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Making The Case For Solar Bike Paths

INTRODUCTION

Solar panels are nothing new. The first solar cell was created as early as 1954 and it's now common for most people to spot one on a neighbor's roof, or driving by open fields of them on a cross country road trip. A solar bike path however, is a new idea that's still gaining attention and fighting its way towards feasibility. In 2014, the first bike path with integrated solar panels was completed near Amsterdam. This initial pilot project took four years to complete from ideation to installation, and the path was 110 yards long. Since completion, the company SolaRoad has installed similar roads in other locations in the Netherlands as well as in France. Sola Road began as a consortium of four different companies, but has since become incorporated as of 2018 in order to boost production.

Another small company out of America, Solar Roadways, has also created similar technology for roadways and with a greater intention of their hexagonal cells being used to cover entire highways. Their technology is still in the development phase. Their technology goes the extra mile to includes things like LED lights within each of the panels that can create road lines and prevent nighttime accidents, as well as a heating system to prevent snow covered roads (and to thereby maintain the ability to generate solar power even under snowy conditions, because the snow won't be preventing panels from receiving light). Something that stands out in particular about their design are the hexagon panels, which lock into one another to create the larger grid. In a similar way to carpet squares being used in an office building, if any of the solar roadway panels are damaged they can easily be removed and replaced individually to maintain efficiency and prevent delays in usage. Unfortunately, an initial test run performed for this technology in Idaho has proven unsuccessful, as one of the electricity boxes started smoking and required a call to the fire department.

Another company deserving of mention is Colas; a world leading transportation company which has, together with the INES (French National Institute for Solar Energy),

patented the term “Wattway.” Although controversial, they’ve devised a plan to convert 620 miles of French streets into solar roadways. According to Wattway’s estimates, it takes just 215 square feet of solar roadway to satisfy energy requirements for one single home. They also note that roadways, when taken as a whole, are only occupied 10% of the time. Operations are still mostly in the testing phase, but if completed this 620 mile stretch alone can provide all the electricity needed to power public lighting for a city of 5,000 people.

All in all, the sole purpose for the roadways are to create a surface for generating solar power, which can offset energy costs for cities and lower environmental impact. The biggest draw is that this is space that has no other purpose and can be utilized for solar without needing to take up further farmland or natural spaces. There’s a lot of debate over whether these types of paths and roadways are really worth the initial investment. Sola Road’s pilot project cost \$3.7 million and projections have said it could pay for itself within 15 years, although many are skeptical. It’s tough to gauge cost however, because when done on a larger scale the cost of installation ends up being much cheaper.

THE SUSTAINABILITY CHALLENGE

In theory this technology has the ability to solve a lot of sustainability issues at once when used on bike paths. There are four main arenas in which this technology has the ability to make a strong sustainable impact and meet the needs of all for the betterment of both community and environment.

People

On an individual level, one dramatic advantage is the ability to have access to a bike and walking path in all weather conditions. With the ability to melt snow and keep paths clear, this would allow residents of the community to not only be outside more in poor weather conditions, but to explore safely during these conditions. There would be less incidents from slipping on snow and ice, and it would be especially beneficial for elderly and disabled persons during the winter months. With more people biking or walking to work, there would be an increase in the overall health of individuals from getting more exercise and being out in nature. It comes as no surprise that a report from the University of California found that bike-friendly communities have higher levels of mental health and wellbeing. In addition, it would spark conversation and provide a common ground around for discussion on the topic of sustainability. Someone who may not have been convinced of environmental impacts in the past

might have a more open mind should they use the bike path and see all the benefits for themselves.

Planet

First, with solar bike paths there would be an increase in the total amount of people biking and walking instead of driving a car, thereby decreasing vehicle emissions. This uses less fossil fuels and improves air quality. Also, all unused solar power generated by the solar bike path would go towards powering the city itself with renewable energy. This would have a dramatic effect on decreasing energy usage. Not to mention, installing this type of technology would create a buzz and generate more general sustainability awareness within the community and hopefully empower people to change in other areas of their life as well to reduce waste and use less energy.

Public

With better and more accessible bike lanes and city that's easier to navigate by foot or bike even at night, more residents will choose to move to these areas for these benefits. Not to mention that the lower energy costs that will come as a result of the solar offsets will certainly be a big draw as well. With more people getting exercise and being out in their neighborhoods instead of stuck behind a steering wheel, the community will be a happier one. This will have a snowball effect of positive changes throughout the rest of the community with more involvement and positive change. It could also be a source of great pride among residents, making them proud of their community and thereby more willing to invest back in it in other ways and be an active member.

Profit

Another finding from the report done by the University of California found that "cities whose residents ride, run, walk, and participate in other activities have increased economic growth and productivity compared to areas with more sedentary citizens" and that an active city is a "low-cost, high-return investment." In 2007, \$146 billion was spent in the US for maintaining highways. Not to mention, it's estimated that "the average American driver spends \$523 in extra vehicle operation and maintenance annually" due in part to poor roads - this is often referred to as a "pothole tax." Having less cars on the road will cost cities and citizens less, while boosting health and economic growth.

STRATEGIC RECOMMENDATION

While there are unquestionable faults to the current solar bike paths models, there's a lot of room for potential. The benefits to be gained from this concept are profound and would have a dramatic positive effect if adopted on a large scale. Combining the current system and technology with the emerging water drainage technology is a new way of approaching this. It's a different approach to the idea and is looking more at the big picture instead of narrowly on just the benefits of solar. Not to mention it's capable of doing even more good for communities and the environment than the current solar bike path technology as it stands today.

Strategic Recommendation: Integration with pervious concrete.

Pervious concrete is a mixture of cement, water, and other loosely compacted fragments to form a concrete which water can run directly through. This has been gaining a lot of attention lately for stormwater management. Pervious concrete improves water quality, prevents flooding, and reduces temperature rise in incoming rainwater. Using pervious concrete allows water to soak into the soil beneath the ground as it would were the concrete not there, using the earth's natural water storage methods and avoiding surface runoff. Surface runoff from highways, roads and parking lots present a problem because detention ponds are needed to hold all the runoff water in order to prevent flooding. This water then needs to be treated before it can safely return safely to streams and waterways. Pervious concrete technology has been noted by the United States EPA as one of the best management practices for stormwater management.

Combining the potential of the solar bike paths with the benefits of pervious concrete would be a mean combination for serious change and improvement in our communities. Bike paths could be a combination of the two elements, having solar pathway strips outlined by pervious concrete on the sides as well as underneath the solar portions. If room allowed, the concrete portion could even be wide enough on the side areas to have a separate walking path from the biking paths. This would not only offset runoff created by the immediate solar surfaces on the path, but help maintain runoff from nearby roads and highways. In addition, it would help keep water cleaner and would save the city from having to filter all the runoff water.

Another thought would be for the bike paths to be more segmented between the solar panels and concrete sections, having solar panels not make up the entire path but just portions of it. This would allow for the bike path to have even larger sections of

pervious concrete to help with runoff from local highways and paved areas. It would also allow for bike paths to be longer without increasing cost by as much as if the entire path were only solar. It could be strategically placed so that areas under lots of shade or that tend to have more flooding could be made of concrete so the solar panels don't go unutilized in that area, but the bike path can continue on and still generate all the great benefits.

Imagine if starting today all new sidewalks were created using this technology, and with enough width to allow for a bike path combined with a walking path. We already use so much space for parking lots and roadways, how is it that we find it so difficult to find enough space for a simple bike path? By combining efforts and giving this approach the added benefits of water filtration, it will be that much easier for cities and communities to buy into the initial investment required.

CONCLUSION

Solar bike paths are far from perfect, but the potential benefits from their widespread use are unignorable. With more thoughtful implementation and a combining of different ideas, this technology can continue to move forward towards being a reality for more cities. The amount of land that's already been converted to use for roadways is alarming. Installing solar panels where this land is otherwise serving only one purpose utilizes the space effectively and offsets the negative impacts of having so many paved roads. An idea that can not only solve a problem but have positive effects on all areas of society is one worth pursuing.

Climate change brings with it an uncertainty of the future, but if there's one thing we know with near certainty it's that the sun will continue to shine for the next 5 billion years. Solar energy is not only free for us to use, but it reminds us of the greater universe of which we are all a part, and just how precious and deserving of protection our great earth is.

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