

Role of Green Technology in Transportation

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ABSTRACT: *The transportation industry, is the carrier of goods and passengers, it is undeniably one of the most important industries in the world. Global warming, environmental pollution, health consequences (physical, physiological, behavioral, spiritual), and greenhouse gas emissions are all problems that current transportation systems face. Urban traffic congestion is becoming more severe as the urbanization process accelerates, and the conflict is growing. Populace, resources, and the atmosphere are all becoming more important, according to the estimated data, all the road transportation is reliant on the oil as a source of transportation and uses about 90% of the oil. Green transport is a less polluting and environmentally sustainable form of transportation. Implementation of green transport system is beneficial not only for efficient utilization of street resources, reduced transportation jamming, lower energy expenditure, and improved air eminence, but too as a reappearance to the past. present paper identifies the cause and effects of conventional transportation sector on environment, importance of green technology, benefits and contribution of green transportation to flora and faunas. Further, in the present study various modes of green transportation approaches is been discussed.*

KEYWORDS: *Green, Resources, Sustainable, Technology, Transportation.*

INTRODUCTION

Human society generates and uses a variety of technology to sustain everyday activities. Technology implementation is small, but its negative consequences are large for the atmosphere and anthropoid society. Although, there is space for emerging progresses that are more eco and environment friendly to enable everyday activities of today's lifestyle. New technologies, contrastingly, are more effective and ecologically sustainable as a result of upgraded information and modern advances in energy conservation science, green or sustainable technology refers to these technologies. Performance, reprocessing, security, wellbeing concerns, renewable energy, and other factors all play a role in green technology. With improved determinations in the direction of globalization over worldwide, the level of race among different businesses in various grounds of work, in addition to between governments for the sake of development, has improved. Each person is continuously deploying Mother Nature, the world, for the ease of globalization and advancement. People worried about the atmosphere and biodiversity accept that if existing levels of manipulation continue, the globe and its environment will no longer be appropriate for a healthy existence. From here the term "green technology" comes into play, which refers to the implementation of technology in such a way that growth as an outcome of the globalization will be continue and negative impact will be minimum.

Green technology, a technology that is environment friendly in nature, and it is used or implicated in such a way that it will not disturb the ecological balance of the environment and will conserve the natural resources. In other way green technology can be referred to as the advancement and implementation of the products, apparatus and system used to safeguard the natural atmosphere and resources, which reduces the adverse effects on the environment by the actions of human beings. There are four basic criteria that a technology needs to satisfy to be called as green technology (Figure 1). The main motive for the introduction of green word in technology is that the particular technology should be working in favor of the environment means it should not be harming the environment in any way. So the first criteria are, it should reduce the exhaustion of the environmental sector and natural resources. It is a known fact the industrialization raised the problem of the global warming and industries are the main and major contributors to this issue. So the second criteria are the particular technology to be called as green technology, it should have a zero or low greenhouse gas release which will encourages the vigorous and value-added atmosphere for very forms of lifecycle. The next criteria are that, it should safeguard the usage of

power and mineral deposits'. And the last criteria is the technology should be promoting the use of renewable resources.

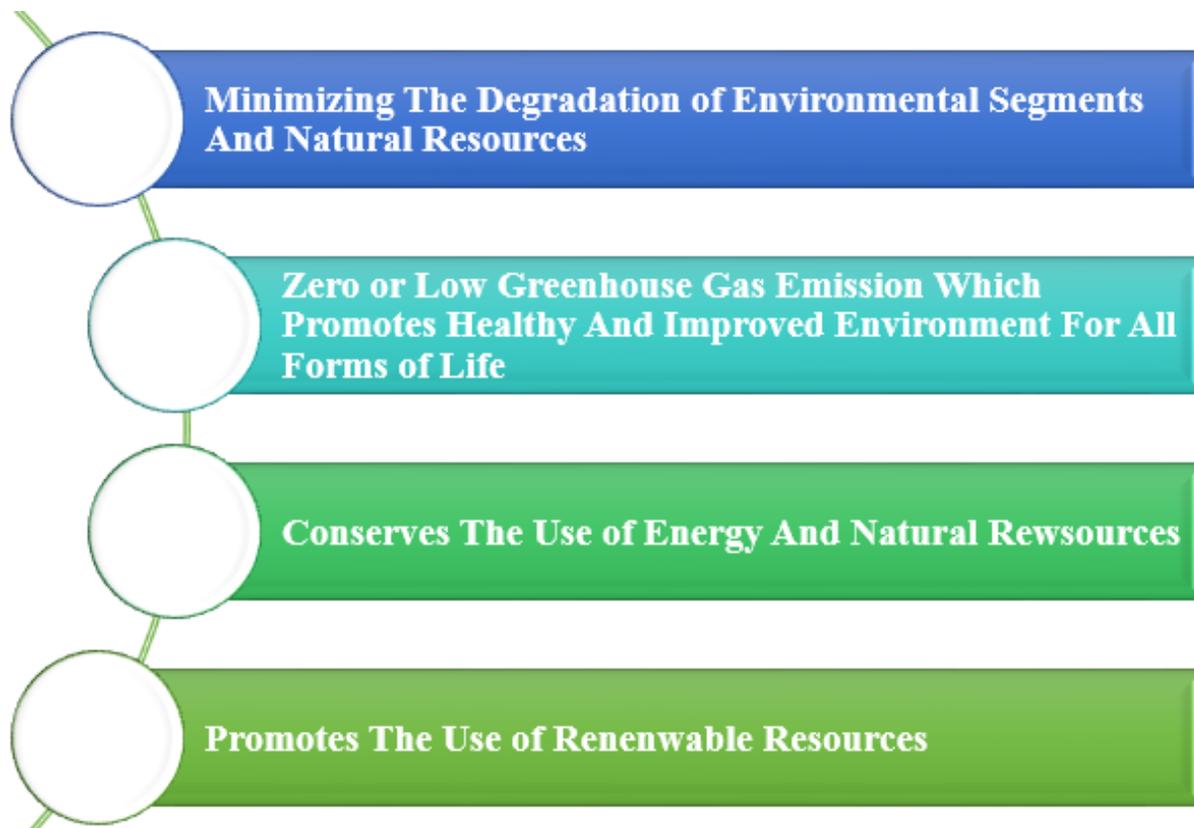


Figure 1: Satisfying Criteria for Technology to Come Under Green Technology[1].

CURRENT SCENARIO OF TRANSPORTATION IN URBAN CITIES AND GREEN TRANSPORT

Metropolitan areas all over the world are populated by automobiles and are difficult to maintain. Noise and wind contamination, transportation jamming, street misfortunes, communal transportation failure, ecological deprivation, weather alteration, and power exhaustion are all problems that cities in developing countries face. Urban transportation is the only way for people in average and large cities to get to work, school, and public facilities. These destinations are farther away than can be reached by walking or cycling. Inadequately, the current state of official communal transportation facilities in many developing towns does not meet the population's versatility needs; they are inefficient, cramped, unsafe, or problematic. The traditional method for alleviating traffic congestion in many countries is to expand the street system's size by building innovative highways and broadening present ones. This technique, however, only serves as a temporary fix based on previous experience. Within a little decade, these infrastructures will get overburdened yet again, and the condition will deteriorate to the point that it shall be difficult to build fresh streets because of lack of land-living or the incapability to extend the current system. It is not an option; creating a maintainable and green transport system is the finest reason for overcoming and meeting the conveyance stresses of the ever-increasing metropolitan populace and freight fronting cosmopolis. There are numerous meanings for harmless and sustainable conveyance as a consequence of the energies of numerous administrations and authorities. It uses renewable or renewed energy as an alternative of fossil fuels and has a low ecological effect.

IMPORTANCE OF GREEN TECHNOLOGY

Green technology, referred to as the technology that is assembled and utilized in a mode that it shields the atmosphere while also safeguarding natural deposits. Sustainable technology is a part of renewable energy branch of environmental technology, hence the importance of this cannot be ignored. With so many arguments for the worth of sustainable technology, books could be printed and vocalized on the subject. It is not very non-

obvious to say that every individual has to do something about uncontaminated environment and conserve energy resources. Only promoting and going green can help to overcome the present situation. And before things will turn out more worst, the importance of green technology should be recognized. Green technology is based on four pillars on different sectors. These pillars of technology policy are energy, environment, economy, and social shown in Figure 2[1].



Figure 2: Four Main Pillars On Which Green Technology Policy Works[1].

It is believed that the environmental expertise and environmental ethics development will going to be the backbone of sustainable future as the inhabitants is keep increasing. Though the environmental beliefs are just about evolving one's mentality and individual duty concerning the atmosphere, so these automations are established and conferred to deliver unpolluted and environment friendly substitutes to the current ones specifically sustainable transportation. Global heating, ecological deprivation, healthiness effects (physical, sensitive, psychological, mystical), and conservatory gas toxicity all are the result of existing transportation networks. The transportation sector is being targeted because it is the main source of greenhouse gas releases. Greening the transportation sector is the most understandable and urgent resolution to this deliberate ecological pollution. subsequently, Green Transport is being built to boost environment friendly conveyance activities or vehicles that have no damaging effects on the environment. Nowadays, oil is used in over 90% for all road transportation, which resembles to 60% of total worldwide oil consumption. Road transportation accounts for most of overall greenhouse gas releases, 75 percent to be precise, and this development is estimated to endure in the upcoming time if it continues persistent[2]. Green and ecological transportation has a number of benefits, including environmental, health, and economic welfares (Figure 3).

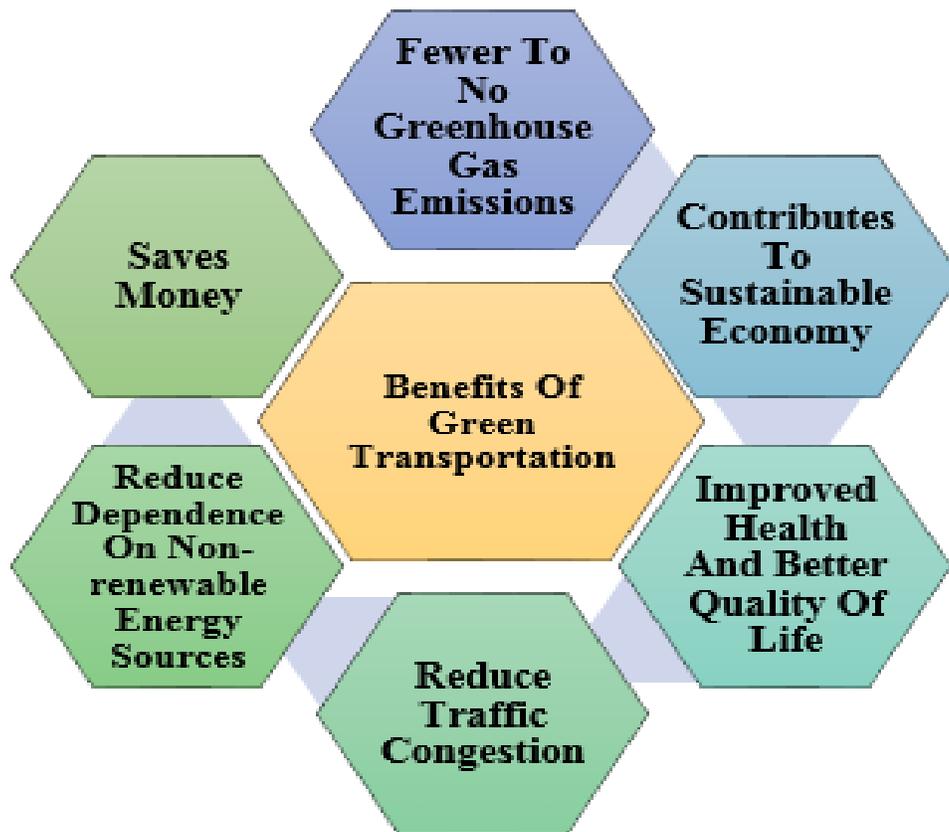


Figure 3: Various Benefits of the Green Transportation and Contribution to Environment.

WAYS OF GREEN TRANSPORTATION IN FUTURE

Researchers and inventors are at work to develop innovative technology that will facilitate flying in an eco-friendlier way by using quiet, environmental friendly aircraft. Here are the newest and most talked-about discoveries that will revolutionize travel and transportation in the future. Currently available modes of transportation necessitate enormous amounts of power to ride cars. They release harmful fumes that contaminate the air and causes difficulties in wellbeing. It is advantageous to utilize environment responsive means of conveyance system to evade these undesirable significances.

1. *Electrical Motorbikes or E-Bikes:*

They are an excellent means of sustainable transportation as they emit no harmful emissions into the atmosphere. In certain countries, riding an electronic motorcycle necessitates a special registering, certificate, and assurance. The promptness of electronic motorbikes is heavily controlled by commandment.

2. *Electrical Cars:*

Electrical vehicles, also known as battery-operated motorized cars, have been on the road for relatively some time. They are smaller, brighter, and move a little slower than traditional energy-powered vehicles. Due to traffic and management problems, the design and expansion of these cars failed in India. Since the effectiveness of these vehicles depends on more level roads and equally spaced charging stations.

3. *Hybrid Cars:*

Electricity powers hybrid cars, much as it does electronic vehicles. Modern amalgam cars are engineered to restore their cells in a robotic and reliable manner by switching energy while braking. Conservatory gas releases from amalgam vehicles are tremendously small. Radiations can be reduced by up to 90% as compared to traditional gasoline-powered vehicles. Experts agree that electric cars reduce health frightening radiations by above 90%.

4. *Electrical Aircrafts:*

The concept of electrical aircrafts and private winged vehicles, according to leading aircraft manufacturers, will propel the future of environmentally friendly airlifts to new heights. Airbus and Boeing, two of the world's biggest aero plane makers, have recently invested in producing electrical aero planes for commercial airlifts in order to increase air tourism by reducing airlift times, costs, and the amount of pollution released into the atmosphere unconstrained.

5. *Hyperloop's:* The Hyperloop is a revolutionary mode of travel that consists of an airtight duct or set of pipes through which a shell can travel without friction or resistance. It works by accelerating and decelerating an electromagnetically ascended shell through a low-compression conduit using an undeviating electric motor[2]. There is one more approach discovered for the sustainable transportation system considering ecological concern. Application of biofuels in place of natural fossil fuels is a beneficial strategy as it is eco-friendly in nature, biofuel use does not cause any potential harm to environment. There are various types of biofuels like bio-ethanol, bio-diesel, bio-butanol, bio-gas which are used in various application and bio-diesel is the fuel used in combination with natural fuels in transportation system. Till now no vehicle is fully reliant on bio-diesel because of some shortcomings. Having tremendous advantages of these fuels still they are not used on 100% basis. Biofuels are presently produced by raw materials of crops that are also used as foodstuff. As a result, there is a chance of struggle between foodstuff and petrol, which might have an effect on prices of food. Another definite threat is the development of biofuels raw material fabrication into surroundings that bear high heterogeneity and other facilities vital to our economies and existence[3]. Although biodiesel, whether unadulterated or mixed, emits fewer contaminants than diesel, including particulates, Sulphur, hydrocarbons, CO, and pollutants, it does so at a lesser cost. Releases are affected by engine scheme, vehicle state, and fuel quality. With the exclusion of NO_x (Nitrous Oxide) emissions, possible reductions of most contaminants in biodiesel-diesel combinations rise practically linearly as the fraction of biodiesel increases[4].

6. *Global Greenhouse Gas Emission by Transportation Sector:*

There are several activity sectors that contributes to the greenhouse gas emission, significantly with energy generation. Carbon emission by every source is the consequence of specific procedures and methods that aren't addressed collectively. For example, carbon emissions from fossil-fuel-based electric power generation (coal or gas) cannot be mitigated in the same way that carbon emissions from cement manufacturing can (Figure 4). Transportation is accountable for about 20% of greenhouse gas releases, with road transportation accounting for three-quarters of that (Figure 5). The percentages for air and oceanic transportation are 11 percent respectively. Each of the major styles of transportation necessitates its own reduction plan[5].

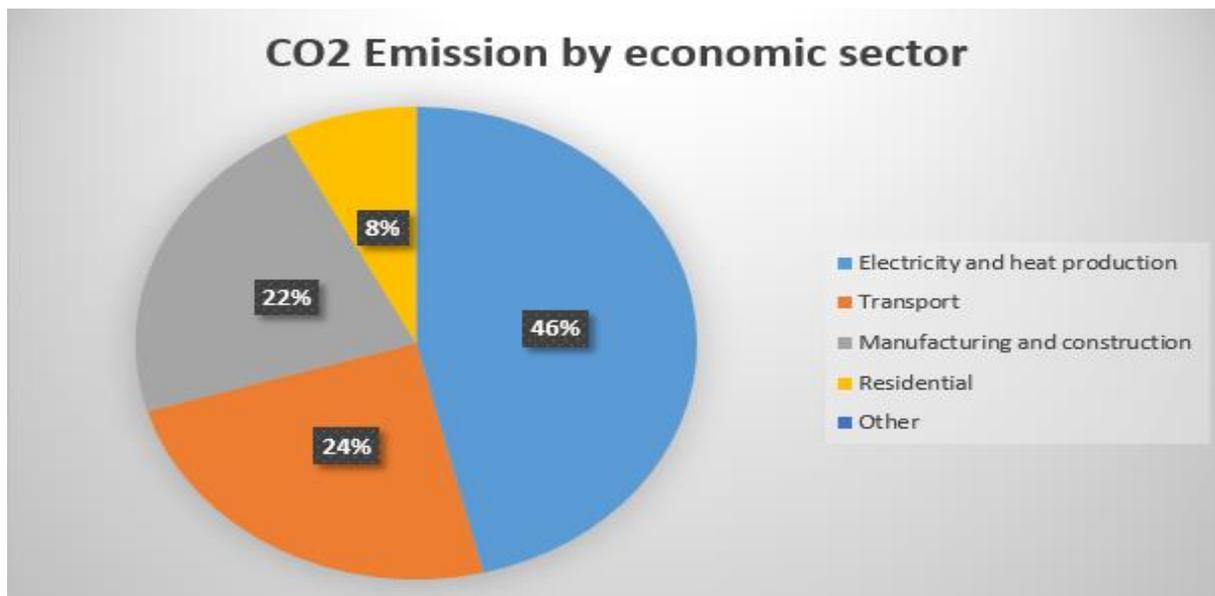


Figure 4: Worldwide Greenhouse Gas Releases by The World Economic Sector[5].

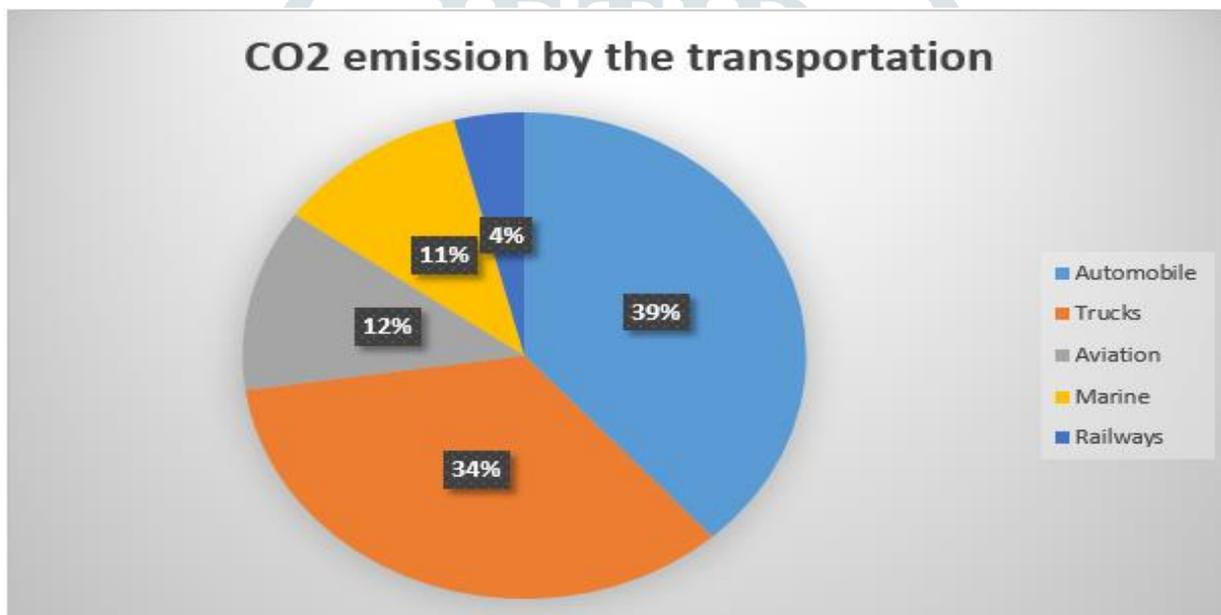


Figure 5: Worldwide Greenhouse Gas Releases by The World Transportation Sector[5].

LITERATURE REVIEW

Suhaiza Zailani et al. explained about the consequence of the green technology origination implementation in the transportation business in Malaysia. Transportation infrastructure and organization will be critical in the logistic plans of companies challenging in the international marketplace in the twenty-first century. The impact of transportation and logistics systems upon the physical atmosphere has become a chief concern as they continue to integrate. The background and consequences of sustainable technology acceptance in Malaysian automobile companies are investigated in this study. 252 samples were analyzed in a questionnaire investigation into the green technology origination implementation of Malaysian's conveyance firms. Founded on the findings of the analysis, the author concluded that the value of human's resource, customers burden, and ecological ambiguity all had a significant impact on sustainable invention implementation for transport company, while organization's and administrative backing had little impact. Furthermore, the study's results reveal that there is a strong link between the implementation of green technology and environmental consequences[6].

Bilal Shouket et al. examines the influence of inflight and railway transportations on ecological deprivation in forms of massive carbon release, normal reserve exhaustion and jungle reduction in the framework of Pakistan by utilizing a yearly interval sequence statistic since 1975 to 2016. The finding shows that travelling by train increased carbon releases, while in-flight and rail transport and portable service degrades the atmosphere by depleting natural resources. The "pollution haven theory," which states that free trade policies increase carbon pollution, was verified in the study; however, the "human genius" theorem, which states that population increase preserves natural resources and the environment through prosperity and development, was also confirmed. The author stated that the government must take thoughtful steps to redefine the transport substructure in order to promote the environmental protection agenda by implementing hybrid cars and sustainable transport schemes, which are necessary for the nation's lengthy sustainable growth.

Jia Mao et al. in the study presented the outcomes of a study testifying into whether the community support the perception of sustainable transport in the insolent communities. Smart towns are changing over time, resetting new approaches and agendas that have a significant impact on policymaking and development while coexisting with existing infrastructure. It is nowadays essential to understand the impact of the insolent towns on full metropolitan preparation and conversely in order to identify urban preparation proposals for a smarter city framework. Transportation is now used as an assembly line for all facets of lifecycle around the realm. The green town movement model has been suggested as a way to analyze urban traffic data in order to characterize key aspects of insolent agility in insolent towns. The expansion of smart transportation's schemes based on a planned model's that styles road traffic flow in the metropolitan safer and more enjoyable. The findings of the investigation recommended the necessary elements of sustainable transport and honest smart movement behavior.

Ying YingTye et al. in their study outlined the significance of subsequent generation's biofuel as a possible vitality basis for the Malaysia's conveyance area and its upcoming growth viewpoints. In their work, they reveal that Malaysia vitality rule constantly favors the RE (renewable energy) trade above non-renewable conservative power resource, which have undesirable environmental consequences. Crop residues have considered as a leading substitute base for the development of second-generation biofuel (SGB) in Malaysia, which has a large agricultural industry. The biomass accessibility and potential energy generated are estimated to be 50,919 dry kton/year and 13,343 kton/year, correspondingly. Biomass energy is expected to contribute about 21.5 percent of the country's energy requirements. Malaysia's main factors for transitioning to renewable energy sources, such as SGB, are also addressed. SGB will help Malaysia achieve energy security and mitigate CO₂ emissions. SGB is also a financially viable option. Similarly, since a large part of Malaysia's automotive fleet runs on gasoline, the marketplace for bio-ethanol could considerably greater than the marketplace for biodiesel. As a result, successfully executing and endorsing subsequent generation bioethanol is a premeditated change for Malaysia country to develop into a self-reliant nation in the upcoming time[7].

Md. Faruque Hossain explained about the solicitation of wind energy in the transportation sector. As a vital basis of energy, the worldwide transportation area is heavily dependent on fossil energies. This has had an undesirable impact on the atmosphere. Weather variation necessitates that inexhaustible and unpolluted power technologies be executed in the worldwide transport sectors. While addressing this problem, a small breeze turbines was connected on an automobile in this study, letting it to capture air while the automobile is moving and produce the energy wanted to function the vehicle. As a result, hypothetical modelling and investigational calculations were accomplished to approve the use of wind by the running vehicle's turbine to produce energy through the electrical sub-systems translation process, thus running the automobile as a self-contained power machinery that might be profit-oriented. The results show that a vehicle travelling at 10 kph generates 8 kWh with an average wind speed of 2 kph. Because a typical car takes 20 kWh to fully charge, the consequences show that if the vehicle run at 10 kph for about 60 minutes while charging, it will fully charge and run for 200 kilometers. The

outcomes of this study indicate that using wind energy to power cars on a huge scale, which is completely clean and abundant, could be an original way to meet the worldwide transportation area's energy request.

DISCUSSION

The transportation area delivers the necessary infrastructure that permits for monetary and communal growth. Every single day, the industry passages millions of tons of consignment and thousands of passengers. Individuals go to work, cargo is transported to and from plants, scholars are given outings to and from schools, and families do travel. Their grocery weekly shop and a range of other outdoor activities are dependent on transportation vehicles. Though it has significance to global life, it poses a risk to environment because transportation vehicles are one of the biggest consumers of petroleum goods and thus a chief source of detrimental particles such as greenhouse smokes and CO₂ in the air. Some emergency measures have been taken to decrease the release of these greenhouse gases and the global population is mobilized under the idea of Green Transportation. This will be the best habitation to accumulate all efforts to safeguard the planet and its populations. Engineers, representatives, and metropolitan planners, communal and behavioral experts, organizers, ecological engineers, organization scholars, manufacturing engineer's advocates, biochemical engineers, corporation executives, conveyance researchers, auto-mobile engineers, and others from a diversity of arenas are now work in partnership to green the transportation business.

Release of noxious gas, rapid extractions of fossil fuels resource, increasing oil rate and growing distresses concerning power safety are declining the attractiveness of IC engines-based vehicle. Amalgam vehicle have the capacity to change the prevailing state of transport and marketplace place with lesser fuel utilization and noxious emissions. From the study it can be concluded that the idea of converting the conventional transportation into green transportation is the only way to reduce the exhaustion of natural fossil fuels and the impact they cause on the ecosystem. It is an ideal modes of conveyance for small distance roaming and transference along with an essential part of metropolitan complete transportations. In the meantime, the growth of metropolitan sustainable transport is a significant way for saving power, dropping carbon and PM_{2.5} emissions and refining atmosphere.

CONCLUSION

The credibility of IC (integrated circuits) engine-based automobiles is decreasing due to the release of toxic gases, rapid extrication of natural mineral assets, increasing oil rates, and the distresses about vitality safety. With the huge consumption of fuels and toxic pollution, amalgam automobiles have the ability to improve the present state of conveyance and the marketplace. The administration's and the society's interest in another modes of conveyance are growing. Another strategy which comes under the policy agenda of sustainable transport is biofuel. Biofuels, like petroleum fuels, can have ecological concerns at each stage of creation and use. Though, when linked to fossil fuels, the ecological effects of purifying, conveying, and expending biofuels are generally much lower. Additionally, these doings can be enhanced in terms of reserve efficiency and outcomes. Green transportation guidelines, according to the study, should be executed to substitute cost-effective approaches, reduce emissions, and inspire different operating ways.

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