذ / مازن بهكلي	شركة جنرال إلكتريك	خاص
٥١	الأستاذ / زياد جزار	مجموعة الأغر	أهلي
٥٢	الأستاذ / فهد اسعد أبو النصر	الرئيس التنفيذي لمجموعة الأغر	أهلي
٥٣	الدكتور / حسين سندي	جامعة الملك عبد العزيز	حكومي
٥٤	الأستاذ / رافي يوسف	مجموعة الأغر	أهلي
٥٥	الأستاذ / ألين بترسن	مجموعة بترسن	خاص
٥٦	الأستاذة / سمر فطاني	إعلامية	خاص
٥٧	الأستاذة / خيرة بندقجي	جامعة عفت	خاص
٥٨	الأستاذة / أسماء جلال خان	جامعة عفت	خاص
٥٩	الدكتورة / الاء نصيف	مجموعة الأغر	أهلي
٦٠	الدكتورة / خديجة الصبان	جامعة الملك عبد العزيز	خاص
٦١	الأستاذة / نورة مغربي	كلية دار الحكمة	خاص
٦٢	الدكتورة / أروى الأعمى	مساعدة أمين جدة	حكومي
٦٣	الأستاذة / الاء المزين	لية دار الحكمة	خاص
٦٤	الأستاذة / دينا النهدي	مؤسسة تقنية تحسين البيئة	حكومي

APPENDIX (2): VISIONS AND MESSAGES OF THE SIX WORK GROUPS PARTICIPATING IN THE "SPRING OF KNOWLEDGE AND INNOVATION" WORKSHOP.

Visions of the six groups:

The first group: A conscious and pioneering community in the production and export of various energy, water technologies, and achieving sustainable development for a better life.

The second group: A distinct country in achieving water and energy requirements, pioneer in the renewable energy, to achieve sustainable development and welfare of the community.

The third group: A country of sustainable sources of water and energy with global environmental standards that provide quality life and comprehensive development.

The fourth group: That the Kingdom is a pioneer in the production, management and utilization of water and energy efficiently and sustainably.

The fifth group: That the Kingdom is a global pioneer in the development, utilization and export of sustainable solutions and renewable energy in the production of water and energy.

The sixth group: That the Kingdom of Saudi Arabia is a pioneer in diversifying energy and water sources that achieve sustainable development to achieve the nation and community's welfare and awareness in light of Islamic values.

The message for the six groups:

The first group: Provide and export energy and water from various sources and with appropriate price while maintaining environment, development of national and research experiences, development of profitable industry and systems that help achieving sustainable development.

The second group: Hard work to secure water and energy through a basic structure characterized with efficiency and effectiveness in the utilization of natural sources for conscious beneficiaries for achieving welfare of the society and promoting sustainable development.

The third group: Diversification of energy and water sources that are environmentally friendly and providing it with high efficiency and a suitable cost for target segments that attract knowledgeable and economical investment with resettlement of talents and scientific research in water and energy technology; and stopping the waste through regulations and awareness to achieve strategic security.

The fourth group: Enhance the Kingdom's capability to provide a high level of produced water and energy services in a sustainable and friendly way to the environment by the private sector in a price that reflects the actual cost and apply the smart support of a conscious community, settlement of techniques, raise efficiency of human strain and development of required legislations.

The fifth group: Sustainable and renewable development for water and energy through:

- Secure water and electricity for each individual in a clean environment.
- Management and rationalization of demand
- Leadership desalination of sea water and solar energy
- Strategic plan for a sustainable development
- Set rules to conserve water, energy and environment.
- Maximize the benefit of water reuse.

The sixth group: the message for the sixth group is summarized in the following points:

- Using renewable energy sources
- Communicating between experts and society
- Adopting the most suitable techniques for the society
- Enhancing of the pattern of consumption
- Providing industrial development for the country and welfare for the citizen
- Leading consumption and production of water and energy
- Rehabilitating traditional agricultural areas which are capable of continuous natural production
- Preserving of Islamic values in terms of sources, energy and environment

APPENDIX (3): NAMES OF THE AUDIT AND REVIEW COMMITTEE

الاسم	تسلسل
الدكتور/محمد الصبان	١
الدكتور / عادل بشناق	٢
الأستاذ / طلعت قاري	٣
المهندس / فؤاد الشريبي	٤
المهندس / رضا اسلام	٥
الدكتور / جعفر صباغ	٦
الأستاذ / محمد أبو نيان	٧
الدكتور / فريد الياقوت	٨
المهندس / محمد الصوفي	٩
الدكتور / أحمد الخليفة	١٠
الأستاذ / فهد أبو النصر	١١
الدكتور / حسين سني	١٢
الدكتور / نبيل ندا	١٣
المهندس / منصور بن هلال	١٤