

Transforming Energy from Garbages

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Abstract - Accumulation of waste and their management is a serious concern all around the world. In addition to that, electricity generation from thermal energy and nuclear energy etc. consumes fossil fuels which leads to their depletion. It also contributes in environmental pollution. Our project aims at better management of the accumulating waste and reducing the use of fossil fuels that are on the verge of depletion, also mitigating the pollution caused during producing energy from them. We burnt solid waste and generated electricity out of them by absorbing the heat produced from burning waste onto a solar panel or heat panel. This process works on the principle of photovoltaic effect. Smoke produced on the consequence of burning waste is not released into the air rather passed through a pipe and filtered the carbon content out of a carbon filter. Thus helping in reducing the waste by generating energy from them, which is also a reliable source because waste will be produced as long as human race exist. Pollution is also reduced by filtering the harmful carbon.

Key Words: Solar panel, Carbon filter, Photovoltaic effect

1. INTRODUCTION

The problem of waste management and the need for developing sustainable energy are growing in today's world. The ever-increasing waste as a result of growing population and industrialization has also put pressure on current disposal system and also increased environmental contamination. Concurrently, resource depletion and climate change have been accelerated by the dependence on fossil fuels for energy production. A lot of attention has been paid to the idea of producing electricity from waste in order to address the above problems. This involves burning waste to generate electricity, reducing environmental damage while also supplying energy needs. The combustion of waste is referred to as waste-to-electricity which involves harnessing the calorific values of different type of waste. Concurrently, solar photovoltaic system capitalizes on photovoltaic effect to directly convert sunlight to electricity. By deploying solar panel of semiconductor materials, photons from sunlight are absorbed, generating electric current. Solar energy system is a sustainable energy system. By integrating these systems can contribute in achieving the objective of our project.

2. LITERATURE REVIEW

Research in renewable energy focuses on enhancing efficiency and sustainability. Studies explore diverse approaches such as cooling methods for solar photovoltaic (PV) cells to extend their lifespan and improve performance. Hydrogen is investigated as a cleaner fuel for municipal waste incineration, reducing carbon emissions. Thermophotovoltaic systems capture wasted heat from fossil fuel conversion, contributing to energy efficiency and reducing reliance on fossil fuels. To advance solar panel technology, researchers explore new designs integrating materials like Cu₂O for cost-effective, high-efficiency cells. Additionally, innovative solutions like neural network-based active cooling systems enhance the performance of silicon solar cells in concentrated PV systems, optimizing efficiency and longevity. Further, energy recovery from municipal solid waste through combustion is studied, emphasizing pollution control measures. Lastly, research examines the evolving electricity consumption patterns in private households, exploring strategies to optimize energy usage and enhance flexibility, ultimately contributing to a more efficient and sustainable energy future.

3. COMBUSTION OF WASTE

The waste-to-energy (WtE) concept, which involves burning waste to produce electricity, is based on the idea of using combustion to extract energy from waste materials. It involves collecting solid waste that are to be burnt in a chamber. The burning of waste is performed inside the chamber and the heat is harnessed to generate electricity

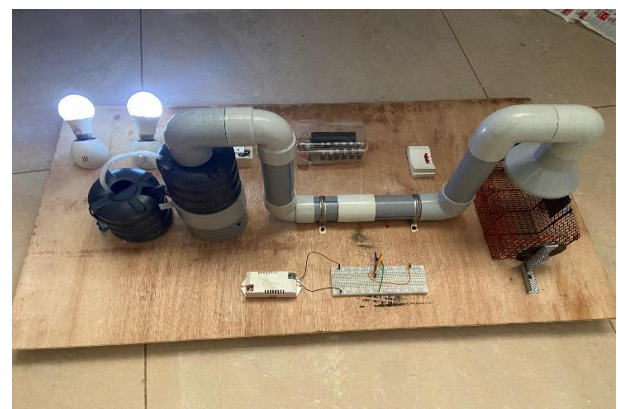


Fig -1: Combustion

4. PHOTOVOLTAIC SYSTEM

The photovoltaic effect is how certain materials, like silicon, turn sunlight into electricity[5]. When sunlight hits these materials, it knocks electrons loose from their atoms, creating electron-hole pairs. Because of the material & structure, these charged particles separate, creating an electric field. When connected to a circuit, this electric field forces the electrons to move in a specific direction, generating an electric current. This current can then power electrical devices or be stored for later use, making solar energy a clean and renewable source of electricity[8].

Here, heat produced as a result of burning waste is passed to a solar panel that converts this heat into electricity by the above principle. The electricity thus produced can be stored or directly used[9].

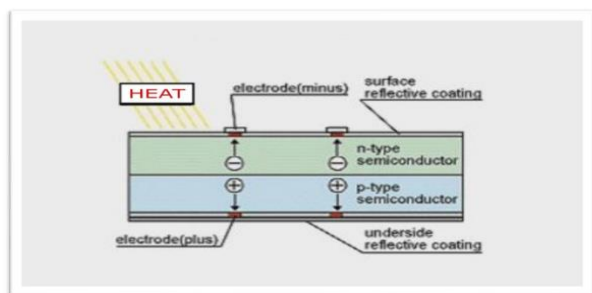


Fig -2: Photovoltaic System

5. FILTERING & PURIFICATION

It is important to make sure that we don't contaminate and pollute the environment while producing electricity. Therefore, the smoke produced as a consequence of burning is sucked by a fan through a pipe passage where it is filtered by a carbon filter without releasing it into air. This will filter out the harmful content out of smoke and helps in reducing their impact to the environment. Further, smoke is filtered again in a tank using charcoal layer by dissolving it into water[10]. This filtered water is again reused. The water is cooled using Peltier module and heat thus produced is pumped out.



Fig -3: Carbon filter

6. BLOCK DIAGRAM

The block diagram in fig-4 illustrates the functioning of transforming energy from garbages highlighting key components such as combustion chamber, heating panel, suction fan, amplifying circuit, battery, water pump, cooling system, bulb, peltier module, exhaust fan. The system focusing on generating electricity through combustion of wastages by minimizing pollution through filtrations.

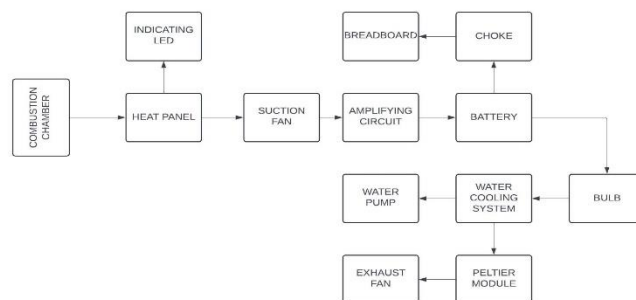


Fig -4: Block diagram

7. CONCLUSION

This paper presented the problems faced by accumulation of waste and their management concerns. It also focused on how waste can be converted to useful electricity and simultaneously ensuring the sustainability of fossil fuels and mitigating the pollution caused by the generation of electricity from other existing sources. We conducted combustion of waste to generate heat necessary to carry out photovoltaic effect[15]. We found that electricity can be generated from this method. This helped in reducing the waste and their disposal concerns. We were also able to reduce the contamination caused to the environment as, no smoke produced as a result of combustion where directly released into the environment, rather they were filtered and absorbed into water. This water is again filtered and reused. Thus, we were able to manage waste accumulation, cut down dependence on fossil fuels for power generation. We were also able to reduce pollution of environment that is causing climatic change. Therefore, the integration of waste-to-energy combustion, photovoltaic technology & carbon filtration presented a promising solution for sustainable electricity generation. By using these processes, we can mitigate environmental impact, also addresses waste management challenges and promotes renewable energy generation, aligning with our commitment to a greener future.

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