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# University of Central Punjab (UCP), Lahore, Pakistan's Responsibility for SDG's and World Complex Challenges Pertaining to its Innovation for Energy and Climate Change Management

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**Abstract** One of the important essentials of modern living is energy without which modern world cannot survive and therefore depends deeply on energy usages and energy abuse. What is important to be seen is that more than 7.8 billion people on this planet are burning fossil fuels for their daily needs. Therefore, the challenge for the 21<sup>st</sup> century is how to conserve this 'good' energy and how to reduce its transformation into 'bad' energy and at the same time enjoy a sustainable lifestyle through modern inventions of science and technology. The problems facing University of Central Punjab, Lahore (UCP) is on the one hand how to minimise the usage of energy resources and secondly, how to move away from using fossil fuels and toward usage of eco-friendly energy sources for achieving sustainability and abiding by the Goal 7 of the SDG (Affordable and Clean Energy). Keeping sustainable development and energy conservation issues in mind, UCP has already in collaboration with M/S Premier Energy embarked upon the renewable solar energy solutions and 1/4<sup>th</sup> of the total energy consumption of UCP is being produced through state-of-the-art grid-tied solar system. UCP also promotes the sagacious use of water. In UCP, processor treat sewage water. In addition, UCP promotes the use of filtered drinking Processor treat sewage water. Promote the use of filtered water instead of bottled water.

**Keyword:**

Sustainable Development Goals (SDG's), environment, University of Central Punjab, Lahore, Pakistan (UCP), innovation for energies, climate change management

## 1. Introduction

According to UNO, “Sustainable Development Goals are the blueprint to achieve a better and more sustainable future for all. They address the global challenges we face, including those related to poverty, inequality, climate change, environmental degradation, peace and justice. The 17 Goals are all interconnected, and in order to leave no one behind, it is important that we achieve them all by 2030”. (United Nations Organization, 2020)

One of the important essentials of modern living is energy without which modern world cannot survive and therefore depends deeply on energy usages and energy abuse. What is important to be seen is that more than 7.8 billion people on this planet are burning fossil fuels for their daily needs, whether for cooking purposes, whether for electricity production and consumption or for transportation – land, air and at sea. Transforming energy that is conducive for life like oxygen into energy that destroys life like carbon emissions. Alternatively, transforming ‘good’ energy into ‘bad’ energy. Therefore, the challenge for the 21<sup>st</sup> century is how to conserve this ‘good’ energy and how to reduce its transformation into ‘bad’ energy and at the same time enjoy a sustainable lifestyle through modern inventions of science and technology.

SDG Goal 7 reads, “Affordable and Clean Energy – Ensuring access to affordable, reliable, sustainable and modern energy for all”. Goal 7.2 reads, by 2030, increasing substantially the share of renewable energy in the energy mix.

There are different ways to produce electricity with an electromagnetic generator, some of these methods are environmentally friendly and sustainable, while others are less environmentally friendly and therefore less sustainable and even use non-renewable sources of energy and are therefore pollutive. For example, water (Hydro) turbines, hydroelectric plants, and wind turbines are sustainable, environmentally friendly and do not use fossil fuels as energy source and are dependent on renewable clean energy source. So is the case with producing electricity with solar power. On the other hand gas turbines, steam turbines using coal and other fossil fuels internal combustion engines, combined heat and power plants, are not environmentally friendly, are highly pollutive and cause hazardous waste both for flora and fauna as well as for human health. [2]

As the world slowly but surely is changing its energy producing mix from major use of fossil fuels towards clean, sustainable energy sources. It has become important that universities both in the developed world as well as the developing world encourage its own administration as well as its faculty and students towards research into more and more environmentally friendly and sustainable engines and energy usages.

We have reached middle of 2020 and there is just another 10 years to achieve all these seventeen goals. Governments and private sector especially the corporate sector and MNC's have to play a major role in finding solutions to local and global issues. At the same time, Universities are key to introducing new research methodologies, simulation techniques and teaching methodologies for educating the younger people who have to become policy makers and managers of tomorrow is ways to achieving SDG's by year 2030. Also, universities are both users of energy as well as producers of new ideas and techniques of finding sustainable ways of energy usage, especially renewable energy sources away from fossil fuel usages.

UCP, Lahore, Pakistan as a young upcoming university is committed in assimilating local educational problems with international teaching and research methodologies and therefore has created the Department of Sustainable Environment, which, is trying hard to

assess the teaching and administrative departments of the University in introducing the SDG's in their methodologies and work behavior.

The problems facing University of Central Punjab, Lahore (UCP) is on the one hand how to minimise the usage of energy resources and secondly, how to move away from using fossil fuels and toward usage of eco-friendly energy sources for achieving sustainability and abiding by the Goal 7 of the SDG (Affordable and Clean Energy).

The objective of this study is to analyze the Universities' (University of Central Punjab, Lahore, Pakistan - UCP) Responsibility and activates pertaining to its Innovation for Energy and Climate Change Management in context to SDG's and World Challenges.

## 2. Literature Review

University of Central Punjab, Lahore, Pakistan in its mission is committed to teach and research the seventeen MDG's in their different faculties and departments in the near future under the guidance of its sustainable development department as O' Malley states that, "Now is the time for the international community to recognise the fundamental importance of higher education to achieving all 17 Sustainable Development Goals (SDGs), ... and for universities to dedicate themselves to helping the world achieve those goals". And concludes, "in the past universities were criticised for working too much in silos, but the sustainable development agenda has pushed for better interdisciplinary and multi-disciplinary research, as well as the international collaboration that is needed for a more complex world" [3].

University of central Punjab's Department of Sustainable environment is committed to use Walter leal Filho developed questionnaire in order to contain statements which showed what "ideally universities should do as climate action and what they are really putting into practice". And concluded, " It is understood that universities occupy a central position as centres of learning, innovation and research. Consistent with these multiple roles, there are many ways via which universities can engage on matters related to climate change. Apart from deep actions such as the execution of research projects which may investigate matters related to climate change mitigation and adaptation, university engagement on climate issues can be as simply as institutional climate protection, i.e., fostering energy efficiency by investing in low-cost and energy saving equipment, devices and lights, or by the use of renewable energy sources in order to reduce their carbon emissions. Efforts can also be more intensive and have a multiplier role, such as the inclusion of climate issues in the curriculum, making it more present and more visible in university programmes. However, in order that this is achieved, there is a perceived need to address the currently seen scepticism, since a reluctance to engage on climate issues means that good opportunities to educate and raise awareness about them are being lost" [4]. In this regard UCP would use these formulations in its future course of action in implementing the SDG's and assimilating them in their teaching methodologies of the near future.

Wendy Maria Purcell stated that, "Universities can do more to deliver against the sustainable development goals (SDGs), working with faculty, staff and students, as well as their wider stakeholder community and alumni body. They play a critical role in helping shape new ways for the world, educating global citizens and delivering knowledge and innovation into society. Universities can be engines of societal transformation. Using a multiple case study approach, this study aims to explore different ways of strategizing sustainability toward delivering the SDGs are explored in a university setting with an example from the UK, Bulgaria (Europe) and USA" [5]. The Sustainable Development

Department of UCP would induce its teaching and research faculties to inculcate the approach of Wendy Maria Purcell as help university-community interactions for greater community participation in formulating localized approach to SDG's in Pakistan.

Monika Sandy & others researched that, "Universities create study programs and organize extracurricular activities in order to prepare future generations of professionals as well as political and social leaders for responsible actions toward sustainable development". Moreover, concluded that, "Polish universities attempt to shape sustainable development-oriented competencies not only through formal sustainable development education, but also via non-formal activities toward social and environmental challenges" [6]. In this respect, UCP has already started organizing extracurricular activities in liaison with the Environment Ministry, Climate Change Ministry, the ministry of Forestry as the Environment Department of the Punjab and the country (Pakistan) with the aim to have a greater role in policy and implementation on SDG's, energy conservation, forestation and on climate change.

Sustainable Department of UCP recognizes the role of universities as stated by Holy Ryan that, "Many higher-education institutions recognize the crucial role that they can play in raising awareness and understanding of climate change amongst their students" [7]. H. Ryan further notes down numerous examples of universities around the world that have integrated subjects pertaining to climate change and experiments for mitigating the problems arising from climate change in her article. Therefore, UCP is gearing up towards a better future of its youth for tomorrow in assimilating the environmental issues and SDG's in the teaching and research environment of the university.

Sustainable Department of UCP agrees with Fadlallah who states that "Universities are uniquely placed to lead the cross-sectoral implementation of the SDGs and advance the 2030 agenda. This commentary provides the case for building, strengthening and institutionalising university partnerships with governments and communities to achieve the SDGs". Therefore the article advocates "a change in mindsets and culture in both academia and government, and invite both parties to start the dialogue if we are to rise up to the global challenge" [8]. In this respect the sustainable department of UCP is trying to introduce the significance of SDG's for the future generations of Pakistan and the world in the mindframe of its deans, HOD's and the teaching and research faculty for sustainable Development Goals to be implemented in their different forms as well as in their wholistic form.

### 3. Discussion

University of Central Punjab, Lahore, Pakistan also called UCP is a private sector university, established in 1999 and currently is working with 10 Faculties with a vision to "become an internationally acclaimed University in teaching and research". With a mission, "To provide quality education to the youth of our nation in a stimulating and conducive learning environment by equipping them with the intellectual and technological tools necessary to meet the challenges of the future" [9]. The partner organizations of UCP are World Wildlife Fund (WWF) and **Sunrise Green Pak Welfare Organization**.

The University of Central Punjab (UCP), Lahore was ranked as the 478th World's Most Sustainable University in 2019 UI GreenMetric World University Rankings [10]

The Department of Environment Sustainability (DSE) at UCP "is established to perform various activities related to sustainable environment and to coordinate work done by the teaching departments in their areas". DSE is to:

- Suggest policy guidelines regarding protecting our environment
- Create awareness among the students, teachers, and staff about the importance of preserving our environment and the harmful effects of polluting our world
- Organize events and activities related to the sustainable environment
- Coordinate various environment-related activities at UCP and other universities and colleges in the group.
- Participate in national and international events to enhance the effectiveness of the efforts towards environment

### 3.1. Energy conservation

Keeping sustainable development and energy conservation issues in mind, UCP has already in collaboration with M/S Premier Energy embarked upon the renewable solar energy solutions and 1/4<sup>th</sup> of the total energy consumption of UCP is being produced through state-of-the-art grid-tied solar system as shown in Fig. 1 and Fig. 2 below. As Fig. 1 and Fig. 2 shows that all three main teaching campus buildings, the roof top of the Auditorium as well as the roof top of other buildings at the campus of UCP are grid-tied and cover the entire roof of UCP structures with solar pannels.

Total campus building area of UCP is 86,702 m<sup>2</sup> out of the total campus area of 152,681 m<sup>2</sup> and this 86,702 m<sup>2</sup> is also the smart building area as per energy consumption. The energy efficient application usage of UCP is 50-75%. Number of renewable sources of energy in UCP are three sources, all of them as solar power. Total electricity usage of UCP in 2019 was 3,927,600 KW/h, which divided by total campus population came to less than 297 KW/h and the ratio of renewable energy production divided by total energy usage in 2019 was greater than 25%, while the total carbon footprint in the same year at UCP was 00907 metric tons, that came to 2.05 metric tons when divided by total campus population. [11].

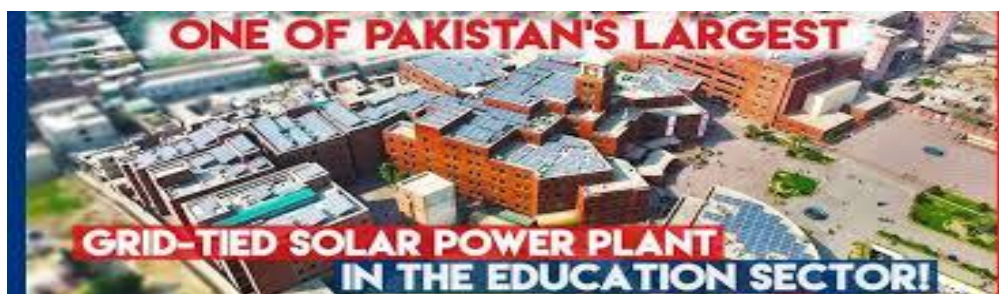


Figure 1. Grid-Tied Solar Pannels for energy production at roof tops of the entire UCP, lahore building structures



Figure 2. Inauguration of 0.5 MW Grid-Tied Solar Power Plant at UCP, Lahore on all rooftop structures

While Fig. 3 below shows the benefits of the solar panels in increasing energy efficiency of UCP, Lahore and shows that the New Building Parking Lot and lowest performing inverter of 4<sup>th</sup> floor at UCP has an environmental impact at CO<sub>2</sub> reduction of 1032 Tons with 40621 trees saved



Figure 3. Data of new building UCP parking lot environmental impact and lowest performing inverter of 4<sup>th</sup> floor (UCP)

### 3.2. Tree plantation drives by students of UCP Lahore

The Government of Pakistan has initiated the Prime Minister Imran Khan *Clean and Green Pakistan Initiative* under which all universities of Pakistan have to every year plant more and more trees with student and faculty initiative. Under this program the UCP Department of Sustainable Environment has collaborated with Ministry of Climate Change and Ministry of Forests, Pakistan for yearly tree plantation drive. Most of the trees planted were Mulbry trees, Sukchain trees (*Pongamia pinnata*), Neem trees (*Azadirachta indica*), Tali trees (*Dalbergia sissoo*) and Ambaltas trees (*Cassia fistula*). Every year a total of 250 to 300 students and 10 to 12 faculty members apart from the Deans and the Pro-Rector participated in the tree planting activities. The initiative of Green Campus was First taken in 2017 when the Minister for Environment Protection Mrs. Zakia Shah Nawaz Khan addressed the Students in a Seminar "Save Earth: There is No Planet B". In 2018, Inaugurated the tree plantation Campaign in the context of Prime Minister's Clean and Green Pakistan Movement under the theme of ,Clean, Green and Sustainable Campus-UCP. Tree plantation campaign of 2018 was inaugurated by Federal Minister for Climate Change Ms. Zartaj Gul in UCP Campus. Since 2019 UCP is planting trees with the collaboration of Ministry of Forest, Pakistan (In campus and in local residential areas). Tree plantation campaign of 2019 was inaugurated by Minister for Forests Mr. Muhammad Sibtain Khan in UCP Campus and outside campus Student's lead Plantation Campaigns, Plantation Drives and Climate Walks to spread awareness.

The student participation of tree plantation drive can be seen from the following pictures (Fig. 4-7)



Figure 4. Minister of Forest, student and faculty of UCP planting a tree 2019



Figure 5. Dean (now Provost) UCP, Director Department of Sustainable Environment (DSE) and students on Tree Plantation Drive at UCP 2019



Figure 6. Pro-Rector UCP Dr. M. Mansoor and Director DSE planting a tree at UCP Campus in 2018



Figure 7. Pro-Rector UCP Dr. Nizam planting a tree at UCP in 2017

### 3.3. Initiative to Decrease Vehicle Parking at University

UCP campuses have international standard parking facilities. This does not only make parking easy but also reduces the time to park thus controlling carbon emissions at the campus. Nevertheless, campus traffic and parking issues are serious concerns for the universities due to which faculty, staff, and students face problems. UCP's management is keen to reduce the carbon emissions from vehicles by better management of parking facility and Pick & Drop facility.

To deal with these issues following steps are taken or are in process and include. Providing shuttle bus service to the students, faculty, and staff members (already provided).

In addition to the shuttle bus service, UCP provides Pick and Drop bus service to students to reduce the flow of personal vehicles. Planning to reduce unnecessary parking at the UCP campus. Encouraging and facilitating carpooling for students, faculty, and staff. Reducing the distance traveled by vehicles in the parking area by using empty space indicators and electronic boards. Planning to subsidize the bus rates to encourage students to use this service. Improving management of parking areas to minimize traveling of vehicles in these areas. UCP management is working on improving the Pick and Drop lane to reduce the time per pick and drop.

The number of vehicles used and managed by the university in 2019 were 21, while the number of cars entering the university campus were restricted to 800 and number of two-wheelers (motorcycles) were restricted to 25,00 daily. Total number of vehicles divided by total number of campus population came to less than 0.5-0.125%. UCP administration provided daily shuttles to the students at their own cost. Number of shuttles provided by the university were 21 with three trips per shuttle daily, and the average number of passengers per vehicle (shuttle) were 35. Zero emission policy was on campus but not provided by UCP and average number of zero emission vehicles on campus were 30 per day, that divided by the total number of populations on campus came to greater than 0.004-0.008. At the same time total parking area at UCP is 32220  $m^2$  and the ratio of parking area to total area of the campus is less than 11-7%. Since 2016 till 2018 transport programs design to limit or decrease the parking area on the campus are three that have resulted in more than 30% of the parking on campus [11].

### **3.4. Water Conservation Policy**

It is extremely important that we start understanding the seriousness of this issue and adopt measures to conserve water. UCP also promotes the sagacious use of water. Some of the salient features of the water conservation policy of UCP are given here:

In 2019 the water conservation program at UCP are at its early stages and the program is implemented at 1-25% of its full capacity. Water recycling program is also at its early stage and is implemented at 1-25% of its full capacity. While water efficiency applications at the campus are greater than 50% efficient, and 1-25% of the water consumed is treated water. [11] Students, employees and faculty are advised that they should try not to use running water directly. They should never keep water running when not used. They should regularly check leakages in the water supply and places of water use. The UCP water processor treat sewage water. UCP also promote the use of filtered water instead of bottled water for drinking purposes. Use reusable glasses or cups for drinking water. Use any other device that reduces water use. It should be noted here that the reuse water is for inferior purposes. Use of rainwater is being utilized at the campus for watering the green patches at UCP and also is being channeled toward the inbuilt pits for underground water reservoirs. Along with reuse of water, use of rain water and the use of Altered Nozzles and use of Low-flush or Dual-flush flush systems in bathrooms has reduced total water consumption at UCP by a very large amount.

## **4. Conclusion**

UCP has already in collaboration with M/S Premier Energy embarked upon the renewable solar energy solutions and 1/4<sup>th</sup> of the total energy consumption of UCP is being produced through state of the art grid-tied solar system. UCP also promotes the sagacious use of water. In UCP, processor treat sewage water. In addition, UCP promotes the use of



filtered drinking Processor treat sewage water. Promote the use of filtered water instead of bottled water. UCP recycles all its waste through professional waste managers from the private sector.

The natural science departments of UCP, especially the Electrical and Engineering Departments have introduced courses intrigrating enegy conservation and research based experimintation for energy conservation and waste management thereof. Students at UCP from different departments are encouraged through out of class activities and voluntary work and tree plantation drives to learn conservation techniques, especially in energy usages as well as water usages and waste management systems.

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