

Khulna University of Engineering and Technology

Khulna-9203



Climate Action Plan



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1. Background

For humans and the rest of the natural world, the effects of climate change can be devastating. Increased greenhouse gas emissions cause a shift in the Earth's energy balance, which results in an increase in global temperature. Extreme weather phenomena such as heat waves and tropical cyclones are getting more and more common, and they are occurring more frequently and intensely than ever before. Due to these events, water levels are rising as glaciers shrink, biodiversity is being lost, health risks are increasing, hunger is increasing as food production declines, critical infrastructures are being destroyed, and lastly, our standard of living is being disrupted. For the time being, our only hope of escaping this situation is to act quickly.

To fight climate change and deal with its effects, countries from all over the world have come together because climate change is a problem that affects everyone. A low-carbon and disaster-resilient future can be assured by the three post-2015 agendas: the Paris Agreement based on the UN Framework Convention on Climate Change, the 2030 Agenda of Sustainable Development, and the Sendai Framework for Disaster Risk Reduction. In the face of a rapidly changing climate, these strategies establish the framework for long-term development. The primary goals of these agendas are to reduce greenhouse gas emissions, then to achieve net-zero emissions and to develop an integrated climate action plan for a sustainable future. The climate action plan includes actions like increasing adaptive capacity and building resilience and to climate-related threats and natural disasters; incorporating climate change policies, strategies, and planning into national policies; developing human and institutional capacity in climate change mitigation, adaptation, and impact reduction, as well as promoting mechanisms for raising awareness of the threat of climate change.

As a form of developing institutional capacity, university contributions to the Agenda of Sustainable Development Goals (SDGs) can take at least three forms, including research, teaching, and participation in actual operational activities. In research section, universities can arrange multiple activities to encourage both teachers and students to conduct research on the issues of sustainable development, green technologies and the economy, technological advancement for mitigating climate change, innovative techniques and systems to preserve nature and biodiversity, use of clean energy etc. It is possible for universities to engage with industry in the research area in order to disseminate research findings and apply them for the betterment of the climate. As part of educational activities at universities, new fields of study may be created based on sustainability and climate change issues. Finally, as an active participant in the fight, universities can organize environmental social campaigns, ensure neighborhood engagement, develop living laboratories and energy-efficient buildings, use sustainable construction methods during the construction of new infrastructures, build environment friendly installations on campus, such as electric power plants based on renewable energy sources, rainwater collection systems for irrigation of local parks and green areas, waste treatment plants, and other similar facilities.

In light with the above scenario the university may take place a great role. For example, thousands of graduates are regularly passed from the universities over the world. The country Bangladesh also walks with others. It is the Asian country with so many pressures from nature as well as man-made perspective. Here the Khulna University of Engineering & Technology (KUET) is situated on the southern side near the Bay of Bangle (Fig 1). Geographically it is very disaster-prone area. Apart from this a Climate Action Plan (CAP) is a crying need for ensuring a better future and KUET has initiated the plan.

As world pioneer person's and general people fight to grasp the extent of worldwide climate change and in what manner to cut discharges in the neighborhood, KUET has linked with several institutions throughout the world to focus higher education research and leadership on this critical subject. The initiative was taken by KUET Vice-chancellor, committing the campus to establish formal plans to attain

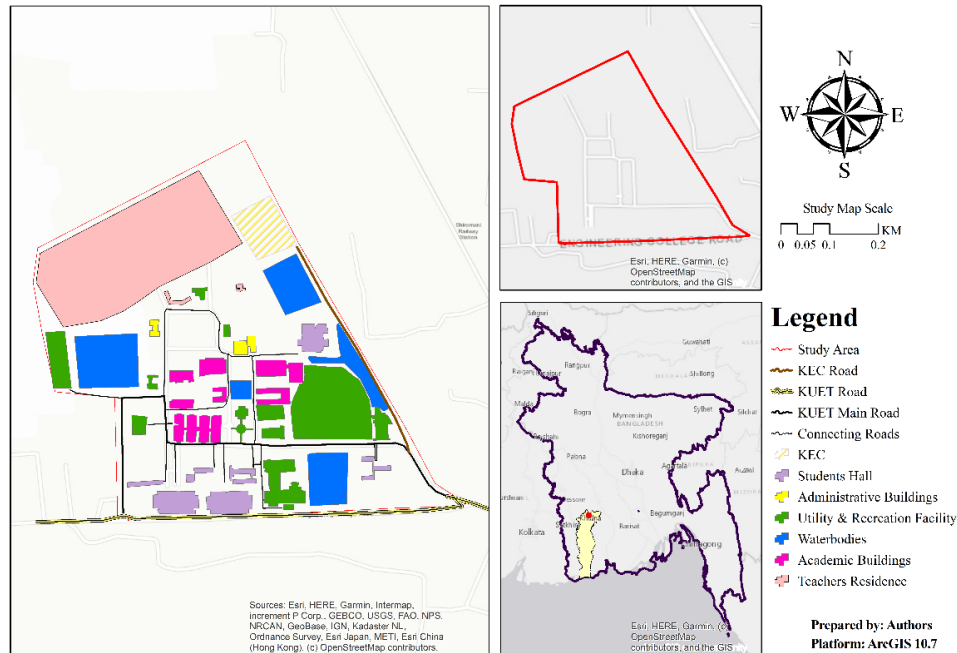


Figure 1: The location of KUET in respect of Bangladesh

climate neutrality.

The program is slice of KUET's long history of community involvement that the campus has a responsibility to share academic and student information in order to address major global concerns. Taking up the complex subject of climate change at KUET benefits not only the university but the nation as a whole. It will take the participation and inspiration of the entire society to address the globe's serious environmental and social concerns, and the biosphere is looking to organizations of advanced education for leadership and creativity. As it tries to teach the next group to construct a sustainable future, KUET is confident in its capacity to handle the campus climate footprint.

2. Impacts of Climate Change in KUET

Since climate change is a global common issue, the KUET campus is not out of the circle and it faces numerous problems as well. The common problems are extreme hot weather in summer, more likely saline water induces shortage of drinking water, comfortless actions of people, Heavy rainfall may cause flash flood etc. The last few years the change has been found at a large scale.

3. Visions of KUET

KUET has occupied a good position at home and abroad in infrastructural development concept. Lots of planner, architects and engineer have contributed to give the shape of the University to present structural sceneries. KUET has declared to assess the impact of every construction works or projects on environment and take steps accordingly to build a sustainable campus. Extensive field visits are made for

close monitoring and evaluation of the construction and maintenance work of the University Campus. Roof garden, rainwater harvesting system and solar panel will be established. Within 2031, green area of the campus will be enhanced through building green belt and landscaping. Several creeks will be built which will be connected to different lakes of the campus. The whole campus will be converted into a green campus. Usage of water and energy will be reduced by minimum 20%. There will be provision for grey water management and shared bicycle ride. Global Climate lab will be established, the main focus of which will be sustainable invention and creative solution.

4. Existing Polices and Current Practices

Provision of natural greeneries/waterbodies is another useful measure of KUET campus. There is ample place for softscapes in the campus. The ratio of softscapes and hardscapes is almost 60:40 prevails in the KUET campus. The science tells that the green space is beneficial for controlling the heat island effect. There are also some big ponds (Figure 2) as well as a newly made canal (Figure 3) available to serve the cooling zone for climate variations. Big play fields also serve the eco-friendly campus orientation.



Figure 2: KUET canal

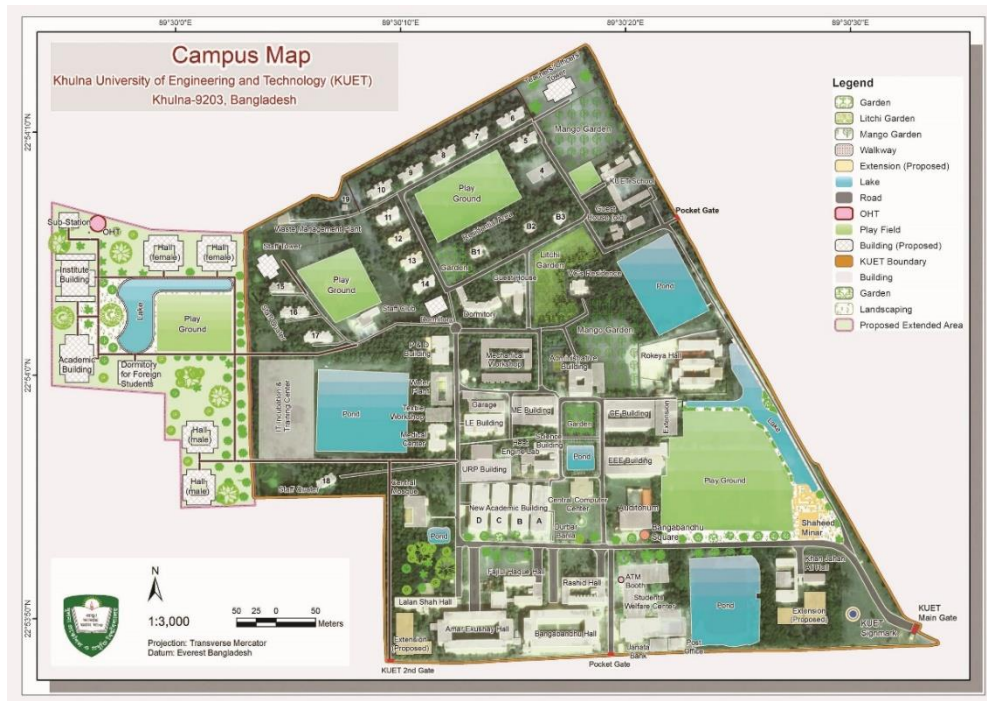


Figure 3: Existing and Proposed plan of KUET

KUET has already launched more than a couple of contemporary policies to mitigate the adverse effects of Climate Change. The most effective measures are taken in the sectors of waste management and environmental management.

4.1 Waste management and reduction

Waste is an important contributor to greenhouse gas emissions, including methane emissions from organic waste, black carbon from burning, and the CO₂ embedded in the goods we consume. Universities are now taking ambitious action on waste - whether introducing universal collection and safe disposal, or advancing toward zero waste - reap rapid local benefits becoming more clean, resilient, efficient and competitive, while reducing their emissions.

The Khulna University of Engineering and Technology (KUET) produces huge amount of waste from different laboratories, offices, student halls and residential areas. This will result in the release of CO₂ into the atmosphere from the decomposition and transport of waste. To reduce waste-related emissions, the university has set a goal of reducing waste and increasing recycling. Moreover, the university authority develops some waste management issues that underpins the environmental activities is included in the following statement:

- The university authority puts high priority to protect the environment as well as the climate.
- The authority recognizes that it has the responsibility to ensure that through the implementation of good environmental management practices, all the potential adverse impacts on the environment associated with this may be appropriately mitigated.
- All works are conducted in compliance with all applicable environmental laws and regulation as well the standards which support the protection, preservation, and enhancement of the environment.
- Perform top management reviews, at least annually, to ensure compliance with established policies, procedures, and applicable environmental laws and regulations.
- Maintain a commitment to waste minimization & pollution prevention and will incorporate these principles when defining project specifications & conducting its activities.
- Identity, assess & manage environmental risks and review quantifiable objectives & targets; associated with its operation to minimize the like hood of adverse environmental impacts.
- Be committed to building relationships with the government, the scientific community, and the public to promote the development and communication of innovative, cost-effective solutions to environmental problems.

Alongside collecting, disposing of and treating waste, the university takes the steps to minimize the waste produced. This leads to more efficient use of resources and reduced need (and associated costs) for waste management. To reduce waste, university can encourage repair and reuse of products that might become waste, enact material restrictions, and incentivize waste minimization, for example.

Introducing “Green watchman” facility is a great initiative towards waste management. There is an assigned person with specific dress to serve the role. Generally, the traditional waste picking van is used in KUET but the special appointed person holds a bicycle and pick the packets/polyethene from the roadside throughout the day (Figure 4). The waste induced carbon emission/heat effects increase the vulnerability in climatic elements which may reduce in this way.



Figure 4: Green watchman

4.2 Environmental management plan for climate change

The Environment Management Plan (EMP) was developed to ensure that the university is implemented every project in an environmentally sustainable manner and to understand the potential environmental risks arising from the proposed project and take appropriate actions to minimize those risks. The EMP for KUET has been prepared to address potential issues based upon discussion with university's teachers, students, officers, the local community's view, stakeholder consultation, and from the site visit of experts. The following environmental issues that require environmental management plans based upon the potential impacts of activities by the university are as follows:

- Air management plan
- Water management plan
- Land management plan
- Drainage management plan

4.2.1 Air Management Plan

Particulate matter and gaseous emissions from Diesel Generator (DG) set operating during power failure. To mitigate the adverse impact of pollutants from DG sets and vehicular traffic during the working period the following measures are implemented:

- Diesel Generator set emission control measures
- Vehicular emission controls and alternatives
- Greenbelt development

4.2.2. Water Management Plan

A water treatment plant for supplying safe water within the campus is constructed to produce potable water and to ensure smooth water supply to Residential, Academic and others building of the University Campus (Figure 5). Excavation of Pond as Underground reservoir for source of water treatment plant was

also a recent major construction work. However, the treatment plant uses both groundwater and surface water. This will impact on groundwater consumption as well as natural water body. The measures are to be taken up are as follows:

- Water source development.
- Minimization of water consumption
- Wastewater Treatment

4.2.2.1 Water Source Development:

Water source development is practiced by the installation of the rainwater harvesting system. Rainwater harvesting promotes self-sufficiency in water. It also promotes it as a source of water.

4.2.2.2 Minimizing Water Consumption:

Consumption of freshwater is minimized by the combination of water-saving devices such as low flow flushing systems, waterless urinals, tap aerators, etc. and other domestic water conservation measures. Further, to ensure ongoing water conservation, an awareness program is introduced.

4.2.2.3 Waste Water Treatment Scheme:

The wastewater treated by septic tank was installed in all the building throughout the campus. The treated water from the septic tank is supplied into the soak well for groundwater recharge.



Figure 5: Water Treatment Plant KUET

4.2.3. Land Management Plan

The improper storage and disposal of solid waste, e-waste, hazardous waste, and bio-medical waste may lead to an impact on the land. The leaching of those wastes may lead to leaching of waste leading to contamination. To minimize waste generation by developing strategies for the management and disposal of all waste in a manner that is sustainable and sensitive to the environment.

The philosophy of solid waste management at Khulna campus will encourage the four R's of waste i.e. Reduction, Reuse, Recycling, and Recovery (materials & energy). Regular public awareness meetings are conducted to involve the residents in the proper segregation and storage techniques. The plan for solid waste focuses on three major components during the life cycle of the waste management system are:

- Collection and transportation
- Disposal or treatment

4.2.3.1 Collection and Transportation:

- During the collection stage, the solid waste is segregated into biodegradable and non-biodegradable waste. Proper guidelines for segregation, collection and storage are followed according to ECR'97.
- The biodegradable waste and non-biodegradable waste are separated at source by providing appropriate color-coded bins as per the color-coding provided in the Bio-Medical Waste (Management & Handling) Rules.
- As a result, the biodegradable organic waste is collected in green-coloured bins whereas the non-biodegradable waste is categorized into five classification such as hazardous waste, solid waste, pathogenic plastic waste, pathogenic waste, and pathological waste.
- Also, the as hazardous waste, solid waste, pathogenic plastic waste, pathogenic waste, and pathological waste are collected in red, white, yellow, blue, and black-coloured bins, respectively.
- To minimize littering and odour, waste is stored in well-designed containers/ bins that are located at strategic locations to minimize disturbance in traffic flow.
- Storage of e-waste as per rules and in an isolated area.
- Development of a leachate proof intermediate hazardous storage facility.
- The wastes collection vehicles are well maintained and generate minimum noise and emission of poisonous gaseous. During the transportation of the waste, it is covered to avoid littering and bad smell.

4.2.3.2 Disposal:

Disposal of waste in a proper way ensures the safety and environmentally sound management of hospital wastes can prevent adverse health and environmental impacts from such waste including the unintended release of chemical or biological hazards, including drug-resistant microorganisms, into the environment thus protecting the health of patients, health workers, and the general public.

- The biodegradable organic waste is regularly handed by waste treatment plant that already developed by campus authority (using composting).
- Besides, the non-biodegradable recyclable solid waste is handed over to local vendors for reuse or recycling and waste tracking records shall be kept.
- The inert waste is disposed in landfilling or backfilling.
- However, the pathogenic and pathological wastes are incinerated every 15 days interval and dumped the ash into the soil.
- The pathogenic plastic waste is cleaning with bleaching powder and over to a third party for further processing.
- Also, domestic hazardous waste would be generated like discarded paint drums, pesticide cans, CFL bulbs, tube lights, expired medicines, broken mercury thermometers, used batteries, used needles and syringes, and contaminated gauge, etc. generated at the household level and sent to the vendors.
- Disposal of e-waste only to the authorized agency.

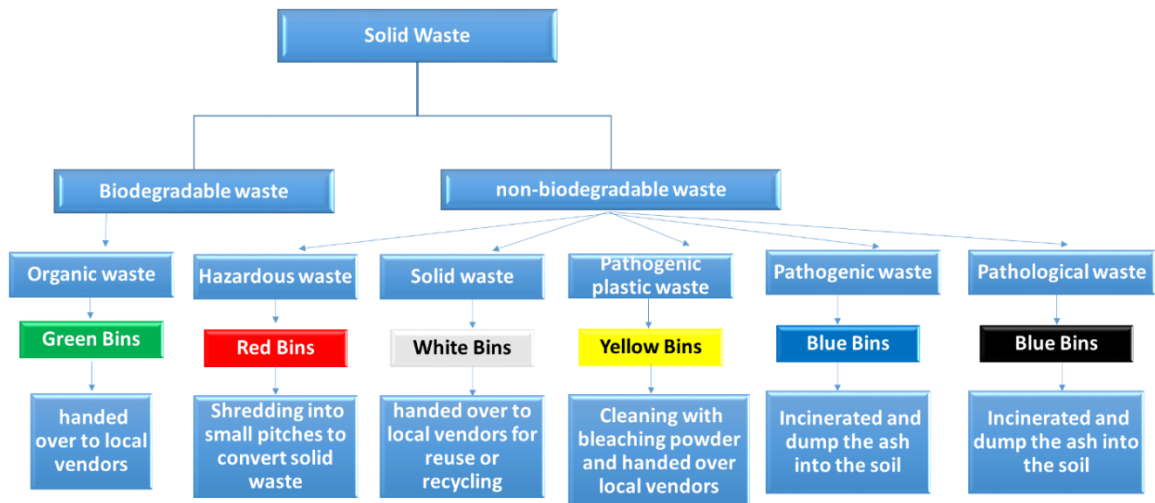


Figure 6: Waste management plan in KUET cam

4.2.4 Drainage Management Plan

To protect groundwater and surface water from contamination, proper management of the drainage system is required. Also, the mismanagement of the drainage system may create air pollution and odour problem in the surrounding area. The following measures are taken for the drainage management plan:

- Make sure that all drainage systems are covered to avoid air pollution as well as a bad nuisance.
- Liquid wastes are disposed into the drain after treatment.
- Clean the drainage line periodically.

4.3 Provision for renewable energy

A design has been formulated to construct a sub-station with solar system. It will ensure and maintain electricity supply by sub-station of all building and streets of the University Campus. Well-developed solar and wind energy laboratories with sufficient precision equipment have been established which are essential for reasonable and acceptable experimental data and research. As a renewable energy source Solar Energy is the most promising one from the context of Bangladesh. The goal of the laboratory is to educate students the use of solar energy through Solar PV, Solar Thermal experimental, and Solar Water Pumping module. Equipment for wind energy measurement and testing are expected to be available within short period of time. The lab will be enriched with solar simulator system, wind monitor, wind turbine generator and Hall effect measurement system in future. KUET organized several Workshop on Solar PV Panel organized by the office of the Director (Planning & Development) of this University. The technical session covers solar energy, context and design and implementation of solar PV panel.



Figure 5: Solar Panel, KUET

4.4 Awareness Generating Interventions:

KUET is one of the pioneer University of Bangladesh that organizes couple of international conference regularly in order to disseminate the recent knowledge on sustainability/global climate change/technological contribution in environmental planning. The main target of the conferences is to make the society aware about the global warming and its negative consequences on the earth. Again, encouraging the community to behave on the favor of environment and make the earth sustainable is another key goal of the conferences. To grow global and national awareness regarding climate change KUET has organized several international conferences which are as follows-

- Waste Safe is an international conference on Integrated Solid Waste and Fecal Sludge Management jointly organized by KUET, Bauhaus University Weimer Germany, University of Padova, Italy and International Waste Working Group (IWWG) jointly organized the conference aiming to exchange views and experiences at international level and to understand solid waste and faecal sludge management concept. The first conference was held in 2009.
- International Conference on Mechanical Industrial & Energy Engineering (ICMIEE) organized by Department of Mechanical Engineering was first held on 2010. Aim objective of ICMIEE is to present the latest research and results of scientists, preferred students, PhD students, Post Graduate students, Faculties and Researchers). Conference provides opportunities for different areas delegates to exchange new ideas and applications experiences face to face to establish research relationship to collaborate global partners.
- International Conference on Civil Engineering for Sustainable Development (ICCESD) organized by the Department of Civil Engineering, Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh. The 1st, 2nd, 3rd, 4th & 5th events of the ICCESD conference were held in 2012, 2014, 2016, 2018 and 2020 respectively, and received more than 200 delegates from all around the world in each event. ICCESD aims to provide a platform for exchanging ideas on latest advances in research and innovations.
- The faculty of Electrical and Electronic Engineering (EEE) of Khulna University of Engineering & Technology (KUET) organizes the International Conference on Electrical Information and Communication Technology (EICT) in the industrial city Khulna of Bangladesh. The main objective is to create an effective platform for researchers, and technical experts to share recent

ideas, innovations, and problem-solving techniques in the vast areas of electrical, information, and communication engineering. The first conference was held on 2013.

5. Conclusion and Recommendation

Climate change is most likely to wreak havoc on society's poorest and most vulnerable. Every effort will be taken to safeguard them, and all programs will be tailored to meet their needs for food security and safe shelter. Access to fundamental amenities, such as health, became easier as a result of employment. KUET also works to achieve the SDGs and make the environment safe. Current measures taken by KUET are serving well to mitigate the adverse effect of the climate change. The waste treatment plant, rain water harvesting facilities, solar power uses, green watchman facility etc. are the examples of what KUET is doing now for the climate safety. The international seminars and conferences also help to make people aware about the green infrastructure and importance of green environment. Regard of the current practices KUET needs to follow some advance policies to meet the ultimate goal.

That's why a group of experts was formed by the authority and the working groups were developed around five main priority areas to help with the CAP planning process: Environmental engineering, Urban Planning, Disaster management, architecture and Civil engineering divisions.

Each panel made major suggestions after doing considerable research and scenario modeling. KUET's plan focuses on making significant reductions in energy and transportation GHG emissions on campus. By showcasing successful technologies such as solar PV, solar thermal, biomass and biogas steam production, and hybrid fleet vehicles, the University intends to inspire innovation and regional initiatives to reduce emissions. KUET's attempts to address harder-to-control emissions like staff air travel may inspire other universities and businesses to follow suit. The following proposals, which make up KUET's CAP, not only lay the groundwork for a climate-neutral campus, but also, hopefully, serve as a model for many institutions on how to establish a path to this goal.

- KUET should maintain a time effective plan for transportation throughout the campus. After analyzing the travel demand management KUET can introduce some good initiative like park and ride/kiss and park etc. The authority can control the use of personal vehicle to public vehicle for all commuters and staffs as well. There will be a provision for promoting the cycling facilities.
- Next KUET should use the energy consuming materials in further construction to prevent the energy loss. The alternative use of fossil fuel should be innovated by KUET. New technologies should be used to cope up the inferior situation.
- KUET should introduce a carbon wall for the whole campus.
- The waste management procedure should be improved to make the environment friendly campus.