GridWay: Harnessing the Energy of Urban Traffic

As global energy demands continue to rise, due to human technological advancements, the need for a clean source of energy is here. It is projected that by 2027, the world will require an additional 85-134 terawatt hours of energy (De Vries, 2023). As renewables have been steadily supplying more and more; they will require additional space and funding. What if there was an innovative technology that could be directly implemented into current infrastructure? A solution could be to harness the 25.7 million cars driving on Canadian roads, using Faraday's Law of Electromagnetic Induction. There will be two editions to this revolutionary piece of technology, (1) a simple magnet and coil design intended for vast low traffic distances, and (2) an integrated, flywheel-based system engineered for certain high-traffic zones. Unlike solar or wind, road tiles do not require additional space. Instead, they are a dual-purpose system, able to support current transportation infrastructure while also producing renewable electricity.

In the experiments, Variant #1 was able to generate approximately 0.0015 Watts, using two 1.14kg neodymium magnets and a 100x coiled wire. While this small number seems insubstantial, the scaling potential is significant. A single car passing could generate up to 7 Watts with the use of industrial magnets. If expanded to one of Canada's busiest highway lanes, the system could generate more than 1 Terawatt hour annually; enough energy to sustain the street lighting consumption of BC/Territories for 10 whole years.

Additionally, each tile is projected to cost 10% cheaper than a typical Pavegen tile (a commercial kinetic sidewalk energy system), coming out at around $170 for every half meter squared. This means that there will be a return on investment in approximately 1.8 years for high traffic areas or 5 years for low traffic use. On the other hand, Variant #2 can produce significant amounts of energy, but will require a larger upfront investment due to complex engineered components. Both variants have the potential to transform Canada's renewable energy sector by producing electricity right beneath our tires. The future steps include testing for durability, to simulate real traffic conditions, and piloting installations in high-traffic zones to demonstrate real-world scalability and energy transformation efficiency.

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