

# 'SOLAR ROADWAYS': A Revolutionary Change in highway construction

Chiranjeev Singh<sup>1</sup>, Shivam Singh Patel<sup>2</sup>

<sup>1</sup>M.Tech (Civil Engineering with specialization in Highway Engineering) Scholar, Maharishi University of Information Technology, Lucknow

<sup>2</sup>Assistant Professor (Civil Engineering Department), Maharishi University of Information Technology, Lucknow Uttar Pradesh, India

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**Abstract** -Solar roadways are fundamentally basically designed sun oriented boards, which can without much of a stretch and viably act like regular roadways, the main contrast being cleverness and insight. These sun powered roadways are a lot of canny without anyone else, and entirely appropriate for the current period's turn of events; and consequently, these have been properly named as 'Brilliant Roads'. The principle thought process is to decently limit the utilization of traditional black-top and solid roadways, parking areas and carports, and to displace a dominant part of them by sun based roadways boards which will be answerable for the age of clean sustainable power source, which thusly will be utilized for fueling a particular or all the zone of a genuinely evolved city. A keen interstate framework and a self-mending decentralized force lattice will adequately help in decreasing the utilization of petroleum products, and subsequently, will constrain the outflow of ozone depleting substances significantly. This will bring about a half lessening noticeable all around contamination of that specific zone, where this innovation is utilized. Every one of these objectives can be accomplished by paying only some extra. This is a savvy framework which pays for itself. Along these lines, the time has come to update our foundation for the improvement of the not really inaccessible future.

power than our economy can devour. At simply 15% productivity, which is far underneath what is normal, a '100% sun oriented roadways' empowered

## 1. SOLAR ROADWAYS

The sun powered roadways comprise of fundamentally designed sunlight based boards, the size of each being 1sq. ft. (roughly). Notwithstanding electric force, information flags likewise travel through the sun oriented roadways which go about as a conductor for the information links. This dispenses with the horrendous sight of utility shafts, electrical cables and hand-off stations everywhere throughout the open country. It likewise takes out force shorts and disappointments brought about by fallen or broken electric lines or posts.

Each sunlight based roadways board utilizes a portion of the power it produces to illuminate implanted LEDs, which enlighten the roadways lines from underneath the surface. This element likewise causes it feasible for word messages to be lit to up on the roadways surface, and to make markings and signs to tell the driver about preoccupations and paths. Around evening time, the roadways will be genuinely lit up, subsequently, adding to the wellbeing of the driver.

**Key Words:** Electric Vehicles, Fossil Fuels, Intelligent Roads, Smart Grids, Solar Panels, Solar Roadways.

## 1. INTRODUCTION

The worries about expanding an unnatural weather change because of contamination and the abuse of petroleum derivatives prompted the introduction of sun based roadways. This advancement occurred in the mid 2009 and consequently its improvement started. Inevitably, an organization by the name of 'Sunlight based Roadways' was set up in the U.S. which was granted an agreement by the government.

The innovation of sunlight based roadways is planned for accomplishing long haul benefits rather than transient benefits. The sun based roadways framework, at present, costs around multiple times more than the traditional black-top roadways, yet it is more solid, all the more in fact sound, all the more effortlessly supplanted in particular design and can pay for itself by creating more



In locales of overwhelming snowfall, the roadways can be planned in such a manner to contain radiator units, and consequently, when there is snowfall, the roadways itself gets warmed up and dissolves all the day off, the need to physically clear the roadways and furthermore killing the blockages brought about by day off.

The sun oriented roadways will likewise make the electric vehicle innovation more commonsense. Reviving stations can be worked in parking garages and rest stations, and furthermore close by the roadways at equivalent timespans. It will likewise make voyaging and transportation less expensive because of the ceaselessly expanding costs of oil based commodities and because of the way that electric vehicles are less expensive to use than burning motor vehicles.

### 3. SOLAR PANELS AND PAVEMENT LAYERS

The sun oriented boards, after they are interlinked, structure the essential foundation of the sun based roadways. These sun powered boards comprise of the accompanying parts:

- i. Road Surface Layer
- ii. Electronics Layer
- iii. Base Plate Layer

#### 3.1. Road Surface Layer

This is the highest layer of the roadways gathering. This is the layer covering the sun oriented cells (photovoltaic cells) inserted in sunlight based boards. This layer ought to be clear for daylight to go through, and simultaneously, it ought to be sufficiently unpleasant to give adequate foothold to abstain from sliding of vehicles. It is made to be intense and solid in order to deal with tremendous traffic loads and furthermore it is caused waterproof so it to can ensure all the electronic components underneath it.

#### 3.2. Electronics Layer

This is the layer arranged beneath the roadways surface layer. It contains chip sheets, fitted at each 12 feet, which can detect loads on a superficial level. The LEDs and roadways lights will illuminate just when it detects a vehicle going on it. with the goal that the lights will stay off when there is no heap on it, sparing vitality. It additionally contains a warming component which liquefies the snow on the roadways, an element which is explicitly important in frigid territories. The lights light up when a vehicle is in a particular separation extend, say, 500 m or 250 m from the light. This office has assisted with decreasing night mishaps in England by about 70%. It can likewise show words, markings, and signs out and about surface with the assistance of LEDs to advise the driver about any impediments, temporary re-routes, and so forth. This makes this roadways get together a "Smart Highway System".

#### 3.3. Base Plate Layer

This is the layer arranged underneath the hardware layer. It disseminates all the force produced from the vitality

gathered by the electronic layer, down-line to all the houses, workplaces, enterprises, and so on associated with the sun oriented roadways. This layer is likewise made water verification to shield the hardware layer from ground water.

The following are a few figures which quickly portray the structure of sun based roadways boards.

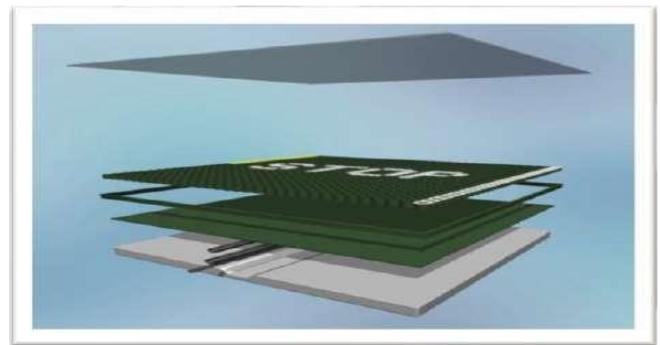
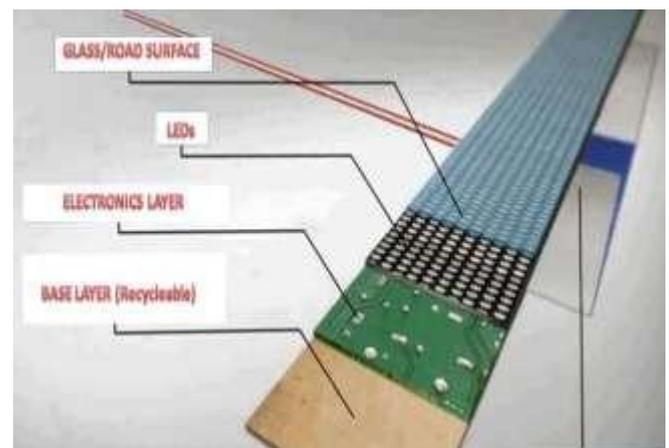


Fig: 1 Different layers of a distinct Solar panel



### 4. OIL DEPENDENCY

In 2010 alone, a great many lives have been lost in coal mineshaft and oil rig debacles and gas line blasts. Our oil reliance is with the end goal that even death toll would not make us think for a subsequent choice. All things considered, it is beyond the realm of imagination to totally annihilate the utilization of oil based goods and other non-renewable energy sources, however at any rate we can attempt to make sense of about a superior trade for these. What (more) is it going to take to drive us to wean ourselves off of our reliance of petroleum products?

So as to proceed at the present pace, we should expand our reality flexibly from 80 million barrels per day to 120 million barrels per day by 2030. In the event that this proceeds, the world utilization would ascend by a factor of right around 10.

Anyway, what will occur if the world comes up short on oil? Indeed, we as per estimations, we have about an additional 50 years before this occurs, however this reality is as yet debateable. Nobody can anticipate what may occur after, state, 10 years. Subsequently, rather than holding up until the eleventh hour, it is valuable to begin takes a shot at certain substitutes, ideally, sun based vitality.

It will be of colossal alleviation, if a completely operational, ongoing substitute, as sun based vitality, can be utilized to fuel even 70% to 80% of our everyday needs and works. The creation of electric vehicles is viewed as of most extreme significance for the flow given circumstance. The best possible usage of sunlight based roadways and electric vehicles can help diminish oil reliance by an extraordinary portion. What's more, besides, perfect and environmentally friendly power vitality, must be constantly liked.

Electric vehicles are relied upon to be a significant defining moment in the car just as the transportation business. The best possible execution of these helpful innovations will be a humongous commitment to the improvement of things to come ages.

## 5. SMART GRIDS

The force lattices by and by being used are put together and subordinate with respect to brought together force stations. The transmission lines (overhead or underground) handle the dispersion of intensity, with the help of hand-off stations and transformers. At the point when a line goes down (because of snowfall, overwhelming precipitation, helping, braid, utility shaft hit via vehicle, and so forth.), the whole zone on an inappropriate side on the line faces outright loss of intensity until the line is fixed. Also, in addition, if a force station goes down, a whole area of a nation goes dim.

The sun oriented roadways, then again, can supplant all the directly brought together force stations, including warm, atomic and hydroelectric force stations. Force is created all over; each roadways, parking area, garage adds to the power creation. No more force blackouts, voltage mistakes, and so forth should be face. Additionally, it thoroughly takes out the danger of death or a genuine physical issue because of direct contact with live wire. Thus, the sun powered roadways have been unequivocally named as 'Savvy Grids'.

## 6. APPLICATION IN INDIA

The principle reason of doing explore on sun oriented roadways and making a paper out of it was to help make India a propelled nation in all angles. One of the manners in which this should be possible is through lessening

contamination and, making shrewd thruways and giving all day, every day power to the country.

Presently, we did a gauge on how much power would be produced if the asphalt of one of the significant national expressways was supplanted with sun based roadways. In addition, it may likewise assist with making a keen expressways arrange. For this reason, we thought about supplanting the asphalt of National Highway 4 (NH-4), i.e., the Mumbai-Pune Expressway with sun oriented roadways.

As indicated by the gauge, the complete length of the parkway is 96 km. Also, accepting the width as 6 (number of paths) duplicated by 3.5 m (width of one path), the all out region secured by NH-4 is 2016000 m<sup>2</sup>. Presently, considering a 1ft\*1ft segment of a sunlight based board appraised 15 W, its territory is 1 ft<sup>2</sup> or 0.093 m<sup>2</sup>. Thus, absolute power created by NH-4 whenever supplanted by sun powered roadways will be around 32500 MW. Be that as it may, the territory of Maharashtra has an every day necessity of 20340 MW as it were. Thus, with this substitution, we can satisfy the day by day needs of a whole state and furthermore have an excess of around 12000 MW produced. Along these lines, this is an answer by methods for which brilliant roadways, adequate power and contamination free age of power can be accomplished.

In addition, the absolute force age limit of Maharashtra is 13602 MW and 10842 MW of this force, i.e., about 80%, is being produced from warm and gas turbine power plants. This is one of the significant reasons of expanding contamination in our nation. Thus, with this innovation of sun based roadways, we can thoroughly dispose of warm and gas turbine power plants from our age framework, live in a contamination free condition and still have the option to meet all our power needs and have excess of intensity put away with us.

## 7. ADVANTAGES

### 7.1. Renewability

The essential favorable position of sun powered roadways is that they produce vitality from a sustainable source, in contrast to different techniques and advances, which utilize traditional and non-inexhaustible hotspots for power age. It additionally helps in decreasing our reliance on coal, oil and other non-renewable energy sources by an extraordinary portion.

### 7.2. Life-Span

There is a major distinction in the normal life expectancy of sun based roadways and the normal life expectancy of regular black-top and solid roadways. The normal life expectancy of sun powered roadways is 30 to 40 years, though that of the customary roadways is 7 to 12 years.

This makes the upkeep of the sunlight based roadways less successive and bother free than that of the regular roadways.

### 7.3. Maintenance time

The sun powered roadways are made to be extreme, solid and in fact sound, yet at the same time, in the event that it gets harmed in any capacity, the fix is exceptionally helpful, simple and speedy, in contrast to the regular roadways. The harmed part is immediately supplanted or fixed (contingent on its state) inside less time when contrasted with the regular roadways.

## 8. DISADVANTAGES

There is just one significant detriment that drastically affects the utilization of this innovation. The underlying establishment and support expenses of sun powered boards are high. Along these lines, it can't be built into immature, poor and financially powerless nations. Be that as it may, in any case, progresses in this innovation may ideally make these costs fall.

## 9. CONCLUSION

Sun oriented roadways utilize treated glass and photovoltaic cells to make a totally keen and smart roadways framework. The innovation is as yet in its crude stage, yet with legitimate financing, little scope models have been built and effectively tried upon. China has just begun supplanting its primary roadways with sun oriented roadways framework, continuously. Despite the fact that the underlying venture is high for this innovation, it is an amazing swap for non-renewable energy sources, reducing later expenses and furthermore diminishing ecological contamination.

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