3*3 Energy Production and Conversion

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Abstract: Now a day's production of electricity was one of the social problem and production of sufficient electricity power was not reaching up to the mark. We know the importance of electricity power in our present day to day life. Even now the production is not sufficient. So, to overcome this problem, we have come out with a small solution that is by converting heat energy into electric energy by using vehicles heat and the sun light.

Keywords: Thermoelectric generator, Seebeck effect, heat energy, thermo electric materials .

I. INTRODUCTION

Yes, as we mention above generation of electricity is one of the major problem facing in India especially in Karnataka. Recently state energy minister said the state expects power demand, to rise from around 8500mw to 9500mw, but we are not able to generate that much of electricity in our state so, Karnataka will buy an additional 100mw of power for 8 months.We paid nearly 4.06 rupees per unit for importing electricity. To overcomethis, we have a small, idea to generate electricity.

Here we are generating power with the use of non-exhaustible energy to produce exhaustible energy which is very much essential in human life. Here we implementing TEG(Thermoelectric generator) in the divider where we get the vehicles heat and sunlight. We know that, the vehicle whichis in motion produces mechanical energy which is converted into heat energy and then heat energy is converted into electricity, usually question arises why we use TEG? Yes, now when we come to the TEG, means Thermoelectric power generation offers a potential application in the direct conversion of waste-heat energy into electrical power. If we convert waste-heat energy directly into electrical power, means it leads to improve the overall efficiencies of energy conversion system and also Thermoelectric power generators offer several distinct advantages over other technologies that is,

- They are simple, compact and safe.
- They are very small in size.
- They are virtually weightless.
- They are capable of operating at electrical temperatures.
- They are suited for small – scale and remote applications.
- They are environment friendly.
- They are not position dependent.
- They are flexible power sources.

Thermoelectric power generation is based on the phenomenon called "Seebeck effect" which is discovered by Thomas Seebeck in 1821.The Seebeck effect is a phenomenon in which a temperature difference between two dissimilar electrical conductors or semiconductors produces a voltage difference between the two substances.

A schematic diagram of a simple thermoelectric power generator operating based on the see beck effect is shown in the figure.

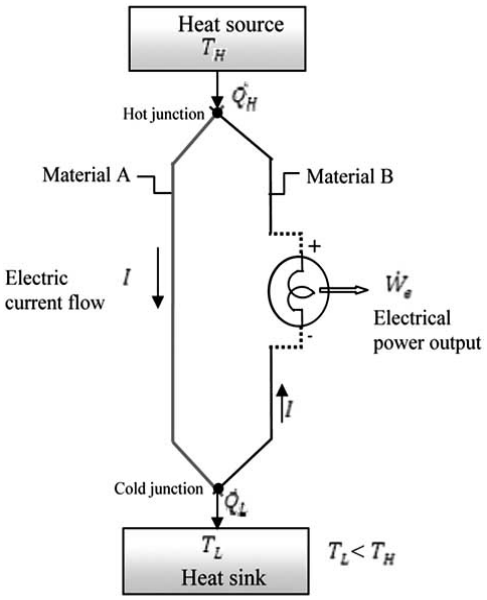

Fig. 1 Schematic diagram showing the basic concept of a simple thermoelectric power generator operating based on Seebeck effect.

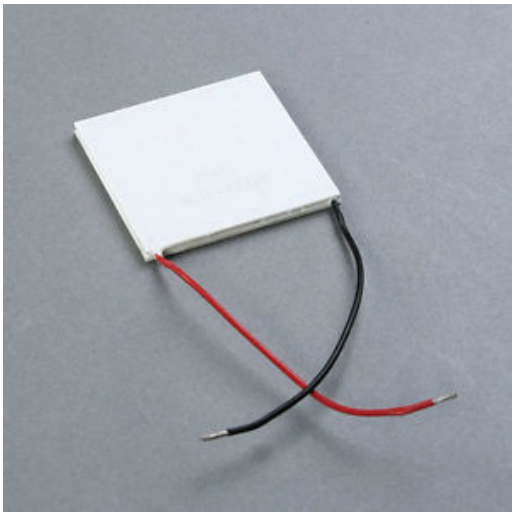

Fig.2 Thermoelectric generator

Here heat is transferred at a rate of QH from a heat source TH to the hot junction and it is rejected at the rate of QL to a low temperature sink maintained at TL from the cold junction. Based on Seebeck effect, the heat supplied at a hot junction causes an electric current to flow in the circuit and electrical power is produced. Using the first law of thermos-dynamics the difference between QH and QL is the electrical power output We.So, we are selecting TEG in this project..Yes, now in this project, here we placed the TEG in the dividers where it able to get vehicles heat and sun heat and it automatically converted into electrical energy, that energy we satisfactory used for street lights and small home appliances also. Then at least we do some betterment in this field benefits of this projects,

- In simplest way, by using natural energy we get electricity.
- It can be used for home appliances.
- It can be used for domestic users.
- We are getting heat energy by free of cost.
- Heat is renewable energy, we can be utilised as much as possible.

II. SEEBECK EFFECT

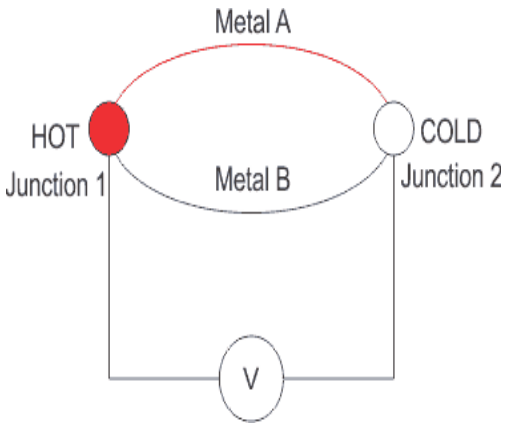

Fig. 3 Seebeck effect

In 1821 Jerman scientist Thomas Johann Seebeck discovered the Seebeck effect. It work like, a circuit consist of two dimensional metals like iron and copper an emf is generated and the junction are maintained at different temperatures. Two dissimilar metals connected to form two junction are known as Thermocouple and the emf developed in the circuit is thermo electric emf. The current through the circuit is called thermoelectric current and this effect is known as thermoselectric effect or Seebeck effect. If the hot and cold junctions are interchanged the current in the circuit also reversible. For example in copper and iron thermocouple, the direction of copper is from copper to iron at the hot junction. The magnitude and sign of thermos emf depends on the materials of the two conductors and the temperatures of the hot and cold junctions Seebeck after studying the thermoelectric properties of different pairs of metals, arranged them in a series called thermoelectric series. The thermoelectric series of metals is

Bismuth- Bi
Nickel- Ni
Palladium- Pd
Platinum- Pt
Copper- Cu
Manganese- Mn
Mercury- Hg
Lead- Pb
Tin- Sn
Gold- Au
Silver- Ag
Zinc- Zn
Cadmium- Cd
Iron- Fe
Antimony- Sb

The direction of the current at the hot junction is from the metal occurring earlier in the series to the one occurring later in the series. If there is a less gap between the two metals then emf will be less, if there a more gap between the two metals then the emf will be more.

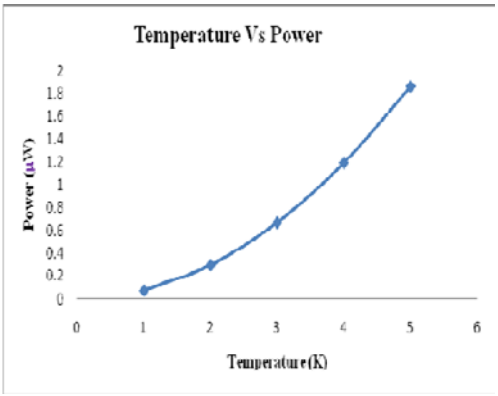

Fig. (4). Temperature verses power.

The above graph represents if the temperature increases simultaneously the power also increases.

III. THERMOELECTRCI MATERIALS FOR POWER GENERATORS

Among the vast number of materials known to date, only a relatively few are identified as thermoelectric materials. A large amount of research in thermoelectric materials has focused on increasing the Seebeck coefficient and reducing the thermal conductivity, especially by manipulating the nanostructure of the thermoelectric materials. Because the thermal and electrical conductivity correlate with the charge carriers. Thermoelectric generator can be conveniently divided into three groups. Alloys based on Bismuth (Bi) in combinations with Antimony (An), Tellurium (Te) or Selenium (Se) are referred to as low temperature materials and can be used at temperatures up to around 450K. The intermediate temperature range - up to around 850K is the regime of materials based on alloys

of Lead (Pb) while thermoelements employed at the highest temperatures are fabricated from SiGe alloys and operate up to 1300K.

IV. CONCLUSION

Production of electricity is very essential in present situation if population increases the power demands, so we should find some alternative ways to produce electricity. So, to generate electricity we have come out with a small idea.

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