

Renewable energy generation from Campus waste (Best Practice in Innovative areas)

Title of Practice:

Renewable energy generation from Campus waste

The context that required the initiation of the practice:

Industrialization, Globalization and new technological development have entirely changed the environment of the earth. A large amount of waste, which is generated by anthropogenic activities, causes pollution of land, soil and water. The only way to protect the environment is to reduce, reuse and recycle the waste.

As a part of innovative practices, by reusing and recycling the campus waste, we produce Bio-palates and Bio-gas for hostel kitchen, manure for Agriculture and recycled water for watering the campus greeneries

Sarva Vidyalaya Kelavani Mandal- Kadi'' - the trust which has been in existence for more than nine decades, is a philanthropic educational trust in North Gujarat. Kadi campus is broaden over 48 acres of land. The campus has 7 schools and 11 colleges. More than 18000 students are pursuing their school and higher studies at Kadi campus. Over 2500 boys and girls are residing in campus hostels. The hostels generate around 400 kg of kitchen waste per day. The lush green campus is having over 1048 trees in 25 different species. We also collect around 80-100 Kg of plant-waste in the form of leaves stems and Grasses from the campus. Apart from this, the trust has a 'Gaushala' with more than 125 cattle. These cattle generate approximately 800 kg of cattle waste per day.

Objectives of the practice:

- To manage such large amount kitchen waste as well as cattle waste generated
- To generate renewable energy from kitchen waste and agri-waste of campus
- Biofuel generation by kitchen waste and agri-waste of campus.

The practice:

Biogas plant:

Biogas technology is a waste management tool that promotes the recovery and use of biogas as energy by adapting manure management practices to collect biogas. The

biogas can be used as a fuel source to generate electricity for on-farm use or for sale to the electrical grid, or for heating or cooling needs. The biologically stabilized byproducts of anaerobic digestion can be used in a number of ways, depending on local needs and resources.

Institute has set a biogas system in campus which is working entirely on kitchen waste generated in hostel, and the gas generated is used as fuel for cooking in hostel kitchens. A pilot plant has been setup that uses 40 kg of kitchen waste and produces gas of 1200 gm per day which saves the requirement of other nonrenewable fuel. Such biogas generated contains 60% methane and 40% carbon dioxide: high grade fuel.

Tank volume – 4 m ³
Waste added – 40 kg per day
Input to a biogas plant- Food waste generated in hostel after meal.
Daily Output – 1200 gram/day

Looking to success of pilot plant of biogas system, a large scale project is going to be implemented that will utilize cattle waste also. The estimated cost for the project is 27 lakh Rupees where ROI will be back after two years.

Composting

We prepare compost from agriculture waste of the campus including dry plant leaves, stems and grass waste of campus. A microbial consortium has been developed which is used to treat the plant waste to produce compost. The Compost is analyzed for various parameters like pH, organic carbon analysis, C:N ratio, E.C and so on. One cycle of compost preparation is of 21 to 25 days. The compost prepared is used as manure in campus garden.

Bio-pellets preparation – fuel for cooking

We use agri-waste of campus; paper-waste and other wastes like saw dust to produce bio-pellets that serve as alternative source of energy and for fuel purpose. In the pilot study, with various types of combinations of wastes, bio-pellets are prepared. For each

sample type, the pellets were analyzed for parameters like Calorific value and Ash content. The highest calorific value was found in pellets prepared from sawdust. Specially designed ‘Chullas’ are set in hostel kitchens and these bio-pellets are used as fuel. In pilot study, 35% cost reduction was found in compared to conventional source of fuel in kitchen hostel which is PNG. We are going to establish a large scale plants for increase in the production of bio-pellets.

Obstacles faced if any and strategies adopted to overcome

Obstacles	Strategy adopted to overcome
Manpower requirement for continuous execution of operation of Biogas plant, preparation of Bio-pellets and composting	Involving students as a part of project work with continuous training every year
Increase in maintenance cost if not continuously operated (During Vacation)	Keeping plant operational even in vacation in with minimal waste
Slurry management	Using slurry in trust’s ‘Gaushala’ land as manure

Impact of practice

- Biopellets serve as alternative source of fuel available for cooking in campus hostel with 35% of energy saving.
- Management of kitchen waste in biogas plant

Resources required

- Manpower
- Laboratory facility for constant analysis of parameters of waste and finished product.