

Installing various means of sustainable transportation to achieve sustainable urban development and Cairo vision 2050

Prof. Dr.Wael Ahmed Shaaban Abo Neama

*Associate Professor In Architectural Department, Faculty Of Fine Arts, Helwan University,
Cairo, Egypt*

E-mail Address: wael.aboneama@gmail.com

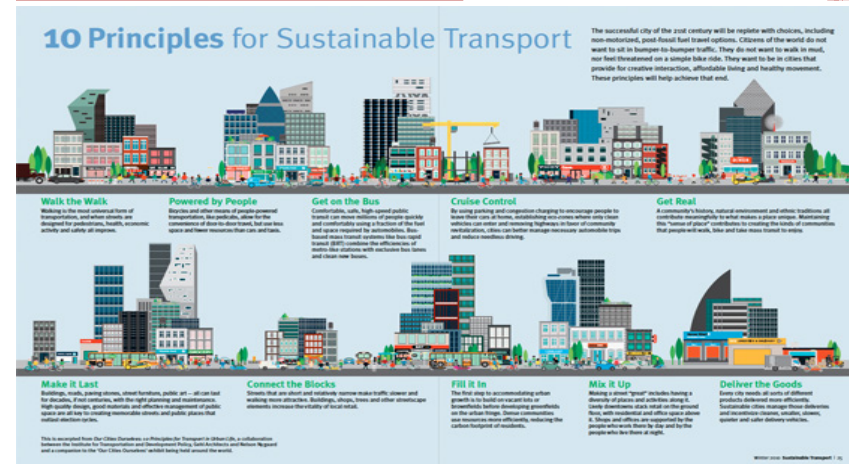
Mobile: (+20) 100 1426 210

FUTURE NORTH AFRICAN TRANSPORTATION SUMMIT

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Abstract:

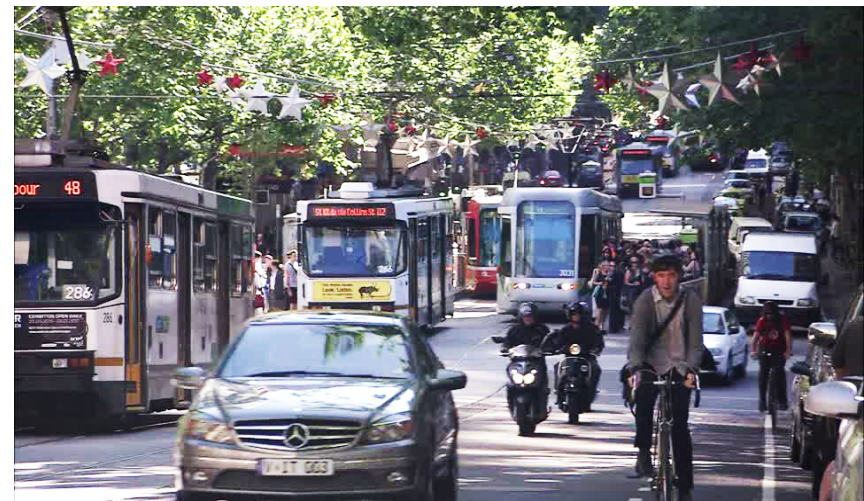
Sustainable urban growth nowadays is not an option for big cities all over the world. It is a mandatory to protect the environment and our planet for grandsons' future. Sustainable transportation is a main pillar for urban growth. It refers to the broad subject of transport that is sustainable in the senses of social, environmental and climate impacts and the ability to, in the global scope, supply the source energy indefinitely. The future of mega cities such as Cairo needs a time-framed planning based on sustainable criteria such as the first edition of Cairo vision 2050. Obviously, it needs enhancement and more detailed plans to be a guide for all governmental decisions and sub-planning projects. Opening new areas for urban growth needs the movement of people, animals, and goods from one location to another. This paper is focusing on the diversity of means of sustainable transportation that should exist in the new transportation plan. The infrastructure plan 2050 should consider the operation of those means to can achieve our



Introduction:

Sustainable transport systems make a positive contribution to the environmental, social and economic sustainability of the communities they serve. Transport systems exist to provide social and economic connections, and people quickly take up the opportunities offered by increased mobility. The advantages of increased mobility need to be weighed against the environmental, social and economic costs that transport systems pose. Transport systems have significant impacts on the environment, accounting for between 20% and 25% of world energy consumption and Carbon Dioxide emissions. Road transport is also a major contributor to local air pollution and smog.

Traditional transport planning aims to improve mobility, especially for vehicles, and may fail to adequately consider wider impacts. But the real purpose of transport is access - to work, education, goods and services, friends and family - and there are proven techniques to improve access while simultaneously reducing environmental and social impacts, and managing traffic congestion. Communities which are successfully improving the sustainability of their transport networks are doing so as part of a wider program of creating more vibrant, livable, sustainable cities.



Literature review: 1.Sustainable City

A sustainable city, or eco-city is a city designed with consideration of environmental impact, inhabited by people dedicated to minimization of required inputs of energy, water and food, and waste output of heat, air pollution –CO₂, Methane, and water pollution. Contrary to common belief, urban systems can be more environmentally sustainable than rural or suburban living. With people and resource located so close to one another it is possible to save energy and resources things such as food transportation and mass transit systems.

Walkable urbanism

Walkable urbanism is a development strategy in opposition to suburban sprawl. It advocates housing for a diverse population, a full mix of uses, walkable streets, positive public space, integrated civic and commercial centers, and accessible open space.

Urban strategic planning

the United Cities and Local Governments(UCLG) that is working to establish universal urban strategic guidelines. The UCLC a democratic and decentralized structure that operates in Africa, Asia, Eurasia, Europe, Latin America, North America, Middle East, West Asian and a Metropolitan section work to promote a more sustainable society. The 60 members of the UCLG committee evaluate urban development strategies and debate theses experiences to make the best recommendations. Additionally, the UCLG accounts for differences in regional and national context.



Literature review: 2.Sustainable transport

As major focus of the sustainable cities, sustainable transportation attempts to reduce a city's reliance and use of greenhouse emitting gases by utilizing eco friendly urban planning, low environmental impact vehicles, and residential proximity to create an urban center that has greater environmental responsibility and social equity.

Due to the significant impact that transportation services have on a city's energy consumption, the last decade has seen an increasing emphasis on sustainable transportation. Currently, transportation systems account for nearly a quarter of the world's energy consumption and carbon dioxide emission. In order to reduce the environmental impact caused by transportation in metropolitan areas, sustainable transportation has three widely agreed upon pillars that it utilizes to create more healthy and productive urban centers.

Diversity in modes of transportation:

Sustainable transportation emphasizes the use of a diversity of fuel-efficient transportation vehicles in order to reduce greenhouse emissions and diversity fuel demand. This strategy has become very important because it allows a way for city residents to be less susceptible to varying highs and lows in various energy prices.

Among the different modes of transportation, the use alternative energy cars and widespread instillation of refueling stations has gained increasing notoriety. Also, the creation of centralized bike and walking paths remains a staple of the sustainable transportation movement beside electric means such as Tram, trolleybus, and monorail.

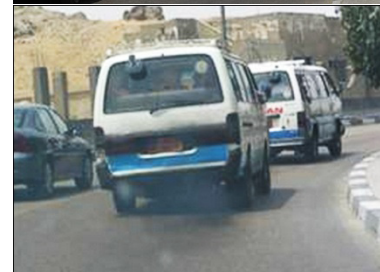


Literature review:

3. Cairo problems as historical city

Cairo suffers from many problems not limited to the following:

- Cairo is an expanding city, which has led to many environmental problems. The air pollution in Cairo is a matter of serious concern. Dangerous levels of lead, carbon dioxide, sulphur dioxide, and suspended particulate matter concentrations due to decades of unregulated vehicle emissions, urban industrial operations, and chaff and trash burning. There are over 4,500,000 cars on the streets of Cairo.
- Rapid urban expansion resulted in encroachments on agricultural land. Total prime agricultural land lost to urbanization during the period 1952-2002 amounts to 300,000 acres
- An addition of almost 1.35 million overpopulated annually.
- Egypt faces a shortage of affordable housing supply for the poor despite the presence of 5 million vacant units.
- About 440,000-600,000 new housing units are needed annually between now and 2020, of which 300,000 for low income households.
- Optical pollution.
- The underground is the only tool for sustainable transportation.
- Economical problems that create an obstacle to achieve sustainable growth and environmental goals.

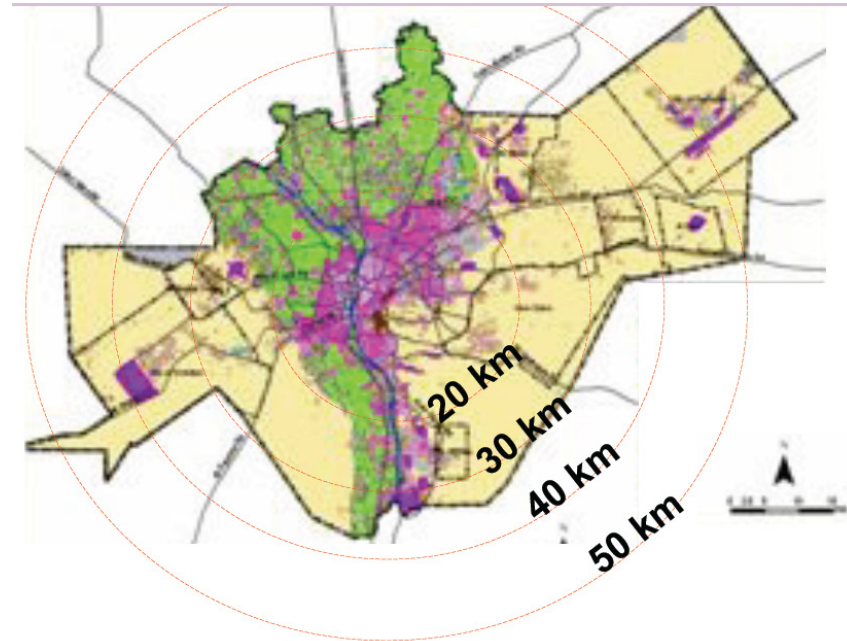


Literature review:

3. Cairo problems as historical city

Cairo suffers from many problems not limited to the following:

- High residential density in main existing agglomeration
- Rising traffic congestion.
- Limit/mediocre use of culture and natural resources.
- Mediocre living condition in some areas.
- Limited green spaces (0.3 m² /person within the ring road and 1.5 m²/person in the region as total).
- The challenge is not the size, but the population distribution over the whole region area



Methodology steps to achieve Cairo's sustainable urban development

Step One:

1. Cairo Vision 2050

Main Goal:

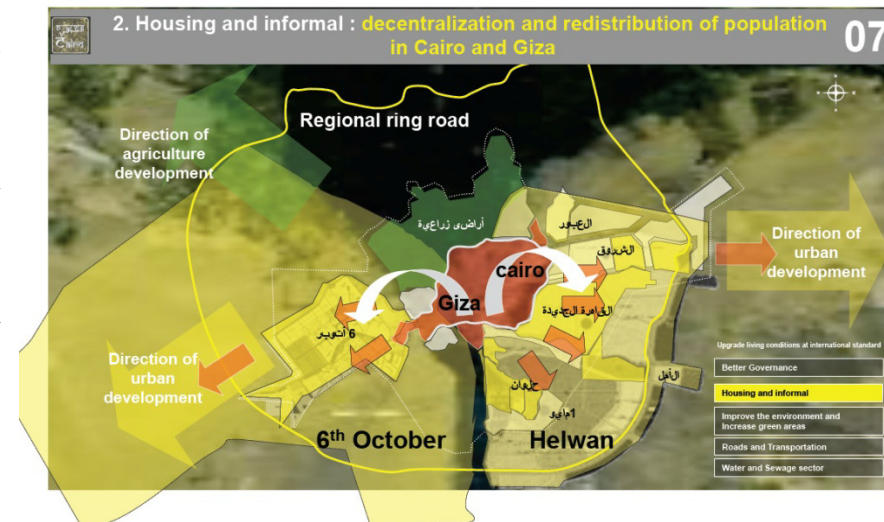
Sustainable development vision for Cairo 2050 and beyond, Includes social, cultural and economic fields integrated with urban field. With good Governance, we can achieve the best results for current and future generations. This aim includes the following items:

- Good living condition for its citizens (to be among the 30 best cities in the world).
- One of pioneer cities on the context of environmental level.
- Restoration of urban and architecture heritage of the city and elimination of slums.
- Reach the international standard for green areas/per capita.
- Containing routes for pedestrians, open and green areas and public squares.

In page 33 it was mentioned the following:

Road and Transportation networks connection

- Access to roads network linking Cairo suburbs to regional roads.
- Good transportation network at an international level.
- Has pedestrian and cycling network linked with the transportation network.



Methodology steps to achieve Cairo's sustainable urban development

Step two:

2. Issue the Egyptian sustainable rating system Green Pyramid and start applying it

Egypt is considered to be one of the countries most at risk from the impacts of global climate change. It is therefore of critical importance that the Nation follows the lead of others in rationalizing energy use, reducing CO2 emissions, and managing natural resources. The Egyptian Green Building Council produced the Green Pyramid Rating System. This rating system as the whole systems all over the world put several points to reach the level of sustainability. The first category of it is (Sustainable site, Accessibility, and ecology objectives). It is focused on minimize pollution and traffic congestion from car use and to conserve non-renewable energy by encouraging public and alternative transport. In addition, LEED (The US rating system for sustainability) recommends the reduction of automobile use and demonstrating strategies to the use of greener methods of transport [20]. Unfortunately, the steps of demolishing Cairo Tramline are against sustainability rating systems.



ما هو المجلس المصري للبناء الأخضر ، بالطبع تسأل؟



الطريق للحصول على مباني منخفضة التكاليف ذات كفاءة في الطاقة وصديقة للبيئة

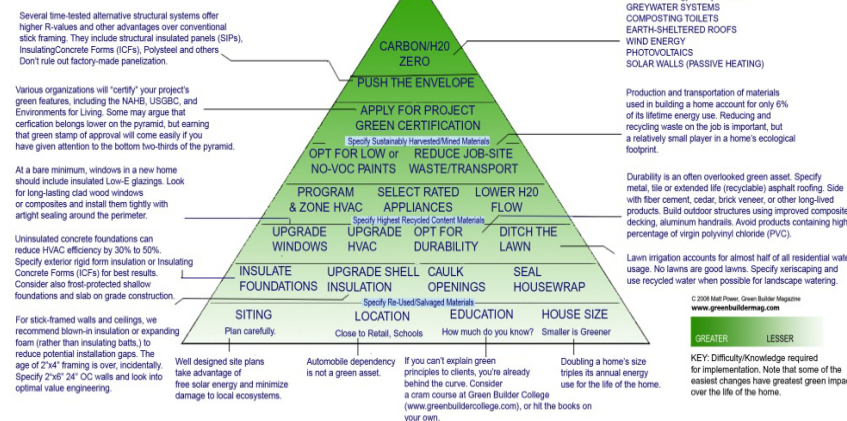
التبنت الحكومة المصرية بشكل نشط على مدى العدين الماضيين لتحسين كفاءة استخدام الطاقة في المباني بالإضافة إلى معالجة انبعاثات غازات الاحتباس الحراري. وكان الدفاع وراء ذلك المهد هو ادراك معدل الزيادة السكانية التي تشكلت هائلة مما يؤثر على جميع قطاعات الدولة المصرية ، و أن هذه المطلب يتكون لها الفرز على الحد بشكل كبير من نمو الاقتصاد المصري على المدى الطويل. في حين ذلك، أظهرت الدراسات المفصلة ارتباط وثيق بين النمو السكاني والطاقة

لنا السبب بحث المبرورون الرسميون للحكومة وأصحاب المصلحة المصرية عن طرق للحد من استهلاكها للطاقة وانبعاثات الغازات الدفيئة. وفي ضوء ذلك ، كان وضع كودات كفاءة الطاقة في المباني خطوة أولى وحاسمة في هذه العملية وتحديد مسارات جديدة من أجل كفاءة استخدام الطاقة بمثابة الخطوة الثانية.

وقد بذلت جهود لم تجرى بعد في قطاع البناء، وطرحنا مقترحات لتحسين الأداء في هذا المجال ولكن تبين أنه هناك فلة اهتمام وعجز في القوى العاملة، في حين يقوم العديد من النلس الأخرين بدراسة هذه المعضلة ويبحثون عن نظم بنيلة لمعالجة نفس الضضايا كما يقومون بنشر زيادة الوعي بأهميتها.



GREEN BUILDER MAGAZINE'S GREEN BUILDING PYRAMID



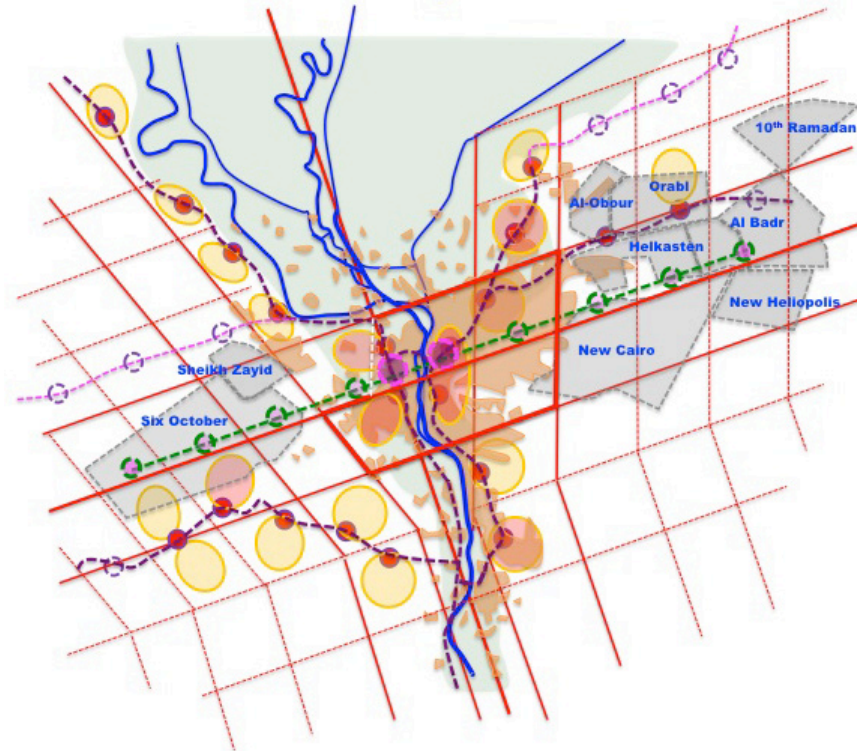
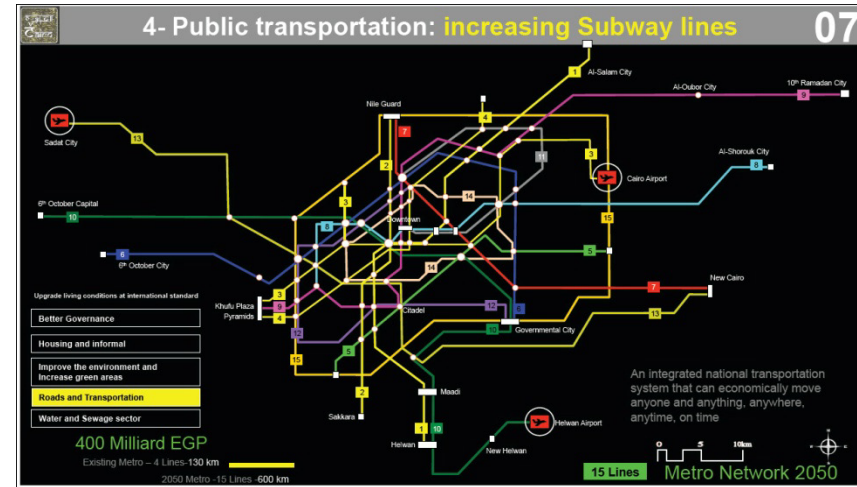
Methodology steps to achieve Cairo's sustainable urban development

Step three:

3. Enlarge underground lines to achieve Cairo vision 2050

Main Goal:

The existing 4 lines of underground metro covers 130 km. It is expected to reach 600 km by the end of 2050 using 15 lines of underground metro. It should start from the airport and covers all Cairo districts such as London, Paris and Moscow. Cairo's new extension as sustainable urban growth towards all direction east, west and south should be linked with many sustainable transportation tools and the underground or train should be one of them.



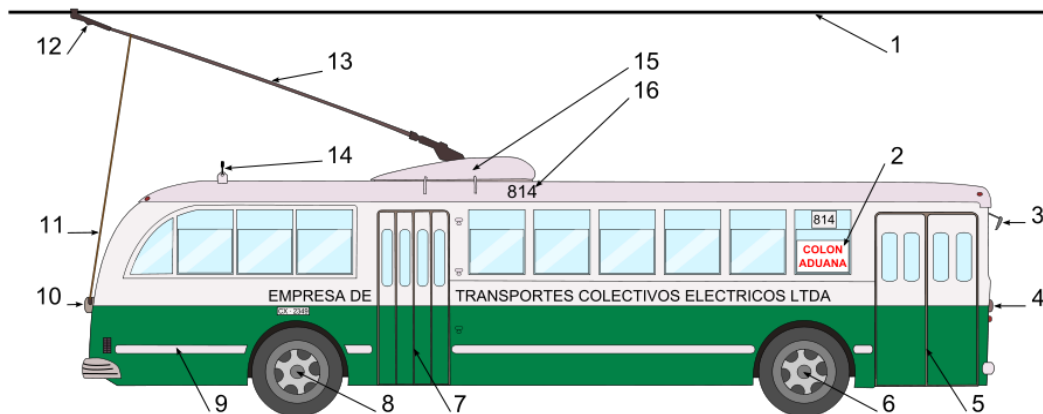
Methodology steps to achieve Cairo's sustainable urban development

Step four:

4. Installing trolleybus as sustainable transportation

Trolleybus is an electric bus that draws its electricity from overhead wires (generally suspended from roadside posts) using spring-loaded trolley poles. Currently, around 300 trolleybus systems are in operation, in cities and towns in 43 countries. It has electric engine providing torque in the start-up with rubber tires not need underneath infrastructure. New models have gas engine for any failure of electric rods.

Unfortunately, it was existing in Egypt covered high density district, but killed like tram lines under the plan of ending most of sustainable transportation in Egypt.



Methodology steps to achieve Cairo's sustainable urban development

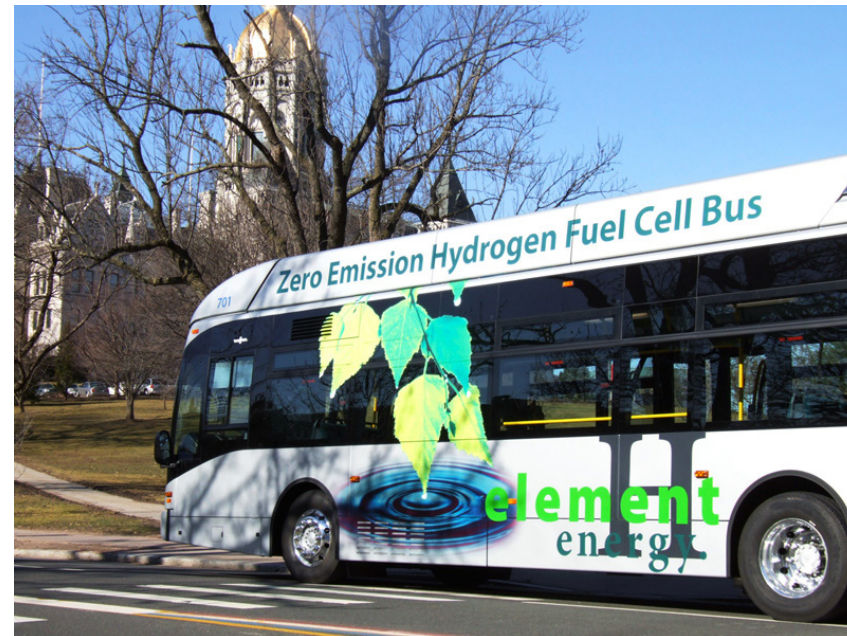
Step five:

5. Zero emission buses “Electric Bus”

The Zero Emission Urban Bus System, aims to be the main EU activity to extend the fully-electric solution to the core part of the urban bus network. It fits within the context of the European Commission's objective to create a competitive and sustainable transport system.

Emission Fuel Cell Hybrid Bus Fleet

Zero-Emission Fuel cell vehicles are zero-emission vehicles. The only thing that comes out of the tailpipe is water vapor: no smog forming nitrogen oxides; no particulates; and no carbon dioxide. This means cleaner air, less global warming, & healthier, quieter neighborhoods.



Methodology steps to achieve Cairo's sustainable urban development

Step six:

6. Stop demolishing tram lines in Heliopolis and Nasr City because it is sustainable transportation

- After studying the advantages and disadvantages of tram, we will explore that the future of any sustainable city should have a huge portion for the tramlines as public transit. Tram, trolleybus, & subway are the best green transportation tools for big cities.
- Establishing or demolishing tramlines is strategic urban decision that should be based on real urban planning and city vision with respecting and reviewing if it is against or support the sustainable rating system for this city
- The decision of demolishing the tramlines is against Cairo 2050 vision and Green Pyramids recommendations.
- Cairo city committee should make workshops and attend conferences around the world for similar old cities to study the benefits of enhancing tram service like Athens or adding the Tram as a new method for public transit like Rabat.



- Establishing a new tramline costs a lot for its infrastructure. So, if we already have it and only the tram vehicles are old (working more than 50 years), the solution is to study vehicle replacement with new models and repairing its railways which will be cheaper, more sustainable and reducing the use of private automobile to comply with Cairo 2050 vision.
- Traffic congestion imposes economic costs by wasting people's time and by slowing the delivery of goods and services. Communities, which are successfully improving the sustainability of their transport networks, are doing so as part of a wider program of creating more vibrant, livable, sustainable cities.



Methodology steps to achieve Cairo's sustainable urban development

Step seven:

7. Installing new tram lines as sustainable transport in new traffic plan

Take into consideration old cities solutions to solve traffic problems and to move towards sustainable urban growth. Rabat in Morocco and Athens development in 2004 for Olympic games are samples. Also, the new cities which suffer from heavy and crowded traffic problems, present solution for their problem focusing on sustainable transportation.



Methodology steps to achieve Cairo's sustainable urban development

Step seven:

7. Installing new tram lines as sustainable transport in new traffic plan

7.1 studying similar historical and overpopulated cities such as Athens, Greece:

Athens Tram began its operations in 1882 with horse tramways. After 1908, the metre gauge tram network became electrified and was extended to 21 lines. The original Athens tram system ceased operations in 1960 and was replaced by trolleybuses and thermal buses. However, a standard gauge tram system was constructed along the perimeter of Piraeus Harbour by the Hellenic Electric Railways. In March 2001, Tram S.A. was established as a public utility company under the supervision of the Ministry of Transport and Communications, as a subsidiary company of Attiko Metro S.A. the state company which developed the Athens Metro network. The company started the construction of the tram lines in the beginning of 2002, while the commercial launch of the system took place in July 2004, a few weeks prior to the Athens 2004 Olympic Games. The construction of the tram network was financed by the Third and Greek state funds.



Methodology steps to achieve Cairo's sustainable urban development

Step seven:

7. Installing new tram lines as sustainable transport in new traffic plan

7.2 Studying similar historical and overpopulated cities such as Al Rabat, Morocco:

The Rabat-Salé tramway is a tram system, which was put into service on May 23, 2011 in the Moroccan cities of Rabat and Salé. The network has two lines for a total length of 19 km (12 miles) and 31 stops. It is operated by Veolia Transdev with Alstom Citadis trams.



Methodology steps to achieve Cairo's sustainable urban growth

Step seven:

7. Installing new tram lines as sustainable transport in new traffic plan

7.3 studying new cities solutions for traffic problems such as Dubai

Dubai has emerged as a global city and business hub of the Arabian Gulf region. It is also a major transport hub for passengers and cargo. By the 1960s, Dubai's economy was based on revenues from trade and, to a smaller extent. In the first decade of 21st century, Dubai's traffic suffered from overpopulated vehicles. The solution was creating a tramline. A tramway located in Al Sufouh, Dubai. It runs for 14.5 kilometers (9.0 mi) along Al Sufouh Road from Dubai Marina to the Burj Al Arab and the Mall of the Emirates with two interchanges with Dubai Metro's Red Line. The first section, a 10.6-kilometer (6.6 mi) long tramline that serves 11 stations, was opened on 11 November 2014



Methodology steps to achieve Cairo's sustainable urban development

Step eight:

8. Installing Monorail for heavy traffic places

A **monorail** is a railway in which the track consists of a single rail, typically elevated. The term is also used to describe the beam of the system, or the vehicles traveling on such a beam or track.

Monorail vehicles often appear similar to light rail vehicles, and can be staffed or unstaffed. They can be individual rigid vehicles, articulated single units, or multiple units coupled into trains. Like other advanced rapid transit systems, monorails can be driven by linear induction motors; like conventional railways, vehicle bodies can be connected to the beam via bogies, allowing curves to be negotiated.

The most common type is the straddle-beam, in which the train straddles a steel or reinforced concrete beam 2 to 3 feet (0.61 to 0.91 m) wide. A rubber-tired carriage contacts the beam on the top and both sides for traction and to stabilize the vehicle. The style was popularized by the German company ALWEG.



Methodology steps to achieve Cairo's sustainable urban development

Step nine:

9. Developing Nile river bus (taxi) and stations and install zero carbon engines

A water taxi or a water bus, also known as a sightseeing boat, is a watercraft used to provide public or private transport, usually, but not always, in an urban environment. Service may be scheduled with multiple stops, operating in a similar manner to a bus, or on demand to many locations, operating in a similar manner to a taxi. A boat service shuttling between two points would normally be described as a ferry rather than a water bus or taxi. Egypt needs to work on the following steps:

9.1 Developing the river vehicles

Taxi river in Egypt is used for local tourists and rarely for normal transportation. It needs to develop the boats and increase its number,

9.2 Developing the stations from Helwan & 15 May to Shobra

The station design, construction, facilities and location of river bus determines the number of people who use this successful tool as sustainable fast transportation.



Methodology steps to achieve Cairo's sustainable urban development

Step ten:

10. Zero emission vehicles

A green vehicle is a road motor vehicle that produces less harmful impacts to the environment than comparable conventional internal combustion engine vehicles running on gasoline or diesel, or one that uses certain alternative fuels.

Green vehicles can be powered by alternative fuels and advanced vehicle technologies and include hybrid electric vehicles, plug-in hybrid electric vehicles, battery electric vehicles, compressed-air vehicles, hydrogen and fuel-cell vehicles, neat ethanol vehicles, flexible-fuel vehicles, natural gas vehicles, clean diesel vehicles, and some sources also include vehicles using blends of biodiesel and ethanol fuel or gasohol.

Egypt can encourage the people to buy these kind of cars by canceling any taxes or customs for this kind of cars, and provide stations for car charging or alternative fuel supply.



Methodology steps to achieve Cairo's sustainable urban development

Step eleven:

11. Developing bike lanes for district connection

A bikeway is a lane, route, way or path which in some manner is specifically designed and /or designated for bicycle travel. Bike lanes demarcated by a painted marking are quite common in many cities. Cycle tracks demarcated by barriers, bollards or boulevards are quite common in some European countries.

Bicycle superhighways:

Denmark has pioneered the concept of “bicycle superhighways” to increase the speed, safety, and comfort of bicycle commuting. Since then London, England, has also started building bicycle superhighways. The physical design of the routes changes depending on the circumstances and can include shared in-road bikeways, bike lanes and cycle tracks, making it difficult to categorize into degree of separation from other traffic.



Methodology steps to achieve Cairo's sustainable urban development

Step twelve:

12. Developing footpaths for pedestrian traffic “side walk” in Egyptian streets

Roads often have a designated footpath for pedestrian traffic, called the sidewalk. Regular walking is important both for human health and for the natural environment. Frequent exercise such as walking tends to reduce the chance of obesity and related medical problems. In contrast, using a car for short trips tends to contribute both to obesity and via vehicle emissions to climate change.

12.1 Determine side walk in all streets

Not all the streets in Egypt have the possibility of space for side walk. It should be clear in the code of cities that there are no streets without side walk and safe street crossing.

12.2 Demolish all obstacles for people on sidewalk

Roads and streets in Egypt are full of illegal street furniture which prevent people to walk safely on side walk “if they are existing”.



Methodology steps to achieve Cairo's sustainable urban development

12. Developing footpaths for pedestrian traffic “side walk” in Egyptian streets

12.3 Define side walks and Bike lanes in new compounds

Nobody can deny that new compounds in Egypt have a real landscape and apply most of international codes, however that for bike and man walk still there is no separation and defined areas for both as sustainable transport, not children play.

12.4 Apply the Law through authorities and stop blaming the people attitude

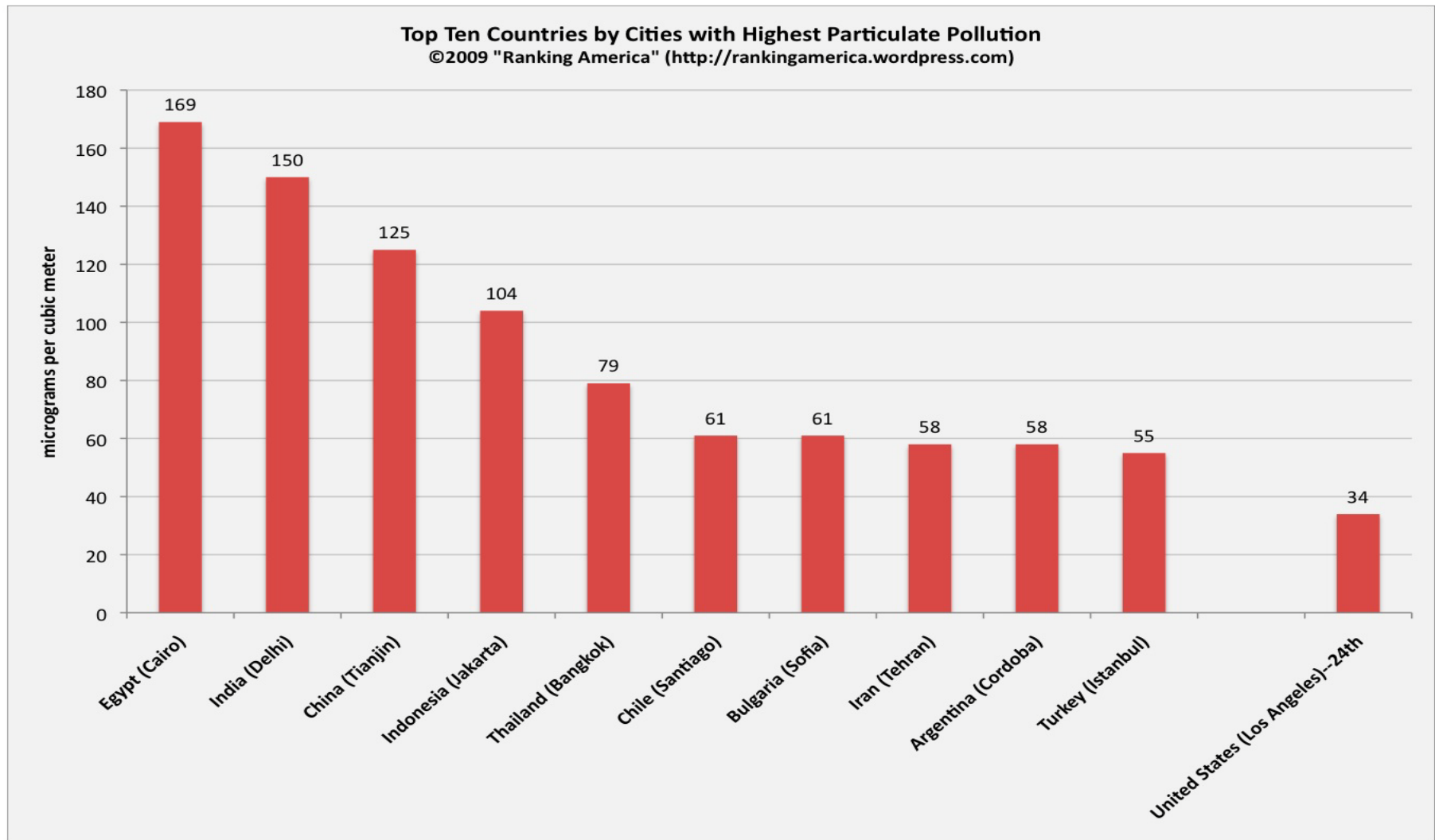
The new compounds in Egypt close and end all claims that people are the reason of lack of system. The problem is very clear that the law is not applied. Those compounds had all social categories and levels.

12.5 Consider handicaps traffic in Egyptian streets:

We can not ask for pedestrian traffic without mention to consider handicapped solution to make their movement easier. Unfortunately, a very few places in Egypt consider this subject and the rest are out of track, meanwhile pavement height and material in Egypt needs a real review and study.



Results and findings of Egyptian need for sustainable urban & transportation growth

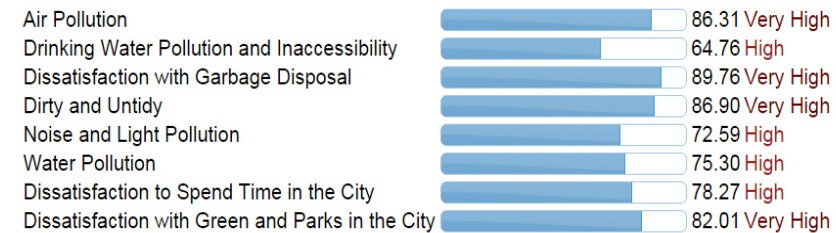


Data from World Bank
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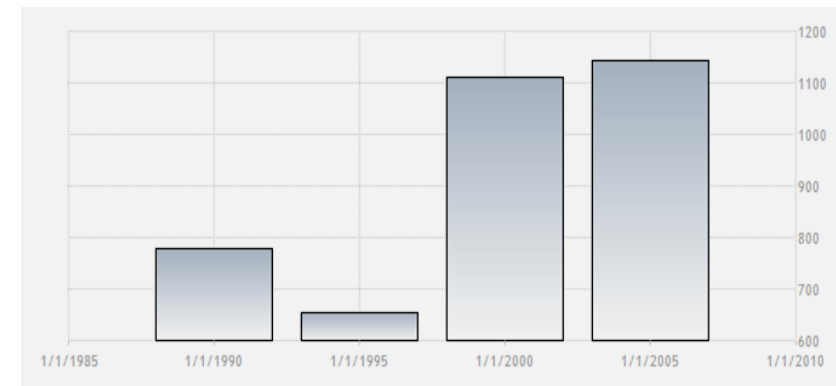
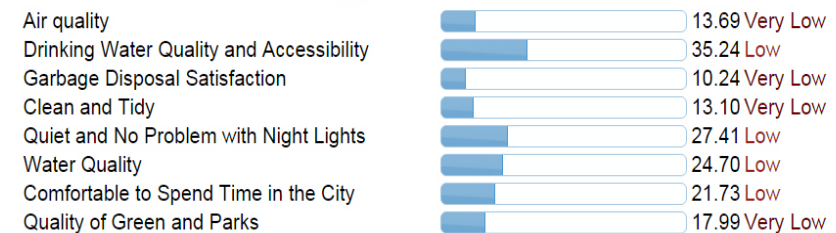
Results and findings of Egyptian need for sustainable urban & transportation growth

- Urban sustainable growth is an essential demand for Cairo and the rest of Egyptian cities.
- The air pollution in Cairo is a matter of serious concern. The air quality in downtown Cairo is more than 10 to 100 times of acceptable world standards.
- Many describe slums in Egypt as ticking time bombs waiting to go off at any minute. Studies provide conflicting reports about the number of slum areas and their populations. A study conducted by the Central Agency for Public Mobilization and Statistics (CAPMAS) stated that the number of slums in Egypt amounted to 1,221 areas among which 20 have been called for removal because they are not fit for development.
- Sustainable development (SD) is a process for meeting human development goals while maintaining the ability of natural resources and ecosystem services upon which the economy and society depend
- Urban development should be guided by a sustainable planning and management vision that promotes interconnected green space, a multi-modal transportation system, and mixed-use development. Diverse public and private partnerships should be used to create sustainable and livable communities that protect historic, cultural, and environmental resources. In addition, policymakers, regulators and developers should support sustainable site planning and construction techniques that reduce pollution and create a balance between built and natural systems.

Pollution in Egypt



Purity and Cleanliness in Egypt



SF6 gas emissions (thousand metric tons of CO2 equivalent) in Egypt

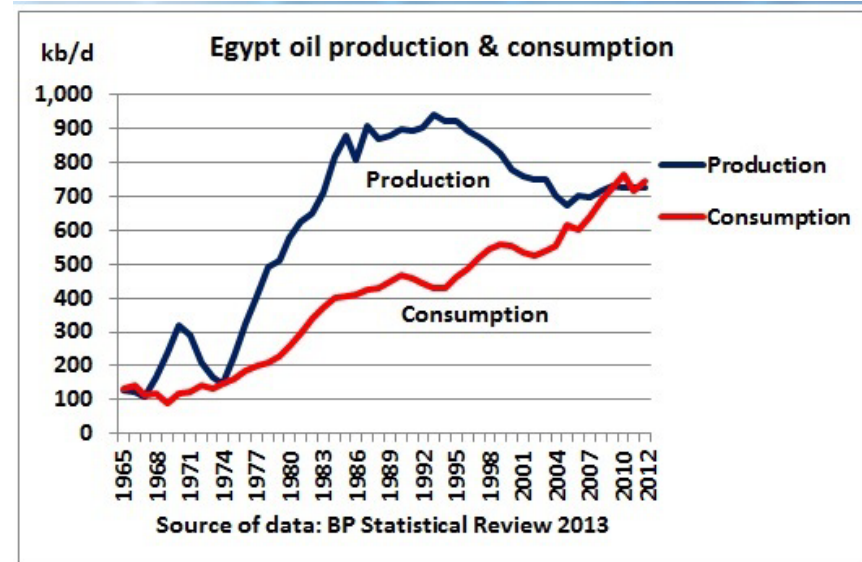
Discussion and analysis

The Sustainable Transport Project for Egypt aims to reduce the growth of the energy consumption and the related greenhouse gas emissions of the transport sector in Egypt, while simultaneously mitigating the local environmental and other problems of increasing traffic such as deteriorated urban air quality and congestion by:

- 1) initiating the concept for the development of new, integrated transport services for Greater Cairo and its satellite cities on the basis of public-private partnerships;
- 2) promoting non-motorized transport in medium sized provincial cities;
- 3) introducing new traffic demand management measures;
- 4) improving the energy efficiency of freight transport;
- 5) enhancing the awareness and capacity of local professionals on different aspect of sustainable transport and strengthening the institutional basis to promote sustainable transport.

Reference: <http://www.stpegypt.org/>

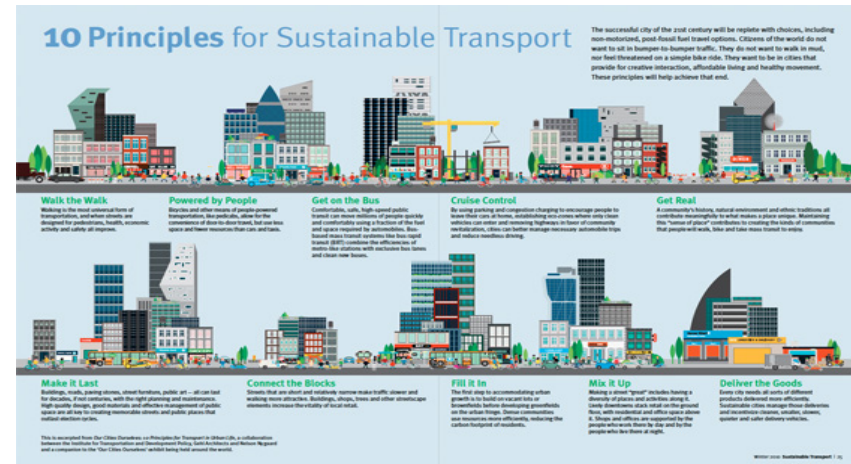
The Sustainable transport project does not have concrete time schedule, defined actions for using different means of sustainable transport and annually report since 2009. The duration of the project ended by 2015.



Name:	Sustainable Transport Project for Egypt (STP)
Project ID :	00054348 PIMS 3523 CC-FSP
Start Date :	January 2009
Duration:	Seven Years 2009: 2015
Budget:	44 million US \$ = 7 million US \$ funded by GEF/UNDP + 37 million US \$ local contribution by the Egyptian Government & Private Sector.
Implementing Partner (Executing Agency)	Egyptian Environmental Affairs Agency / Ministry of State for Environmental Affairs (EEAA / MoSEA).
Technical Support:	Development Research & Technological Planning Center (DRTPC), Cairo University
Main Stakeholders:	Ministry of Transport, Ministry of Housing and New Urban Communities, Ministry of Interior, Cairo, Guiza, Fayoum, Monofia, Giza & Cairo Governorates, and private sector.

Conclusion and recommendations

- Increasing means of sustainable transportation will provide more flexibility to deal with different places and cities.
- Transportation is best way for developing new urban areas as a result of historical new areas such as Heliopolis and Nasr city.
- Demolishing tram lines was a big mistake for Cairo.
- Installing new tram lines is the sustainable solution to solve traffic problems in both historical and new cities.
- Long term planning such as Cairo vision 2050 should be studied by governmental authorities with corporation of academic and research staff of the country.
- Publishing the data and results of long term planning will help researchers to provide ideas for better enhancement of this entire vision.
- Apply the sustainable rating system and pushing all designers and developers to build upon its recommendations will push Egyptian projects towards better environment.
- Installing trolleybus will decrease the toxic emissions of traditional bus vehicles.
- Focus on apply the law everywhere not only inside new compounds with fences, and claim that the careless people is the reason of irregular attitude in Egyptian streets.
- Eliminate any taxes or customs on environmental-friendly vehicles and cars and provide refill stations for those new tools
- Using all means of sustainable transportation which are; tram, trolleybus, monorail, underground metro, zero emission buses, environmental friendly cars, river taxi, bikes, and side walks.



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Thank you,

Dr. Wael Aboneama