

## Environmental protection must be considered in transportation area

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**Abstract:** Traffic and the environment are paradoxical in nature. From the side, supporting transport activities is increasing the demand for mobility for passengers and freight, and this varies from urban areas to international trade. On the other hand, transport activities have resulted in the development of mechanization and congestion. As a result, the transportation industry is becoming increasingly involved in environmental issues. With a technology that relies heavily on the combustion of hydrocarbons, especially with internal combustion engines, the impact of transport on environmental systems has increased due to mechanization. This has reached a point where transport activity is a dominant factor behind the emissions of most pollutants and therefore they impact the environment. These impacts, like all environmental impacts, can fall into three categories. The direct consequence of transport operations on the environment where the causal relationship is clear and often understood; The (or tertiary) efficiency of transport operations on environmental systems. They often have higher consequences than direct impacts, but the participating relationships are often misunderstood and difficult. They take into account the various effects on direct and indirect effects on a system. ecology, often unpredictable, the complexity of the issues that has led to many controversies in environmental policy and the role of transportation. Transport industry often subsidizes the public sector, especially is through the construction and maintenance of road infrastructure that tends to be free of access. Sometimes, public shares in the mode of transport, terminals and infrastructure can be isolated with environmental issues. If the owner and this is the same (different, industry by the Government), then there is a risk that the regulations will not be effectively compliant to. It could also lead to an extremely suitable place that would result in less efficient transportation systems, but subsidized costs. The total costs incurred due to transportation activities, especially environmental damage, are generally not entirely undertaken by the user. The lack of interest in the actual costs of transportation can explain a number of environmental problems. However, a complex system of related costs, from internal (mostly operational), compliance (regulatory compliance), contingent (risk of an event such as a spill) to outside (assumption of society). For example, external account costs averaged more than 30% of the estimated automobile cost. If environmental costs are not included in this assessment, the vehicle's use is thus socially subsidized and costs accrued as environmental pollution. This requires consideration because the number of vehicles, especially cars, is increasing.

**Keywords:** air pollution, climate change, transportation

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### I. INTRODUCTION

The relationship between traffic and the environment is multidimensional. Some of these unknown aspects and some of these new findings could lead to drastic changes in environmental policy, as it did in regards to acid rain and chlorofluorocarbons in the 1970s and 1980s. 1990 has been characterized by the realization of global environmental issues, the epitome of growing concern between people and the impact of climate change. Transport has also become an important dimension of the concept of sustainability, which is expected to become the main focus of transport activity in the coming decades, from vehicle emissions to the supply chain. Green-level management practice. Imminent developments require a deep understanding of the interaction between physical and transport infrastructure and this lack of understanding is often lacking. The main factors considered in physical environments are geographical location, topography, geological structure, climate, hydrology, soil, natural vegetation and animal life. The main dimensions of the transport environment are related to the causes, activities, outputs and outcomes of transport systems. Establishing a link between dimensions is a difficult task. For example, to what extent is carbon monoxide emissions linked to land use models? Moreover, transportation is embedded in environmental cycles, especially in the carbon cycle. The relationship between traffic and the environment is also complicated by the two observations. Firstly, transport activities contribute between children and other natural causes, directly, indirectly and accumulated for environmental issues. In some cases, they may be a dominant factor, while in others their role is marginal and difficult to establish. Secondly, transportation activities contribute in different scale areas to environmental issues, from (noise and CO emissions) locally to global (climate change?), Not forgetting the continent / national / regional issues (fog and acid rain). Setting environmental policy for transportation must therefore take into account the extent of contribution and the geographical size; otherwise, some policies may only move other

issues and have unintended consequences. One noted example is that local / regional policies were forced to build higher chimneys for coal-fired facilities (power plants) and cause continental diffusion of acid rain. Therefore, even if an administrative department (urban, county, state / province) has fully implemented the environmental policies, the geographical scale of common pollutants (especially pollution) air) obviously exceeds established powers. In addition to the environmental impacts of traffic, networks and regimes, the most economical / industrial processes that maintain the transport system are considered. These include the production of fuel, vehicles and building materials, some of which are very energy intensive (e.g. aluminum), and the handling of vehicles, parts, and infrastructure. All have a life cycle using production time, and processing. Therefore, the transport environment assessment does not take into account the cycle in the environment and in the product life as well as being able to convey a limited overview of the situation and even Releases can lead to inaccurate reviews and policies. As such, transportation has a wide array of factors outside the environment, some of which may be justified when others judge primarily speculation (often used as the event of groups. environment). Outside also occurs in different scale areas, and some may even overlap even more. The bottom line is better traffic practices, such as a fuel-efficient vehicle, which reduces external factors that can have positive economic, social and environmental consequences. The question of which strategies remain most beneficial is in all of the environmental issues that are subjective and often dominant. Since Vietnam's economy has changed from a centrally planned economy to a market economy, Vietnam's economic picture has many bright points and people's living standards have been improved step by step. Although Vietnam's economic growth rate is quite high, it is accompanied by problems of traffic accidents and congestion and environmental pollution caused by transportation activities. Especially for road traffic, the number of traffic accidents keeps increasing in both scale and quantity, quality of the living environment is seriously degraded. Therefore, transportation in Vietnam needs more investment in development, especially green and intelligent transportation systems. There have been a lot of campaigns about green transport or decrees and decisions of the Government of Vietnam but it is only temporary and there is no coherent link between the campaigns to resolve traffic problem [1].

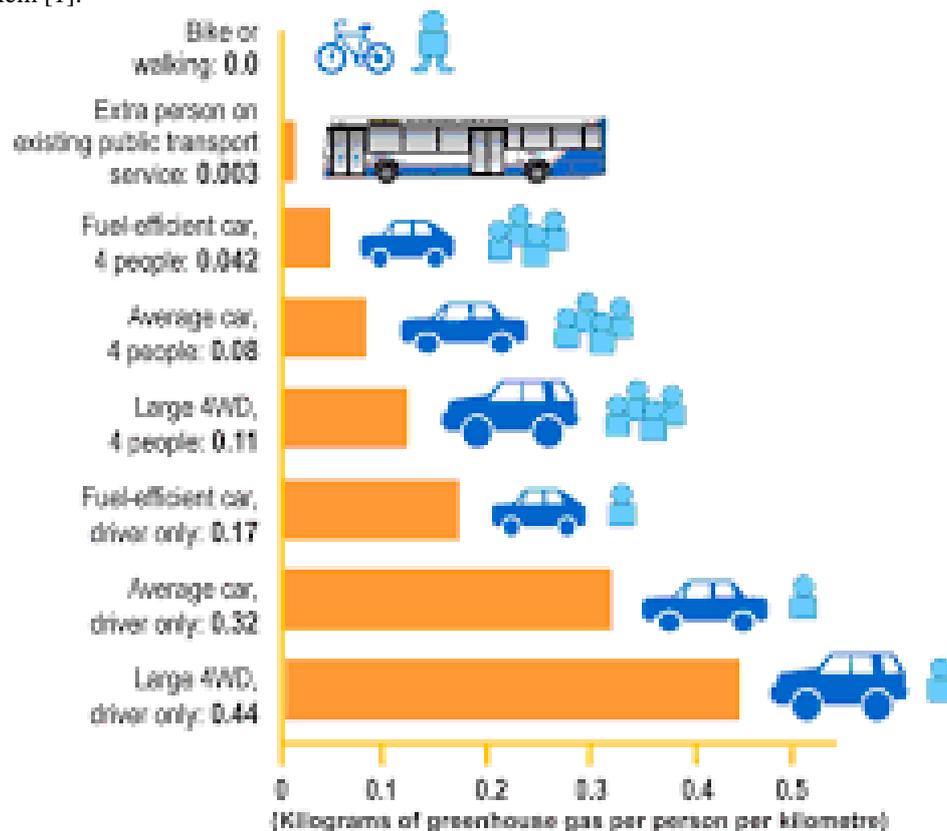


Fig. 1. Emissions from transportation means

Especially in two big cities, Hanoi and Ho Chi Minh City, are the two leading economic drivers of Vietnam, but along with the economic development, the traffic in these two cities is seriously degraded. The rapid increase of the population makes the traffic of these two cities often overloaded, causing traffic congestion. In addition, the connection between traffic modes is also a concern. Accordingly, Vietnam's

transport has a huge imbalance between road transport and inland waterway transport. Over the past years, Vietnam's road traffic has grown fast and is hot. That increases the situation of traffic accidents (156 times higher than inland waterways), high logistics transport costs, impacts on the environment, causing the greenhouse effect (3.4 times higher than roads).

## II. TRANSPORTATION AND ENVIRONMENT IN VIETNAM

Vietnam is one of the five countries most affected by rising sea levels and the second country in the world that has been strongly affected by climate change impacts. And urban areas in Vietnam are facing many difficulties and challenges in the process of developing green and sustainable urban areas, especially green transport development. Urban planning in Vietnam is almost done according to the traditional method. Planning products lack flexibility, multi-sectoral coordination in the planning process, lack of plans to implement the plan and resources to build according to the plan ... Especially, in the past time, The development of transport planning is not synchronized and the resources are implemented so the development of the road network is slow compared to the demand for transportation; The development of environmentally friendly forms of transportation such as walking, non-motorized transport, public transport, etc. has not been paid attention. Meanwhile, although transport infrastructure has been paid attention to investing, it has not yet met the demand, the proportion of land for transportation is still low; lack of car stops and parking lots; Especially in big cities, the urbanization process takes place at a faster pace than the situation of investment in renovation and development of transport infrastructure system; The control of motor vehicle emissions is still complicated and inconsistent among related industries. At the same time, personal vehicles increase quickly and uncontrollably (the average annual increase is over 10%). Being one of the main causes of environmental pollution. The focus on developing road traffic that other modes are neglected, especially inland waterways, is causing Vietnam to be overloaded on roads while other modes develop in a very sketchy manner. According to the World Bank in Vietnam, road and inland water transport accounts for 90% of freight transport in Vietnam. Vietnam is one of the largest open economies in the world, and Vietnam's competition is increasingly dependent on transportation and logistics costs. The average income of Vietnamese people increases, thus requiring greater and greater movement of goods and transportation. However, the inland waterway transport system lacks serious investment, although accounting for 20% of the overall transportation network, the investment capital accounts for only 2-3% of the transport investment budget and the level as That is not enough to expand transportation, maintenance, and maintenance. Greater investment is needed because this is an area that needs to be concentrated in the Vietnamese system [3]. In addition to the lack of investment and uneven distribution of investments, green transport investment is also a big problem. In recent years, the number of private vehicles has increased rapidly, making air pollution in urban areas across the country increasingly serious. Transport activities are now considered a major and worrying source of pollution for the living air environment, especially in urban areas and densely populated areas where transport activities develop. thrive. The HCMC Department of Transport has reported that the environmental pollution caused by transportation activities is at an alarming level. Currently, the city has more than 8 million vehicles (of which more than 7 million motorbikes) are operating every day emitting a tremendous amount of emissions into the environment, increasing air pollution and the cause of disease risks for people in the area and people in traffic. More specifically, there are many old and rotten vehicles, which have been outdated for a long time and still be used and blatantly participating in traffic, not only threatening the safety of life for traffic participants but also It also seriously affects the air quality of urban centers and people's health. Ho Chi Minh City has a large source of greenhouse gas emissions with 38.5 million tons of CO<sub>2</sub>, accounting for about 16% of national emissions. In particular, greenhouse gas emissions from the transport sector accounted for 45%. Controlling greenhouse gas emissions in urban transport activities, contributing to reducing greenhouse gas emissions is an urgent environmental problem for Ho Chi Minh City. The same situation is that Hanoi also has a huge amount of vehicles. According to some statistics, Hanoi currently has more than 7 million people, accompanied by an equal number of personal vehicles. It is predicted that this number of personal vehicles will increase in the near future. By 2020, the number of cars will increase to 843,000 units and 6.1 million motorbikes; in 2025, cars will be 1.45 million units and motorbikes will be 7 million pieces and in 2030, cars will be 2 million pieces and motorbikes will be 7.5 million pieces.

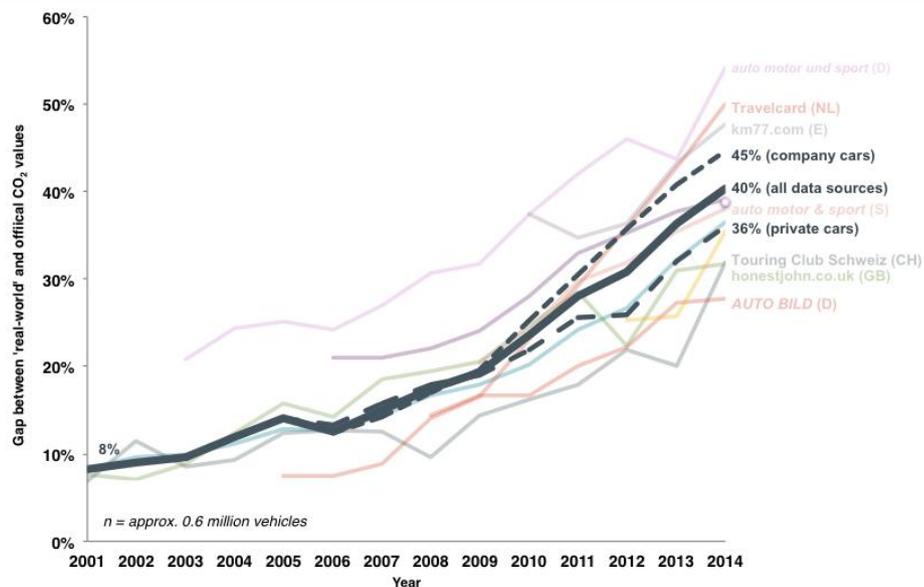


Fig. 2. Emission in the world from transportation means

Of the total emissions that pollute the urban air environment, emissions from motorized road vehicles take the leading position. Among the types of transport vehicles, motorcycles and mopeds account for the largest proportion and are also the largest source of pollutant emissions. To explain the root cause of the problem on motor vehicles using gasoline and diesel as fuel, the process of leakage, evaporation, and burning of fuel also leads to the generation of many toxic gases such as VOC, Benzene, Toluene ... Emissions of motorized vehicles are shown to depend heavily on vehicle quality, fuel, speed, driver, congestion and roads. Cars and motorbikes in Vietnam include many types, many have been used for many years and have not been regularly maintained, low fuel efficiency, high levels of toxic substances and dust in emissions. Motorbikes are still a major contributor of polluting gases, especially for emissions such as CO and VOC. Meanwhile, trucks and passenger cars emit a lot of NO<sub>2</sub>, SO<sub>2</sub>. The burning process does not run out of fuel also emits carbon dust. This source of dust is often deposited on the road, or following the vehicle and often entraining tires when the car is running is also considered as a factor from traffic emissions. Another reason for the increasingly polluted urban environment is that the roads are narrow, degraded, lack of synchronous planning, do not meet the travel needs, and the sense of participation in traffic of People are not high cause of traffic congestion is also a significant factor that exacerbates the problem of air pollution, especially in big cities like Hanoi and Ho Chi Minh City. Ho Chi Minh. In addition, dirt and rock dust on the road due to poor road quality, dirty roads, and transportation of construction materials and garbage, when vehicles running through the dust from the road surface are lifted. Currently, motorized vehicles use gasoline and diesel as fuel to create movement, the combustion of this fuel has led to the generation of many different air pollutants, including CO, VOCs, SO<sub>2</sub>, NO<sub>x</sub>, lead dust, ... Besides, it also leads to the formation of TSP dust due to sand and soil being swept up from the unsanitary street surface during transportation. More dangerous, experts point out that the increase in road motor vehicles, especially cars and motorcycles, along with the quality of the roads do not meet the demand, the quality of fuel used. Low usage is the main cause of air pollution. Along with that, the quality of vehicles is limited (used cars, not regularly maintained), significantly increasing the concentration of pollutants in the air. Many roads are cramped, downgraded, lack of synchronous planning, not meeting the demand for travel together with the low awareness of people in traffic, causing traffic congestion, which is also a serious factor. more serious problems of air pollution, especially in big cities such as Hanoi and Ho Chi Minh City. Ho Chi Minh. Given the above situation, Vietnam needs to take measures such as: Carrying out inspection and maintenance programs. Accordingly, registered vehicles must be inspected for annual emissions before issuing or changing driver licenses. Encouraging traffic environment sanitation by spraying water and sweeping roads; encourages the development of clean energy transport means such as natural gas, liquefied gas, fuel alcohol, biodiesel, and electricity. In big cities such as Hanoi, Ho Chi Minh City, Can Tho ... air pollution is quite high. Especially very fine dust pollution. Hanoi is one of the 10 cities in the world most polluted by dust. This type of pollution is worrying. If normal dust pollution is used, masks can be prevented, while fine dust pollution is useless. Dust gets into deep lungs, causing respiratory diseases, even cancer. Therefore, in order to control air pollution in urban areas, it is necessary to control emission sources from cars and motorbikes and to check emissions of cars and motorbikes. Limited implementation of private vehicles, development of public transport. Along with that,

it is necessary to enhance the awareness of road users. Many people now have the habit of using the vehicle for a long time without care and repair. Many people's awareness of participating in traffic, causing traffic jams are also significant factors that make air pollution worse, especially in big cities.

### III. SOLUTIONS TO REDUCE ENVIRONMENTAL POLLUTION

Polluted air will affect contact organs such as eyes, respiratory organs, skin ... Through contact with pollutants, it will seep into the bloodstream, into body organs, causing long-term diseases. Air pollution not only affects human health but also affects the treatment process of patients, making the disease worse, prolonging treatment time. Air pollution is a situation in which foreign substances appear in the air. But now, people are only interested in the physical part, which is the size of the particle affected in the air, but the nature of air pollution is completely different. In the mountains or with mist, air quality is not good but does not affect health. Meanwhile, in industrial areas, dust mist completely different will affect health. Therefore, it is necessary to control which pollutant particles carry the anxiety and find a suitable solution. Air pollution is closely related to climate change, in which burning fossil fuels both causes climate change and is a major driver of air pollution. Climate change mitigation efforts can also improve polluted air and vice versa. Recently, the United Nations Intergovernmental Panel on Climate Change warned that if the process of producing coal-fired thermal power does not end by 2050, the temperature of the Earth will rise by more than 1.5 degrees Celsius and we could see a major climate crisis in the next 20 years. Air pollution is closely related to climate change, in which burning fossil fuels both causes climate change and is a major driver of air pollution. Climate change mitigation efforts can also improve polluted air and vice versa. Recently, the United Nations Intergovernmental Panel on Climate Change warned that if the process of producing coal-fired thermal power does not end by 2050, the temperature of the Earth will rise by more than 1.5 degrees Celsius. and we could see a major climate crisis in the next 20 years. WHO believes that the sources of polluting energy now create great health burdens, so it is necessary to switch to cleaner and more sustainable options for energy supply and transportation of food systems effectively. The first global conference on air pollution and health will raise awareness about the harmful effects and risks to public health, as well as share information on the effects of air pollution. Along with the increase in population and global warming, the air that people breathe every day is also seriously polluted because the engines and industrial processes continue to emit a lot of dirty air. Air pollution affects human health, is the cause of many diseases and a major factor leading to high morbidity and mortality, especially in developing countries like Vietnam. Therefore, practical measures to reduce air pollution in Hanoi or Ho Chi Minh City are very important, needing more attention and investment in implementation. The inevitable trend of transport today is to reduce the number of greenhouse gases emitted by vehicles. Therefore, green transportation should be in association with urban development. However, in order to build a green transportation system, firstly, it is necessary to completely develop the transport network system according to the approved plan. Promote the application of scientific and technical advances and new technologies to design, construction, exploitation, and maintenance of transport infrastructure in an environmentally friendly manner; developing the network of public passenger transport; control emissions from vehicles; strengthening management capacity and raising awareness about transportation environmental protection for managers. Besides, it is necessary to build pedestrian streets, encouraging communities to participate in traffic by non-motorized vehicles such as bicycles, trams and walking. At the same time, it is encouraged to invest in high-volume public transport vehicles using clean energy, causing less environmental pollution such as subways, SkyTrain and fast buses. Developing green urban areas and green transportation is a strategic orientation, which needs attention in the synchronization of authorities, socio-political organizations from the central to local levels and the whole community. copper. Therefore, Vietnam needs to have Besides, the construction of walking streets, encouraging the community to participate in traffic by means of non-motorized vehicles such as bicycles, trams and walking. At the same time, it is encouraged to invest in high-volume public transport vehicles using clean energy, causing less environmental pollution such as subways, SkyTrain and fast buses. Developing green urban areas and green transportation is a strategic orientation, which needs attention in the synchronization of authorities, socio-political organizations from the central to local levels and the whole community. copper. With the right mindset, appropriate roadmap and innovative solutions, green urban development, green transportation will play an important part in successfully implementing the objectives of the National Green Growth Strategy.

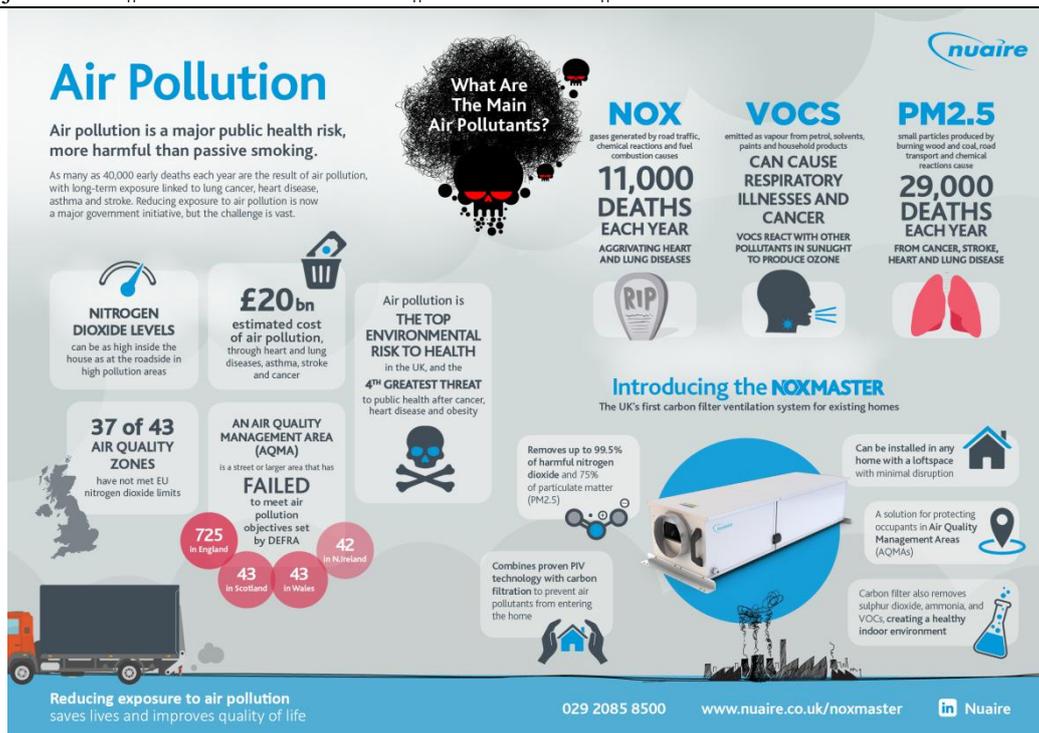


Fig. 3. Impacts of environmental pollution

Firstly, it is necessary to change the perception of managers, businesses, and people about green transport, considering it a central issue of urban development. Accordingly, the authorities need to create a diverse transportation environment, which prioritizes environmentally friendly means of transport, gradually changing the habits of road users towards green and sustainable. Construction of urban transport infrastructure combined with tree planting contributes to the greening of the urban landscape. In parallel with the promotion of education, propaganda and raising the people's self-awareness in observing the provisions of the law on vehicle quality, methods, and skills of participating in traffic. Secondly, complete development of the transport network system according to the approved plan; promote the application of new scientific and technical advances to the design, construction, exploitation, and maintenance of transport infrastructures in an environmentally friendly manner; strengthening management capacity and raising awareness about environmental transportation protection ... Along with that is developing a network of public passenger transport, controlling emissions from vehicles, typically bus facilities. Bringing good quality buses, high emission standards, and using clean energy is one of the important factors of each urban area to develop green and sustainable transportation. Therefore, according to the roadmap, transport enterprises will have to gradually phase out the buses of standard euro 1 and euro 2, replace them with standard Euro 3 and proceed to operate the vehicles. Buses meet Euro 4 standards. Thirdly, constructing pedestrian streets, encouraging communities to participate in transportation by non-motorized vehicles such as bicycles, trams, and walking, and encouraging the investment of public transport vehicles. plus large volumes of using clean energy, less polluting the environment such as subways, SkyTrain and fast buses ... Need to increase the addition of environmentally friendly vehicles, gradually abandoning feudalization agar and alternative fuels such as CNG engines, liquefied gas fuels, hybrid engines, hybrid electricity with diesel engines, or fully electric motors. Transportation development should be associated with environmental protection in order to protect the living environment of people. Economic development causes huge losses for Vietnam in the environment. Therefore, urban development associated with environmental protection is a very important issue. However, the development of transport is a field with high social sensitivity, mainly using petroleum products and a large amount of consumption, means of transport, especially privately owned road traffic. The use of administrative measures is extremely difficult; The implementation and implementation of measures to improve energy efficiency in the transport sector's activities also face many obstacles, that is the process affecting all aspects of social life; want to succeed, requires high awareness of the people, ... Therefore, the implementation of the task must be taken step by step to gradually change the habits of road users. Therefore, the immediate task still requires strengthening the propaganda to raise awareness of all levels and the community to join hands in the transport industry to build a green transportation system.

In order for Vietnam to achieve its goal of reducing greenhouse gas emissions in accordance with the

commitments set out with the United Nations, besides controlling pollution from industrial production and urban activities, it is essential to reduce emissions from transport activities. The process of developing green urban areas and green transportation is a strategic orientation, requiring attention to the synchronization of authorities, socio-political organizations from the central to local levels and throughout community. With the right mindset, appropriate roadmap and innovative solutions, green urban development, green transportation will play an important part in successfully implementing the objectives of the National Green Growth Strategy. According to the annual report of the Environmental Performance Index (EPI) of the US, Vietnam is currently in the top 10 of air pollution countries in Asia. Notably, the total amount of dust in Hanoi and Ho Chi Minh City is constantly increasing, making the air quality index (AQI) always at an alarming level. According to the World Health Organization (WHO), air pollution causes 7 million premature deaths each year. UN statistics also show that there are about 800 deaths from air pollution every hour, an average of 13 deaths per minute, three times the number of deaths from malaria, tuberculosis, and AIDS each year. Also according to WHO, Vietnam has 34,232 premature deaths related to air pollution. Specifically, the air quality index (AQI-Air Quality Index) in Hanoi and Ho Chi Minh City in recent days has increased quite high, ranging from 100 to 200. Particularly in Ho Chi Minh City, the results Monitoring of 30 environmental locations in September 2019 showed a sudden increase of pollutants such as suspended dust, NO<sub>2</sub>, SO<sub>2</sub>, CO ... in the days from 18 to 20 September 2019. The cause of this situation is due to urbanization, rapid population growth, especially construction density, and a sharp increase in the number of vehicles. Regarding sources of air pollution, mainly from local sources, such as transportation, construction, industrial production, straw burning, garbage incineration and some sources of remote transportation. Air pollution in Hanoi often increases during peak hours, from 60% to 70% of fine dust generated by cars and motorcycles.

#### IV. CONCLUSION

The problem of air pollution caused by urban transport activities in our country comes from many different causes. First of all, that is the effect of urbanization associated with the industrialization process. The process of urbanization on the one hand will promote economic, social development and accordingly the urban population will constantly increase. Currently, the urban population in our country is growing rapidly and there is no sign of being controlled. In 2002, the new urban population accounted for 25% of the national population, by 2012 the urban population reached 34% and in 2015 was 35.7%. That has led to an increasing number of motorized vehicles in urban areas. According to data from the Traffic Police Department, in 2015, there were 50,682,934 vehicles in the whole country (2,932,080 cars, 47,760,854 motorcycles and motorbikes). Only the total number of motor vehicles managed in Hanoi is 5,591,729 vehicles (546,057 cars, 5,045,672 motorcycles, motorbikes) in Ho Chi Minh City. There are 7,420,395 vehicles (556,688 cars, 6,863,707 motorcycles and mopeds). The quality of the transport is also a matter worth discussing. Most of the old cars and motorcycles in circulation do not have a control system for emissions. Meanwhile, many people in traffic in Vietnam still do not have the habit of periodic vehicle maintenance according to the manufacturer's recommendations. The vehicles after a while using the fuel injection system will be exposed, the risk of fire. Engines that do not run out of gasoline will also produce benzene in the exhaust. When the vehicle is regularly maintained, it will help the engine operate better, the fuel consumption is less, so the vehicle emissions to the environment are also less. On the other hand, it also helps to make the vehicle structure better and safer during circulation. Therefore, many individual vehicles do not strictly implement the periodic maintenance and maintenance regime, which causes an increase in emissions to the environment with increasing levels of toxicity. In particular, many old and rotten vehicles still use traffic, not only threatening the safety of life for road users but also seriously affecting the air quality of the roads and urban areas, threatening people's health and life.

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