The United Nations, in September 2015, outlined the 2030 Agenda for Sustainable Development, which includes 17 comprehensive and detailed Sustainable Development Goals (SDGs). These goals are designed to help alleviate poverty and climate change affecting the world. Member countries have taken the initiative to address the rapid changes in society.

Princess Nourah bint Abdulrahman (PNU) has been at the forefront of establishing itself as a leader in sustainable development in the GCC region. PNU has aligned its strategy and policies to help meet the requirements of the SDGs in the area of Climate Change (SDG 13, including making a formal commitment to reduce the effects of its operations on climate change.

This report will detail the university's actions on greenhouse gas emissions and present a plan for eliminating the university's contributions to climate change.

SDG-13 defines goals for climate action that strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries.

This goal aligns directly with the vision of PNU of reducing energy consumption and implementing renewable energy initiatives, with the knowledge to sustain it for future generations.

We have established programs and practices to directly support the UN's SDG-13 and work diligently every day to implement them.

In April of 2010, H.M. King Abdullah bin Abdulaziz Al Saud established King Abdullah City for Atomic and Renewable Energy (K.A.CARE), with the aim of conducting applied research in the are of sustainable energy development.

PNU in its design has focused on efficiency to its central heating and cooling plants as they are the largest contributors to its emissions profile. The plan focused on the heating and cooling distribution systems, lighting retrofits, fully utilizing the existing chiller plant, and various policy and conservation initiatives. Princess Nora University has partnered with a consulting firm to perform an assessment on the central heating plant and distribution of hot water, decentralization of heating loads from the central heating plant. The combined effect of these two agendas – the central plant renovation and distribution system replacement – will result in a reduction in greenhouse gas emissions. The second phase of the Climate Action Plan will continue to include a heavy focus on energy systems and energy efficiency as the largest components of our emissions profile. While there are important carbon reduction strategies in this section of the plan, the university is committed to continuing an on-going review of energy options that reflects the anticipated further development of renewable technologies.

Research on Climate Action

In an arid region with very scarce resources of water, Saudi Arabia faces many challenges from the effects of climate change. Several studies have reported the effects of climate change on the availability and quality of water resources, increased morbidity and mortality due to thermal extremes, epidemics, malnutrition, geographical and seasonal spread of infectious vector, rodent borne diseases, and cardiovascular and respiratory illness. [1]

Dr. Qassem Tarawneh, a professor and researcher at King Saud University and Prince Sultan University, has researched the effects of climate change not only in the Kingdom of Saudi Arabia but also in Jordan. His research on behalf of King Saud University on the Harmonic analysis of precipitation climatology in Saudi Arabia, illustrated how climate change has affected rainfall. For a region that is known for having the least amounts of rain in the world, a record of 74mm of rainfall was registered on the 25th of November 2009. This abrupt increase is usually followed by a long periods of little no rainfalls. This abrupt fluctuation contributes to the depletion of water resources in the Kingdom of Saudi.

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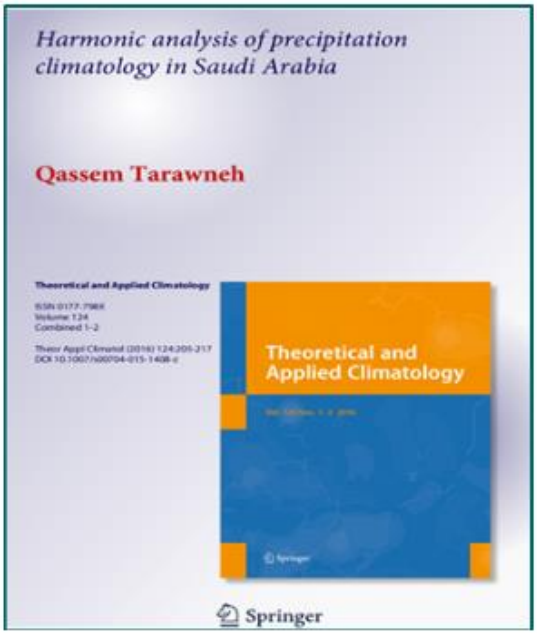

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The Three Energy Goals:

Accessibility, Availability, Acceptability

"In 2000, the World Energy Council published a Statement "Energy for Tomorrow's World – Acting Now" which looked at the challenges the world faced in meeting its energy needs in the 21st Century. The following description of the three WEC energy goals is extracted

from that document. WEC considers economic growth, together with national and international institutional reforms, essential to energy accessibility for everyone, including the poorest two billion people in the

world. When only some individuals or regions of the world benefit from energy development and others are left behind, the ensuing political and social instability can pose a significant threat to world peace and, in turn, to energy availability through supply disruptions. In addition to the impact of accessibility on energy availability, it is also linked closely to energy acceptability. Investment partnerships to achieve energy accessibility and availability could also address social and environmental issues.

Accessibility is the provision of reliable and affordable modern energy services for which a payment is made. It depends on policies specifically targeted to meeting the needs of the poor, in the context of increasing reliance on market signals. The best way to ensure that a growing number of people will be able to afford commercial energy in line with their needs is to accelerate economic growth and pursue more equitable income distribution. This requires increasing reliance on the market, while addressing cases of market "failure"with special policies. An energy tariff reflecting all costs, including external costs such as emissions or waste management, is necessary to secure adequate investment and encourage energy efficiency and environmentally preferred technologies, but such a tariff would be unaffordable for many people. At the same time, a tariff subsidized down to a socially affordable price would not attract sufficient investment, consequently, in the long run, working against the interests of those who need commercial energy infrastructure. There may be a need, in some cases, to subsidize energy technology and delivery for a period without creating price distortions, or at least by keeping them to a minimum. Variable, maintenance and extension costs need to be reflected in the price paid for energy, but sunk costs might be handled differently in some circumstances.

- Availability covers both quality and reliability of delivered energy. The continuity of energy supply, particularly electricity, is essential in the 21st Century. While short-term interruptible supply may be feasible in certain circumstances, as long as the conditions are known and understood by customers, unexpected power cuts bear a high cost for society that cannot be ignored. The world's growing reliance on information technologies makes reliability even more critical… Energy availability requires a diversified energy portfolio consistent with national circumstances together with the means to harness potential new energy sources.

Most WEC Member Committees agree that all energy resources will be needed over the next fifty years and there is no case for the arbitrary exclusion of any source of energy.

- Acceptability addresses environmental goals and public attitudes. Local pollution is a cause of harm to billions of people, especially in developing countries. Global climate change has become an important concern. Mindful of these two facts, developing countries are concerned about both the potential impact of climate change-related response measures on their economies, and the rising levels of consumer-based household emissions which create local (urban) and regional pollution (e.g. such as acid rain's impact on crops and forests). The energy sector is one area in which new and readily available technologies have already reduced emissions and hold prospects for future improvement. Of course, environmentally friendly technologies have to be developed, diffused, maintained and expanded in all parts of the world. Hence, there is a need to foster adequate local capacity to ensure that the technologies can be used and maintained by local people. Energy resources must be produced and used in a manner that protects and preserves the local and global environment now and in the future." [2]

- At Princess Nora University, an effort is being made to reduce energy consumption and implement renewable energy sources to supplement the energy demand of the campus.

Low Carbon Energy Use

Total energy used	540 KVA
Energy used from low-carbon sources: No fossil fuels	NA
Energy used from low-carbon sources: renewable sources (biomass, hydropower, geothermal)	96cm²/month
Energy used from low-carbon sources: Power generation sources (wind, solar, nuclear)	In Progress
Energy used from low-carbon sources: Electricity (renewable)	NA
Energy used from low-carbon sources: Electricity (nuclear)	NA

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Princess Nora University currently has a total energy use of 540 KVA, in which energy used from low-carbon sources such as renewable sources (biomass, hydropower, geothermal) is 96cm^2/month.

The university will also be using solar energy as soon as the construction of the solar panels are in the finishing stages,

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Saudi Arabia: Greenonetec Delivers 3,600 collectors to Riyadh

Submitted by Baerbel Epp on July 3, 2010

Three partners, one project: Representatives from all three participating companies - Millennium Energy Industries, Jordan, and Greenonetec and AEE Intec, both based in Austria - met for their kick-off meeting at the collector factory of Greenonetec.
Photo: Greenonetec

The 3,630 collector panels for the new Princess Noura Bint Abdulrahman University for Women in Riyadh, Saudi Arabia, are manufactured at the Greenonetec factory in Austria. Currently the world's largest solar heating project, a plant with a collector area of 36,305 m^2, will be installed on the roof of the central university building. It would surpass the solar thermal installation in Marstal, Denmark, which has been the largest one so far, covering 19,875 m^2.

Millennium Energy Industries (MEI), one of the leading providers of solar heating and cooling solutions in the Middle East and North Africa, was awarded the contract for the solar plant in January 2010. The company is responsible for planning, designing and building the huge, flat-roof system, which will feed the solar energy into the district heating system of the campus.

The campus, which is already looking like a small city will offer space for 40,000 students, lecturers and other staff, 13 faculties, accommodations, research facilities and a hospital.

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Environmental Education Including Disaster Planning

Princess Nora University implements three environmental awareness campaigns relative to the sustainable development objectives

In view of the role of Princess Nora bint Abdulrahman University in achieving environmental sustainability, and its belief in the importance of active students' participation in various international forums and events related to the environment. The Department of Biology and the Community Service Unit at the College of Science have recently organized three environmental community awareness campaigns with slogans

linked to the thirteenth objectives of private sustainable development in the climate, and the fifteenth of life on the land. In the presence of the head of the Biology Department, Dr. Laila Al-Shuraim, the college's vice-rector, as well as several faculty members, administrative staff and the students.

As coordination and cooperation has been made with the General Department of Parks and Community Service in the Secretariat of the City of Riyadh to obtain various types of different annual flowering seedlings, cacti, perennial outdoor plants, and small trees to be cultivated by approximately (90) students among the fourth level students in the Biology Department within two weeks at a rate of one hour per day, under the supervision of Dr. Arwa Abdul Karim Al-Hukail.

Riyadh-Newspaper

This comes in line with the Kingdom's strategies towards the environment and the restoration of vegetation in Riyadh to reduce the damages related to drought and its negative effects, as an influential environmental mission and social responsibility to activate the role of students in society inside and outside the college and university. In addition to contributing to raising awareness and environmental sense with a number of Applied Ecology issues.

On the other hand, and to achieve the quality of educational outputs, in line with the achievement of the Kingdom's Vision 2030, the initiative has

been taken to host (14) third-graders (American Diploma) students from Riyadh Najd Private Schools to attend the various campaigns and events and participate in applied activities such as afforestation. In order to increase the green areas inside the college and educate them about home gardening methods in addition to a scientific tour to learn about the laboratories of the Department of Biology and the herbal plants in the college.

The awareness campaigns varied to include the introduction of the World Day to Combat Desertification and Drought under the slogan (Vision is affiliation to achieve development), the introduction of the International Day for Biological Diversity, whose campaign was called (Our Vision 2030 Saves Our Environment). As well as the introduction of the International Day for Preserving the Ozone Layer and shedding light on the resulting global climate change and global warming under the slogan (Vision 2030 protects the environment).

The event was accompanied by three corners of environmental issues for the three campaigns to cover them from various aspects and link their issues to each other and to clarify the risk of continuing to pollute the environment with different pollutants. Several visual presentations, which have been designed and prepared by students, were presented. In addition to reviewing some international efforts and the Kingdom's efforts specifically the directives included in the Vision 2030 for environmental protection.

This came within the framework of promoting the principle of rationalization, reducing consumption and waste in natural resources, preserving biological diversity. As well as protecting it through nature reserves, sustainable development for it, preserving it, and directing renewable (clean and safe) energy such as solar energy, wind energy, etc. as a safe and clean alternative that protects and preserves the environment and contributes to reducing the breadth of the Ozone (O3) layer hole. Princess Nora University shows this commitment by its participation in the SDG reports.

The campaigns also presented recommendations and proposed solutions to contribute to limiting the exacerbation of these problems and controlling them and explaining some positive applied mechanisms to protect the environment. These recommendations emphasized the importance of solidarity and effective participation in eliminating pollution by limiting the use of all kinds of plastics, and the need to

move to the use of safe alternatives as biodegradable plastics alternatives. As well as the possibility of using some insect repellent plants, especially in house rooms, as an alternative to the use of chemical pesticides. In addition to urging the rationalization of electricity and water consumption and preventing logging, and encouraging the participation of students in planning and implementing organized campaigns, including some positive activities and events, and developing a high sense of responsibility towards public property and cleanliness of the environment within university and college facilities.

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[1] C. S. Tarawneh QY, "Trends of Climate Change in Saudi Arabia: Implications on Water Resources," Climate. , p. 6(1):8, 2018.

[2] M. K. Kurt Yeager, "Energy and Climate Change," World Energy Council, London, 2007.