

ELECTRIC SPEEDBREAKERS

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Topic & Research Question

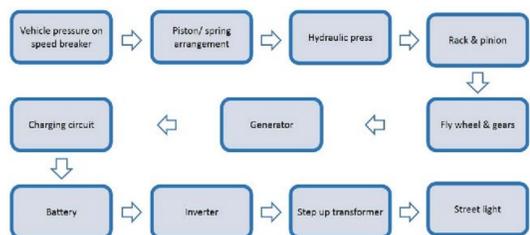
Our topic describes the utilization of mechanically modified speed breakers as alternative source for sustainable energy production.

The main research question to be answered is "What are the benefits of generating power using speed breakers to meet energy demands and environmental sustainability?"



Situation

Demands for energy have increased considerably. This demand is explained by the rapid growth of the world population and the continuous advances in technology. In order to meet the energy demands, renewable energy sources should play the main role in supplying energy for all nations. This switch in energy sources should take place because fossil fuels, a non-renewable source, is scarce. In addition, burning of fossil fuels releases harmful gases leads to respiratory diseases and deplete the ozone layer [1]. To avoid such health and environmental issues, the proposed project discusses the ways in which power can be generated by implementing a system of engineer-altered speed breakers. These speed breakers can be designed so that the weight of the vehicles and the rotation of the vehicles' tires will result in power generation.



Key Problems

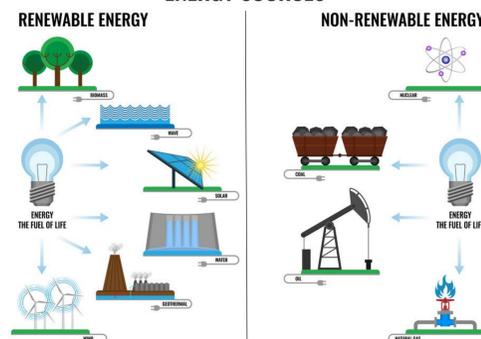
Around 80% of world energy is generated using non-renewable energy sources, indicating the world's heavy reliance on sources such as fossil fuels[2]. Conventional energy sources are non-renewable, and are not able to keep up with the nonstop demand of electricity. Therefore, it is important to minimize the demand of non-renewable sources and use renewable energy sources such as solar, hydro, and wind power.



Conventional energy sources rely on burning fossil fuels to obtain energy and generate electricity. This action produces greenhouse gases, which are the main contributors to global warming. Renewable energy sources, contrarily, are environmentally. Therefore, it is important to devise a solution that exhibits the beneficial features of both non-renewable and renewable energy sources to serve as an alternative in the meantime.



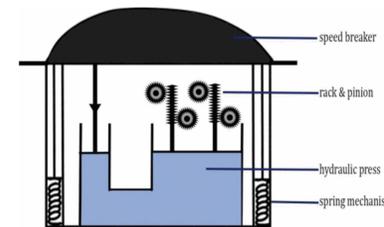
ENERGY SOURCES



Main Solutions

• Spring gear system:

There are two mechanisms that can be used to generate electricity using speed breakers. The first mechanism is a spring-gear system. The spring-gear system converts the gravitational potential energy provided by a vehicle's weight in to electrical energy. A spring attached to the speed breaker's upper platform is compressed as a vehicle steps on the speed breaker. When released, the spring rotates a gear attached to a generator which produces electrical energy.



• Roller system:

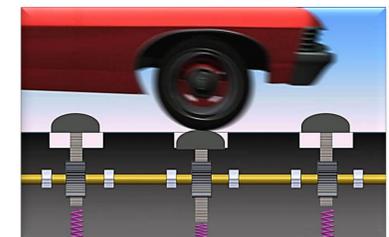
Alternatively, the second mechanism is a roller system. The roller system converts the kinetic energy of a vehicle's rotating wheels in to electrical energy. The rotation of the cylindrical rollers is responsible for driving a shaft that is attached to an electrical generator.



Our goal is to devise a system that combines both mechanisms in order to exhibit both of their advantageous features.

Evaluation of Solutions

Implementation of the proposed speed breakers will significantly diminish the reliance of fossil fuels and similar environmentally toxic sources of energy. Such invention can potentially jumpstart visible improvements and raise concerns about environmental sustainability in the near future.



The design of this speed breaker will take advantage of the weight of the vehicle itself. The innovation behind this design is the usage of weight to create kinetic energy. The kinetic energy can then be transformed into storable electrical energy. However, the initial application of such a mechanism will be expensive, as the product consists of numerous components to fulfill the desired functions. Nonetheless, every speed breaker will only be installed once, with periodic checkups and maintenance occurring to ensure the quality of the product. As a result, the costs that will be incurred mostly consist of that of maintenance, which is relatively inexpensive in the long term.



Main References

- [1] M. Ramadan, M. Khaled, and H. El Hage, "Using speed bump for power generation-Experimental study," Energy Procedia, vol. 75, pp. 867-872, 2015.
- [2] R. Hannah and R. Max (2019), "Fossil Fuels". Published online at OurWorldInData.org. Retrieved from: 'https://ourworldindata.org/fossil-fuels' [Online Resource] - Other references will be provided upon request.

POWERUP