International Journal of Advance Research in Science and Engineering
Volume No.06, Special Issue No.(04), December 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354

PIESO – The Harvesting Revolution

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ABSTRACT

A majority of our planet's electricity supply is being generated from fossil fuels such as coal, oil and natural gas. These energy sources are staring at irreversible and damaging issues, including rising prices, security concerns, over dependence on imports from a limited number of countries and growing environmental concerns about the climate. Topping this list is the fact that these resources are finite and are depleting fast. It's not a question of 'if', it's a question of 'when'[1] .Today, the time has come when humanity must tackle two critical challenges – meeting the ever-growing global energy needs and fighting global warming for a better tomorrow[2]. So, how can we do this?

Using renewable clean energy resources would come to the rescue. Using resources that are renewable in nature like solar, wind and piezoelectricity would help when the non-renewable resources extinct. PieSo promotes the use of clean energy by making use of Solar and piezoelectricity technology in the flexible solar panel enclosing the vibro-wing type piezoelectric pads which helps in generating considerably more amount of energy when used in a grid type structure by connecting more number of panels together.

Keywords- Solar Panels, Piezo crystals and Vibro-wind pads.

I.INTRODUCTION

In India, the use of Solar Power Generation has currently become the trend but no such application is evidently seen making use of piezoelectric crystals with Solar Panels. PieSo Panels are first of its kind making use of two very important renewable and clean form of energy resources to get higher power output. The panels comprise of solar energy generating cells and the Vibro-wind pads arranged as a cantilever using the principle of piezoelectricity. It comprises of all the traditional features of a solar panel but adding the Vibro-Wind pads adds up to the efficiency and throughput of the panel giving a considerably good power output.

II. CURRENT SCENARIO

Availability of non-renewable resources is only until 2050 ,the traditional means od generating energy via the power plants seems to be demolishing in nature due to many reasons and thus it is of utmost use to find an alternative.Today,In India about 50 million homes have dark nights due to poor infrastructure and inefficient energy grids or at some places people cannot afford the cost per unit of the power supplied to them in the rural areas. Today when we aim of 100% electrification in India including all the rural areas also, making use of the

non renewable resources gives a huge hand in not only saving the cost per unit for the consumers but also the generation cost via the power plant.Generation of energy by using Piezoelectric means has still not gained much popularity in India. Only 10% of the energy generated in the world is through means of piezoelectricity into which India's contribution is not even 1%. Promoting the use of this very simply used renewable technology by PieSo panels embedded with both Solar and Piezoelectricity can help India develop and enhance its power generation means by a huge margin.

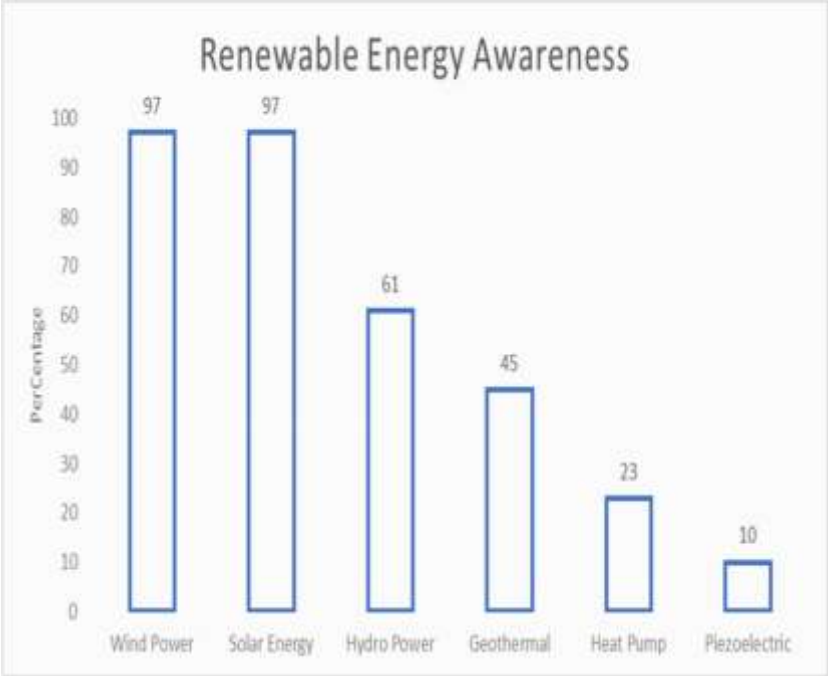

Figure 1: Energy generation by Renewable resource [3]

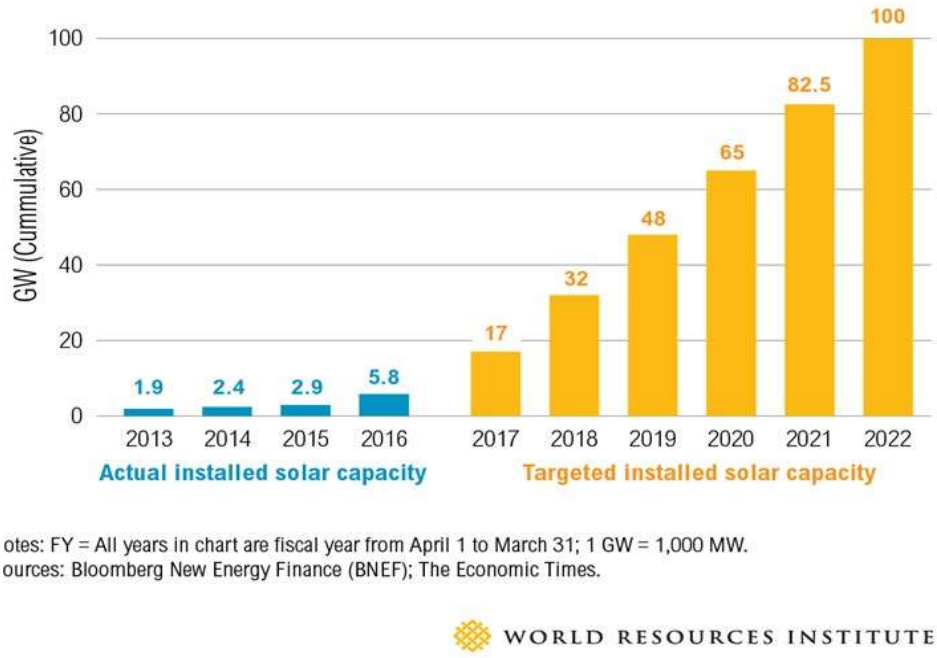

Figure 2: India's 100GW Solar power mission target [4]

III. PROBLEMS OUR PRODUCT WILL BE ABLE TO SOLVE

1)With the ever-increasing use of non-renewable energy resources the industrial and housing sectors will face a blackout and therefore using a conventional panel introducing the important energy resources renewable in nature, PieSo, will be the most vital solution.

2)Today, In India the setting up and operating cost of a power plant on a daily basis is about Rs.10000 crores which is not viable to the economy when the same amount of power generation can be done by PieSo panels and at a comparatively very low cost.

3)Power plant emit various harmful emissions thereby polluting the environment in the nearby area and lowering the index of living standards and as India has signed the Paris Climate Agreement within the UNFCCC and using renewable energy resources like PieSo panels will help India to achieve its target.

4)As our Prime Minister, Mr Narendra Modi aims at '100% Electrification in India', PieSo panels will be a form of localized infrastructure to generate electricity.

5) In India, there are people who cannot afford the high cost of electricity, they can dream of having a 24x7 electricity supply by installing PieSo panels.

IV.PRODUCT DESIGN

The below proposed block diagram shows the power generation arrangement with multiple panels connected for high amount of power generation.

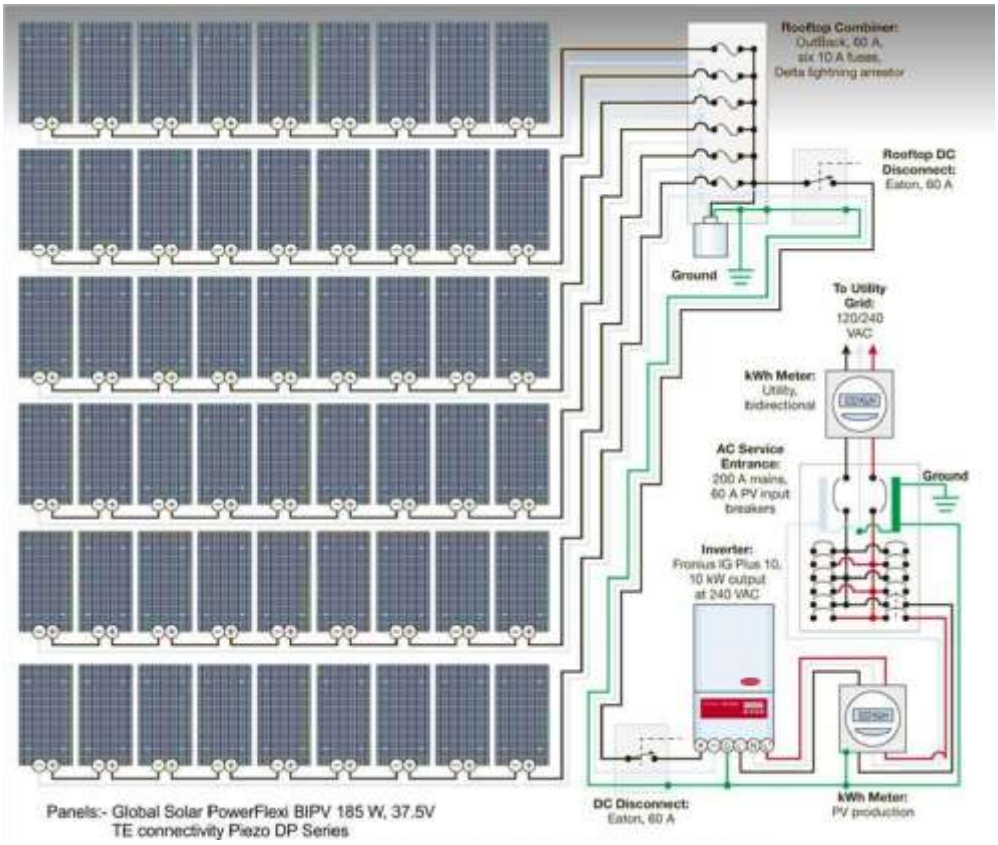

Figure 3: Block diagram of the grid structure

Table 1: List of components

Parts	How is it being used in the proposed solution? Explain its role/functionality
Cutler Hamer 60A	It is used as a circuit breaker for Inverter.
Combiner Box	It is necessary when multiple panels are used in a system. It also provides an easy access point for future panel additions
Delta Lightning Arrestor	For Protection Against Lightning.
KWh Meter	To Measure the Energy Production
Inverter	To Convert DC to AC
Panel[7][8]	Solar and Piezo electric converter

The below shown models give us a brief idea about how the panel would look like and the different views of the panel.

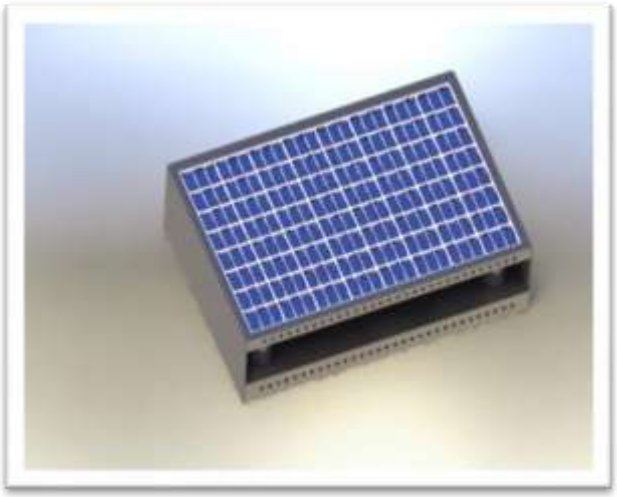

Figure 4(a)- Panel covering

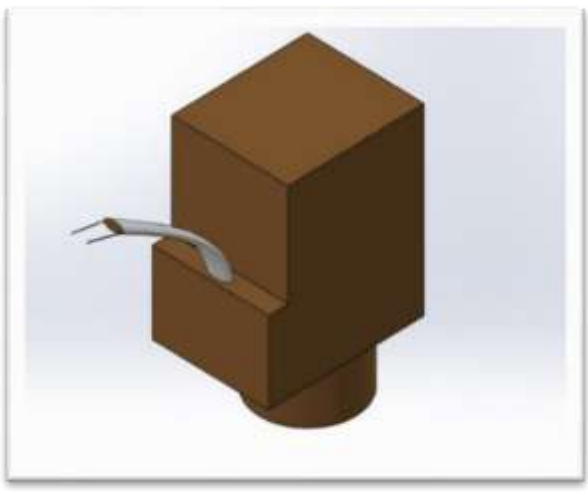

Figure 4(b)- Piezoelectric Crystal

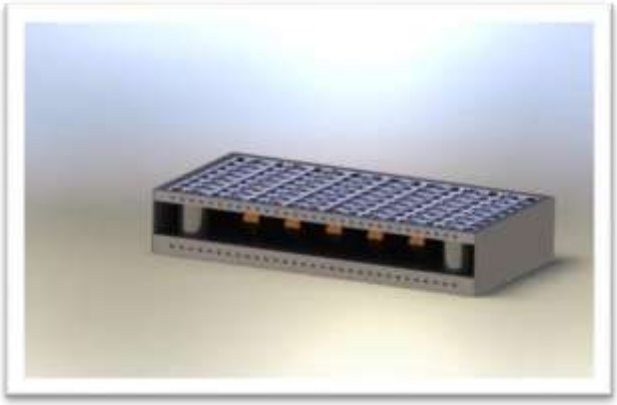

Figure 4(b)-Panel side view

VI. CUSTOMER IDENTIFICATION & DISTRIBUTION

1)Urban building and corporate setups in tier 1,2 & 3 cities use the power that is traditionally generated by power plants.

2) Wind and solar farms which are been setup in the coastal and hilly areas by either the investors in this sector or the government.
3) Certain buildings in the urban cities have windmills installed on their terrace in order to use renewable energy sources to generate electricity for the building.
4) A few people in the rural areas in India make use of a personalized solar panel at home for electricity generation.

For distribution of the panels that we make at PieSo we aim at adopting the B2C and also the B2B business models which implies that we plan to deliver the panels directly to the consumer end for personal use and installation and also to various businesses in this sector for more efficient power generation.

VII. CONCLUSION

Thus we conclude to the following topic by distinguishing the major features of the panel and by describing the major impact it would create in terms of power generation.

Innovativeness of the Proposed Solution: -

Table 2: Features of the Panel

Size	Residential installations is 65 inches by 39 inches Commercial applications is 77 inches by 39 inches.
Power	Power of Flexible Solar Cell + Power of PeizoStrip
Performance	35% Increase than Traditional Panel
Cost	10% Rise as the Traditional Panel
Functionality	More Ergonomically Designed for Optimizing the Panels.

Impact: -

Although generation of electricity by means of solar energy has become a trend in India, but technologies accomplishing both piezoelectricity and solar energy is not developed in India.PieSo introduces this concept of merging these two energy sources for power development. Solar power depends on sunlight. And because the amount of sunlight falling on it throughout a day is not constant, the output of the solar plant also varies. On an average, a solar plant which has a power output of 1 kW provides 5 units of electrical energy in a day (24 hours) which can be utilized by appliances. But on the other hand, the 1 kW power which is produced from coal (in power plants), provides 24 units (1 kW * 24 hours = 24 kWh) during a day[5]. If there is a requirement of 50000 units at a place, then, required capacity of solar plant should be = 50000/5 = 10000 kW = 10 MW whereas the required capacity of a coal power plant would be = 50000/24 = 2083.3 kW = 2.1 MW (approx.) [6].It means that the required capacity of a coal power plant to generate a given amount of electrical energy will approximately be one-fifth of the required capacity of a solar plant to produce the same amount of electrical energy. Although harnessing of solar power is not very common today but is gaining popularity rapidly. In fact, in some countries the solar power market has witnessed tremendous growth in the recent years. And why shouldn't it? In addition to reducing the expenses on electricity, it also is a perfectly clean and sustainable source of energy. It's just a matter of time when solar energy shall be as popular as the regular sources of energy. PieSo introduces this concept of merging the solar energy with piezoelectricity which would create a great impact in the energy generating sector by bringing out the best from both solar and piezoelectricity.

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