ABSTRACT

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Title: Kinetic Energy from Footsteps and Recycle Plastic-based Road Materials

The traffic is an important part in the city construction. In the same way, the power consumption of traffic lights is unstoppable with the large amount of deployment and high cost. The conventional LED traffic light usually uses the energy up to 13 watts which takes 1330 kWh consumption every year. Considering the energy used in traffic, if electricity can be generated by any other methods, the cost of government to provide the necessary electricity will be greatly reduced.

Electricity is the essential power for the society and industry development. The level of the development of a society could firstly be evaluated by the produced and utilized value of the electricity. Because of the importance of it, the source, efficient transmission and allocation must be considered carefully in the way of the sustainable development. Currently, although there is the development of some kinds of solar power and wind power, the ratio of the global thermal electricity power generation is still around 65%. And because of the much lower price compared to the wind and solar power, this proportion won't change a lot. Nevertheless, the limitation of the fossil fuels means humanity must search for the new kinds of methods for electricity generation. We should accelerate the industrialization of solar and wind power generation (that is, reducing their price and improving their safety operation ability). And how to use nuclear power is another significant issue. In addition, increasing efficiency of transmission and allocation could reduce electricity loss greatly. Increasing transmission voltage is a practical way. The higher voltage, the less loss. However, the cost of insulated and circuit-breaking equipment required by the high voltage is also rising. So, we need a tradeoff here. Another thing is the Electricity allocation, which require the system could recognize the demand of loads. In fact, it is not that fewer loads save energy more. Less loads often mean more grid-connected generators need to be cut off. Repeating starts and stops, especially for thermal generators, is a behavior that cost energy outrageously, which often occurs when the electricity system could not fulfill the great change of loads. It is feasible to connect large area networks, so as to ensure that the load fluctuation within a large area is not very drastic, and the power system can always maintain high efficiency in power distribution.

Considering the electricity consumption problems for the traffic, one of the good ways of generating power for supporting the lights is to use the pedestrians' and automobiles' moving power. While all pedestrians need to walk through the crossroad, the utilization of the device can be maximized. Basically, there are two different approaches to produce the power: electromagnetic induction and piezoelectric effect. By using the power storage technology, we

can store these energies for use of lighting. However, these two different ways of producing energy have different efficiency and thus need to choose between.

Energy “harvesting”—where incidental energy like radio waves, heat and vibrations are harnessed for power—is not a new concept, but the technology to support the idea is getting better. Just as today the kinetic force of a swinging arm can power a wristwatch, some technologists are betting that in the future pedestrians’ footsteps can light a city. Much of energy harvesting’s promise lies in manufacturing, where so much energy is lost to the heat, sound and vibrations of machinery. If even a small percentage of that could be captured and reused, then companies could realize significant cost savings or so the theory goes.

In addition, the road layer or asphalt layer covering on piezoelectric for electric energy generation from kinetic energy should be considered with environmentally friendly material. Plastic waste as Polyethylene terephthalate (PET) could be applied for asphalt production in order to reduce amount of polymer bitumen using in the process. Besides, the life and strength of the road could be improved with better performance from the conventional road. Moreover, the combination of smoke absorbent material like titanium di-oxide by 10% of polymer content can reduce the vehicular pollution. Therefore, the green electric energy is able to generate together with eco-friendly material.

As been mentioned above, the “kinetic energy from footsteps” technology makes it possible to reduce electricity consumption by using the pedestrians’ and automobiles’ moving power. And the “recycle plastic-based road materials” which is made from plastic waste, has the advantages in recycling plastic waste. In conclusion, these technologies have superiorities in both minimizing consumption of energy and plastic waste recycling, which can change the way of energy consumption and thus can make human life more comfortable.