Environmentally friendly Sustainable Transport

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Environmentally friendly Sustainable Transport

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- **Introduction:**

Transport is of great importance in all areas of life, and plays a role in achieving sustainable development in its various economic, social and environmental dimensions, and the latter, which is one of the most important pillars on which sustainable development is based, is concerned with the transition to cleaner and more efficient technologies that move society to an era that uses the least amount of energy and resources, and the goal of these technologies is to produce a minimum amount of pollutants and gases, and to use certain standards that lead to reducing the flow of waste, recycling it internally and preserving natural systems.

As the environmental damage caused by the use of transportation is one of the most serious damages that threaten human life, and emissions from transportation are the main source of air pollution in cities in particular, and the combustion of fuel inside car engines produces many pollutants and carbon dioxide emissions, and greenhouse gas emissions in the transport sector are increasing at a faster rate than any other sector, and road transport is a major contributor to air pollution, and many environmental and health problems. As traditional transport plans have worked to improve mobility, especially for cars and other vehicles, but did not concern themselves with the effects they have in various fields, especially ecology, the real goal of transport is to improve and accelerate access, there are technologies that allow improving access at the same time while reducing environmental and social impacts in particular.

Air pollution is one of the most important environmental problems in Egypt, especially in the Greater Cairo region, and the transport sector is one of the most sectors that lead to air pollution in Egypt, because one of the main sources of emissions of gaseous pollutants and greenhouse gases is the combustion of fuel in the transport sector, and the air quality index in Greater Cairo indicates that it is relatively low, and it is certified as unhealthy, as pollution levels exceed the permissible limits of the World Health Organization, reaching 20 micrograms / m3 and more than 70 mg/m3, which represents the locally permissible limits. Therefore, the problem of air pollution is one of the most important problems in Egypt, which made it one of its top priorities in Egypt's Vision 2030 to reduce air pollution in order to achieve the eleventh goal of the sustainable development goals related to making cities inclusive and environmentally safe, and air quality is directly linked to the third goal of the sustainable development goals on reducing the number of deaths and diseases caused by air pollution.

Therefore, we will address this topic through several axes, namely clarifying the relationship between transport and sustainable development:

1. Definition of sustainable transport.
2. Advantages of sustainable transport.
3. Challenges faced by sustainable transport.
4. Egypt's Vision 2030.
5. Relationship between Transport and Sustainable Development.
6. Egyptian projects implemented in sustainable transport
7. Recommendations.

1. Definition of sustainable transport:

There is no universally agreed definition of sustainable transport, but it refers to the provision of services and infrastructure for the movement of people and goods in order to promote economic and social development for the benefit of present and future generations in a safe, affordable, accessible, efficient and flexible manner, while minimizing emissions and other environmental impacts. It refers to the use of means of transportation with the least negative impact on the environment, and the use of transport systems, policies and networks that achieve the integration of economic, social and environmental goals with each other, as a whole, in an integrated manner without focusing on one side versus neglecting the other, while achieving a balance between meeting the needs of successive generations.

Sustainable transport is also known as green transport and its types vary between walking, sailing, cycling, and railways, and it focuses mainly on planning, ensuring efficient transport of goods, and the high quality of transport services. Over the past two decades, sustainable urban transport has evolved dramatically and contributed to increasing bus efficiency. The most prominent example of this development was the high-speed train system, which is characterized by combining the capacity and speed of light rail (metro) with the flexibility and low price of the bus system, and in this context, the development of sustainable transport depends on city planning, which would contribute to the creation of urban areas.

The importance of sustainable transport is evident in developing countries that suffer from the proliferation of vehicles, which often leads to significant traffic congestion and difficulties in parking, whether in large or medium

cities, and as a result, sustainable transport offers a number of solutions and means to move away from traditional polluting means.

2. **Advantages of sustainable transport**

Sustainable transport offers many advantages, foremost of which is:

- Securing access to people, goods and services at the lowest cost, while ensuring the well-being of society by diversifying transportation options for people.
- Integrated transport planning, achieved through public-private coordination. Focus growth, reduce urban sprawl, and design appropriate transportation systems with an urban pedestrian and bicycle route.
- Achieving the greatest degree of health and safety by designing and operating transport systems in a manner that is not harmful to public health, based on one of its most important goals, which is to reduce polluting emissions.
- Reducing traffic congestion as supporting sustainable modes of transportation such as bicycles and the use of cars and electric scooters will reduce the number of vehicles on the roads.
- Reducing the cost, by creating a system of accounting for economic costs, to achieve the standard of justice and equality in payment by transport users, so that those wishing to move to their work centers or educational institutions can achieve this with the lowest expenses of transportation services.
- Sustainable transport secures the basic needs of individuals and communities in a safe and certain manner, both in terms of transporting people and in terms of transporting goods, without harming public health, the ecosystem and the interests of future generations, thus allowing individuals and communities to meet their basic needs in a safe way.
- It is the least polluting of air, water and soil, and the least noise.
- It consumes the least natural resources, including fossil fuels, and is therefore more energy efficient, and makes use of renewable energy sources.
- It is the most widespread and reaches poor and remote areas.
- It is capable of meeting the demand for it, while decoupling the growth of the economy from the evolution of greenhouse gas emissions from transport.

3. **Challenges have faced by sustainable transport:**

Sustainable transport in developing countries faces many challenges, most notably:

- The physical design of infrastructure and facilities lacks the design of pedestrian paths and bicycle paths, in addition to the high costs of maintaining infrastructure, especially in cities with an obsolete road network.
- The transport of goods within cities is increasing in large quantities and freight traffic usually shares the same road network within public and private transport, resulting in serious car accidents and traffic congestion.
- Reliance on private vehicles is one of the most prominent obstacles in many countries, which must be overcome to achieve sustainable transport.
- Decisions in transport are made only by governments, which takes considerable time and results in delays in completion, and the achievement of the goals of institutions and individuals in the transport sector.
- The continuous increase in the demand for transportation and energy, which creates problems and affects the environment, in addition to excessive energy consumption.
- The concept of sustainability is not integrated into the transportation planning method.

4. <u>Relationship between Transport and Sustainable Development:</u>

The role of transport in sustainable development was first recognized at the 1992 United Nations Earth Summit and promoted in its outcome document - Agenda 21. In conducting the five-year review of Agenda 21 at its nineteenth special session in 1997, the United Nations General Assembly further noted that, over the next twenty years, transport is expected to be the main driving force for increasing global energy demand and is now the largest end-user of energy in developed countries and the fastest growing sectors in most developing countries. Furthermore, the role of transport was once again included in the outcome document the Johannesburg Plan of Implementation of the 2002 World Summit on Sustainable Development. The implementation plan included multiple focal points for sustainable transport, in the context of infrastructure, public transport systems, commodity delivery networks, affordability, efficiency and ease of transportation, as well as improved urban air quality and health, and reduction of greenhouse gas emissions.

Global interest in transport has continued in recent years. At the 2012 United Nations Conference on Sustainable Development (Rio+20), world leaders unanimously recognized that transport and mobility are essential to sustainable development. Sustainable transport can boost economic growth and make mobility more accessible. Sustainable transport promotes economic

integration while being environmentally friendly, improving social equity, health, city resilience, urban-rural connectivity and rural productivity.

Subsequently, the Secretary-General of the United Nations, within the framework of his five-year action plan, identified transport as a key element of sustainable development. To this end, the Secretary-General established and launched in August 2014 a High-Level Advisory Group on Sustainable Transport, representing all modes of transport, including road, rail, aviation, maritime and ferry transport providers and urban public transport providers. The recommendations of the Policy Advisory Group were presented to the Secretary-General in a global report on the prospects for sustainable transport, entitled "Mobilizing sustainable transport for development", released at the first World Conference on Sustainable Transport in November 2016. The report included a series of shocking data on the current reality of transport. An estimated 450 million people in Africa, or more than 70% of the rural population, are unconnected and unconnected. There is also a profound imbalance in the efficiency of supply chains.

Transporting an avocado container from Kenya to the Netherlands, for example, requires 200 interventions and more than 20 documents at a cost equal to the cost of shipping. Solving this problem would increase farmers' incomes by 10 to 100%. In terms of public safety, about 1.3 million people die on the world's roads each year, and tens of millions are seriously injured. Road traffic accidents are the leading cause of death among young people between the ages of 15 and 29. Transport emits 23% of all energy-related greenhouse gases, and its carbon dioxide emissions could reach 40% by 2040.

These indicators are of concern, given that sustainable transport is critical to reaching the targets of the 2030 Agenda for Sustainable Development and achieving many, if not all, of the Sustainable Development Goals, such as reducing greenhouse gas emissions (Goal 13), achieving food security (Goal 2), and enhancing access to health care services (Goal 3). A sustainable transport sector is also necessary to increase youth access to schools (Goal 4) and ensure women's employment and empowerment (Goal 5). In the 2030 Agenda for Sustainable Development, sustainable transport is mainstreamed into several sustainable development goals and targets, particularly those related to food security, health, energy, economic growth, infrastructure, cities and human settlements. The transport sector will play a particularly important role in the achievement of the Paris Agreement, because nearly a quarter of

global energy-related greenhouse gas emissions come from transport, and these emissions are expected to increase significantly in the past few years.

5. **Egypt vision 2030:**

Provide a transport system that achieves sustainable development and is intrinsically linked to the requirements of future national economic and social development, while supporting the role of transport at the regional and international levels. In this context, the main axes of the development vision of the transport sector are as follows:

- Achieving balance and integration between the various means of transport.
- Focus on multimodal transport to achieve optimal use of each mode of transport.
- Developing the railway sector and increasing its contribution to the transport of goods to improve the economies of the sector, provide a cheap means of transport movement and reduce the burden on the road network.
- Encourage the contribution of river transport in the transport of goods.
- Financial and administrative restructuring of affiliated bodies and sectors.
- Developing human resources to ensure improved performance levels and maximize the return on activity investments.
- Strengthening the vital role of maritime transport due to its strong positive impact on the revitalization of international trade and the movement of individuals and tourist groups.
- Enhancing the participation of the private sector in the development of the transport system.
- Providing high levels of safety in the transport sector and paying attention to the quality factor in the sector's services.

6. **Egyptian projects implemented in sustainable transport:**

The Ministry of Environment is working to encourage citizens to use sustainable environmentally friendly means of transportation, in order to reduce emissions from fuels used in conventional vehicles, in order to improve air quality, mitigate the effects of climate change and preserve biodiversity and the environment.

As there is a new strategy for the government represented in sustainable transport, represented in the multiple national projects for roads, in addition to the development of various means of transportation, with the aim of providing civilized and environmentally friendly means of transportation, to raise traffic liquidity rates within the main cities, because of the positive economic, social, environmental and health return. That strategy takes a lot of space with the Government, with the great support of the political leadership,

because of its important role in urban development. The Egyptian state is implementing 6 environmentally friendly transport projects represented by the Ministry of Transport, in light of its interest in green transport, namely:

a) **Monorail:**

The monorail is an electrically powered train that runs on individual iron rails, where these rails are implemented on a concrete beam far from the ground and traffic intersections.

- **Advantages**
  - The monorail is implemented in places where it is difficult to implement metro lines and other means of rail transportation, as the monorail is characterized by the possibility of implementing it in narrow and crowded streets that have large horizontal bends and does not need many modifications in the facilities and the work of expropriation is greatly reduced.
  - The monorail is also characterized by its implementation on an upper path in the middle island of the streets it passes through and does not occupy any parts of the street, which means that traffic is not affected by these streets.
  - One of the most important features of the monorail is that it is environmentally friendly, safe, and fast and does not make any noise during operation. In an effort to reduce pressure on Cairo and connect it to new cities, the state is working on two monorail lines as part of the first phase of the project, which will be financed by a soft international loan from Export Bank of Canada.

- **The design speed of the project is 80 km/h, and it can accommodate a quarter of a million passengers per day, as for the duration of the trip, it is as follows:**
  - ✓ The Administrative Capital Monorail project and the 6th of October Monorail, the monorail that connects east and West Cairo interchangeably with the third line of the metro, and is integrated with the electric and express train.
  - ✓ It is a breakthrough and a turning point in the clean mass transport system inside Egypt, and the Ministry of Transport began working on the project a few years ago to link the Greater Cairo region with the Administrative Capital, thus making a cultural shift in the passenger transport sector, and it is expected that the monorail will contribute to reducing the rate of environmental pollution.
  - ✓ The design speed of the monorail project is 80 km / h, and the journey will be cut from Cairo Stadium, where the project began, to the Administrative Capital at the end of the project in 60 minutes, and contributes to the

transfer of the movement of employees and visitors from Cairo and Giza in the shortest trip time due to its connection to the third line of the metro.

- ✓ As for the 6th of October Monorail, it starts from the League of Arab States with the third line of the metro to the new expansions in Sixth of October City, and reaches a length of 42 km, and includes 12 stations.

The state has contracted with a consortium of three companies to carry out the design and implementation of the two monorail lines, and this consortium will also operate and manage the project for a period of thirty years - from the date of implementation of the project - with a usufruct system, as the consortium consists of:

- ✓ Bombardier Company based on signaling and communication systems, in addition to the supply of trains.
- ✓ Orascom Construction and Arab Contractors will carry out the civil works for the project.

The National Authority for Tunnels also selected a consortium consisting of two companies to carry out the consulting and supervisory work for the monorail project, and this consortium was chosen after submitting the lowest cost offer within the tender offered by the Authority:

- ✓ American Hill International Company
- ✓ Egyptian Company Gigi Group

b) <u>The LRT connects the Administrative Capital with Greater Cairo:</u>

- ➢ **<u>The basics of choosing urban transportation</u>**
  - Relatively spaced distances of an average of 5 km between each two stations.
  - It is carried out on a surface track and can be carried out on an overhead or tunnel path at intersections.
  - It does not require high maneuvers
  - Medium implementation time
  - linking the new cities together.

1) Design speed: 120 km/h
2) Financial cost: $ 22 million per kilometer
3) Capacity per hour: 20-40 thousand passengers/hour/direction
4) Capacity per day: 1 million passengers per day
5) Distance between stations: 3.5 - 6.5 km.
6) Places of implementation: linking new cities at distances.
7) Method of implementation: (upper - superficial).

- **Advantages**
  - The route starts from Adly Mansour Central Interchange Station parallel to the (Cairo - Ismailia) Desert Road, then branches north after Badr City until Tenth City of Ramadan and south to the New Administrative Capital and then extends to the International Sports City with a total length of 105 km and 19 stations.
  - The electric train project achieves passenger exchange service with the third line of the metro at Adly Mansour Central Station and serves the new cities on the Cairo/Ismailia Desert Road such as Obour, El Shorouk, Al Mostakbal and Badr until the tenth of Ramadan in the north and the Administrative Capital in the south to facilitate citizens to move from Cairo to those cities and vice versa, which also achieves an economic return by contributing to increasing growth and development of new urban communities residentially, commercially and industrially, as well as reducing maintenance costs for surface roads as a result of reducing density Traffic on it.
  - Achieves passenger exchange service with the East Nile Monorail (Administrative Capital) at the Arts and Culture Station in the Administrative Capital, the electric express train at the Central Capital Station, which ensures the implementation of an integrated transport network.
  - Linking the Administrative Capital with the Greater Cairo Region through a sustainable green mass transport network that is safe and effective and directly contributes to the agenda of confronting the effects of climate change.
  - Environmentally friendly bus lines are provided to integrate with the project stations to maximize the benefit and increase the number of passengers, in addition to the establishment of parking lots outside the stations that can accommodate about 800 cars to encourage private car owners to ride the electric train.
  - The project includes 22 trains with a speed of about 120 km/h moving in an isolated path with walls on both sides with a length of 120 km to ensure its security during movement, where 7 bridges have been established for the train track with a length of 6 km and 4 bridges for cars to solve the problems of intersections with axes and main roads with a total length of 5 km, and two tunnels have been implemented for the train track with a length of 500 meters and one tunnel for cars, in addition to the implementation of 6 pedestrian bridges to facilitate the movement of passengers.

- Reducing the journey time for passengers along the route of the line, reducing fuel consumption as the operation of the line depends on clean electrical energy.

c) <u>Electric high-speed train:</u>

➢ **<u>The basics of choosing urban transport:</u>**

- Large distances with an average of 25 km between each two stations.
- No high maneuvers are required
- It is carried out on a surface track and can be performed on an overhead or tunnel track at major intersections.
- Large implementation time due to the large distances of the routes - linking the main cities and governorates to each other.

1) Design speed: 250 km/h.
2) Financial cost: $ 25 million per kilometer.
3) Capacity: 15 thousand passengers per hour in each direction.
4) Capacity: 250 thousand passengers / day.
5) Distance between stations: 30 - 50 km (for high-speed and regional train stations).
6) Place of implementation: linking governorates, ports and major cities.
7) Method of implementation: upper - superficial.

➢ **<u>Advantages</u>**

- The express train network is implemented to achieve the service of transporting passengers and goods and consists of three lines about 2000 km and the number of 60 stations as follows:

✓ The first line extends from Ain Sokhna to October Gardens, then branches south to Fayoum / Beni Suef and branches north to Alexandria, El Alamein and Marsa Matrouh with a length of about 660 km and 22 stations

✓ The second line extends from Fayoum station / Beni Suef to the city of Abu Simbel with a length of 1100 km west of the Western Upper Desert Road, and the number 35 Station

✓ The third line extends from the interchange station with the second line (Qena station) and then extends east to Hurghada and then to Safaga Port with a length of about 225 km, 3 stations.

- The express train is characterized by its ability to work long distances, as its speed reaches 250 km / h, so it was established to link all governorates of Egypt to transport passengers and goods, and it is considered one of the safe means of transportation that are completely separate from the existing traffic axes in cities, so it takes the shortest way to shorten the distance between all governorates, so that it made the distance between northern and southern Egypt not exceed five hours.

- Creating a green land development axis linking the Red Sea and the Mediterranean to stimulate the movement of internal and external trade and link the logistics ports to Bahrain, so the movement is no longer limited to the ports of Port Said or Damietta only, but access to all ports will become easier to transport goods between the different ports (Ain Sokhna Port, Jarjoub Port West El Alamein, Alexandria, Borg El Arab and Dekheila Ports... etc).
- One of the pillars of the sustainable development plan implemented by the state to serve urban sprawl in the cities it passes through along the path (the Administrative Capital - Sixth of October City - Alexandria - Borg El Arab - El Alamein - Matrouh - Minya - Sohag - Assiut - Luxor - Aswan - Toshka - Abu Simbel - Hurghada - Safaga) as it facilitates movement to and from it and thus reduces the burden on the valley and the delta.
- The high-speed train network aims to stimulate the movement of internal trade.
- Transfer of local production of export ports (sea ports - dry ports - air ports).
- Linking industrial zones with export ports.
- The express train has a higher transport capacity, which reduces traffic congestion, achieves higher safety for passengers, a better impact on the environment, helps economic development and enhances the infrastructure of the region.
- Establishing new logistics zones to serve all industrial and agricultural areas passing through them to transport products and raw materials to and from them at a speed of up to 120 km/h.
- Developing tourism between the Red Sea (Hurghada) and southern Upper Egypt (Luxor - Aswan - Abu Simbel), which allows tourism companies more flexibility in diversifying tourism programs.

d) <u>The BRT bus runs on the ring road:</u>

The bus route includes 57 stations, starting from Field Marshal Tantawi station, to the assembly entrance station. The reciprocating bus serves the pioneers of the Ring Road in Greater Cairo, and aims to provide distinguished services to passengers and eliminate traffic jams, and the frequency bus stations are demarcated on the Ring Road according to international specifications, and works with electric energy within Egypt's orientation to preserve the environment and the green economy.

The plan to operate the new frequency bus comes after the expansion and development of the ring road, to become 7 lanes in one direction instead of

only 4, where a traffic lane has been allocated in each direction, for the bus, and it will be in the middle of the road and isolated from the path of other cars, which gives the bus the advantage of speed and determining the time of arrival to the stations scattered on the ring road and currently being implemented along the road.

The Ministry of Transport's plans for the development of the ring road include preventing the microbus from stopping at the top of the ring road and preventing its loading from the road, with the establishment of a service road on both sides of the ring road - under the road - with a width of 10 meters in one direction, with the operation of the reciprocating bus above the ring road, and encouraging citizens to reduce the use of private cars by establishing parking lots for private cars under each reciprocating bus station, targeting the use of a distinct and environmentally friendly means of passenger transport represented in the new frequency bus.

- **Principles of project selection:**
  - Close distances with an average of 2 km between each two stations.
  - High maneuver
  - Performed on a surface trajectory.
  - Short execution time
  - average transfer volume

1) Design speed: 50 – 70 km/h
2) Financial cost: $ 2.5 million per kilometer.
3) Capacity: 10 thousand passengers per hour in each direction
4) Capacity: 180 thousand passengers per day
5) Distance between stations: 1 - 2 km.
6) Places of implementation: in the roads allowed by the cross-section of the road for the establishment of stations.
7) Method of implementation: upper - superficial.

- **Advantages**
  - Flexible to use and follows secluded paths
  - Its industry is localized in Egypt
  - Its cost is lower compared to other means of transportation
  - Fast loading passengers from stations
  - Fixed arrival and departure times, regular operating schedules and regular train time
  - Display trip information inside buses
  - High transport density without traffic density

e) Tram:

Implementation of the rehabilitation of the Raml tram in Alexandria completely, from signals and rails and the construction of bridges in the areas of traffic intersections, to isolate its path from traffic, and to achieve the goal of the project of reducing traffic congestion, providing distinguished services to the public in Alexandria, preserving assets, reducing maintenance and operation costs, and increasing their life span. The journey time will be reduced to 31 minutes, where its speed will increase to (21 km / h), and the train time will be reduced to 3 minutes, and the length of the tram line is 13.2 km, and it includes 24 stations, where Victoria and Sidi Gaber stations are interchange stations with the Alexandria metro project.

The development aims to overcome traffic jams at intersections of the main streets and axes in Alexandria, and reduce traffic density resulting from the use of private cars in short distances within cities and public streets in the governorate. The Ministry of Transport has defined the bases for choosing urban transport in general, and the tram train in particular, including the presence of close distances with an average of 0.5 km between each two stations and high maneuvering, and it will be implemented on a surface track, and it can be implemented on an upper or tunnel path at simple intersections, in addition to the relatively short duration of its implementation and a large transport volume. The design speed of the tram train was determined to be (40-60 km / h), with a capacity of about 13 thousand passengers per hour per direction, 400 thousand passengers / day, and the distance between stations will be approximately (0.4-0.6 km).

f) Metro:

One of the most important means of transportation in the capital, and it is one of the oldest environmentally friendly green transportation in Egypt, and the state is currently increasing the subway lines to meet the growing needs of citizens on that means. The Ministry of Transport aims to localize technology and maximize the role of the local component in metro projects by manufacturing and assembling mobile units in cooperation with the Egyptian companies SEMAF and Nerek.

It also took into account the service of the elderly and people of determination, starting from entering stations using ground signals, to trains that contain places for people of determination or light plates and internal radios. The design speed of the metro project is (90-100 km/h), the capacity is 40-65 thousand passengers/hour/direction, the capacity is 1.51 million/day, and the distance between stations is (0.8-1.2 km).

- **Implementation method:** tunnel, overhead, surface, to create traffic flow on surface roads, and reduce congestion and traffic accidents on roads through the implementation of tunnel lanes in narrow high-density areas of surface transportation.
- The metro lines achieve interconnection and integration between the components of the mass transport network by electric traction (monorail - light electric train), and public and private mass transportation, as was done in the central interchange station Adly Mansour by taking into account the connection and exchange of service in the interchange stations, whose locations are determined according to the requirements of transportation.

- It is noteworthy that the Ministry of Environment was able to complete the replacement of 871 motorcycles within the pilot project to replace two-stroke motorcycles with new four-stroke motorcycles in Fayoum Governorate, and the Ministry has implemented an initiative to establish 7 modern and high-level bus lines operated by the private sector, linking the cities of 6th of October and Sheikh Zayed with the metro station in Giza.

  The Ministry of Environment, in cooperation with the Center for Environment and Development for the Arab Region and Europe, held the international conference in Cairo "Sustainable Transport in Egypt 2019 - Clean Fuels and Low Sulphur Roadmap for the Refining Industry in Egypt" in the presence of representatives of Egyptian companies, the Egyptian General Petroleum Corporation and a number of leaders and stakeholders.

- **Conclusion:**

  Transport movement today has become a major concern in most countries of the world and affects the vitality of cities in them, and the means of transport and its systems have become a sharp debate between both transport policymakers and environmental experts who are working to research possible ways to reduce the negative effects of urban transport systems such as traffic congestion, environmental pollution and noise, and then sustainable transport is the best way to address transport problems in cities by including the environmental, social and economic dimension.

  In the past years, Egypt did not include environmental requirements in the development plan for the transport sector more than it included economic requirements, which led to the deterioration of the transport sector, and therefore the state has included in recent years the dimensions of sustainable development in its planning policy for transport in order to reach sustainable transport and preserve the environment, and began to implement many

projects to encourage citizens to use environmentally friendly sustainable means of transportation, in order to reduce emissions from fuel used in traditional vehicles, in order to improve Air quality, climate change mitigation and conserves biodiversity and the environment.

- **Recommendations:**
  1. Ensure the existence of emergency management within the components of the transport systems in place In order to respond to any accidents that may lead to Environmental disasters and other accidents.
  2. Giving priority to pedestrians, adopting a comprehensive plan to secure paths for cyclists, and identifying pedestrian paths with the implementation of tunnels designated for them.
  3. Enact the necessary laws and regulations in order to encourage the use of clean transport modes and reduce dependence on the personal vehicle.
  4. Re-planning roads, by providing special routes for public transport and buses, identifying service stations and waiting for passengers.
  5. Improving the application of traffic rules, improving safety rates and reducing traffic congestion.
  6. Taking care of sound insulation by surrounding roads, especially highways, with trees and shrubs.
  7. Ensure that the rate of use of frozen resources does not exceed the rates of Renewed.
  8. Preserving green areas.
  9. Upgrading the road structure.