

# A STUDY ON “RECYCLING OF ENVIRONMENTAL WASTE INTO MULTIPLE USES”

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## **INTRODUCTION**

INDIAN GREEN SERVICE (IGS) is an environment protection organisation launched in the year 2010 based on 15 years of extensive field research in the area of Waste Management. IGS was launched with the objective of ensuring that every citizen realises the need to be responsible to the environment and contribute in their own ways towards protecting the same.

"Experiencing the difference" is the best form of awareness. IGS believes in making people experience the difference that NATURE could give if there is a change in their behaviour towards the environment.

The 'Green Force' of IGS has developed simple but effective methodologies to tackle the immediate and extremely dangerous issues facing the world today. IGS views WASTE as a RESOURCE and considers GARBAGE as GOLD

Cows, hens, frogs, ducks and earthworms—these are only some of the ‘workers’ need to convert garbage into gold. Srinivasan, who appeared on the Don’t Waste Your Garbage episode, spoke about the ‘Vellore model’ of solid waste management which involves both animals and human beings in reusing and recycling waste. After the show, people from all walks of life approached him to learn more about handling waste responsibly. He us tells us more here.

Biogas is produced after organic materials (plant and animal products) are broken down by bacteria in an oxygen-free environment, a process called anaerobic digestion. Biogas systems use anaerobic digestion to recycle these organic materials, turning them into biogas, which contains both energy (gas), and valuable soil products (liquids and solids).

**AIM:** To study about the recycling of environmental waste into multiple uses [biogas]

**OBJECTIVE:**

1. To use of vegetable waste & cow dung into biogas.
2. To understand the conversion of biogas residue into manure.
3. To create awareness about IGS (Indian Green Service) in all parts of India.

**Limitations**

The study is limited to Nagpur only due to time & money constraints.

**REVIEW OF LITERATURE**

Biogas is produced after organic materials (plant and animal products) are broken down by bacteria in an oxygen-free environment, a process called anaerobic digestion. Biogas systems use anaerobic digestion to recycle these organic materials, turning them into biogas, which contains both energy (gas), and valuable soil products (liquids and solids).

Anaerobic digestion already occurs in nature, landfills, and some livestock manure management systems, but can be optimized, controlled, and contained using an anaerobic digester. Biogas contains roughly 50-70 percent methane, 30-40 percent carbon dioxide, and trace amounts of other gases.<sup>6</sup> The liquid and solid digested material, called digestate, is frequently used as a soil amendment.

Some organic wastes are more difficult to break down in a digester than others. Food waste, fats, oils, and greases are the easiest organic wastes to break down, while livestock waste tends to be the most difficult. Mixing multiple wastes in the same digester, referred to as co-digestion, can help increase biogas yields. Warmer digesters, typically kept between 30 to 38 degrees Celsius (86-100 Fahrenheit), can also help wastes break down more quickly.

After biogas is captured, it can produce heat and electricity for use in engines, micro turbines, and fuel cells. Biogas can also be upgraded into bio methane, also called renewable natural gas or RNG, and injected into natural gas pipelines or used as a vehicle fuel.

## **The Benefits of Biogas**

Stored biogas can provide a clean, renewable, and reliable source of base load power in place of coal or natural gas. Base load power is consistently produced to meet minimum power demands; renewable base load power can complement more intermittent renewables. Similar to natural gas, biogas can also be used as a source of peak power that can be rapidly ramped up. Using stored biogas limits the amount of methane released into the atmosphere and reduces dependence on fossil fuels. The reduction of methane emissions derived from tapping all the potential biogas in the United States would be equal to the annual emissions of 800,000 to 11 million passenger vehicles. Based on a waste-to-wheels assessment, compressed natural gas derived from biogas reduces greenhouse gas emissions by up to 91 percent relative to petroleum gasoline.

In addition to climate benefits, anaerobic digestion can lower costs associated with waste remediation as well as benefit local economies. Building the 13,500 potential biogas systems in the United States could add over 335,000 temporary construction jobs and 23,000 permanent jobs. Anaerobic digestion also reduces odors, pathogens, and the risk of water pollution from livestock waste. Digestate, the material remaining after the digestion process, can be used or sold as fertilizer, reducing the need for chemical fertilizers. Digestate also can provide additional revenue when sold as livestock bedding or soil amendments.

## **Food Waste**

Around 30 percent of the global food supply is lost or wasted each year. In 2010 alone, the United States produced roughly 133 billion pounds (66.5 million tons) of food waste, primarily from the residential and commercial food sectors. To address this waste, EPA's Food Recovery Hierarchy prioritizes source reduction first, then using extra food to address hunger; animal feed or energy production are a lower priority. Food should be sent to landfills as a last resort. Unfortunately, food waste makes up 21 percent of U.S. landfills, with only 5 percent of food waste being recycled into soil improver or fertilizer. Most of this waste is sent to landfills, where it produces methane as it breaks down. While landfills may capture the resultant biogas, landfilling organic wastes provides no opportunity to recycle the nutrients from the source organic material. In 2015, the EPA and USDA set goals to reduce the amount of food waste sent to landfills by 50 percent by 2030. But even

if this goal is met, there will be excess food that will need to be recycled. The energy potential is significant. As just one example, with 100 tons of food waste per day, anaerobic digestion can generate enough energy to power 800 to 1,400 homes each year. Fat, oil, and grease collected from the food service industry can also be added to an anaerobic digester to increase biogas production.

## **Raw Biogas and Digestive**

With little to no processing, biogas can be burned on-site to heat buildings and power boilers or even the digester itself. Biogas can be used for combined heat and power (CHP) operations, or biogas can simply be turned into electricity using a combustion engine, fuel cell, or gas turbine, with the resulting electricity being used on-site or sold onto the electric grid.

Digestate is the nutrient-rich solid or liquid material remaining after the digestion process; it contains all the recycled nutrients that were present in the original organic material but in a form more readily available for plants and soil building. The composition and nutrient content of the digestate will depend on the feedstock added to the digester. Liquid digestate can be easily spray-applied to farms as fertilizer, reducing the need to purchase synthetic fertilizers. Solid digestate can be used as livestock bedding or composted with minimal processing. Recently, the biogas industry has taken steps to create a digestate certification program, to assure safety and quality control of digestate.

Renowned waste management expert C Srinivasan, Project Director, Indian Green Service (IGS), Vellore who was the chief speaker at the 'Garbage to Gold' workshop held at NTPC-Ramagundam said that before we worried about how to dispose of waste, there was a chance to stop waste from even becoming 'waste'.

He further explained that if garbage is collected within the first six hours, it isn't even waste yet. It can easily be used for other purposes like food or compost. Collection of garbage twice in a day is now a practice in some places, he added.

Held as part of Swachh Bharat Pakhwada (July 01-15, 2017), the programme was attended by employees and their spouses in large numbers. In his talk, Srinivasan explained how garbage or waste can be utilized properly to the larger benefits of the society through his own personal experiences and projects.

He demonstrated how simple steps can help us reduce the larger problem of waste management and garbage disposal through some wonderful examples. The Project Director of IGS further explained that garbage segregation starts from home through Red and Green Dustbin. While Red Dustbin will contain inorganic wastes like paper, card board, plastic, electric wire, glass, metal, robber, bottles, foot bears, the Green Dustbin contains organic wastes like vegetables, garden leaves, meat leftovers, food, coconut, tea, wood, etc

## Similar Products



### Amino Acid Organic Fertilizer



### Rock Phosphate Rich Organic Manure



### Humic Acid Organic Fertilizer



### Organic Fertilizers

## Research Methodology

The research is exploratory in nature; it focuses on Literature review, News Papers, Journals, websites and the other reliable sources.

### Data collection

**Primary data:** The primary data was collected from different pod of the agents of India.

**Secondary data:** Secondary data was collected by different websites.

### Data analysis

The researcher took the primary data after looking about the presentations of different environmental agents. It was found that the environmental wastes can be recycled into usable substance which will be more beneficial to the society in a long run. The collected data is later tabulated and presented in a graphical presentation.

## Conclusion

Biogas systems turn the cost of waste management into a revenue opportunity for America's farms, dairies, and industries. Converting waste into electricity, heat, or vehicle fuel provides a renewable source of energy that can reduce dependence on foreign oil imports, reduce greenhouse gas emissions, improve environmental quality, and increase local jobs. Biogas systems also provide an opportunity to recycle nutrients in the food supply, reducing the need for both petrochemical and mined fertilizers.

Biogas systems are a waste management solution that solve multiple problems and create multiple benefits, including revenue streams. The United States currently has the potential to add 13,500 new biogas systems, providing over 335,000 construction jobs and 23,000 permanent jobs. However, to reach its full potential, the industry needs consistent policy support. Reliable funding of Farm Bill energy title programs and a strong Renewable Fuel Standard encourage investment and innovation in the biogas industry. If the United States intends to diversify its fuel supply and take action against climate change, it should strongly consider the many benefits of biogas.

## **Suggestion and recommendation**

1. Liquid Milk is usually sold in milk pouches and has a maximum shelf life of 3–4 days. It is always advisable to use it the same day or maximum in a day after purchase.
2. If we talk about big industries like hotels and restaurants, where the consumption of milk is on daily basis, they can directly contact to the farmers for the fresh milk where they can get fresh milk without adulteration and the use of pouches will decrease.
3. Instead of using plastic, big industrialist can send their containers to a particular spot where all the farmers can transfer the milk into the containers likewise the consumption of plastic will reduce.
4. Aged cattles those are not able to produce milk, can be used for the consumption of vegetable waste so that there dung can be use as a substitute to convert it into biogas or for fertilizers.
5. Also for the fresh vegetables hotels and restaurants can directly contact to the framers for the fresh vegetables and to encourage the employment of farmers.
6. It will help farmers to recuse there waste products into biogas,fuels,electricity,and fertilizers.

## **Bibliography**

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