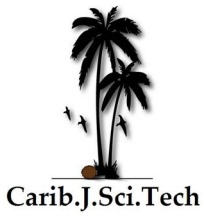

ANALYZING THE RESULTS OF RENEWABLE ENERGY SOURCE OF SOLAR BOTONIC TREES USING NANO PIEZO ELECTRIC ELEMENTS

Authors & Affiliation:

K Vinod Kumar[1], G V N Abiram Kumar[1], G S Ajay Kumar Reddy[2]

[1]Dept. of Electrical and Electronics Engineering,

[2]Dept. of Electronics and Communication Engineering

LakireddyBalireddy Autonomous College Of Engineering

Correspondence To: **K Vinod Kumar**

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ABSTRACT

The world is reeling under the severe shortage of reliable and efficient energy resources. The profitable energy resources used to generate electricity so far, 'fossil fuels [1-3]' are extinguished and also effecting the environment, thus the greenhouse effect and the global warming phenomenon that we keep hearing about are the repercussions. Thus, there is an immediate call to switch over to a better, eco-friendly, affluent energy resource i.e., '*the* Renewable Sources [4-5]'. It eliminates the problems faced by a traditional solar panel fields, i.e., non-availability of solar energy during cloudy or rainy days and during nightfall. In case of Solar Botanic Trees, The more the wind is, the more Nano-leaves are moved. Wind that is moving thousands of Nano leaves in a tree canopy are causing mechanical strain in the petiole, twigs and branches. Nano piezo-electric elements incorporated in the petiole twigs and branches are the tiny Nano piezo-electric elements that will generate millions and millions of Pico watts as these thousands of Nano leaves flap back and forth due to wind. The stronger the wind, the higher the "flap" frequency, and therefore the larger the watts generated in the petiole, twigs and branches. Similar is the case of energy during rainfall, the mechanical vibrations in these tiny generators produce electricity from movement or kinetic energy caused by wind or falling raindrops

1.INTRODUCTION

Natural resources are fast depleting. With a drastic increase in the price of fossil fuels, we may soon needed alternative resources to go on with even our daily activities. While we scratch our heads thinking of various ways to lower up our carbon foot print, solar botanic has come up with a unique solution called Energy.[6] Harvesting[7] Trees that will offer renewable electricity through solar and wind energy using artificial trees.

Several Renewable Sources are considered as an alternative for the present energy crisis. However, they have some limited applicability. Hydro energy – Wind energy – Solar parabolic energy – are all renewable applications. But, several drawbacks are posed by these sources like

- Expensive manufacturing
- High installation and maintenance cost
- Environmental dangers
- Decrease in property and land values
- Building regulations

There is no difference between fake tree and real one. If woodpecker drills a hole the material used inside the tree damaged.

Thus, we will present a method elaborating how we can use today's technology in a more responsible and effective way without causing our planet more stress and the concept shown in this paper is open to various design techniques in renewable energy sources.

2.BIO-MIMICRY

Our solution is primly based on the principle of 'Distributed generation'. This solution is loosely based on the principle of Bio-mimicry.

Biomimicry [8-9] is an emerging discipline that studies nature's best ideas and then imitates these designs and processes to solve human problems.It is the practice of developing sustainable human technologies inspired by nature.

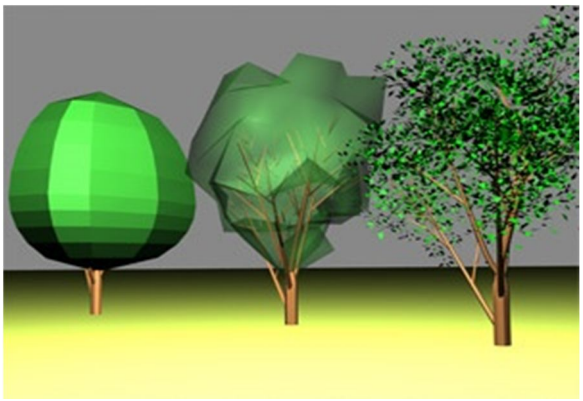

Fig1: Botanic trees

We have numerous examples around us inspired by nature like

Bionic Car: DaimlerChrysler [10] has developed a new concept car from Mercedes-Benz based on the shape of an odd tropical fish - the Bionic Car. Using the shape of the tropical boxfish, designers achieved an aerodynamic ideal that boasts 20% less fuel consumption and as much as an 80% reduction in nitrogen oxide emissions. The diesel-powered compact will get about 70 miles per gallon, and can run just fine on biodiesel fuel.

Self-Healing Plastics: Consider the body's power to heal it of scrapes and cuts. The value of the same sort of process in light polymer composites that can be used to produce things like aircraft fuselage becomes obvious. The new composite materials being developed are called self-healing plastics.
We have several other examples like Velcro, Friction reducing swimsuits, Insect inspired robots etc.

3.SOLAR BOTANIC TREES

Solar Botanic will introduce artificial trees that make use of renewable energy from the sun and wind, they are an efficient clean and environmentally sound means of collecting solar radiation and wind energy.

This plan involves bringing together three different energy-generation technologies. They are

- Photovoltaic (PVs) are arrays of cells containing a material that converts solar radiation into direct current electricity. Materials presently used for photovoltaic[11] include amorphous silicon[12], polycrystalline silicon, microcrystalline silicon, cadmium telluride etc.

- Thermoelectricity[13] refers to a class of phenomena in which a temperature difference creates an electric potential or an electric potential creates a temperature difference.

- Piezoelectricity[14-15] is the ability of some materials (notably crystals and certain ceramics, including bone) to generate an electric field or electric potential in response to applied mechanical stress[16].

- Harness the power of the sun, integrate all aspects of a tree from leaf, branch and twigs and convert solar to electricity to power cities, autos and highways. In this biomimicry concept our trees are fitted with Nanoleaves[17-22], a combination of Nano-photovoltaic[23], Nano-thermo voltaic[24] and Nano-piezo generators[25] converting light, heat and wind energy into green electricity[26-27].

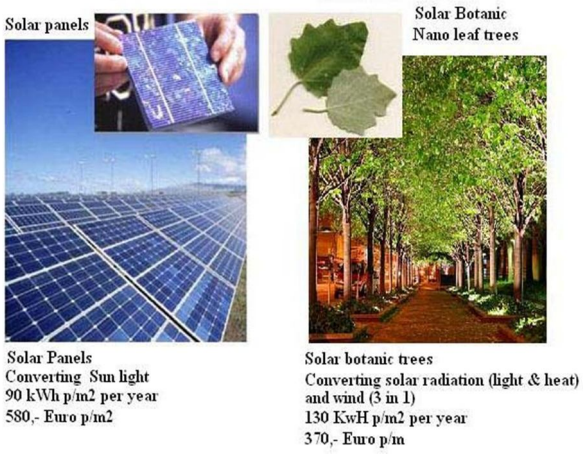

Fig2: solar panels versus solar botanic trees

4.NANO LEAF

The essential element in this technology is Solar Botanic's artificial leaf called the ‘Nano leaf’.

- It consists of a very thin photovoltaic film on one side, which converts the light from the sun into energy.

- Another thin thermo voltaic film on the other side of the leaf converts the heat from the solar energy into electricity.

- In addition to solar power, as rustling wind or falling rain disturbs the false leaves, Nano generators in their petioles—thestalks connecting them to a branch—couldgenerate small amounts of piezoelectric power.

A Nano leaf is thin like a natural leaf, when outside forces, like the wind pushes the Nano leaf back and forth, mechanical stresses appear in the petiole, twig and branches. When thousands of Nano leaves flap back and forth due to wind, millions and millions of Pico watts are generated, the stronger the wind, the more energy is generated.

Our Nano leaves only reflect a small part of the sunlight that strikes them, mostly the green light, and the rest of the spectrum is efficiently converted into electricity.

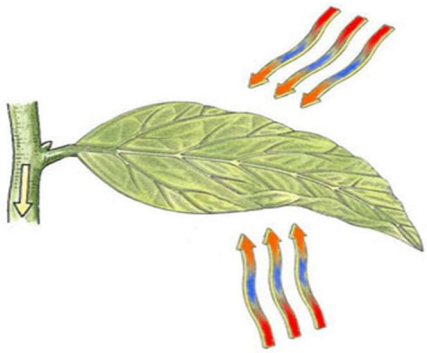

Fig3: Photo Voltaic conversion in Nano leaves

Besides converting the visible spectrum of light, our Nano leaves also convert the invisible light, known as infrared light or radiation, we can't see it, but we can feel it - it's warm - that's why we call it radiation. Due to the unique combination of photovoltaic and thermo voltaic in our Nano leaves it converts this thermal radiation into electricity, even hours after the sun has set.

The more wind there is, the more Nano leaves are moved. Wind that is moving thousands of Nano leaves in a tree canopy are causing mechanical strain in the petiole, twigs and branches. Nano piezo-electric elements incorporated in the petiole twigs and branches are the tiny Nano piezo-electric elements that will generate millions and millions of Pico watts as these thousands of Nano leaves flap back and forth due to wind. The stronger the wind, the higher the "flap" frequency, and therefore the larger the watts generated in the petiole, twigs and branches.

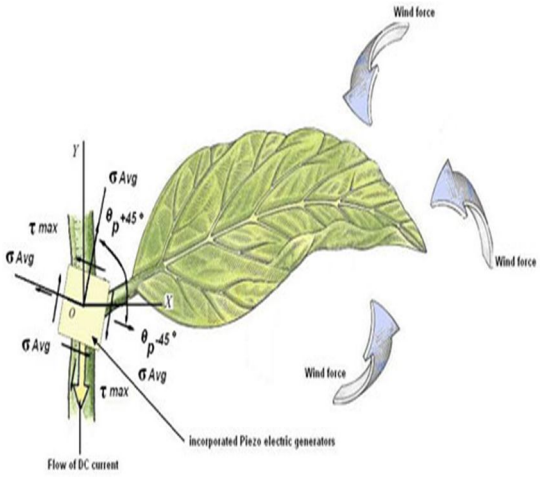

Fig4: process of green energy provider

With the progress in Nano technology, the photovoltaic, thermo voltaic and piezo electric materials are becoming more efficient and combined in one system it will give our products more efficiency and we believe that soon, Solar Botanic will be a mainstream green energy provider, more reliable/cheaper and above all better looking.

5. TYPES OF NANOLEAFS

- Broad Leaf trees- These species can provide between 3500kWh and 7000kWh per year. They provide shade, cooling the air, green ambiance and much more.

- Ever green trees- These species can provide between 2500kWh and 7000kWh per year. They can beplaced as single trees or to fence garden properties.

- **Shrubs, Plants, Roof, Wall and Fencing-** A wide range of shrubs for all electrical needs. Nano leaf roof Carpets can be installed in minutes on any roof design. Wall carpets are easy to apply as fencing.

6. CAPACITY OF BOTANIC TREES

An average tree with a canopy of about 6 sq. meters can create enough energy to provide for the needs of an average household and a tree with a 20 ft. solar canopy could generate enough power between 2000 and 12000 KWh per year.An unremitting operation over two decades could produce 1, 20,000KWh of energy. On a larger scale, a kilometer of solar botanic trees would be able to generate approximately 350,000 kWh per year, enough electricity to power approximately 60 average size houses.Solar Botanic solutions offer up to 50% more power than conventional solar systems.

7.APPLICATIONS

- Urban and Rural
- Recreational parks, city parks
- New housing estates
- Golf courses and resorts
- Mountainous regions
- Coastlines
- Highways
- Airports
- Deserts
- Penthouses, balconies, verandas

Private gardens

- De-forested areas
- Areas of commercial interest; Islands, nature resorts
- Ponds, lakes, seas and oceans
- Crop Protection
- SolarBotanic flowering plants to harvest colourful your electric power.

Solar Botanic [28-33] can be used for: Windshield [34], Shade, anti-glare, objectionable views,sound barrier, windbreak, wind obstruction and much more.

8. BENEFITS

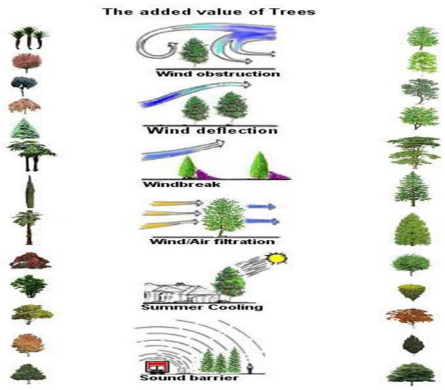

Fig5: Botanic trees at different weather conditions

9. CONCLUSION

India as the 2nd largest country of the world, the increasing demand of the energy has forced the mankind to find a way out which will be efficiently and abundantly available source of energy. As the solar botanic trees is a non-conventional [35] source, we have many advantages of producing electricity compared to the other resources.

Green Energy is the need of the hour and it is our responsibility to ensure a safer planet for the future generations. It is therefore vested on the shoulders of the citizens of the earth, or shall we say Earthlings to think smart and take the right decision. Everything starts with an individual, co-operate with the government and see your progeny enjoy the fruit of your actions and make life favorable for sustenance for mankind.

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