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Development of Smart Tunnel Transportation System Operated by Gravitational Potential Energy for Protecting the Global Environment.

Lok baral
Tribhuvan University,Nepal

All living being are well experienced with the gravitational pull in their day to day life. Inside and outside the earth's surface, different degree of gravitational pulling exists. To a certain level of height around the earth's surface, gravitational field (GF) exists. Due to the presence of GF, there exists enormous source of gravitational potential energy (GPE). This energy can be utilized for transportation purpose by digging spherical shape (for short distance) and straight (for long distance) tunnel under the earth's surface. Vehicle for any mass executes simple harmonic motion inside such tunnels. Energy loss due to frictional force, the vehicle starting its motion at one end can not reach the other end at the same level of the tunnel. To overcome the frictional force so that the vehicle reaches the other end at the same level with the first, the external energy of amount below 10-15% of total energy required for the whole path length is sufficient. About 85 to 90 % of the total energy requirement for driving the tram, roller coaster or train, freely available GPE can be utilized to complete the whole smart tunnel path.
Hence 85 to 90 % requirement of the total energy can be utilized from GPE source for driving such smart tunnel transportation system (STTS). By digging suitable length of smart runnels below suitable depth of the earth, local as well as global level transportation system can be established. Use of GPE up to 90 % and cutting off the use of gasoline can necessarily protect global environment. STTS can provide access to both vehicles operated by gasoline and specially designed trams, roller coaster or trains.
The GPE available for the vehicle of mass m at the depth h,
U = mgh where g-acceleration due to gravity.
$= \frac{1}{2}$ m v^2 , v- velocity of the vehicle.
Neglecting frictional loss
$v = \sqrt{2gh}$
$= \sqrt{(2 \times 9.798 \times 2000)}$ where g = 9.798 m/s^2 at depth h = 2 km
= 197.9
$\approx$ 200 m/s
= 720 km /hrs
U = K + Efr where K – kinetic energy
Efr – energy due to force of friction.
If half of this is the estimated average speed of the vehicle at 2 km below earth surface then it would be the practically demanded useful speed in modern transportation system. Hence such STTS would be practically viable concept.
For a 100 Km tunnel length which passes through one side of earth surface to other side, the depth required below earth surface is 2 Km. The temperature at depth is about 60ºC and working condition can be managed by applying air conditioning technology or so. Digging tunnel is costly but if the investment used to buy gun is diverted towards its development then it can be a smart technology for protecting our globe.
Usages in: (1) transportation and (2) crossing roads through underground tunnels which saves life, time and energy in traffic management system.