Initiatives on Solar Energy, Waste Reusing and Green Architecture to Avail Financial and Environmental Benefits

Doctors For You – Vistex Hospital, Masarhi, Patna (Bihar, India)

GGHH Agenda Goals

- Energy
- Waste
- Buildings

Hospital Goals

- Reduce energy costs
- Promote clean energy
- Support green hospital design
- Reuse waste

Progress achieved

- Savings of up to 58% of energy and related costs, which translates to around Rs. 7, 78,353 (USD 10,435) per year, due to the combination of solar energy, energy-efficient equipment, and green building design.

The Issue

The establishment of Doctors For You (DFY) – Vistex Hospital came out of the need for a healthcare facility in the rural area of Masarhi, Bihar. DFY is an organisation that works in many areas, environment and sustainability being one of them. The idea was to build an energy-efficient hospital which would sustain itself, so as to avoid the unreliable power supply, often experienced in rural parts of India. The aim was to achieve energy efficiency through a combination of solar energy and green building design.

Sustainability strategies implemented

Solar energy

Around 60% of hospital's energy needs are met with solar energy. After conducting an analysis of the solar energy needs, SELCO foundation procured the solar equipment and installed it on the hospital premises. The hospital has a 14 kW solar power system. Under normal circumstances, solar energy meets almost all energy needs of the hospital. When the weather conditions are not ideal (e.g. – cloudy skies), the solar batteries can provide power backup of up to 24 hours. Most of the medical equipment is run on solar energy, except for the CT scan machine (see the list of medical equipment that runs on solar energy).

Table 1: List of equipment that runs on solar energy

• Portable ventilator machine • X-Ray machine • Fetal Doppler • Bipap Lumis V-Paps • Audiometry system • Spirometry • Corona oven 2.0 • Baby incubator • Cautery machine • Auto hematology analyser • Centrifuge machine	• Defibrillator • Traction machine • Ultrasonic physiotherapy machine • 4 channel T.E.N.S. • Interferential therapy unit • Short wave diathermy 500W • Motorised tilt table • Ice lined refrigerator • ESR analyser • ABG analyser	• Hydrocollator machine • Dental X-Ray machine • Dental chair with light • Ultrasonic scaler • Vacuum gauge suction machine • ECG machine • Infusion/syringe pump • UV chamber • Urine analyser • Quattro machine • Haemostasis analyser • High flow air machine

In addition to the medical equipment, other electrical equipment such as fans, lights, refrigerator, extension board, printers also work on solar energy. SELCO Foundation is responsible for the maintenance of the solar panels and batteries.

Solar installation at DFY Vistex hospital

SELCO Foundation calculated the energy required for a conventional building designed as opposed to a green building design. A scenario with a standard building design and inefficient appliances running on solar energy resulted in only 28.82% energy savings as opposed to 58.34% energy savings offered by efficient appliances and green building design incorporated in DFY Vistex hospital.

Table 2: Energy savings due to efficiency and green build design

System	Efficient appliances with green building design	Inefficient appliances with green building design	Inefficient appliances with standard building design
Total load connected	4290W	5749W	5749W
Total units required	21.8 units	30.63 units	52.34 units
Solar panel capacity	14 kWp	16.2 kWp	26 kWp
% of savings (energy)	28.82% (without energy efficient appliances and with green building design) **58.34%** **(with both energy efficiency and green building design)**		

(Source: SELCO Foundation)

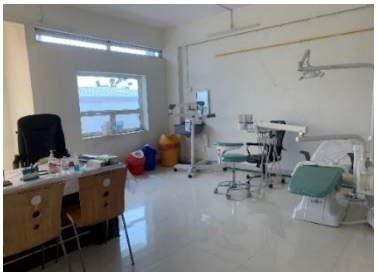
Green building design

The walls of the upper floor of the hospital are made of agri bio panels, a sustainable material made out of stubble/straw left after harvesting rice. Agri bio panels is an initiative of a for-profit venture called Strawcture Eco. In addition to avoiding stubble burning and thereby, air pollution too, these agri bio panels have other benefits as well.

- Thermal insulation – Straw is known to have good insulation properties. It offers five times more insulation than a regular brick-mortar building. A well-built straw building can save up to 75% of heating and cooling costs.
- Fire resistance – While it may seem like straw panels will pose a fire hazard, it is the opposite. Loose straw is indeed inflammable, however, when it is tightly packed into panels there is no oxygen left to fuel the fire. Moreover, the high silica content in straw makes the panel fire resistant.
- Abundant and annually available – Unlike concrete, straw is regenerative and a sustainable source of construction material.
- Less time consuming – A typical steel and concrete construction takes about 20 days for drying. However, these panels can be built off site in advance and then put together at the site of the building. These panels measure 13 feet by 6 feet, which makes it easier for carpenters to work with them.

Agri bio panel

Besides the building material, its design is such that it relies on natural lighting. During the day time, most of the hospital building gets natural sunlight which cuts down the need to use electricity for lights. For roofing, they have sandwiched a layer of foam between two sheets, to avoid over heating of roof due to sunlight.



Natural lighting due to building design

Foam placed between roofing sheets

Biodegradable waste reusing

While the hazardous biomedical waste is outsourced for treatment, the food waste is treated on-site. The hospital premises has two drums (of capacity 200 litres each) which are used for making compost. It takes about ten days to fill one drum. The compost that is generated is used in the kitchen garden.

Composting

Kitchen garden

Rainwater harvesting

The hospital also has a set up for rainwater harvesting, which is used for recharging groundwater.

Challenges faced

- The CT scan machine which requires a lot more electricity to run than other medical equipment, cannot be run on solar energy. It requires a diesel generator backup.
- Winter months may be subjected to loss of productivity due to shorter days and cloud cover.

Demographic information

DFY Vistex hospital is located in the village of Masarhi, about 19 miles southeast of the city of Patna in Bihar. The hospital is funded by Vistex Foundation and managed by Doctors For You. Inaugurated in November 2019, it is a 50 bedded hospital which provides primary and secondary health services to the marginalised communities of Bihar. It is also the only COVID-19 response facility in the area.

Links

To learn more about Health and Environment Leadership Platform 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/resources/

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Submission date:

December 2021

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