

# **REPORT ON DISSEMINATION WORKSHOP TO PROMOTE SOOT-FREE BUS STANDARDS AND SUSTAINABLE PUBLIC TRANSPORT IN ACCRA, GHANA**



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**CLIMATE & CLEAN AIR COALITION**  
TO REDUCE SHORT-LIVED CLIMATE POLLUTANTS



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## **1.0 INTRODUCTION**

### **1.1 Background Information**

Ghana's population has been increasing over the years. The Greater Accra Region has an estimated population of about 4,010,054 people (2010 National Population Census); with additional daily influx of between 2.5 million and 3.0 million people per day. Accra's economy appears to be prosperous, but urban productivity is hindered by low density based urban sprawl which increases the cost of commuting with its attendant negative environmental and health impacts. Vehicle fleet population in Ghana has increase more than 300% relative to the 2005 figure.

The current vehicle fleet is impacting negatively on roadside air quality and human health . EPA air quality monitoring results along the major roadside routes in Accra showed consistently high particulate matter concentrations. Studies by GHS (2010) showed that respiratory infections from exposure to poor air quality ranks second to the top twenty (20) burden of diseases in Ghana.

There is the need to reduce transport-related air pollution, improve commuting time and public health. To achieve these aims Ghana has developed a draft paper on a roadmap for soot-free bus standards (cleaner bus standards)to promote sustainable transport in Accra.

The objectives of the project are to;

- Support the development of soot-free bus standards in Accra;
- Build the capacity of public transport operators and regulators in Ghana and the sub-region;
- Develop communication strategy (awareness creation materials) to educate the public on soot-free bus system in Ghana; and
- Initiate the dissemination of the draft policy options of soot-free bus standard in Ghana.

In fulfilment of the above project objectives, the Environmental Protection Agency and its stakeholders, hosted nine (9) African Cities and several regional organisations to a two-

day workshop aimed at promoting soot free bus standards and sustainable public transport in Africa including Accra, Ghana.

The regional workshop was organized jointly by the Environmental Protection Agency and its stakeholders (including Ministries of Transport, Finance and Environment, Science Technology and Innovation and Ghana Health Service), the African Association of Public Transport (UATP) and UN Environment, with financial support from the Climate Clean Air Coalition (CCAC).

The workshop was held at the Institute of Environmental Studies (IES) at Amasaman, Accra, Ghana from 14<sup>th</sup> to 15<sup>th</sup> June 2017.

The workshop was widely covered by both print and electronic media (see Appendix D).

## **1.2 Participation**

The theme of the workshop was "Promoting Soot- Free Bus and Sustainable Public Transport" in Accra. The workshop was attended by over 58 participants from the following African cities: Abidjan (Côte d'Ivoire); Johannesburg (South Africa); Dakar (Senegal); Accra (Ghana); Abuja (Nigeria); Addis Ababa ( Ethiopia); Kampala (Uganda); Dar Es Salam (Tanzania) and Nairobi (Kenya). Participants were drawn from cities and Ministries responsible for transport policy and regulation, private sector public transport operators, State Transport operators, Agents of vehicle manufacturers, the media and institutions involved in sustainable transport. The workshop provided a platform for learning and sharing experiences among Regional experts and stakeholders within the transport, finance, energy petroleum, environment and the media (See Appendix B). The workshop was also attended by high dignitaries including the following:

- ❖ Ag. Executive Director/Environmental Protection Agency (EPA)
- ❖ Director CSE/EPA ; Chairman
- ❖ UN Environment Representative
- ❖ UATP Representatives
- ❖ ECOWAS Representative

- ❖ Ghana Road Transport Association Representative
- ❖ Representative for Hon. Minister of Transport
- ❖ Representative for Hon. Minister of Environment, Science, Technology and Innovation (MESTI)

### **1.3 Scope and objectives workshop**

#### **1.3.1 Scope of workshop**

The workshop adopted four methods including presentations, questions and answers, group work and field visit. Twelve (12) technical presentations were made followed by questions and answers. The group work was guided by the information contained in the draft paper on cleaner bus standards and sustainable transport for Accra.

#### **1.3.2 Objectives, Programme Outline and Output of the workshop**

##### **1.3.2.1 Workshop Objectives**

The objectives and outline of the workshop were presented by Emmanuel K-E Appoh, a Local Project Focal Officer and a Deputy Director of the EPA. He enumerated the objectives of the workshop as follows:

- Support stakeholder engagement on the need to adopt soot-free public transport system
- Build the capacity of public transport operators and regulators in Ghana and the sub-region
- Share experiences and best practices on implementing cleaner bus standards in Ghana and Africa in general
- Use information from the workshop to draft awareness creation materials on options for soot-free buses.
- Build consensus on roadmap for the implementation of cleaner bus standards in Accra.
- Help finalize the proposed Ghana roadmap on cleaner bus with stakeholder input.

### **1.3.2.2 Programme Outline**

The local project focal officer enumerated the programme outline of the Workshop as follows:

#### **DAY 1**

##### ***Session 1***

The programmes were outlined as follows:

- presentation on Efforts towards Cleaner Buses in Africa,
- presentation on Status of BRT system in Accra and the way forward.
- overview of the impact of fuel quality on soot-free Bus project in Accra
- Discussions on the various presentations (involving contributions, Questions &Answers)

##### ***Session 2 of the programme involves:***

- Presentation on economic and health benefits of Implementation of cleaner Soot- Free Bus standards in Ghana
- Discussions on the economic and health benefits which will include considerations for other regional experiences.

He also indicated that the workshop will close at 4pm each day.

#### **DAY 2**

##### ***Session 3***

- Presentations of Country Reports on Cleaner Bus standards programmes in Kenya, Ethiopia, South Africa, Cote d'Ivoire, Senegal & Tanzania.

##### ***Session 4***

- Presentation on Cleaner Bus Options, Policies, Standards and Roadmap to Cleaner Buses in Accra
- General discussions of country reports & presentation in the form of contributions, Question &Answers.

##### ***Session 5***

Group Discussion: Participants will be divided into 3 groups to deliberate on assigned topics and reported back to plenary (findings and recommendations).

- Group 1: Policy and strategies of soot free bus system
- Group 2: Vehicle technologies available and their benefits
- Group 3: Communication strategy & Implementation period
- General discussions on the findings and recommendations from various Groups

### **1.3.2.3 Workshop Output**

- A paper on options and benefits of soot-free bus standards for Accra developed

The paper should highlight the following:

- policy and strategies of soot-free bus standards;
- Best bus technology options
- Financial and health benefits
- Communication strategies for cleaner bus system for Accra
- Final Implementation roadmap for soot free bus system etc.



## **2.0 WORKSHOP PROGRAMME- DAY ONE**

Day one (1) of the workshop which was held on 14 June 2017, commenced with an opening prayer by Mrs. Helen Asiamah at 9:30 a.m. The programme was moderated by the Local Project Focal Officer, Participants self-introduced themselves and this was followed by a brief introduction of the members of the high dignitaries. Mr. Lambert Faabeluon was introduced to the Participants as the chairman of the workshop. The chairman readily accepted the chairmanship and in his remarks welcomed the participants to the workshop. In his acceptance remarks, he urged participants to contribute positively to the discussions in order to help achieve the objectives of the workshop. He stressed on the need for the discussions to be focussed on the main objective of the workshop and come out with useful recommendations. His remarks was followed by the welcome address and various statements by some of the dignitaries.

### **2.1 Welcome Address**



**Figure 1: Ag. Executive Director/ EPA**

The Ag. Executive Director of the EPA, Mr. John Alexis Pwamang gave the welcome speech. He indicated that, one of the key functions of the Agency in relation to the workshop is to prescribe standards and guidelines with respect to pollution of air, land and water and the control of toxic substances into the environment. He said that, the Agency over the years conducted air quality monitoring in various parts of Ghana. He

further indicated that currently there are 10 air quality monitoring stations located at major road corridors in the Greater Accra Metropolitan areas.

He mentioned some significant achievements in air quality monitoring and vehicular emissions inventory by the Agency in the country. He further indicated that the vehicular emission inventory programme under the DANIDA Transport Sector Support Programme in 2006, helped shape the current transport policy. Mr. Pwamang added that the data from

Agency's air monitoring programmes have been used in the drafting of air quality and vehicular emission standards.

Finally, he expressed his gratitude to the UN Environment for supporting Ghana to develop a roadmap for cleaner bus standards in Accra. Finally, he welcomed the UN Environment and partners, colleagues from various parts of Africa, national experts, stakeholders and the media and wished them well in the 2-day deliberations.

## **2.2 Goodwill Message from UN Environment**



**Figure 2: UN- Environment Representative/ Ms. Jane Akumu**

A goodwill message from the UN Environment was presented by Ms. Jane Akumu, a programme officer for Air Quality & Mobility Unit of the UN-Environment. She thanked the Government of Ghana, through the EPA for organizing and hosting this regional workshop.

She mentioned that the UN Environment has collaborated with Ghana on a number of projects including the elimination of leaded petrol, air quality monitoring, reduction of sulphur levels in fuels, among others. She further indicated that the UN- Environment is currently supporting Ghana to develop soot free bus options policy for implementation. She disclosed that the soot-free bus options project is funded under one of the Initiatives of the Climate and Clean Air Coalition, which aims to reduce emissions from Heavy Duty Diesel Vehicles and Engines.

Ms. Akumu indicated that various studies and research works show that air pollution is the largest single environmental health risk that results in premature deaths resulting in some economic cost.

Furthermore, she mentioned that various studies as well as research conducted proves that air pollution is the largest single environmental health risk that results in premature deaths and provided some economic cost of premature deaths.

Some facts about the state of the transport sector that poses significant health risk were outlined and these included diesel emissions from urban buses, risk of exposure to air toxics, emissions entering the bus cabin, exposure at bus stops or along urban transit corridors. She further explained that urban buses are also large sources of black carbon emissions, the second largest contributor to human induced climate warming, and account for 25% of transportation-related black carbon emissions. Buses are estimated to emit 250 times or more black carbon than a gasoline passenger vehicle travelling the same distance, not taking into account that buses will travel more times.

She then provided technical insights and statistics on the benefits of promoting soot-free Bus programme. She further indicated the need to promote cleaner emissions and greener transport which in effect will reduce primary air pollutants and climate change. She outlined various options available for greener transport such as clean bus technology, benefits of sulphur limits in fuel. She then called for urgent action, indicating that diesel emissions can fall dramatically through changes in vehicle engines and fuels. A city with access to 50 ppm diesel fuel sulphur can operate a Euro IV or V engine which will reduce black carbon emissions by 75 percent compared to a Euro III vehicle.

Ms. Akumu was glad that Ghana is on good path to becoming the first West and Central African country to introduce low sulphur fuels (50ppm maximum) in the market. She was emphatical that with the introduction of 50ppm sulphur fuels, is a key milestone that will support the introduction of cleaner vehicle and bus technologies capable of significantly reducing emissions from the transport sector.

### **2.3 Statement from UATP**



**Figure 3: UATP Representative/ Mr. Yssoufou Cisse**

A goodwill statement was delivered by Mr. Yssoufou Cisse, the Secretary General and Regional Office Manager of UATP. He delivered the speech on behalf of Mr. Meite Bouake, the president of UATP and also the Director General of SOTRA in Abidjan.

Mr. Cisse expressed his excitement to be part of the 2nd Regional Workshop on soot-free buses and sustainable mobility in Africa.

He mentioned that some African countries have committed to advance Eco-mobility including reduction of CO<sub>2</sub> emissions and their transition towards clean, innovative, green transport, resource efficient and low carbon technologies.

He expressed concerns that the transport sector currently emits 28% of all CO<sub>2</sub> emissions worldwide and is likely to triple by 2050 if significant actions are not taken. Mr. Cisse further added that most buses used in Africa are outmoded and generate primary air pollutant and GHG emissions. He emphasized that resource efficiency and cleaner technologies should be embraced.

He urged all African Governments to join the "Mobilise Your City" initiative that aims to reduce transport-related GHG emissions. He was delighted to be part of the process of promoting soot-free buses in Africa through advocacy, dialogue and training.

He finally used the opportunity to thank the UN Environment, UATP and ECOWAS for their commitment and support in promoting local green transport and innovation in the transport sector.

## **2.4 Statement from ECOWAS Commission**



**Figure 4: Representative from ECOWAS Commission/ Mr. Bernard Koffi**

Mr. Bernard Koffi delivered a statement on behalf of the ECOWAS Commission. In his speech he commended UN Environment and the Government of Ghana for inviting ECOWAS Commission to the workshop to discuss issues on the promotion of Soot-free bus options and sustainable transport in Accra.

He indicated that, prior to the workshop, ECOWAS Commission had attended workshops in Ghana in October 2016 and March 2017, where issues on Low Sulphur in Fuels and Green Economy were discussed. He acknowledged the challenges being faced in the cities in the ECOWAS region that relates to public transport. Mr. Koffi mentioned that, public transport system (Tro-tro, Rapid, Gbaka etc.) in the sub-region pose challenge to the cities hence action there is the need to take action towards improving public transport system.

He pointed out that the benefits of the BRT system will involve the substitution of less efficient and low occupancy bus with more efficient, faster and less polluting buses. He indicated that the Commission's commitment to working with member states to develop a regional regulation to ensure sustainable transportation in cities in the sub-region.

Mr. Koffi asserted that, in line with ECOWAS Vision 2020, and the SDGs Goals, ECOWAS plan to organise a Ministerial meeting either in in July or August 2017 to adopt some regional documents developed for chemicals and waste management. This will be a platform to discuss successful pilot projects on POPs management as well as best practice on BRT.

Lastly, he concluded that the workshop will offer opportunity to learn from South African Development Community (SADC) and Intergovernmental Authority on Development (IGAD).

## **2.5 Statement on behalf of Honourable Minister of Transport**



Figure 5: Representative of Hon. of Minister of Transport

Mr. Emmanuel N. Num, the Director for Finance and Administration was glad to represent the Minister for Transport, who was then engaged in a similar sector-related workshop and therefore could not be present. He indicated that his interest in this workshop comes from the fact that Ghana relies heavily on second-hand vehicles imports.

He stated that, the road transport sector is the dominant mode of transport with over 80% of the services provided by the private sector. He further revealed that, the Ministry have commenced the review of the National Transport Policy and developing a 4-year medium term development plan for the transport sector.

Mr. Num expressed concerns about the exposure of women and children to air emissions from vehicles along various road corridors in the country. Emphasis was made on the fact that the current fiscal regime and custom directives makes it cheaper to import used vehicles. Furthermore, the poor quality of fuel does not support the introduction of Euro VI vehicles standards. He suggested that these issues should be considered in the development of clean bus policy options.

He agreed with the assertion that, soot-free buses will provide the country an opportunity to reduce transport related air pollution and green house gas emissions. He added that, the transport sector could be supported to introduce alternative clean burning fuels instead of diesel. Mr. Num suggested that in order to achieve national targets in line with the SDGs, we should refocus our attention on less polluting emerging sources such as compressed Natural Gas, electricity or hybrid technology with fossil or bio-fuels.

Lastly, he re-iterated the government of Ghana's commitment to support any move towards greening our public transport system and the development and implementation of appropriate and effective preventive and maintenance plan for all public transport vehicles.

## **2.6 Statement from Ghana Road Transport Coordinating Council (GRTCC)**

A brief message on the theme 'Emission Eradication' was presented by Mr. Andrews Kwasi Kwakye, the Ag. General Secretary of Ghana Road Transport Coordinating Council's (GRTCC). He said that the entire members of GRTCC executives are appreciative for the platform provided them to contribute to the programme. He added that members of the Council will forever support any project that will go a long way to better promote their business and also protect the environment.

Mr. Kwakye on behalf of members of the GRTCC raised a number of concerns and questions for discussion at the forum and these were as follows:

- That, when will the road transport authority (RTA) be established to set standards for vehicles and operations of public transport operators?
- Most of the things that will be discussed during the workshop had already been mentioned at other fora. The difficulty now is how to implement the outcomes of these workshops and create avenues for operators to renew their fleet to help solve the challenges associated with vehicular emissions.
- Introduction of high occupancy buses is good news, and what is left to be done is to provide incentives and financing that will compel the current private operators and owners of the traditional 'tro-tros' to move from mini buses to high occupancy vehicles.

He was unhappy that only two transport operators made it to the workshop.

## **2.7 Presentations**

The Part two of day 1 was basically on technical presentations, discussions and field trip. Below is the summary of key highlights of the presentations.

### **2.7.1 Presentation on Efforts towards Cleaner Buses in Africa**

The above paper was delivered by Ms. Jane Akumu of the UN Environment. She indicated that transport modal share of different cities in Africa including Abidjan, Accra, Addis

Ababa, Dar es Salaam, Dakar, Doula, Johannesburg, Lagos, Nairobi and Windhoek includes private car, bicycle and walking, moto-cycle, public transport (bus), private taxis and informal (minibus, collective taxi).

That, in Africa basically there is lack of efficient mass transport system, inefficient infrastructure and road congestion leading to the proliferation of motorcycles.

She was of the view that, exposure to higher levels of outdoor particulate matter are responsible for an estimated 3.7 million premature deaths annually. That, heavy-duty trucks and buses currently account for over 80% of PM<sub>2.5</sub> emissions on-road vehicles with human exposure ranging between 300-500 meters from road way. Ms. Akumu was happy that most African cities are now for planning BRT system which has diverse benefits. She said that there are various types of BRT systems being implemented in some parts of Africa including South Africa, Dar es Salaam, Lagos, and Ethiopia and these are worth emulating.

She indicated that, the roadmap for the reduction of sulphur content in diesel is on course and there has been great improvement from 2005 to 2017. That, currently 13 African countries are either producing or importing less than 50ppm sulphur levels in fuels which is good for the introduction of cleaner bus technologies. That, there are various technologies available which include the use of LPG and CNG, hybrid, battery, trolley, diesel, capacitor and fuel cells; and also vehicle emission standards that are available from Euro III, and above.

In conclusion, Ms. Akumu indicated that, with the availability of cleaner fuels (50ppm diesel fuels and CNG) cities should be committed to procure cleaner, soot-free buses based in the standards set.

### **2.7.2 Presentation on the Promotion of Soot Free Bus and Sustainable Public Transport - case study of Johannesburg**

This presentation was made by Mr. Alex Bhiman on the City of Johannesburg. He gave a background of the city of Johannesburg that has a population of 4.4 million, a growth rate of 3.4% per annum and a population density of 2,700 people per square kilometer. That,



23% of economically active people are unemployed and 67.4% of households live on less than R3200 per month with a large percentage of poor household's income going towards transport.

He indicated that Johannesburg contributes 56% to national carbon emissions and transport accounts for 67% (the highest record) of energy demand. He enumerated the various transport modes of the city including Private vehicles, Mini bus taxis (not subsidized, privately owned – organized in associations, Rail (Gautrain – high class and Metrorail – for the poorest) and Bus (City bus fleet, provincial subsidized, Rea Vaya BRT).

He was of the view that, the apartheid spatial legacy (poor people on the periphery) and decades of car-centered and security focused planning has been a major challenge, hence there is currently a new vision captioned "Growth and Development Strategy 2040 Liveable city " for the transport sector in Johannesburg. This vision involves -+pro-public transport, walking and cycling (eco-mobility) and radical increase public transport use; and a more compact city with future development around public transport corridors that support economic growth and low-carbon city economy.

He indicated that a Roadmap to Greening Transport will ensure that all new buses are roped into the bus rapid transit and the conventional and existing fleets are retrofitted to make use of cleaner fuels.

He indicated that Priority 9 of the vision aims at enabling future generations to afford Euro VI buses to provide quality services.

He also said that the re-fleeting of 150 new buses with DDF Technology test buses is completed. Again, he mentioned that the goal to achieve 48% substitution rate and existing fleet conversions is on course with 30 buses completed and the remaining 100 pending funding. That, 30% gas substitution has been achieved and currently targeting 50% optimisation to 70% substitution rate. He stressed that, the DDF Performance Assessment has kicked off with a change management option that includes Driver Capacitation, Technical, Management and Monitoring.

Mr. Bhiman indicated that, the Rea Vaya now refers to all quality public transport, walking, cycling and not only BRT; and its objectives include provision of fast, safe, reliable and affordable public transport; enablement of public transport transformation; Contributions to spatial restructuring and transit orientated development and broad-based black economic transformation; prevention of climate change and reduction air pollution; and promotion of social inclusion.

He further indicated that, the city is implementing the third phase which will link N & S, TOD opports – hsg, provide jobs and quality of life facilities; undertake a 3 -Phase procurement of 588 buses. Phase A includes EVI/Gas; Cost Benefit Analysis on clean fuel options; Gas infrastructure; Responding to Corridors of Freedom initiative and the growing imperative to integrate with walking and cycling and other public transport modes. Other initiatives include the CoJ Internal fleet. That, since the launch of 10 vehicle conversion, a total of 60 has been achieved. The following has also been achieved: CoJ Special Fleets: EMS and JMPD Vehicles – 140, and Mini-bus Taxi provide support to DORLOTJA Taxi Association Gas Filling Station project.

The presenter indicated that the introduction of EMV smart card has been 'bumpy' but with the improved reliability of technology and shift to new points system has brought about stability. Furthermore, he said that, the city has initiated Gas Dispensing Infrastructure and change management and capacitation for buy-in, technical maintenance and operational efficiency, monitoring and evaluation.

That, the current administration has been encouraging the green economy concept and the low carbon shift. The Mayor has encouraged green concessionary financing for bus funding and procurement.

He concluded that, there is the need to align with new priorities, particularly the pro-poor and service delivery impact, efficiency, co-benefits (better air quality and better health).

### **2.7.3 Vision of GAMA 2020 Public Transport**

This third presentation was made by Mr. Samson Gyamera, the Director of Greater Accra Private Transport Executives (GAPTE).

He indicated that, GAMA at the base year of 2014, has 4.33 million population, an area of 1,494 km<sup>2</sup>, road length of 7,592km, vehicle number of 890, 511, public transport MMT(148) and tro-tro number of 11,195. The modal split for GAMA includes trotro: 46.9%, Bus: 10.1%, Car/Taxi: 42.1% and Railway: 0.1%. Buses and Tro-tro carry 70% of Person Trips but utilize only 30% of road space. He therefore indicated that road congestion, inadequate infrastructure, traffic indiscipline, among others affect transportation in the city of Accra.

Mr. Gyamera reiterated the Government Policy of ensure that 80% of all trips in the urban areas are made through public Mass Transit Systems. That, the Government is committed to invest into urban transport systems by implementing policy objective 2, including the provision of Urban Passenger Transport (UPT) infrastructure; Integrating urban transportation within a strategic urban development framework(policy objective 3); empowering the private sector to invest into buses and transport service provision (policy objective 4; decentralization of institutional and regulatory framework (policy objective 5); and Reorganization into business entities to deliver UPT Services; compliance with Government Regulation and provisions of higher quality service and financing for buses and services provision by operators.

He went ahead to enumerate the following implementation strategies:

- A regulatory framework that provides legal basis for the re-organization of the sector at the national level,
- Regulatory institutions that have sufficient capability to plan, regulate, and guide the industry at the local level,
- An industry structure that can compete and operate within the regulatory framework and attract investment,
- A culture of compliance with the regulatory framework, and commitment power to enforce, and
- Infrastructure and a suitable operating environment to support improved Urban Passenger Transport (UPT) services in Accra.

He indicated that a suitable infrastructure including Bus Priority lanes, High Occupancy Vehicles, Dedicated Terminals, Dedicated Bus Stops and Dedicated Depots will be ideal for

the BRT system. That, the road networks including the (1) Kasoa-Central Business District (CBD) with 5km segregated corridor, 10 terminals, 2 depots, 16 stations, 12 routes, that costed approx.USD 107million; (2) Adenta-Tema Station with 22km route, 22 stops, 3 terminals, 1 depot, 2 routes, costed approx USD 25 million; and (3) Amasaman- Cocoa Marketing Board with 20.3km route, 42 stops, 4 terminals, 1 depot, 3 routes, costed approx USD 14.3million.

He said that the Management of the road network include:

- Regulatory agencies i.e. Metropolitan, Municipal, District Assemblies (MMDAs)/GAPTE Operating permits etc.
- Construction /Maintenance i.e. Department of Urban Roads
- Service and Planners MMDAs/GAPTE Network planning etc.
- Public Transport Operators

He indicated that for the service sector, different roles for high occupancy buses, “tro-tros” and taxis in the network are required. That, the current operators should be transformed into operating companies to deliver services on the Quality Bus System option (see appendix C).

On the influence of the regulator, he indicated the following:

- That, Bye-laws has been passed and operational in 2010 in conformance with Local Government Act (2016) L.I. 1961
- That, permit for type "A" issued for normal Tro-tro/Taxi operator Entities and renewable yearly.
- That, permit issued only to operator entities not individuals
- Register of operators created with the permitting system
- That, only permitted operators in register to benefit from the opportunities created by the reforms

On the Statistics on conformance and mitigation, he mentioned that 565 Tro-tro and Taxi entities from various Unions have been registered in GAMA MMDAs including:

- 20,935 drivers,
- 39,816 registered vehicles

- 23 Affected Operators on Amasaman-Tudu (CMB) Corridor
- 57 impacted routes
- 75 impacted route operations

He stressed that there is the need to:

- obtain the support of Tro-Tro Unions for smooth implementation of the BRT system.
- Design strategy to incorporate current informal operators in service provision,
- include all modes of carriage i.e. HOVs , Tro-Tros and taxis have role to play in service provision in the network,
- create Operator Steering Committee (OSC) in 2010 as forum for regular interaction with GPRTU, PROTOA, Cooperative and others in the informal sector,
- develop MOU with OSC providing framework for reforms execution negotiated on 30<sup>th</sup> August 2013
- provide route service contracts for services on the corridor which was negotiated with the three formal Operator Companies in June 2014.
- establish operator companies which have been assisted with the procurement of buses for the System. The operator companies commenced bus services in December 2016

He indicated that the Service Plan for the Amasaman-Tudu Corridor include:

- Estimated Demand of 2,400 passengers per hour
- Round trip time of 110 minutes (+10 min layover)
- Service Frequency of 35 buses per hour
- Peak Vehicle Requirement of 76 buses
- Fleet Requirement of 85 buses

The business and contract structure of the existing model include current bus operators (Tro-Tros) & (MMT) and GAPTE/MMDA<sub>s</sub>.

Mr. Gyamera indicated that, the current buses are dubbed Ayalolo Quality Buses are high capacity, Disable friendly, Electronic ticketing system, Automatic vehicle location, Passenger information system, On-board video cameras (ie. Vehicle Fleet Management System; Automatic Fare Collection System and User Information System).

He indicated that the BRT system is challenged with only 25% of business on corridor affected.

On the service provisions, he mentioned that, 3 operator companies has been created out of current tro-tro operator unions for services on the 3 designed routes namely:

- Amasaman to Tudu
- Ofankor to Tudu
- Achimota to Tudu

#### **2.7.4 Overview of the Impact of Fuel Quality on Soot-Free Bus Project in Accra**

Mr. Joseph Wilson of National Petroleum Authority (NPA) gave an overview of the impact of fuel quality on soot-free bus project in Accra, Ghana.

He said that, the annual average consumption of petroleum products in Ghana is about 3.3 million metric tonnes, with imports far exceeding production. He also said that Ghana has one major refinery (Tema Oil Refinery) and two mini-refineries namely, Platon Gasoil and Akwaaba Link with production capacities of 45,000bpsd, 1,700bpsd and 4,500bpsd respectively. He said that Gasoline/Diesel are mostly imported from Europe and LPG from Equatorial Guinea, DR Congo, Nigeria and Spain to augment the national demand.

Mr. Wilson said that vehicular exhaust emissions are a major contributor to air pollution in Ghana, with the largest emitters being diesel and older vehicles. That, emissions from older vehicles and with the high sulphur levels in fuels, the situation could increase the health burden of citizens. Vehicle pollution is linked to premature mortality, cancer, stroke, heart and lung diseases, school absenteeism, and decreases in productivity.

He gave an overview of a roadmap developed to improve fuel quality and which began with the phased-out of lead in fuels in 2003. That, in 2013, the national Standard for sulphur level in diesel was reviewed from 10,000ppm to 3,000ppm , with import specifications restricted to 5,000ppm since 2008, He also said that during the same period, the national standard for sulphur level in Petrol was maintained at 1,000ppm, while the Cetane index was revised from 40 in 2005 to 45 in 2013.

That, following the Abuja Communiqué, Ghana accelerated the process of revising the sulphur level in fuel to comply with AFRI-4 Specifications. He indicated that, following stakeholder consultations, the Technical Committee on fuel standards in Ghana has revised standards for diesel (from 3,000ppm to 50ppm maximum) and gasoline (from 1,000ppm to 50ppm maximum), effective 1st July, 2017.

Mr. Wilson indicated that, with the improvement of fuel quality, the country stands to benefit from reduced vehicular emissions, improve health of the populace which guarantees economic growth, better investor confidence, and meet Afri-4 specification by 2020. He added that, economic advantages will be gained through the facilitation of regional trade and cooperation (Co-loading), lower cost for the consumer and government leading to a corresponding improvement in economic growth.

On the impact of fuel quality on Soot-free Bus Programme, he indicated that with the current 50ppm sulphur content in fuels, black carbon will be reduced by 75%.

He added that diesel black carbon can be reduced through changes in vehicle engine technology and fuels.

Mr. Wilson identified a challenge of upgrading existing refineries to meet the agreed standards. That, TOR currently is able to produce 1500ppm diesel and will need an investment of about USD120m to upgrade to produce fuel quality of 50ppm maximum by 2020. He indicated that, for TOR to be able to market its products, there is the need to find suitable market for them.

He recommended stakeholder engagement on the implementation of the revised fuel specifications, import restrictions on over-aged vehicles and the provision of economic incentives and disincentives.

#### **2.7.5 A cost Benefits of Implementation of cleaner Soot-Free Bus standards in Ghana**

Mr. Kwasi Asante of the Ministry of Finance presented on the cost benefit analysis of the implementation of the soot-free bus standards in Ghana. He mentioned the advantages of public transport that include the provision of mobility, shaping of land use and

development patterns, creation of jobs, enablement of economic growth, support for public policies regarding energy use, air quality and carbon emissions.

He added that the diversion of the current passenger traffic to BRT could provide benefits such as reduction in air pollution, travel time, road accidents, traffic congestion, associated cost savings, business productivity and social cohesion; and some of these benefits can be translated into monetary terms, categorized into economic, social, Environmental and urban form.

On Economic terms, he indicated that, it will reduced travel times, provide a more reliable product deliveries, increase economic productivity, create employment and improved work conditions.

He indicated that socially, there will be more equitable access through the city, reduced accidents and injuries, and increased civic pride and sense of community.

On the Environmental benefit, he indicated that, there will be reduced vehicular emissions and noise levels.

He further indicated that on the Urban Form, there could be sustainable urban form including densification along major road corridors, and reduced cost of service such as electricity, water and sanitation.

On the travel time benefit, he indicated that, the time spent on travel will reduce and the time savings monetized. That, the health benefits may be realized through reduction in mortality and mobility cases.

He concluded that, the project capital cost consists of cost of bus, infrastructure, depots among others, while maintenance cost (life-cycle cost) entails fuel, bus maintenance, periodic bus overhauls etc.

That, the Cost Benefit Analysis shows a positive Net Present Value (NPV) hence the project is viable.



### **2.7.2 Summary of issues raised during the discussions on the Day 1 presentations**

This session continued after the delivery of all the presentations. Questions, comments and suggestions that arose during the presentations were:

#### **Question 1: Fuel filling infrastructure in South Africa is quite impressive. How was the old infrastructure handled?**

In answering this, the presenter, Mr. Alex Bhiman indicated that the private sector initiated the gas filling station programme but now there are new private sector organizations who are into the production of compressed natural gas for the transport system.

#### **Question 2: Concerning retrofitting of engines, taxis in Ghana are now using LPG. Are there no Compressed Natural Gas filling stations in Ghana? Are there any PPP arrangements to enhance CNG in South Africa?**

Mr. Alex Bhiman indicated that the only company responsible for CNG in South Africa is Sasol and has a monopoly because the Government is a shareholder and who ensures that the system works.

#### **Question 3: BRT can be a solution to sustainability and green transport but how can it serve other cities? What is the business model? what is the project recovery cost and the impact of traffic speed?.**

The presenter, Mr. Samson Gyamera indicated that the government of Ghana received funding from World Bank, Global Environment Fund for the planning on the entire project. He also said that the previous transport system was studied and taken into consideration before this current Quality Bus Service (QBS) was introduced, and that the operationalization of the BRT system took into consideration the informal sector, legal issues, and cost among others. That, Ghana is now demonstrating the framework. "Tro tro" is a business venture and we are comparing this to the QBS to come out with an acceptable model. He lamented that instead of the traffic situation reducing with the

introduction of QBS, it has rather increased due to increase in the number of vehicles on the road (since the mini buses are still on the road).

**Question 4: As a follow-up to question 3, How do you consider the tariff and the gains being made by the QBS system in Ghana**

Mr. Samson Gyamera indicated that, there is currently encroachment on the bus corridor and are observing lower income generation especially during off-peak periods.

**Question 5: Looking at all the concepts, it comes to cash flow efficiency. can it be enhanced?. With natural gas at Atuabo being flared, what is NPA doing to ensure this flared gas could be used in the transport sector?**

Mr. Wilson indicated that Gas at Jubilee field is being processed at Atuabo and not flared.

**Question 6: Why does Ghana not blend the local and exported fuel?**

Mr. Joseph Wilson indicated that, it will be difficult to blend as Tema Oil Refinery (TOR) produces about 30% of the national demand. They have different specifications in terms of sulphur content in fuels and so NPA decided to find a market for TOR and supply imported Fuel to the local market.

Participants were of the view that, the BRT system is a tool to promote soot-free bus system, hence it must be encouraged in cities.

## **2.8 Field Trip**

After the discussions on the various presentations, a field trip was organised by the Environmental Protection Agency on board the Aayalolo Bus System to the a rapid bus transportation infrastructure in the GAMA of Ghana (see appendix C). The Aayalolo Bus System provides quality services such as High Capacity, Disable Friendly, Electronic Ticketing System, Automatic Vehicle Location, Passenger Information System and On-Board Video Cameras. The system is managed by the Greater Accra Passenger Transport

Executive i.e. an inter MMDA Co-ordinating body for public transport in Ghana. A visit was made to some of the company's infrastructure including control rooms and bus terminals.

A trip was also made from one of the proposed routes for the BRT through the Amasaman Terminal to the Achimota Terminal and to the Parliament House, Accra Sports stadium and Independence Square and back to the Institute of Environmental Studies. At the Achimota Terminal, members were taken through some features of the Aayalolo Bus System; the Automatic Fare Collection System (AFC) including the Electronic Ticketing, Vehicle Fleet Management System (Vehicle Follow up, Fuel Chart and Historical information), Vehicle scheduling, Location message triggers, Bus Monitoring, Vehicle schedule reporting and the User Information System (Vehicle Displays and Voice Announcement).

### **3.0 WORKSHOP PROGRAMME- DAY TWO**

Day Two (2) started with a recap of day 1 discussions. This was followed by technical presentations from country representatives and other institutional representatives including Ghana Health Service (GHS) and the Ministry of Transport (MoT). Details of the presentations is summarised below:

#### **3.1 Health Benefits of Soot Free Buses**

The presentation was made by Mrs. Comfort Kugblenu on behalf of Dr. (Mrs) Edith Clarke of Ghana Health Services for (GHS).

She said that, transport is a vital to of modern life and enhances economic development but could pose hazards to the environment and human health.

She said that human exposure to air pollution in Ghana emanate from heavy traffic areas (especially areas with higher concentrations of diesel vehicles) of cities. She indicated that air pollution linked to Diesel Engines are the major cause of premature deaths globally. That, the effects of diesel exhaust on human health is dependent on the length of time of exposure and could have a long or short-term effects, and the symptoms of short-term effect could be irritation to the eyes, bronchitis, pneumonia, headaches, nausea and allergic reactions, among others. That, the long-term effects include chronic respiratory disease, lung cancer, heart attack, stroke, cardiovascular disease, asthma and pre-term birth. She further said that, since most public transport are diesel-driven, there could be an increasing risk to users as well as the general population.

Mrs. Kugblenu also indicated that the prevalence of diseases linked to vehicle soot are increasing, though research and better monitoring needs are required to confirm the association of diseases with diesel vehicles.

She concluded that efforts at ensuring the use of soot free buses could invariably lead to improvement of air quality and reduce ill-health leading to prolonged life.

### **3.1.2 Cleaner Bus Options, Policies, Standards and Roadmap To Cleaner Buses in Accra**

The presentation was delivered by Mr. Daniel Essel of the Ministry of Transport, Ghana. He indicated that, Ghana's Transport Sector is made up four (4) major modes including air, inland water, maritime, rail and road transport with the road transport dominating, with services provided largely by private sector operators. He indicated that, the current ministerial realignment for the transport sector is also linked to the transport modes.

He noted that, the current infrastructure to support public transport operations is inadequate, and service quality is poor. He also said that the features of informal transport operators includes ageing vehicle fleet, safety concerns, carbon, air quality and services are controlled by unions. He further indicated that, the Ministry of Transport is conducting reforms to enhance road transport operations including a shift from the main mode of Troto to mid-term big bus and Long-term Railway and Subway to reduce the 104 minutes travel time to 60 minutes among others.

He identified some advantages that will be derived from implementation of Soot-Free Buses system in Ghana as reduction of GHG, health-related impacts and local air pollution, sustainable urban mobility, market availabilities for alternative fuel and technology types, gas reverse, shift to lower sulphur content in fuels, standards for vehicle emissions, conversion of air quality guidelines into standards.

He also said that, the two main issues being addressed under transport are fuel and vehicle standards. In terms of vehicle standards, Ghana government seeks to facilitate the enactment of regulations to restrict the age of imported vehicles, establish pilot vehicle emission testing programs and harmonization of emission standards for the different categories of motor vehicles in line with available fuel quality standard. That, this is because over 80% of imported buses are second-hand with engine technology ranging from Pre-Euro, Euro 0 to Euro III and there is no established standards for vehicles imported into Ghana. That, age-based restrictions on vehicles (not exceeding 10 years) has not been effective. The ban on importation of over-aged vehicles was lifted and

replaced with the imposition of import penalties on cars exceeding 10 years old which has so far not had any significant impact on the importation of over-age vehicles.

Mr. Essel indicated that, the development of Vehicle Emission Standards, testing programme and standards for public transport vehicles based on EU Directives on vehicle emission standards is paramount for Ghana.

He was of the view that, the available energy in Ghana including Compressed Natural Gas (CNG) and Liquefied Petroleum Gas (LPG) could play a crucial role in facilitating the introduction of cleaner bus technologies into the system. He identified vehicle technology (based on CNG), operational performance and infrastructure requirement as necessary means of achieving sound soot-free bus system in Ghana. He envisioned a future where cleaner bus high occupancy and medium size buses for public transport service provision in urban areas will be implemented in Ghana (by 2037)

The presenter further identified the following strategies needed for the implementation of cleaner bus standards in Ghana:

- Prioritizing the development of vehicle emission standards in line with new fuel standards (50ppm sulphur levels) in Ghana,
- Ensure that all new vehicles in use within Ghana meet the minimum requirements of Euro Engine IV standard, and facilitating the development and implementation of vehicle standards for public transport service provision,
- Investments in low-carbon public transport,
- Promotion of public awareness and securing public commitment to soot-free bus fleet, and accelerate the implementation of fleet renewal policy,
- Promote investment in the Compressed Natural Gas (CNG ) fueling Infrastructure, and target diesel vehicles and encourage the conversion of buses to CNG compatible vehicles in order to minimize CO, CO<sub>2</sub> and NO<sub>x</sub> emissions.
- Introduction of stringent fuel regulations that require maximum Diesel sulfur content of 50ppm in line with the Abidjan Agreement on Air Pollution (2009) and the ECOWAS Communiqué (2016),

- Facilitate technical and policy exchange among MDAs and MMDAs to promote a shift to soot-free engines for all categories of vehicles both new and second hand-vehicles import,
- Promote and prioritize High Occupancy Vehicle (HOV) dedicated lanes in urban areas,
- Promote the implementation of mass transport system in Ghana,
- Support the identification of soot-free engine technologies and the fuels that enable them, and
- Accelerate the transition of diesel urban bus fleets towards soot-free engine technologies.

He re-iterated the need to undertake the following:

- Accelerate the implementation of the Environmental Fiscal Reform Policy
- Introduce alternative fuel technology such as CNG in the on-going Bus Rapid Transit (BRT) in the Accra metropolis.
- Provide technical and financial support for retrofitting existing diesel engines to run on CNG.
- Government already seeking financial arrangement to introduce CNG technology into the public transport system,
- Build related infrastructure for CNG station at major routes to support CNG buses

### **3.1.3 Greater Abidjan Transport Development Plan**

The presentation was made by Mr. Baffah Kone of the Ministry of Transport. He indicated that the Greater Abidjan has a land cover of 3,492 km<sup>2</sup> and a population– 5.375 million (in 2013) which could rise to 8.421 millions in 2030. He said that, the government planning scheme for Greater Abidjan include:

- Transport planning and
- Urban planning

Under the urban planning, he indicated that One-third of the population of Daa live in precarious neighbourhood. He cited problems like:

- Soil erosion
- Traffic noise levels and incidents on the air quality
- Direct discharges into water bodies

He enumerated the following strategies:

- He said that the previous planning policy did not permit an efficient development of urban transport.
- The actions of the Ministry of Transport includes the implementation of Sustainable development strategies and the development of a master plan for urban transport of Greater Abidjan for the period 2015 – 2030.

He also said that, the objectives of the urban transport system pursued by the SDUGA to meet the challenges of sustainable development include efficiency, equity and a healthy environment.

He discussed actions on fuel economy initiative and the reduction of greenhouse gases emitted by vehicles in Cote d'ivoire.

He indicated that the Ministry of Transport is in collaboration with the Ministry of the Environment, Urban Sanitation and Sustainable Development, are implementing all regulatory measures to achieve fuel economy.

That, the Ministry of Transport in this regards, has participated in several meetings with the aim of:

- Sharing the results of the experimental study on the analysis of the exhaust gas of motor vehicles in Côte d'Ivoire;
- Drafting an order banning the use of butane gas as a vehicle fuel;
- Moving towards the development of exhaust emission standards for motor vehicles and engines;
- Providing information on the latest specifications in force on Ivorian fuel;
- Presenting incentives and coercive measures for the use of cleaner vehicles.
- Prioritizing strategies to ensure appropriate mitigation measures at the national level, the following projects are underway:
- Decreeing on the age of used vehicles imported into Côte d'Ivoire;



- Decreeing on the duration of operation commercial vehicles in Côte d'Ivoire;
- Creating Road Transport Development Fund (FDTR) to provide funding for the renewal of the motor vehicle fleet of public road haulers and combating pollution through greenhouse gas (GHG) emissions which are damaging to human health and climate;
- Equipping Société de Transport Abidjanais (SOTRA) with new buses (500 by 2017 and 2000 by 2020),
- Equipping the BRT system

### **3.1.4 Natural Gas as Green Fuel Experimentation Cote d'Ivoire (SOTRA)**

Mr. Yai Vincent of SOTRA presented on natural gas as green fuel experimentation programme in Cote d'Ivoire. He said that the Ivorian Government has authorized companies like Petroci and SOTRA to implement an experimental project on natural gas fuelled buses in Ivory Coast. He said that, to effectively control this technology, requires collaboration and implementation of a comprehensive in-country training plan and on the sites operation in France and England where the technologies are from.

He added that the government of Cote d'Ivoire has developed a training plan for:

- The technical and commercial operation of buses (Maintenance and driving),
- The training of the mechanics of SOTRA to maintain the gas fuelled buses, and
- The inclusion of SOTRA agents in a Natural Gas transport company (ie. Vitalis Poitiers and Véolia Bordeaux.)

That, the advantages of the plan will include:

- Economical gains; reduction of operating costs by the reduction of fuel cost
- Environmental gains; Reduction of noise levels, particulate matter and black smoke.
- Social gains; Comfort of customers and drivers no increase in ticket prices
- Emission reductions from gasoline and Diesel vehicles.

Some useful steps being taken to achieve the objectives include:

- Acquisition of 50 bus GNV every year over 4 years
- Increase in the number of bus reserves from 7 to 9

- Optimization of the operating conditions of gas buses (BRT)
- Extension of the use of the GVN to the buses of SOTRA
- Opening of Ivorian market to natural gas vehicles

### **3.1.5 Johannesburg case study**

Mzwandile Christopher Ngcobo made a presentation on a case study of Johannesburg city which has a Land size of 1 645 km<sup>2</sup>, population of 4.4 million, population growth rate of 3.4%, and Population density of 2695/km<sup>2</sup>. He indicated that 67.4% of households are poor with most of their income going towards transport.

He said that 56% of carbon emissions is associated with Johannesburg, 13% highest carbon emitting City in the world with the transport having the highest demand for energy (67%).

On the state of transport in South Africa, he indicated that there is insufficient investment in transport in the Cities. Transport system is changing now with Gautrain having 90km high speed linking the airport to the old and new CBDs of Johannesburg and Pretoria. That, the objectives of the change include making public transport, walking and cycling the mode of choice; with the vision of providing sustainable integrated public transport services.

The city of Johannesburg has developed a Strategic Integrated Public Transport Network Plan to ensure that every resident can be within 1km of public transport; and the Rea Vaya BRT introduced to meet the objectives for efficient, reliable and frequent public transport services, Affordable fares, Safe and secure, Accessible, Decrease in traffic congestion, energy consumption and vehicle emissions, Enhanced urban environment, Job creation and income generating opportunities.

He said that the bus operating company has the responsibility to:

- Run the bus services,
- Maintain the buses,
- Train and employs drivers,
- Cleans and secures buses, and

to make profits for the shareholders.

He indicated the need for ensuring sound negotiation process between the city and Bus Operating Company (BOC), the taxi industry to surrender their vehicles and licenses.

He said that the negotiation process is time intensive as affected operators do not appreciate the difference between short term income and long term wealth.

In conclusion, he indicated that the independent Board and management team guarantees more efficient BOC.

### **3.1.6 Bringing bus rapid transit to Tanzania**

Eng. Dr. Philemon Kazimili Mzee delivered the above presentation. He indicated that, Dar Es Salam City is one of the fastest growing cities in the world with a population of over 5 million, land size of 1,391 square kilometres, a population density of 3,133 per square kilometre, and an annual average vehicular growth is around 19% per annum. He said that the mode of transport involves Dala dala, Bodaboda, Bajaji and Private Car.

He indicated that Urban transport system has challenges such as rapid population growth, insufficient infrastructure, congestion and traffic jams, inadequate traffic management, among others. That, the city is looking at Mass transit options like Bus Rapid transit, Light rail transit, Underground metro and Urban rail. He said that, the selection of BRT system (Metro system) faced many challenges hence the option for an improved bus system was suggested. The concept was visualized in 2002 and the detailed study was conducted from 2005-2007. He said the Government decided to have an interim services while normal procurement by Private Public Partnership continued as a result of the misuse of infrastructure, invasion by petty traders, local motor cycles and buses.

He indicated that, the main DART characteristics include fully dedicated right of way, alignment in the centre of the road, Stations with off-board fare collection, Station platforms level with the bus floor, Redesigned intersections.

He indicated that a modern transport system should consist of the following:

- Infrastructure (Public) - corridor, stations/terminals deposit, pedestrian bridges, control room.

- Fare collection (private & automated) – equipment, ticket office, smart card, mobile top ups, bar coded paper tickets.
- Bus operations (private) – Bus (articulated 18m, standard 12m and hybrid 12m), cleaner fuel, euro III standard, intelligent transportation system

He indicated that the users of the bus facilities experience savings in time and money, comfortable and larger, environmentally friendly emissions, source of employment, use of modern technology to improve efficiency, etc.

That, the bus system has some challenges. The system is new to the public, private sector investor and the government, resettlement action plan (RAP) and construction contracts.

He said that, the city authority has learnt a lot of lessons Learnt From Phase 1 of the project and has made the following recommendations to improve the situation.

- Procurement of Service Providers should commence early.
- Resettlement Action Plan be implemented and completed before start of construction.
- Build capacity of both public and private sectors

On the way forward, he suggested the following:

- More education for better use of the system.
- Complete installation of the ITS/AFCS including Passenger Information System and Control center.
- Continue Awareness campaigns and enforcement by Police to curb accidents and crime,
- Improve existing legislation to address offenders on BRT corridors.

### **3.1.7 Renewal program for the Urban Public Transport Park (minibus) in Dakar and other regions**

Madam Mbayame Gueye, a Planning Engineer of the Division of Urban Transport presented the above paper. She indicated that objectives of the urban transport renewal programme include the improvement of the urban transport sector by improving its efficiency in a sustainable, and population mobility.

She indicated that the programme is experiencing constraints such as:

- Coherence of transport policies

- Professionalization and segmentation of the sector-regulation of the financing scheme-diversification of financing sources.
- Establishment of a framework for monitoring the transport activity by registration.
- Generation of data
- Improvement of the quality of the buses
- Sales service (after-sales services)-development of the bus stations and terminus

Madam Mbayame said that, the Bus transit system in Dakar has state and Private sector supported components.

### **3.1.8 Steps Towards Reduced Emissions and Cleaner Vehicles In Kenya**

Mr. Martin Eshiwani, Director of Ministry of Transport and Infrastructure, delivered a presentation on the step towards reducing emissions and cleaner vehicles in Kenya.

He said that, Kenya like most developing countries, is experiencing high rate of motorization, and in the last five years, the country has been registering an average of 105,000 motor vehicles and 120,000 motorcycles per year. That, currently transport emissions account for approximately 13% of total national emissions and this is expected to increase to 17% by 2030.

The presenter indicated that, the Kenya National Climate Change Action Plan (NCCAP) has documented areas of emission reduction in road transport namely:-

- BRT/LTR in Nairobi (Standards for BRT buses being developed)
- Improved heavy duty/goods vehicles (Trucks)
- Freight and passengers from Road to Rail (SGR)
- Use of cleaner vehicles (Electric, LPG retrofitting)
- Improved fuel quality with imports of 50ppm sulphur levels
- Kenya Petroleum Refinery Ltd is currently closed for non-compliance
- Limit Age of imported vehicles to 8 years (KS 1515).

He enumerated other measures being taken to reduce emissions as follows:

- Revision of KS 1515; Code of practice for inspection of road vehicles:- to incorporate stringent emission requirements.
- Intend to have Fully-built-up and used vehicle imports to meet Euro IV emission standards requirements
- Develop NMT infrastructure

### **3.2 Summary of issues raised during the discussions (Day 2 technical presentation)**

The technical session continued after the completion of the presentations. Participants asked questions, comments and made suggestions on the presentations. A summary of the exchange of views are indicated below:

#### **Question 1: What are the challenges involved in getting data from the hospitals to show the link between air pollution and health?**

Mr. Daniel Essel indicated that, the Ghana Health Service (GHS) now has a data management centre with information officers to enter information into the system. Various indicators are still not outlined and so work is still on-going. Completeness and timeliness is still a challenge and GHS is trying to overcome.

#### **Question 2: What transport policies have been put in place by Ghana and what are the challenges so far. Provide information on how you want to address the challenges in relation to policy.**

Mr. Daniel Essel of the Ministry of Transport responded that currently, there is multiplicity in handling transport issues. Other ministries like Ministry of Local Government and Rural Development is an oversight ministry who coordinates its activities with all relevant stakeholders. Currently, there is a transport service which was over-looked previously but are now being addressed.

#### **Question 3: How can we work with the refinery to improve the fuel quality?**

Mr. Essel indicated that, the Refinery Association organise meetings every month and is in the known of the regulation to reduce the sulphur content in fuel. They are working on it,

and their main challenge is the Ministry of Finance since there are cost associated with procurement and installation of de-sulphurisation units.

**Question 4: On scale of influence from other regions, can we have a data line to get address from residence and where exactly the source of emission is coming from and what is the estimated cost of converting all 11, 000 tro tros into large buses and its emissions**

Mr. Daniel Essel in his response, indicated that the emissions of 11,000 tro tros can be estimated by EPA while the feedback from this workshop will enable us to add on to the already existing cost estimate made by the Ministry of Finance on soot free buses.

**Question 5: Explain how land dispute in the expansion of infrastructure of the bus corridors were handled in Ethiopia, Abidjan and elsewhere.**

The presenters indicated that, the idea came from municipal mayors and affected people were compensated. A third bridge has been built by the current administration to ensure transportation ( BRT ) becomes a success.

In Abidjan, 123km stretch is has been demarcated for BRT but on different corridors, there are now new buses in Abidjan to improve the BRT.

**Question 6: Explain how the limit on importation of used cars will be improved from 10 years to about 5 years**

Mr. Martin Eshiwani responded that, all used vehicles over 10 years would have to pay \$200 per month. The new proposal is 5 years and if it is implemented, it will change the phase of application. He added that the Government intends to create a new transport authority, and informal people will have to been trained.

#### **4.0 BREAK-OUT SESSION**

During the break-out groups session, 3 groups were formed based on the expertise of the participants. The groups included the Policy and strategies for soot free bus system, Available Vehicle technologies and their benefits, and Communication strategy &

Implementation period. Each group appointed a chairman and a rapporteur. The tasks of each group was to improve upon the draft options developed for cleaner bus Standards in Accra and present their findings to the plenary.

## **4.1 Deliverables from the break-out groups**

### **4.1.1 Group-works**

Presentations of findings and recommendations from the various groups are as follows:

#### **Group 1: Policy and Strategy for Soot-Free Bus**

##### **Current realities;**

Identified & reviewed various policy document developed across the sub-region including:

- national climate change policy (which does not adequately capture road, water and air transportation issues).
- Transport policy,
- Urban transport policy
- Urban development policy
- Energy policy
- Fleet renewal policy
- Abidjan convention, and
- Abuja agreement among others.

##### **Strategic Plan;**

- Expedite action on the development of vehicle emission standards in line with the new fuel standards
- Institutional bench-marking should be done
- Introduce measures to restrict the import of buses not meeting Euro 4 standards



- Best practices from other jurisdictions should be incorporated
- Promote the development of CNG vehicles and its related infrastructure

**Recommendation;**

- There should be a direct relationship between technology and policy,
- Capacity of local authorities should be built to be able to manage government transport-related projects,
- Comprehensive institutional analysis needs to be undertaken to identify capacity needs and gaps, overlaps in mandates, etc.
- Reviews should be done in a participatory manner to ensure stakeholder buy-in,
- Regional bodies should develop regulations which will guide member states. (East Africa have common regulations for air quality, request for ECOWAS to develop regional guidelines on transport ),
- Experience and lessons learnt from other countries should be taken into consideration during review of policies.
- Develop a comprehensive transport policy to include:
  - High occupancy policy
  - Electric bus policy
  - Financing policy (initial support)
  - PPP Policy
  - Clean air policy
- There is a need for a national authority to regulate road transport services

**Group 2: Vehicle technologies available and their benefits**

**Current realities;**

- Current vehicles are less than Euro 3,

- During peak hours a lot of smoke are emitted from the exhaust of vehicles into the atmosphere,
- Most vehicles come with catalytic converters and as soon as bad fuel of 5000ppm are used, the catalytic converters are damaged,
- There is a lack of specification to determine the type of vehicle that should be allowed into the country,
- Because a lot of emissions emanate from mostly the conventional and poorly maintained vehicles, pollution related diseases have passed malaria as the most disease causing deaths.
- Health, economic and social realities
- The fleet population we have is quite old
- Current state of the quality of fuel is not the best (i.e 1500 ppm to 5000ppm sulphur levels). The health benefits to be derived from the use of newly imported vehicles will be eroded when bad fuel is used,
- Low capacity buses that leads to congestion on our roads
- Lack of technical capacity and expertise
- Air pollution is readily a problem for all Africa countries that must be addressed
- Air pollution from transport is a reality even with gadget that we have for monitoring
- Many African countries do not have vehicle emission limits standards that adds up to the burden of pollution.

### **Strategic Plan;**

- Setting of vehicle emission limits and standards.
- All vehicles that comes into the country must have exhaust gas recovery systems (Sensor technology)
- Vehicles that are already in the country can be retrofitted with CNG engines

- Capacity of drivers must be improve to save 10% of fuel
- Provide specification for import of high occupancy buses.
- Buses must be euro 4 standards and must come together with technical capacity for mechanics, drivers, etc.
- Installation of particulate filters/exhaust filtration system
- Ensure that no fuel is below 50ppm
- Monitoring of fuel distributors.
- Where limits have not been enacted, the usage of CNG to reduce emission is preferred
- Alternative cleaner fuels could be considered from short to long term

**Recommendation;**

- All countries must adopt 50ppm maximum sulphur level in fuels
- Low emission vehicle technology (especially CNG vehicles) must be sought for and the technology must guarantee health and social benefits.
- Technical capacity development for drivers, mechanics or technicians for new improved bus technologies required
- Vehicles with older technologies must be retrofitted with standard (Euro 4 and above) engines
- Monitoring and evaluation of vehicle performance (emissions and fuel consumption) required.
- Stakeholder participation in the implementation of the clean bus technology required.

**Group 3: Communication strategy and Implementation period**

**Current Realities Concerning Awareness Creation/Education on Soot-Free Bus and Sustainable transport**

- Target Group should include communities

- Scope of work: piloted in Greater Accra and the route chosen is Amasaman – Accra Central (Tudu)
- Audience / Stakeholders: The primary stakeholders should include Policy Makers (Mayors)

The communication strategy could be replicated for other modes of transport.

**The objectives should include:**

- Improving the health of the people
- Targeting Sports Ambassadors, Real Models and the media among others.
- more discussions on topical/educative issues in the media

**Governance Structure**

- Project Owners
- Local Government and Ministries responsible for Transport and Environment

**Strategies:**

- Stakeholder mapping in the short-term,
- Dialogue and engagements in the short term/ on-going to implementation (small, medium to long terms awareness creation)
- Advocacy programmes (small, medium to long terms)
- Media Engagement (Medium to long term)
- Public outreach programmes (medium to long term)

**Stakeholder Mapping**

- It should include Civil Society Organization (CSOs) and NGOs
- General Public (Hawkers, workers etc )

**Public Outreach Programmes**

- Churches

**Medium of communication**

- Local languages that the people can understand

## **5.0 CULTURAL EVENT**

At the end of the workshop, EPA organised a dinner event for the participants and climaxed it with a cultural display (see appendix B)

## **6.0 CONCLUSION AND RECOMMENDATIONS**

The transport sector remains the main source of urban air pollution and CO<sub>2</sub> emissions in many developing and transitional countries, contributing over 50% of urban air pollution in many cities. The key pollutant is fine particulate matter (PM) causing an estimated 3.2 million premature deaths annually (World Health Organization, April 2014), with the transport sector being a major contributor. One component of PM, black carbon, is an important short-lived climate pollutant with global warming potential. In addition, the sector contributes nearly one quarter of global CO<sub>2</sub> emissions (and 20% GHG emissions in Ghana; EPA 2015). This share is set to rise to at least one third by 2050 unless significant steps are taken.

Developed countries have made major investments to introduce cleaner and more efficient modes of transport and vehicles emissions have been reduced sharply. Similar approaches to promote the use of cleaner fuels and vehicles need to be adopted by developing and transitional countries like Ghana, where the bulk of older vehicle growth is taking place.

Some of the key recommendations that are proposed for Ghana to move towards cleaner fuels and vehicles are as follows:

- Adopting and strictly implementing the new standards for fuels (50ppm maximum sulphur levels in fuels). That, for new vehicles, sufficient resources must be devoted to undertake a strong and effective compliance programme. Adopting fixed standards for vehicles and fuels and a time schedule for their implementation has the advantage of removing uncertainty for all the stakeholders involved and create a level playing field in the market. Import restrictions for countries like Ghana that import gasoline and diesel fuels can easily and quickly set fuel specification or standards that only allow importation of low sulphur fuels into the country.
- Ghana imports vehicles from all over the globe and these imported vehicles can be either new or used. Placing restrictions on the types and quality of imports can be an important tool to reduce emissions, cost of operation and improve public health.

- Ghana is already using Euro 3 buses for their BRT system and it will be prudent to take a decision to move to Euro 4 or 5 standards based on the new improved fuel standards.
- Ghana can consider the provision of economic incentives such as tax variations or price variations to shape the phase-in of cleaner vehicles.
- Ghana can, as a policy begin retrofitting with more efficient and clear burning engines
- Newer imports of buses must include CNG technology.
- African cities must establish CNG infrastructure to take advantage of the regular gas supplies in the continent. Ghana produces abundant gas and can establish a production facility to feed the proposed CNG buses piloted project for Accra.
- Mandatory or voluntary vehicle scrapping programmes exist in many countries and most of them are government and industry funded. Ghana should adopt mandatory Vehicle scrapping policy to promote the replacement of older vehicles with those with better technology. The older high-polluting vehicles should be taken off the road and destroyed. Vehicle owners can receive different incentives offered by the local programmes which can include discounts when purchasing new vehicles or incentives towards public cleaner transportation or cleaner mode of transportation. In this way pollution levels can be greatly reduced.
- Institute an effective vehicle inspection programmes, involving periodic subjection of vehicles to a short/rapid test to identify these high emitters to assure that they are maintained appropriately. The combination of inspection and remedial maintenance (I/M). Targeted I/M programs can contribute substantially to reduce the pollution caused by such vehicles.

**Appendices:**

**Appendix A: List of Participants**



**ATTENDANCE LIST**

**REGIONAL WORKSHOP TO PROMOTE SOOT-FREE BUS AND SUSTAINABLE  
PUBLIC TRANSPORT IN ACCRA  
LOCATION: INSTITUTE OF ENVIRONMENTAL STUDIES, AMASANAN – ACCRA.  
GHANA  
(14<sup>TH</sup> - 15<sup>TH</sup> JUNE 2017)**

<b>NO</b>	<b>REGIONAL PARTICIPANTS</b>	<b>INSTITUTION</b>	<b>CONTACT</b>
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17	Emmanuel N. Num	Ministry Of Transport	
18	Helen Asiamah	EPA	
19	Jerry Asumbere	EPA	
20	Saviour Tsikata	EPA	
21	Kwesi Asante	Ministry Of Finance	

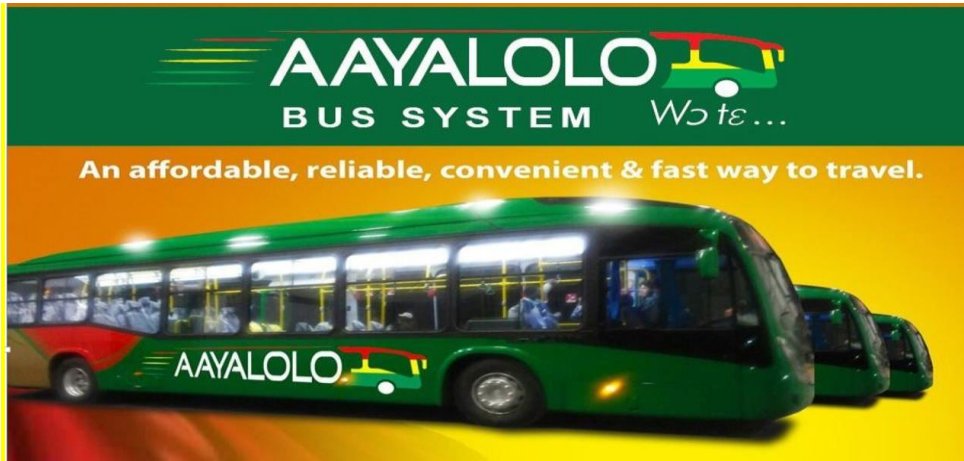
22	Lambert Faabeluon	EPA/GNCPC	
23	Michael Akwei	EPA	
24	John A. Pwamang	EPA	
25	Juliana Bempah	EPA	
26	Kingsley Ekow Gurah-Sey	EPA	
27	Fatawu Issah	Ministry Of Energy	
28	Ruth Osei-Asomani	Department Of Urban Roads	
29	Dacosta Adjei	EPA	
30	Joseph Wilson	National Petroleum Authority	
31	Irene Opoku	EPA/AER	
32	Esi Nerquaye-Tetteg	EPA	
33	Dr. Sam Adu-Kumi	EPA	
34	F. Baitie	Auto Parts Limited	
35	Mo Akkad	Auto Parts Limited	
36	Andrews Kwesi Kwakye	Ghana Road Transport Coordinating Council	
37	Daniel Essel	Ministry Of Transport	
38	Nicholas Bassey	Ministry Of Transport	
39	Audrey Quarcoo	EPA	
40	Moses Akati	EPA	
41	Stephen Wilson Owusu	EPA	
42	Sally Biney	EPA/AWR	
43	Samuel Asare	EPA	
44	Elfrida A.N.D. Ashong	MESTI	
45	Abigail Opoku Donkor	Ministry of Environment Science and Technology (MESTI)	
46	Hadi A. Ahmed	MESTI	
47	Comfort Kugblenu	Ghana Health Service	
48	William Hayfron-Acquah	EPA	
49	Gabriel Adu-Sarpong	National Road Safety Commission	
50	Sampson Gyamera	GAPTE	

51	Acp Adu-Amankwah	GPS-MTTD	
52	Samuel N. Quaye	EPA	
53	Musah Yakubu	EPA	
54	Janet Akutor Asamoah	EPA	
55	Patrick Addai	EPA	
56	Nelson A. Tseh	GPRTU of TUC	
57	Alex Johnson	Accra Metropolitan Assembly	
58	Kwabena Badu Yeboah	EPA	

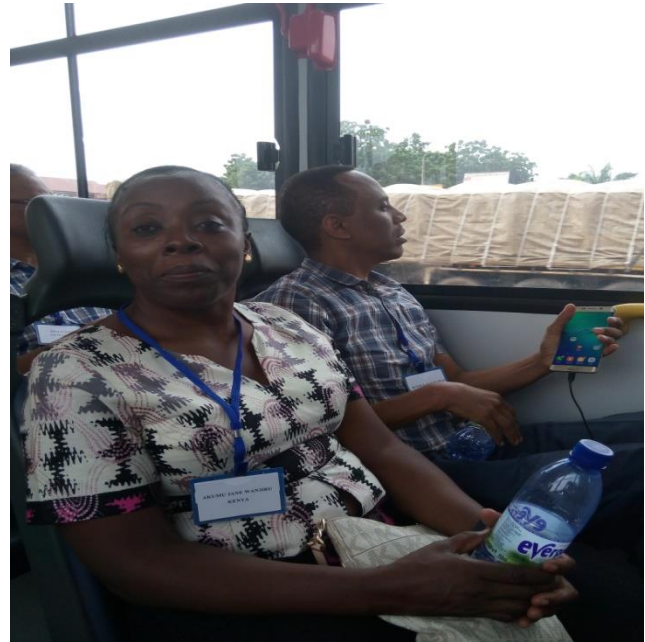
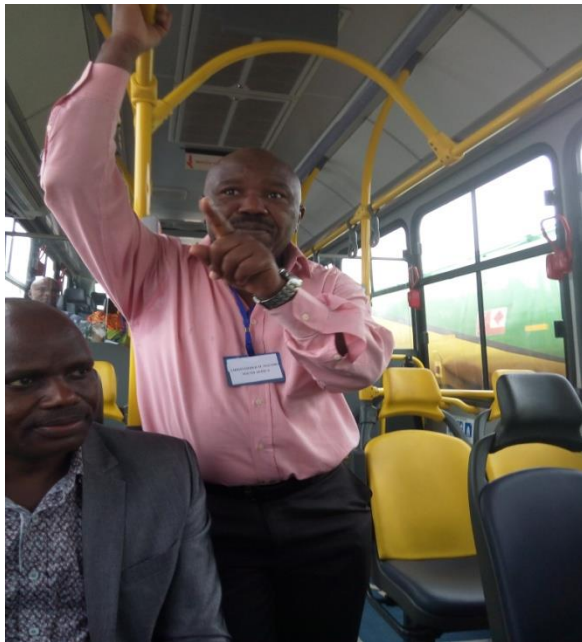
**Appendix B: Cultural dance after a hard day's work**



## **Appendix C: Ghana's Quality Transport Bus**



### **On-Board for Field Trip**





**At Bus Terminal**

## Appendix D: Media Reportage

### Daily Graphic:

**Air quality getting worse, Accra hardest hit — EPA**

By Seth J. Bokpe, AMASAMAN

AIR quality in the country is getting worse as a result of rising vehicular emissions, with Accra recording high pollution levels that pose a threat to human health, the Environmental Protection Agency (EPA) has warned.

The situation exposes residents, particularly traders, hawkers and people who spend long hours in traffic, to high risk of respiratory and cardiovascular diseases.

The Head of the Environmental Quality Department of the EPA, Mr Emmanuel K.E. Appoh, said air quality in Accra was far below its acceptable limits, as well as World Health Organisation (WHO) standards.

**Worrying figures**

Going into the details, he said while the WHO limit for particulate matter (with a size less than 10 microns) was 50 microgrammes per cubic metre and that of the EPA pegged at 70 microgrammes per cubic metre, the city was recording averagely between 100 and 200 microgrammes, almost four times the acceptable limit.

Mr Appoh, who was speaking at the *Daily Graphic* on the sidelines of a regional workshop to promote soot-free bus and sustainable public transport in Accra, said there were times that the levels rose to as far as 1,000 microgrammes, especially during the harmattan season.

According to him, the situation was compounded by fuel with high sulphur content — 3,000 parts per million — which was being imported into the country.

"This is a public health issue that must be addressed to reduce the number of people silently dying from respiratory and cardiovascular diseases.

"The Ghana Health Service did an assessment in 2010 and realised that respiratory ailment is second to malaria among the top 20 diseases in Ghana," he said.

**Cost to Ghana**

According to United Nations (UN) Environment statistics, in Ghana, close to 7,000 deaths in 2013 were attributed to outdoor air pollution, with the economic cost of premature deaths estimated at \$5 billion.

With diesel emissions from urban buses said to pose a significant health risk and constituting up to 70 per cent of the risk of exposure to air toxics, the experts gathering in Accra believe that the solution is in improved public transport, particularly the introduction of soot-free buses.

**The situation exposes residents, particularly traders, hawkers and people who spend long hours in traffic, to high risk of respiratory and cardiovascular diseases.**

**Soot-free buses technology**

While in Accra, the more than 20 participants from countries, including Ghana, Kenya, South Africa, Nigeria, Cote d'Ivoire, Ethiopia, Uganda and Tanzania, are expected to discuss cleaner bus options, policies, standards and a road map to cleaner buses.

The programme is being funded under one of the initiatives of the Climate and Clean Air Coalition, which aims to reduce emissions from heavy-duty diesel vehicles and engines.

According to experts, soot-free engines utilise high-efficiency diesel particulate filters that provide up to 99 per cent reduction of small particles that are harmful to human health.

Other soot-free engines include those that utilise compressed natural gas, electricity and biodiesel to comply with European standards.

"Urban buses residents are at risk from emissions entering bus cabin, exposure at bus stops or along urban transit corridors. The health risks of exposure to diesel exhaust provide clear justification to focus on cleaner diesel bus fleet in urban areas," Ms Jane Akuma, the Programme Officer of the Air Quality and Mobility Unit of UN Environment, said.

**Multifaceted approach needed**

With the country's transport means said to be 80 per cent road, the Minister of Transport, Mr Kwaku Ofori Asiamah, in a speech read on his behalf, said a multifaceted approach was needed to develop sound policies to protect road users, the climate and the environment.

"The soot-free buses, I believe, will provide us with an opportunity to reduce transport-related air pollution and climate change emissions.

"The use of gas is not new as we have witnessed quite a number of taxis retooling to run on LPG. Public transport buses could also be supported to introduce alternative clean burning fuels instead of diesel," he said.

The acting Executive Director of the EPA, Mr John A. Pwamang, observed that while public transport was crucial to mobility, policies on it were either lacking or not being implemented.

**MIN READ**

The Environmental Protection Agency (EPA) has revealed that air pollution in the country is getting worse and that air quality in Accra in particular is far below its acceptable limits and WHO standards.

Ghana News Agency (GNA):



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Wednesday 14th June, 2017

## Soot-free buses will reduce air pollution - Minister



**By Kodjo Adams, GNA**

Accra, June 14, GNA - Mr Kwaku Ofori Asiamah, Minister of Transport has noted that the