International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 10th Oct2018. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-07&issue=ISSUE-11

Title: **A CRITICAL STUDY ON SOLAR ROADWAYS**

Volume 07, Issue 11, Pages: 8–11.
Paper Authors

AKITI JYOTHI

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

A CRITICAL STUDY ON SOLAR ROADWAYS

AKITI JYOTHI
M.Tech in Highway engineering
akitijyothireddy18@gmail.com

ABSTRACT

The Solar Roadway is a series of structurally-engineered solar panels that are driven upon. The idea is to replace all current petroleum-based asphalt roads, parking lots, and driveways with Solar Road Panels that collect energy to be used by our homes and businesses. The renewable energy generated by solar road panels will replace the current need for fossil fuel which is used for generation of electricity as also oil used for driving the vehicles which intern reduces the greenhouse gases nearly to half. The implementation of Solar Roadways Technology will create the clean energy boom, spurring private investment on a massive scale, with relatively little extra cost. An intelligent highway infrastructure and a self-healing decentralized power grid that will eliminate our need for fossil fuels. Solar Roadways will also features wildlife preservation, the elimination of impervious surfaces, law enforcement, DUI detection, counter-terrorism, etc. It provides a decentralized, secure, intelligent, self-healing power grid which pays for itself. So it's time to upgrade our infrastructure (especially roads & power grids) with the 21st century technology i.e. "Solar Roadways".

1. INTRODUCTION

The Solar Roadway is a series of structurally-engineered solar panels that are driven upon. The idea is to replace all current petroleum based asphalt roads, parking lots, and driveways with Solar Road Panels that collect energy to be used by our homes and businesses. The ultimate goal is to store excess energy in or along-side the Solar Roadways. This renewable energy replaces the need for the current fossil fuels used for the generation of electricity. This, in turn, reduces the greenhouse gases to half. Solar Roadways is proposing along-view paradigm-shift solution to major infrastructure, energy and climate challenges. The Solar Roadways system would might, at present, cost about three times what it costs to install an asphalt road, but would be more durable more easily replaced in modular fashion, and able to pay for itself by generating more electricity than our economy can consume. At just 15% efficiency, far below what is expected, a 100% Solar Roadways enabled driving infrastructure would produce three times total electricity demand. There are additional benefits as well, which is a built-in smart grid, major new investment and job creation, the economic benefits inherent in global leadership in building the most advanced clean energy infrastructure every dollar invested in renewable sources, ultimately generates returns, because the resource is not burned and lost. The roadways can also communicate with drivers, alerting drivers with visual messages to the presence of pedestrians in a crosswalk. Asphalt works, in

International Journal for Innovative Engineering and Management Research
PEER REVIEWED OPEN ACCESS INTERNATIONAL JOURNAL
www.ijiemr.org

many ways, and is convenient to lay-down, compared to other methods.

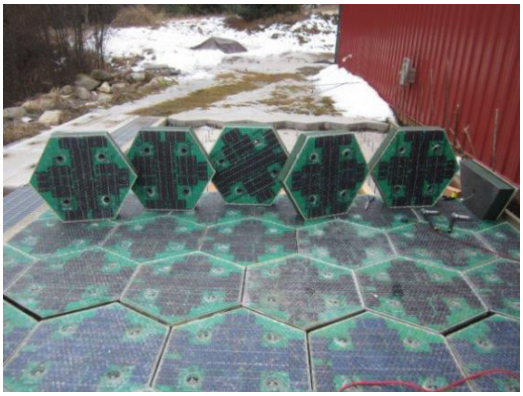

Figure 1 Solar roadways

2. SOLAR PANELS

Solar energy is unsurpassed by any other form of energy. Solar energy is originally coming from sun. Solar cells convert this solar radiation into useful electrical energy and store them in storage device such as batteries. Solar radiation strikes the earth surface and creates the paramount source of alternative energy. Solar panels help to harvest this energy and convert it into usable energy.Solar energy is an intermittent power source that functions only when the sun is shining. Solar cells or photovoltaic cells are arranged in a grid like pattern on the surface of the solar panel. These solar cells collect sunlight during the daylight hours and convert it into electricity.The process of producing solar energy is a process of converting light (photons) into electrical propulsion known as the photovoltaic effect (PV). The rate of energy varies depending on the wavelength and spectrum of solar generated. When the photon is in violation or in contact with the solar energy panel, solar panels will absorb photons in some degree.Not all photons are absorbed by the solar panels because it depends on the type of semiconductor materials used to produce the solar panels. Photon energy at certain levels is able to dissolve the bonding electrons from atoms to produce electricity. Quantity of the energy produced is a difference between a material with other material in the production of solar cells. This energy level is known as bandgap energy which is measured in units of electron-volts.

The solar panels are divided into three basic layers:-

1. Road Surface Layer
2.ElectronicsLayer
3. Base Plate Layer

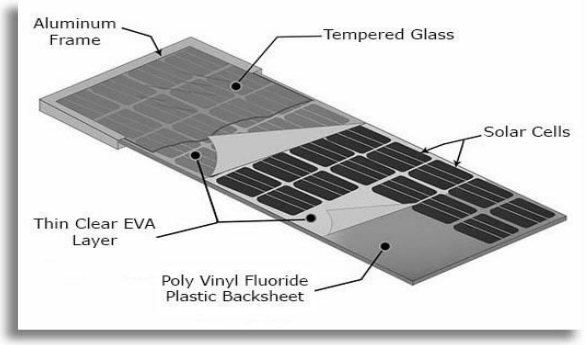

Figure 2. Electronic Layer

3. METHODOLOGY

When it comes to the storage of the renewable energy produced by SR panels, customers will have a variety of options. A virtual grid system can be used with a specialized meter from the utility company that provides net metering. These meters spin backward when extra energy is produced. In turn, energy can be pulled back from the grid when needed to power the panel's LED lights and heating elements at night, or in a storm when the panels may not produce sufficient energy. That is the system used for our first prototype parking lot and it's working very well. Batteries were not selected for use in the SR2 parking lot, since they tend not to be environmentally friendly and using the virtual grid spares one that purchase. One downside

to this system is that there is no energy available during a power outage due to the fact that the micro-inverters disconnect when they don't sense energy on the existing power lines.

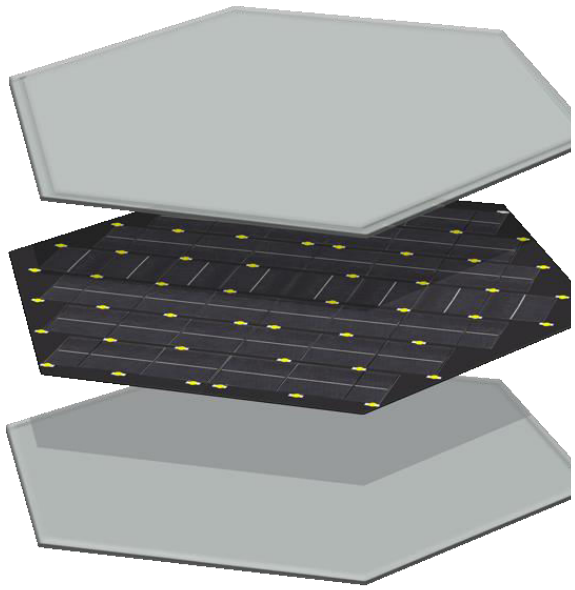

Figure 3. Layers of Solar roadway

4. SPECIFICATIONS

Weight Limits
Strength
Texture/Traction
Longevity and Durability
Hardness

5. ADVANTAGES

Renewability and life-span
No requirements to develop environmentally sensitive lands
On-the-go charging

6. CONCLUSION

- We can't wait any longer to find a replacement for oil, which is rapidly disappearing. Our dependency on oil has long been a matter of national security and we don't want to wait until it's gone to decide what to do next.
- We have the technology to solve this problem in a relatively short period of time, which may be all we have left. In developing counties the major part of the geographical area is to be explored in terms of road connectivity. So instead of implementing the higher targets roads to be developed per day such countries can reduce the target and develop solar road so they could improve economy with infrastructure.
- Generally the Solar Roadways will:-

➢ Create an intelligent, secure highway infrastructure that pays for itself.

➢ Create an intelligent, secure, decentralized, self-healing power grid.

Eliminate the need for coal-fired or nuclear power plants. End our dependency on oil and other fossil fuels (oil, coal and natural gas). Cut our nation's greenhouse gas emissions by over 50%. Provide safer driving conditions. Snow & ice management Traffic management Wild life protection National security Usage of recycled material.

REFERENCES

[1]http://www.solarroadways.com/Home/Specifics

[2] International Advanced Research Journal in Science, Engineering and Technology (IARJSET) - National Conference on Renewable Energy and Environment (NCREE-2015) IMS Engineering College, GhaziabadVol. 2, Special Issue 1, May 2015

[3]http://www.solarroadways.com/Home/Index

[4] Alark A. Kulkarni / International Journal of Engineering Research and Applications (IJERA) ISSN: 2248-9622 www.ijera.com Vol. 3, Issue 3, May-Jun 2013, pp.1429-1436"Solar Roadways" – Rebuilding our Infrastructure and Economy
[5]http://www.solarroadways.com/Home/Specifics
[6]http://shrinkthatfootprint.com/average-household-electricity consumption#27WWZzwhRLlWOTXy.99
http://www.livemint.com/Industry/jqvJpYRpSNyldcuUlZrqQM/Indias-per-capita-electricity-consumption-touches-1010-kWh.html
[7]"Scott & Julie Brusaw - Solar Roadways". The World Technology Network. 2013. Retrieved June 23, 2014.