

GENERATION OF ELECTRICITY FROM WASTE MATERIALS

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Abstract:

This project is about combusting a waste to produce an electricity. This waste to energy uses trash as a fuel such as waste from home, companies and school and hospitals etc. As in today's time solid waste have been a major problems for pollution. Electricity has been generated from various ways and using various fuels so, a main objective of our project is to burn down the waste and convert it into electricity from light energy through a solar panel and supply it to various sources while controlling the pollution using a pollution control filter, roller filter. The main goal is to reduce pollution, recycle and reuse garbage and eventually generate electricity from wastes. The impact of global warming will be reduced. Waste-to-energy (WtE) or energy-from-waste (EfW) is the process of generating energy in the form of electricity and/or heat from the primary treatment of waste, or the processing of waste into a fuel source. WtE is a form of energy recovery. Waste-to-energy plants burn municipal solid waste (MSW), often called garbage or trash, to produce steam in a boiler that is used to generate electricity. A giant claw on a crane grabs waste and dumps it in a combustion chamber. The

waste (fuel) is burned, releasing heat. The heat turns water into steam in a boiler. Generating energy from waste – whether that's electricity or heat – that can then be used in homes and businesses is a logical part of this move towards circular thinking.

Keywords: Solar panels, LED lights, Inverter battery, PCB, Connecting wires, Heating chamber, Voltage regulator

1.Introduction:

With an increasing population of India from 124.06 crores in 2010 to 140.76 crores in 2021, the demands is also increasing such as food, clothes, medicine etc. and this causes an increase in waste materials. India generates around 3.4 million tonnes of plastic waste and only 30 percent of it is recycled. So, the growth in a amount of waste material produces in India which results in human health which causes many diseases. In India, the garbage era is predicted to expand dramatically in the future. Consumptions levels are likely to climb as more people migrate to cities and as wages rise, as are waste technology charges. It includes the

waste material collected by Municipals Corporation which includes wrappers, rotten food stuffs, treated biomedical solid waste etc. This is the great way to generate electricity, as we know that in coming times fossil fuels is also going to get decline and it also produces less harmful gases as compare to other methods of generation. As only the 30 percent of waste is been recycled the rest of waste is send to landfills or aquatic dump which is very harmful to aquatic lives and it also contaminate underground water systems by releasing poisonous chemicals into the water. As the demand for electricity is also increasing day by day. In 2022, India's power demand grew by 8%. Is is necessary to find out the different types of source which can be be used as a input in the production of the electrically especially in a developing country in India. Even in some parts of India there is still no electricity like in a village in Etah district of Uttar Pradesh. So, overall this project "Generation of electricity from waste material" not only help in generation of electricity but also in managing a waste material. The greatest advantage of this project is that it doesn't use any other fuels except waste.

2. Block diagram:

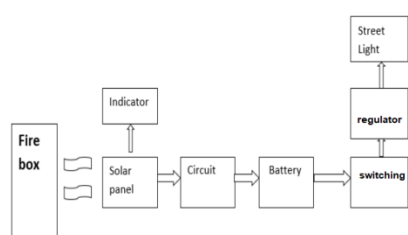


Fig.1. Block diagram of proposed system

2.1. Working Methodology:

This project working depends on the solar panel. So, solar panel principle is project working principle. When a waste materials is burn then the solar panel convert that light energy into an electrical energy .The energy than goes to battery and stored there .And through battery the energy

goes to capacitor .As heating panel is of 6v and Led of 3v, so far that resistor is connected with a Led to resist the change flow .To maintain the change flow to a one direction diode is used. Electricity generated from it then supplied to street light, filters .And control of pollution cooling filter is used.

When we start burning the waste material in the burning box the heating panels will start collecting the generated heat energy by waste material in the burning box. The heat energy collected by heating panel will be converted into the electrical energy. The generated electrical energy will be seen in circuit box with led glowing. The generated electrical energy will transfer to the batteries through the power boosters. The batteries will not dissipate the energy back because a diode is connected to it. The batteries relate to the heat sensor and LED bulbs. Whenever the heat sensor will start conducting the batteries allow energy to flow will start conducting and LED bulbs will glow.

Electricity generation by burning waste materials, also known as thermal waste-to-energy, typically involves the following methodology:

Waste collection and transportation: Waste materials are collected from various sources, such as households, businesses, and industries, and transported to a waste-to-energy plant.

Waste handling and preparation: Waste materials are unloaded and handled to remove any non-combustible materials such as metals, stones, and glass. The waste is then shredded to reduce its size and improve its burn ability.

Incineration: The prepared waste is burned in a combustion chamber at high temperatures, typically between 850°C and 1200°C, producing heat and gases.

Energy recovery: The heat generated by the incineration process is used to create steam that drives a turbine, which generates electricity. The exhaust gases produced during the combustion

process are treated to reduce harmful pollutants before being released into the atmosphere.

Ash management: The remaining ash produced by the incineration process is collected and transported to a landfill for disposal. The generated electricity can be used to power local communities, industries or be fed back into the national grid. This method of electricity generation by burning waste materials is a sustainable solution for waste management, reducing the volume of waste sent to landfills, and producing renewable energy. It also helps to reduce greenhouse gas emissions by avoiding the release of methane gas, which is produced when waste decomposes in landfills.

3. Proposed System:

Electricity generation by burning waste materials, also known as thermal waste-to-energy, is a process that involves converting waste materials into electricity by burning them in a combustion chamber. This process is a sustainable solution for waste management as it reduces the volume of waste sent to landfills while producing renewable energy. The methodology for electricity generation by burning waste materials typically involves waste collection, handling, and preparation, incineration, energy recovery, and ash management. The generated electricity can be used to power local communities or industries or fed back into the national grid. The process of electricity generation by burning waste materials provides a reliable source of electricity while reducing greenhouse gas emissions by avoiding the release of methane gas from landfills. Overall, electricity generation by burning waste materials is a promising solution for waste management and renewable energy production. However, it is important to carefully consider the potential benefits and drawbacks of this method and to ensure that appropriate regulations and technologies are in place to minimize any negative environmental impacts.

4. Objective:

The objective of "waste to electricity," also known as "waste-to-energy," is to convert waste materials into usable electricity by harnessing the heat generated from burning waste, thereby reducing the amount of waste sent to landfills while simultaneously producing a renewable energy source; essentially, it aims to turn a waste product into a valuable resource for power generation.

Outcomes waste-to-energy:

5. Problem Statement:

Nowadays, percentage of pollution is rise day by day.

1. Because of this we face environmental changes and climate changes.
2. Apart from this improper waste disposal can also have adverse health effects on humans as over the years it has been responsible for causing several diseases and in some cases even death.
3. Plastic is not disposal it affects the nature and produce harmful gases.

6. Literature review:

Waste to Energy generation is basically a form process for the generation of electricity directly or through heating first in both process we get Electricity as an output to use for the process. is process is basically completed in 3 steps and in last step we get the output All these steps involves firstly waste materials is been collected from door to door from every places which is been useful for a long time After which in second step this waste material is been purified according to their calorific values and then in third step this waste is been burned out in a container where heat is been generated and in result we find to get Electricity as an output. Compared with other form of technology this is most attractive method of generation of electricity because of low cost, low pollution and easy way. This project has been carried out in some of the areas of bihar also by a

small unit call “HUSK POWER SYSTEM” which is one of the worlds leading off grid utilities which provides 24 hours a day power in rural areas.

Combustion: Burning up what’s left behind

First up, combustion. This is where heat produced by burning waste produces heat, driving a turbine to generate electricity. This indirect approach to generation currently has an efficiency of around 15-27%, albeit with a lot of potential for improvements. Whether any approach to generating energy from waste can be considered sustainable depends on the ‘net calorific value’ of the waste going into the process. Where incineration of waste is concerned, that figure must be 7 MJ/kg, meaning the likes of paper, plastics and textiles are best suited to the combustion method of generating energy from waste.

7. Hardware Description:

7.1. Heating Panel: Solar panel:

5V 100mA 3 Pcs Solar Panel

Although it uses the photovoltaic effect like any other rooftop solar panel to produce electricity, its specifications and details are different.

The most important details of a solar panel with 5 V power include:

- Instead of a rooftop solar installation, you can use this solar panel to run small devices
- You can use it to power IoT devices
- It can also be used to charge laptops and mobile phones
- It is suitable for charging solar battery power banks
- This solar panel is also a reliable power source for charging security cameras and Alexa
- It is mostly suitable for charging small devices only and cannot power a home lighting system

Features and Applications of a 5V Solar Panel

Now that you know the product details of a 5 V solar panel, let’s also look at the features it offers.

- Since it has a compact structure and is portable, you can carry it everywhere with you
- It is lightweight. Therefore, anyone can easily lift it or handle it without needing any support
- All the parts of this solar panel are fixed, and their functions are also easy to understand
- It’s pretty easy to maintain these ‘on-the-go’ solar panels



Fig.2. Solar panel

Heating panels can be used in the process of electricity generation from waste material in several ways, depending on the specific technology used. For example, in thermal waste-to-energy plants, waste material is burned in a combustion chamber to produce high-temperature gases. These gases are then used to heat water and produce steam, which drives a turbine to generate electricity. In this process, heating panels may be used to line the combustion chamber, as well as other areas of the plant where heat is generated or transferred. The heating panels can help to maintain the high temperatures required for efficient combustion and steam production, while also protecting the plant's infrastructure from heat damage.

7.2.LED Indicators:

A “Light Emitting Diode” or LED as it is more commonly called, is basically a specialised type of PN junction diode, made from a very thin layer of fairly heavily doped semiconductor material. When the diode is forward biased, electrons from the semiconductors conduction band recombine with holes from the valence band releasing sufficient energy to produce photons which emit a monochromatic (single colour) of light. Three LED’S are visible in the design as indicators.

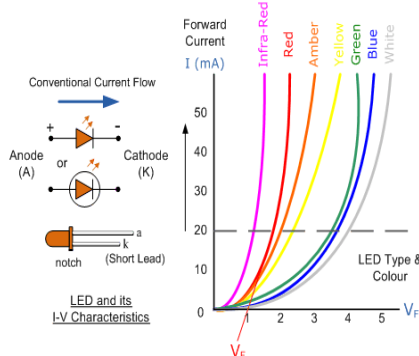


Fig. 3.Led schematic symbol and I-V characteristics curves showing the different colours available

7.3. Rechargeable Battery:

12V 1.3AH Sealed Lead Acid Battery The 'Online' range of sealed lead acid batteries are maintenance free, valve regulated and leak proof ideally suited to all 'standby applications' There will be no loss in power output over the battery life. Low self-discharge of about 2-3% per month compared with 20-30% for more common battery systems. Quality construction with no compromise on materials to ensure a long service life. Low internal resistance means a high discharge rate. Wide operating temperature range operating between -15° C to +50 ° C when fully charged.



Fig.4. 12V battery

8. Benefits of Waste to Energy (WTE):

Here are some of the benefits of the waste to energy process:

1. Reduction of Waste Going to Landfill Sites

The waste to energy reduces the expense of trash transportation and landfilling, while at the exact same time, it produces power that has monetary value. It reduces the amount of waste going to landfill sites as well as could conserve the considerable expense of transporting waste to landfills as a lot of significant landfills are fairly distant from the primary town hall.

2. Reduction of Greenhouse Gases

It has a variety of ecological advantages. It generates much less greenhouse gas like methane. Methane is a greenhouse gas that is mainly sent out from the decomposition of the waste stream in landfills. It is over 20 times even a lot more potent than carbon dioxide and is among one of the most noteworthy contributors to climate modification.

In the waste to energy facilities, the production of methane is avoided. Presently, these facilities in the US account for around 20% of renewable electricity generation.

3. Reduction in the Use of Fossil Fuels

The waste to energy process stays clear of the consumption of natural deposits like oil, gas, as well as coal, which are or else used to create

energy. A solitary waste to energy center saves over 200,000 barrels of oil annually.

4. It is Environment-friendly

Electricity and heat can be generated from waste, which provides an alternative and more environment-friendly source of energy. Waste to energy is an emerging innovative set of technologies aimed at better sustenance of the environment, with minimum damage to the ecosystems.

With these technologies developing by day and their acceptance increasing amongst households and industrial set-ups worldwide, waste to energy is seen as a development tool for emerging countries.

5. The Creation of Jobs

The local community around these facilities benefits from jobs created. The Power Recuperation Council states that the WTE sector supports approximately 14,000 jobs and \$890 million in wages, salaries, and benefits. WTE facilities support local economies, buying goods and services from local vendors.

6. Better Recovery of Products

US WTE facilities recover more than 730,000 tons of ferrous metals for recycling. Communities that rely on WTE recycle at a greater rate than the national average. WTE facilities recover metal for recycling that would have been buried forever if sent to a landfill.

7. Save Ecological Cycles

Waste to energy or energy from waste is a conscious attempt to equalize the patterns of our planet and save our ecological cycles. The energy generations from these technologies are small scale right now, and their employment for domestic and industrial use is sparse. However, they are seen as the emerging solutions for tomorrow, that are set to affect the world immensely.

8.1. Screen shots:

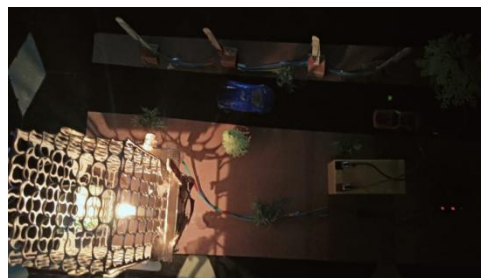


Fig.5. Energy conversion from wastage to electricity

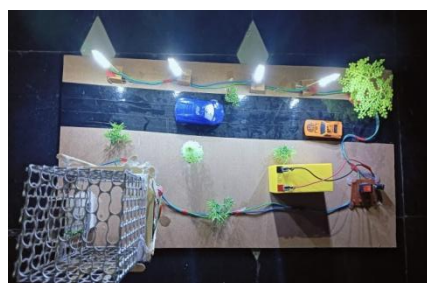


Fig.6.Storage of electricity in battery



Fig.7. Reuse of energy for automatic street lights

9. Advantages:

- This project can be used in a cold places as they always burn a fire to keep their houses warm. They can generate electricity for their basic needs.
- Still there is no electricity in many villages in India; it can be used to generate electricity.

- It can be used in an incineration where waste is burn .so, that polluted gases can be filter out before releasing in an air.
- Some of the solar energy pros are: renewable energy, reduced electric bill, energy independence, increased home resale value, long term savings, low maintenance.

10. Application and Scope:

- The aim of this project is to find a good solution to optimize pollution.
- The main challenges and barriers for reducing plastic waste in mixed waste and residual waste streams, hereby stimulating prevention and recycling of plastic waste.
 - Promoting recycling of plastic polymers as a substitute for virgin plastic.
- The main application of these system is to generate electricity. This is the only major application of this project. After the generation of electricity, we can use it for other application such as agriculture, industrial, residential use, etc

11.Conclusion:

Incineration technology is complete combustion of waste (Municipal Solid Waste or Refuse derived fuel) with the recovery of heat to produce energy that in turn produces power through heating panels. Now from this we can conclude that electricity plays an important role in our life we are made aware of how the generate electricity waste is done. For technical service provider plant Objectives & Maintenance activities are very important as its service mostly depends on the availability of its equipment. From this we see that how electricity generated successfully. From this we can see how to store the energy in batteries. This paper highlights future sustainability. A steady supply of affordable, clean, and renewable energy sources with little harm to society or the environment is a major concern. In this project, we

demonstrate how to successfully generate electricity from waste materials. After finishing our project, we checked to see if everything was operating as intended. Everything went smoothly, and the project successfully demonstrated how to successfully generate electricity from waste materials. The main objectives of waste to energy are the reduction of greenhouse gas emissions and the creation of fossil fuel alternatives. Additionally, the creation of small, inexpensive, yet highly effective technology is necessary, along with the best method for getting rid of or using filter ashes and other leftovers from air pollution control devices. The goal of this project is to create electrical energy out of waste materials like plastic, rubber, garbage, and other waste materials, store it in a battery via a circuit, and then use it to power the entire system. Therefore, in this project, we successfully demonstrate how to produce electricity from waste materials and successfully store it in batteries. Along with this, reducing carbon emissions is the biggest objective of this project and to lessen these waste's harmful effects on the environment and human health. Municipal solid waste, which is produced by industrial, commercial, and household activity, makes up a significant portion of waste management

9. Scope for future work:

1. We can make high quality heating penal for generate high electricity
2. We can make large level burning box with easily heating penal connecting system
3. We can make best storage system by generate electricity by waste materials
4. Reduction of pollution: Recycling helps to reduce energy usage, consumption of virgin raw materials, air and water pollution.
5. Reduction of energy consumed by processing virgin raw materials partially counterbalanced by energy consumed for recycling.

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