Initiatives On Solar Energy and Waste Recycling to Avail Financial and Environmental Benefits

King George's Medical University, Lucknow

GGHH Agenda Goals

- Energy
- Waste

Hospital Goal

- Promote clean energy
- Reduce energy costs
- Reduce carbon dioxide emissions
- Recycle waste for revenue generation

Progress Achieved

- Solar power plant installed at the hospital saves around USD45000 per year in the electricity bill which has halved the energy spending
- Plastic scrap recycling generates over USD2000 per year

The Issue

The quick spread of solar lighting systems and solar power based applications has been contributing to the country's economy in the recent past decades. Government has been advocating and promoting the solar energy by means of different schemes and programmes at Centre as well as State level. To name a few, it includes Jawaharlal Nehru National Solar Mission, Rooftop Scheme, Solar Park Scheme, Ujjwal Discom Assurance Yojna etc. Years ago the sector promotion began, to light the lives of rural India but now has become one of the most preferred low carbon energy technology that has potential to grow to a very large scale. Last few decades have seen swift growth in installation of solar energy based power applications at both individual and institutional level. However, government push and support in the form of programmes and initiatives are needed to enable the increase in adoption of solar power at a subsidized cost. Solar initiatives taken up by the King George's Medical University (KGMU) is one such example, which is

a collaborative effort between the hospital management and State Government of Uttar Pradesh to switch towards solar energy applications. In 2017, KGMU installed an on-campus solar power plant and solar parabolas with the aim to reduce their power cost and ecological footprint under Uttar Pradesh Non-Conventional Energy Development Agency (UPNEDA). UPNEDA is a government created Non- Conventional Energy Development Agency that was formerly established in April 1983 under the department of additional energy sources as an autonomous institution. The agency has been functioning as a nodal body for implementation of various solar schemes in the state.

Fig 1: Rooftop solar panels at KGMC building

Sustainability Strategy Implemented

Management team and the team at University Environment Department of KGMU has a clear vision of making the hospital campus energy efficient aiming to bring down their power cost and carbon foot print. To enable this hospital management took the initiative of installing solar power plant and solar parabolas (solar steam cookers). The initiative not only brings down the dependency of the campus on conventional power source but also promotes use of clean energy. Apart from the energy initiatives, environment division at the campus is also actively involved in plastic recycling and selling out the plastic scrap for financial benefits.

Solar Power Generation:

- The technical staff and electrical department of KGMU carry out a detailed cost benefit analysis.
- The hospital management approaches State Government to sign up as one of the beneficiaries for installation of solar panels and solar parabola under UPNEDA.
- Solar power plant with capacity of 400kW is installed at the hospital campus to reduce the dependency on conventional power sources. Automatic Power Factor Control Panel, an electric device, is installed with the new system to minimize energy consumption by 35-40% from conventional sources.
- Currently the system generates only 50% of its total power generation capacity i.e., 200kW in an average time of 5 hours. This in turn produces 30,000 units (200×5×30) of power per month. These units save over USD 45000 of energy cost per year, with the average per unit rate of INR. 9 (30,000 units × 9× 12 months=INR 32,40,000≃USD 45000).

- Thirty solar parabolas are installed at one of the hospital buildings to cook food for 3000 patients admitted at the hospital.
- Team of electrical engineers deployed along with assistants to maintain and coordinate for the efficient functioning of solar power plant and solar parabolas.
- There is an electric boiler and grid connection for conventional power source as back up to manage the campus requirements.
- The management replaces regular 250 W sodium lights with 120 W LED lights. Around 600 such LED lights installed for the indoor areas of the hospital, replacing the old 150 lights and addition of remaining 450 new lights. The team also replaces 12 High-mast lights of 850 W with those of 250 W lights, in the outdoor areas. The LED replacement leads to the additional savings of 7200 W for 12 High-mast lights and 19500 W for 150 LED lights, making the total savings as 26,700 W.

Plastic Waste Recycling:

- University Environment Department team monitors and deploys health workers to segregate and collect plastic waste from each ward and division.
- Plastic waste is treated and disinfected at a specified unit under the environment department, which is then sold as scrap to authorised recyclers for financial benefits of over USD 2000 (INR 1.5 lakhs) annually.

Implementation process

The initiative begun as a cost cutting measure as well as a sustainability step to reduce the carbon footprint generated by the hospital in collaboration with UPNEDA. The hospital achieved this through installing solar energy power plant, solar parabolas and LEDs to reduce its environment and economic footprint. The electrical department and the management team are involved in monitoring and evaluating the initiative. Electrical division team and team at environment department are responsible for cleaning and maintaining solar panels installed at rooftop of the hospital buildings. Also, to reduce the ever-increasing waste load within the campus, hospital management took steps to segregate and sell all the plastic waste to a local authorized recycler. The plastic waste includes both bio-medical as well as general waste. Infectious plastic waste (bio-medical waste) is appropriately segregated, treated and disinfected before being sold to the recyclers.

Tracking Progress

The cost of installation of both solar power plant and solar parabolas is around USD 373912 that is jointly shared between UPNEDA and KGMU. On an average, the system saves around USD 45000 per year. The total cost is estimated to be recovered back roughly in 8-9 years from the date of installation i.e., by 2025-26. The average lifespan of the solar system, installed at KGMU, is 20 years.

Fig 2: Waste segregation carried out by health workers and plastic recyclable waste that is sold out to the authorized recyclers

Challenges and lessons learned

- The panels need to be cleaned regularly, as it accumulates lot of dust which interferes with the panel functioning.
- Weather conditions and availability of sunlight especially on cloudy days influences the functioning of system. Winter months are subjected to loss of productivity due to lack of sunlight penetration which also contributes to decrease in the efficient operation of panels.
- Due to the above stated factors, the system is only able to perform 50% of its actual efficiency.

Next Steps

The management will be taking further steps towards achieving higher efficiency in the current system. Further actions will be taken to advance low emission and energy consumption.

Demographic information

King George's Medical University is a 4000-bedded, 114 years old tertiary care public hospital. Situated in the heart of Lucknow City, hospital was established in 1905 and is currently managed by the State Government of Uttar Pradesh.

Links

To learn more about Health and Environment Leadership Platform's and its members:

https://www.ceh.org.in/activities/help/about/

To gain access to HELP's Information, Education and Communication materials and other case studies:

https://www.ceh.org.in/activities/help/resources/

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