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



United Nations Environment Programme



REPORT ON TWO-DAY WORKSHOP ON

“LOW SULPHUR FUELS IN GHANA”

*Theme: Promoting low sulphur
in West Africa*

HOLIDAY INN, ACCRA
OCTOBER 31, 2016- NOVEMBER 1, 2016

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EXECUTIVE SUMMARY

The National Petroleum Authority (NPA) in collaboration with the United Nations Environment Programme (UNEP) organized a two-day workshop on the promotion of Low Sulphur fuels in Accra.

The theme of the workshop was **“Promoting Low Sulphur Fuels in West Africa”** and had the following objectives:

1. To deliberate upon and propose implementable actions for the roadmap towards the achievement of 50ppm in petrol and diesel consumed in Ghana & in the sub region by 2020.
2. To provide technical support for Ghana and other countries in the sub-region to take steps to produce and import diesel with environmentally friendly Sulphur levels.

The two-day workshop was opened by Hon. Mahama Ayariga, the Minister for Environment, Science, Technology and Innovation and Hon. Benjamin Dagadu, Deputy Minister for Petroleum. In his keynote address, Hon. Ayariga gave his Ministry’s commitment to the promotion of environmentally friendly policies which include the use of cleaner fuels and called for a regional consensus. He further stressed the need to achieve higher fuel standards while at the same time addressing multiple issues facing the economy.

Hon. Dagadu, in his keynote address spoke of Ghana’s signatory to the Paris Agreement on climate change, which implies that the country has a responsibility to implement measures towards the use of cleaner fuels in the country and ultimately create a cleaner and healthier environment. He expressed the country’s eagerness for cleaner fuels and endorsed the proposed low sulphur fuels roadmap for Ghana. The roadmap requires an upgrade of the state owned Tema Oil Refinery (TOR) and both Ministers informed participants that they would liaise with other relevant government agencies on funding options for TOR upgrade.

The workshop was also graced by officials of NPA led by its Chief Executive Honorable Moses Asaga, Jane Akumu, from the United Nations Environment Programme (UNEP), Bernard Koffi of the ECOWAS Commission and Kwame Awuah Darko of Tema Oil Refinery (TOR). Mr. Emanuel Quartey, a renowned Petroleum downstream expert chaired the two-day workshop.



Representatives from the African Refineries Association (ARA), Ghana Standard Authority, Environmental Protection Agency (EPA), Driver Vehicle & Licensing Authority (DVLA), Ministry of Transport, Ministry of Environment (Nigeria) also attended the two-day workshop.

Other stakeholders including the Chamber of Bulk Oil Distributors (CBOD), Association of Oil Marketing Companies (AOMC) and Greater Accra Passenger Transport Executives (GAPTE) were also present at the workshop .The two-day workshop was held from October 31 to November 1, 2016 at the Holiday Inn hotel in Accra.

At the end of the two - day workshop the following recommendations were made

#	Recommendation	Responsible Institution
1	Set National Standards at 50ppm (Max) by March 2017 for diesel	Ghana Standards Authority (GSA)
2	Give TOR a waiver to deliver onto the market diesel at 500ppm by March 2017 with a plan to reach 50ppm by 2020. - Review plan annually	NPA/GSA/TOR
3	Capital Investment to upgrade TOR to produce low Sulphur diesel fuel of 50ppm by 2020	MOPET/TOR
4	Make TOR commercially independent and viable -Change the ownership of TOR by divesting 51% of government shares	MOPET/NPA

#	Recommendation	Responsible Institution
5	Define a market for TOR's 500 ppm diesel - Find alternative markets for TOR (Export, Rigs, /Marine industry) - TOR should consider blending	NPA/TOR
6	Harmonize Sub-Regional Fuel and emission Standards	ECOWAS Member States
7	Complete the development of Vehicle Emission Standards by September 2017 and ensure they match Fuel Quality Standards	GSA
8	Develop proper vehicle emission testing and inspection procedures	DVLA/EPA
9	Commence data collection and research towards development of fuel economy policy	EPA
10	Reduce import tax on cleaner and fuel efficient vehicles	MoF/GRA
11	Reduce charges on registration and licensing of vehicles with low emissions	DVLA/MoT
12	Promote cleaner and fuel efficient public transport system	MoT
13	Create awareness on benefits of low Sulphur fuels	NPA
14	Enforcement of fuel standards and sanctioning of delinquent service providers	NPA
15	Information sharing on progress towards achievement of fuel standards per Abuja Communique among sub-regional countries	ECOWAS Member States



#	Recommendation	Responsible Institution
16	Establishment of recognized correctional centers for high emitting vehicles	DVLA/MoT

Implementation of these proposed measures will make Ghana the first West African country to shift to the use of Ultra Low Sulphur Diesel (ULSD) fuels and to match fuel quality to its vehicle emission standards.



1.0 BACKGROUND

A regional workshop on the reduction of sulphur in fuels was organized by the National Petroleum Authority (NPA) of Ghana, in collaboration with the United Nations Environment Programme (UNEP), the Climate and Clean Air Coalition (CCAC) and the ECOWAS. The workshop was held at the Holiday Inn Hotel in Accra from 31st October to 1st November 2016.

The workshop, which was a sequel to a similar workshop held in 2012 to kick start the project to have cleaner fuels for public transport, was to enhance Ghana's efforts at setting the pace in reducing sulphur levels in the fuels imported and produced in the West African sub-region to 50-ppm by 2020. It was also aimed at supporting Ghana to prepare a national roadmap on the adoption of low sulphur fuels. The roadmap is expected to consider options for the refinery upgrade, low sulphur fuels import options and vehicle emission standards.

The theme of the workshop was **“Promoting Low Sulphur Fuels in West Africa”** and it was attended by about sixty people from institutions like United Nations Environment Programme (UNEP), National Petroleum Authority (NPA), Economic Community of West African States (ECOWAS) Commission, Tema Oil Refinery (TOR), African Refineries Association (ARA), Ghana Standard Authority (GSA), Environmental Protection Agency (EPA), Driver Vehicle & Licensing Authority (DVLA), Ministry of Transport, Ministry of Environment (Nigeria).

Other stakeholders present include participants from the Chamber of Bulk Oil Distributors (CBOD), Association of Oil Marketing Companies (AOMC) and Greater Accra Passenger Transport Executives (GAPTE).

The objectives of the workshop were as follows:

1. To deliberate upon and propose an implementation actions for the roadmap towards the achievement of 50ppm in petrol and diesel consumed in Ghana & in the sub region by 2020.
2. To provide technical support for Ghana and other countries in the sub-region to take steps to produce and import diesel with environmentally friendly Sulphur levels.



2.0 WORKSHOP OPENING

The workshop was chaired by Mr. Emmanuel Quartey, a renowned Petroleum downstream expert. At this session, invited dignitaries gave a few remarks, and participants' expectations were recorded.

2.1 Welcome Address

Hon. Moses Asaga, the Chief Executive of the NPA, thanked participants for responding to the invitation of the NPA. He outlined that the objectives of the workshop were to engage stakeholders, in building the roadmap towards the reduction of sulphur contents of fuels in Ghana by 2020. The roadmap includes plans for the Tema Oil Refinery (TOR) upgrade,



Low sulphur fuels import options and review of current fuel standards in the country to reflect low sulphur levels and vehicle emission standards. He stated that the workshop under the auspices of UNEP, sought to create the needed awareness among stakeholders and the general public.

Additionally, he indicated that the workshop would enhance Ghana's effort at setting the pace in reducing sulphur levels in the fuels imported and produced in the West Africa sub-region. He said the authority had through concerted efforts over the years rolled out innovative strategies "aimed at improving upon the quality of the standard of fuel to ensure that the fuel supplied at final dispensing outlets is of the right national specification."

Commenting on the effects of bad fuels, he said bad fuel causes engines to malfunction and come at an extra cost to the consumer to restore damaged engines. Bad fuels also generate toxic fumes that pollute the air and are harmful to the health of the people.

He emphasized that Ghana has already set the precedence on the continent in the elimination of lead from fuels. However, the country cannot afford to take lightly the health of citizens and residents by looking unconcerned at the fatal impact of sulphur contents in fuels. He urged participants, therefore, to take the

opportunity to contribute their quota for a cleaner environment. Cleaner fuel, he said, hopes to bring to bear the financial, health, and environmental implications of both the current sulphur content and the desired future sulphur content in fuel.

2.2 Introductory Remarks

(A) Remarks by Jane Akumu, UNEP

Mrs Jane Akumu, Programme Officer in the Transport Unit at UNEP expressed her delight and appreciation of the workshop. She revealed that UNEP has been supporting cleaner fuels programmes since 2002. She emphasized that developed countries have adopted the use of low sulphur fuels for health reasons and there is the need for developing countries to change for the same reasons.



Jane recounted that Ghana was among the first countries in Africa to eliminate the use of Lead in gasoline. It is her hope that Ghana will also lead in the reduction of sulphur in diesel to at least 50ppm, even though 10ppm is ideal.

She informed the Ministers and dignitaries present that UNEP is collaborating with the Ministry of Environment (Nigeria) to organize a meeting with all ministers of Environment and Ministers of Petroleum in the sub-region on the December 1, 2016 in Nigeria. The ministerial meeting is aimed at holding discussions on relevant policies and regional cooperation to help facilitate cleaner fuels in the sub-region.

(B) Remarks by Minister of Environment, Science, Technology & Innovation

The Hon. Minister of Environment, Science, and Technology & Innovation commended the National Petroleum Authority and the United Nations Environment Programme (UNEP) for bringing together various stakeholders in the environment, transport, health and the petroleum downstream sectors in Ghana and across West Africa to deliberate on issues relating to sulphur levels in fuels.



He emphasized that unless the health and environmental hazards associated with emissions were controlled, the country's efforts towards achievement of its Sustainable Development Goals (SDGs) are at risk of a failure. The Minister added that the promotion of low sulphur fuels and the full implementation of the Bus Rapid Transit System in Ghana will go a long way to reduce air pollution, and consequently contribute immensely to achievement of national health security targets.

(c) Remarks by Bernard Koffi, ECOWAS Commission

The Head of the ECOWAS Environmental Division, Mr Yao Bernard Koffi, on behalf of the Commissioner of the ECOWAS Commission in charge of Agriculture, Environment and Water Resources commended the Government of Ghana, the National Petroleum Authority (NPA) & the United Nations Environment Programme (UNEP) for bringing together stakeholders in the ECOWAS sub-region to deliberate on issues relating to sulphur levels in fuels.



Mr Yao Bernard Koffi, acknowledged the challenges the sub-region faced with producing and importing cleaner fuels due to the lack of fuel specifications to

meet evolving improvements in engine technology that supported reduction in vehicle pollutant emissions.

He, therefore, made a case for harmonising fuel standards, as well as emission standards, across the sub-region.

(D) Opening Remarks by Deputy Minister of Petroleum

In his opening remarks, Deputy Minister of Petroleum Hon. Benjamin Dagadu expressed the Ministry's appreciation to the National Petroleum Authority and the United Nations Environment Programme (UNEP) for organising the 'Low Sulphur Fuel' workshop.

The Deputy Minister also commended the National Technical Committee on Low Sulphur Fuels, set up under the auspices of the NPA to facilitate the country's move to 50 ppm (parts per million) Sulphur content in diesel, by the year 2020.

Hon. Dagadu, asserted that the road map towards achieving 50 ppm sulphur levels in fuels consumed in the country by 2020 was an important factor in the government's effort towards improving air quality and the environment in general. It will ensure the protection of public health through a reduction in the emission of black smoke, Sulphur dioxide, hydrocarbons and other greenhouse gases from vehicle exhaust tailpipes.

The Deputy Minister on behalf of the substantive minister of the Petroleum Ministry officially opened the two (2) day workshop



(E) Chairman’s Address

The Chairman of the workshop, Mr Emmanuel Quartey, who is a renowned petroleum downstream expert in his address pointed out the objectives of the programme and urged the stakeholders to be guided by the objectives in their deliberations.



3.0 PRESENTATIONS BY STAKEHOLDERS

3.1 Global Trends in Sulphur Reduction (UNEP)

Jane Akumu, the representative of UNEP was the first person to present her paper on “**Global Trends in Sulphur Reduction**”. She recounted how outdoor pollution has accounted for the death of 3.7 million people in the world, adding that, 58,000 were in America, 200,000 in Europe and 236,000 deaths in the Eastern Mediterranean. Africa, South East Asia and Western Pacific account for 176,000 and 2.6million deaths respectively.

“Over half of the World’s population lives in urban areas; but only 12% of the cities have quality measure that meet the World Health Organisation (WHO) standard” she stated. She said “the financial cost of environmentally related health risks are in the range of 5%-10% of GDP with air pollution taking the highest toll. “Air pollution causes diseases such as chronic obstructive pulmonary, Childhood pneumonia, Ischaemic heart disease and stroke. Others are asthma, Breathing and Chronic respiratory illness.”

Citing a report by OECD Development Centre, she said economic loss due to Ambient Particulate Matter pollution in 2013 was estimated at 2.2 billion USD in Kenya and 5 billion USD in Ghana.

She also noted that, in July 2016 the city of Paris banned old, exhaust-belching cars from its streets in a war against air pollution, stressing that,

environmentalists hope this will also drive dirty vehicles from the centres of other European cities.

Air pollution, in large part caused by fine particulate fuel emissions, kills 48,000 people each year in France, some 400,000 people in Europe and around 3.7 million people worldwide, as shown by data published by France's public health agency in October 2016.

Norway is planning to ban petrol-and diesel-fuelled cars from 2025 and several cities in Europe are testing various anti-pollution or anti-congestion measures based on tolls for city centre access or temporary and selective car bans during surges in pollution levels.

According to ICCT, at 10-15ppm, there is 95% PM reductions, at 50ppm sulphur, 75% PM reductions and 15%-30% PM reductions for 500ppm sulphur.

Sulphur levels are proportional to PM and CO2 emissions in all cars, both new and old cars.

There has been progress in Global Low Sulphur Diesel levels from 2005 to 2016. 24 countries have moved to 50 ppm and below. 8 countries in Africa have reduced the sulphur levels significantly.

On UNEP's support to West Africa/ECOWAS, she enumerated the following

- ✓ UNEP is collaborating with the Economic Community of West African States (ECOWAS) for a roadmap
- ✓ Regional workshop held in May 2015 came up with a recommended low sulphur strategy for the sub-region including air quality monitoring
- ✓ Sub-regional workshop for Nigeria and neighbouring countries in June 2016
- ✓ Sub-regional Ministerial follow up meeting planned 1 December 2016



3.2 ECOWAS Fuels Roadmap

Engineer Tony Ogbuigwe, the ECOWAS Regional Advisor for African Refiners Association (ARA) presented a paper on the ECOWAS Fuels roadmap.

According to him, refiners have been seeing improved operating conditions across the globe. Historically low refinery margins have only seen recent improvements due to falling oil prices. Large scale refinery plants are coming on stream in the

Middle East and Asia. Restrictions, until recently, of export of US tight oil production has meant refining margin and product export bonanza for US Refiners and low shipping freight rates offer increasing product arbitrages -from AG, India & USGC.

He said, IEA forecasts that, oil will remain an important part of energy mix in Sub-Saharan Africa (SSA). The forecast demand growth implies a huge increase in clean product production/imports.

ARA advocates common regional specifications and tax policies in order to promote trade and an efficient supply chain across Africa.

ARA's goal is to improve Africa's air quality, with the consequent improvements in public health, while recognising:

- ✓ Air quality problems are localised, not universal
- ✓ Clean fuel demand can only be met by modernising refinery infrastructure or product imports
- ✓ Time is needed for the local economies and consumers to support the tightening of specifications and the consequent cost increase
- ✓ Refinery investment must be in line with car fleet modernisation and vehicle controls



Engineer Tony recounted some implications for the Refiners as the sub region adopts low sulphur diesels. He mentioned that;

- ✓ Both existing and new refineries must meet new emission guidelines
- ✓ Refiners and the entire supply chain must prepare
- ✓ The choice of where to invest down the supply chain, particularly between refining and product imports, is increasingly driven by the ability to attract financing
- ✓ Whereas storage and distribution companies have been able to secure financing, refiners still struggle.

Sulphur content in products from the region's refineries is currently between 500 and 2000 ppm for diesel and 500 and 1000 ppm for gasoline. Niger is an exception, where sulphur content in diesel is 380 ppm and 160 ppm in gasoline.

Overall, sulphur content in the fuels sold in the region remains at levels above the AFRI-4 specification targeted for 2020.

Use of higher sulphur content fuels in various sectors including transport, industry, etc., result in releases of pollutants with negative impacts on health and the environment.

There are some health impacts as a result of high sulphur contents in fuel. ARA summarises the impacts as:

According to WHO, nearly 800 000 people die prematurely every year in the world due to urban air pollution, and vehicle exhaust emissions are among the factors contributing to poor air quality in urban areas.

The 2009 World Bank/ARA SSA Refinery & Health Study concluded an investment of \$4.96billion to improve existing refineries would lead to over \$32billion savings over ten years in avoidable health costs by adopting AFRI-4.

These benefits accrue to the governments, who, within ECOWAS, are also significant refinery shareholders.

He revealed that ECOWAS/ARA have drawn a Road Map to achieve the low sulphur content levels in fuels. The Roadmap includes the following

- ✓ Adopt AFRI-4 for implementation by 2020



- ✓ AFRI-5 by 2030
- ✓ For fuel imports into the sub-region from Europe, Asia and America

Adopt the AFRI-4 specification by 2017 and Refiners operating within the sub-region should be allowed until 2020 to make necessary improvements

- ✓ Introduce and implement vehicle emission standards and control.

Engineer Ogbuigwe presented some recommendations from ARA which included developing a harmonized regional framework taking into account the realities of the region, and proposed an action plan for implementation and developing two draft regional guidelines: one on oil product specifications (gasoline and diesel) and the other on motor vehicle emission limits.

He concluded his presentation by indicating the achievement of the roadmap. According to him, the implementation of the roadmap would help achieve the following in the sub region:

- ✓ Product quality
- ✓ Introduce in parallel, vehicle emission limits and controls
- ✓ Promote regional harmonisation of fuel excise duties, taxes and subsidies
- ✓ Promote best practice for biofuels handling and use
- ✓ Promote infrastructure policy for fuel distribution

3.3 Improving African Fuel Standards for sustained Economic Growth

The Director in charge of Pricing, Planning and Research at the National Petroleum Authority, Mrs Alpha O. Welbeck, in her presentation explained the mandate of the National Petroleum Authority (NPA). She indicated that NPA protects the interests of consumers and Petroleum Service Providers (PSPs). It initiates and conducts



Alpha Welbeck, Director, Pricing, Planning & Research Division, NPA

investigations into standards of quality of petroleum products offered to consumers.

Experts have called for environmentally friendly policies as far as fuel related issues are concerned. African countries including Ghana have resolved to switch to cleaner fuels for the health of its citizenry.

Africa which is the second largest continent in the world has numerous gains from implementing these environmentally friendly policies. The continent boasts of over 130 billion barrels of oil reserves (2010 estimates) and Over 500 trillion cubic feet of gas reserves.

Justifying the ARA roadmap specifications, Alpha Welbeck asserted that the strategy is to reduce emissions. This way, countries would have a healthy population and hence economic growth is guaranteed. Investors would also have confidence in our countries. The investors would channel more investments into the sub region. The roadmap would also help to meet internationally agreed goals like the Paris accord on climate change which Ghana has signed up to.

Ghana revised the National Standard Sulphur level in Diesel from 10,000ppm (Max) to 3,000ppm (Max) in 2013. Following the workshop held in Abuja in June 2016, discussions are ongoing to further revise the sulphur level further down by January 2017. Consultative meetings have been held with key stakeholders such as the Ministries of Environment and Petroleum, the refineries and importers.

Ghana established a National Task Force (NTF) for cleaner fuels which is made up of representatives of all stakeholders including Ghana Standards Authority (GSA), TOR and the Bulk Distribution Companies (importers). This NTF has developed a Roadmap that will enable the Tema Oil Refinery to produce diesel at 50ppm (max) by 2020, as well as ensure that imported petrol and diesel have sulphur levels of maximum 50ppm by 2020 according to AFRI-4 of the ARA roadmap.

To achieve AFRI-4 for Health & Economic development, Alpha Welbeck recommended the following:

- ✓ Mainstream Regional agreements into National Emission & Fuel Standards Policies
- ✓ Revamp Refineries to meet agreed standards
- ✓ Conclude Regional Discussions on a shift to cleaner fuels



3.4 Fuel Import Trends in Ghana

The entire sub-region has failed to meet its target to harmonize standards. There is no sign of real commitment to make the needed investments.

Research by ARA indicates that \$2.98bn in investments in West African Refineries to produce Afri4 specs will yield \$32bn health return over 10yrs.

The CEO of CBOD was worried about the preferential treatment for TOR. He said TOR must not remain the policy constraint for Sulphur reduction.

Senyo Hosi concluded by suggesting the way forward for the attainment of low sulphur levels as follows:

- ✓ Ghana should stop mortgaging the health of the citizenry for political expediency.
- ✓ Move Standards to responsible health levels of 50ppm & 10ppm.
- ✓ Grant local refineries limited special dispensation for a gradual achievement of AFRI4 by 2020. Government must provide the required investment if it is truly committed to restructuring TOR.
- ✓ Harmonize regional standards to facilitate consumer and national security benefits from shared specs.

3.5 Plans for Tema Oil Refinery Upgrade and Road Map to 50ppm Diesel

The Managing Director of the Tema Oil Refinery (TOR), Kwame Awuah Darko in a brief remark said Western Europe consumes about 18million barrels a day while Africa consumes about 700,000 barrels daily.

The Chief Executive said that TOR is currently not



Kwame Awuah - Darko, MD, TOR

in a capacity to produce 50ppm in 2017. The refinery needs to upgrade its infrastructure in order to achieve production of low sulphur fuels, this requires a lot of resources. He informed the workshop that there are ongoing discussions to upgrade the refinery to enable it produce low sulphur fuels by 2020.

3.6 Vehicle Population and Growth Rates

Daniel Essel, representative of the Ministry of Transport presented on **'Vehicle Population and Growth Rates'**.

Daniel Essel began his presentation with an overview of the transport sector in Ghana. He said Ghana's Transport sector is mainly made up of air, inland water, maritime, rail and road. The Ministry of Transport has oversight responsibility for all the modes of transport except road infrastructure. Road transport is the dominant mode of transport in Ghana.

Economic development has historically been strongly associated with an increase in the demand for transportation. In Ghana, he said, government has over the years supported the transport sector through the development of policies and strategies to respond appropriately to the increasing travel demand in order to reduce the cost of doing business.

On the global front, Daniel Essel gave an overview of vehicle ownership and other relevant information as far as vehicle ownership statistics are concerned in America, Asia and Africa.

"Car ownership in the world is increasing at an alarming rate. As of 2010, there were more than one billion motor vehicles in use in the world" he pointed.

The United States had the largest fleet of vehicles with 239.8 million in 2010 compared with a population of 309.3 million.

Vehicle ownership in the US is also the highest in the world with 769 vehicles per 1000 people. China has the second largest fleet in the world and now the world's largest new car market. For the African continent, the vehicle ownership



per 1000 people was around 25 in 2010. This however stood at 21 vehicles per 1000 population at the beginning of the 21st century.

The increasing motorization has important implications for transport and environmental policies, as well as the global oil market. There is inadequate infrastructure to support the growing traffic congestion, pollution and its related impact on human health. Transport contribution to Green House Gas (GHG) emissions has become a major bottleneck.

Vehicle manufactures and regulators have over the years introduced standards and other enforcement mechanisms to reduce vehicular emissions. (Euro 1-6 and its attendant fuel requirement).

He also presented to participants Ghana's vehicle population and regional statistics. He said the total number of registered vehicles in Ghana in 2015 stood at approximately 1,952,564.

The Greater Accra Region had the highest number of registered vehicles of about 1,164,942, followed by Kumasi with just 269,689.

The remaining regions recorded about 517,933 of registered vehicles. The vehicle/population ratio in Ghana has been growing steadily from about 50 vehicles per 1,000 population in 2010, to about 70 vehicles per 1,000 population in 2015.

The average age of a vehicle in Ghana is about 14.2 years. It is much higher for public transport vehicles. Majority of vehicles imported are second hand (Home Used).

More vehicle being registered translate into higher demand for road space.

According to Mr Essel, the growth in vehicle population has some implications in Ghana. He said the Ministry was concerned about the following implications;

- High level of road traffic crashes and fatalities
- Increased traffic congestion on almost all arterial routes in the Central Business District (CBD).
- Ambient air quality particularly in urban and densely populated areas have worsened.



- Pollution and its related impact on human health and attendant health issues.

He said the cities were increasingly suffering from vehicle related pollution and external costs generated by motorized transport. Mr Essel enumerated the following actions to be executed;

- Provide appropriate incentives and investments needed to facilitate the emergence of greener, more efficient and more sustainable transport modes and lower transport-related GHG emissions.
- Provide appropriate incentives needed to enable a gradual modernization of Ghana’s vehicle fleet focusing on both private and public transport.
- Conscious investment and road priority for higher occupancy vehicles.
- Put in measures to improve fuel quality for better engine performance and reduce related emissions.

3.7 Vehicle Emission Enforcement

A Director at the Driver and Vehicle Licensing Authority (DVLA), Mr George Ackom briefed participants on Vehicle Emission Enforcement.

He said the purpose of emission enforcement was to restore, preserve and improve the quality of air. The requirement provide for the protection of the air from pollutants.

He said Ghana has a transport regulation (Regulation No. 33, L.I. 952, Road Traffic Regulations, 1974) on vehicle emissions

and it states that ‘No person shall drive a motor vehicle which emits exhaust fumes in such quantities as to be a hazard or annoyance to road users or pedestrians.

Commenting on the regulation, Mr Ackom said the law allows the importation of used vehicles that cannot pass emission test in the country of origin. According to him, the country has become a dumping ground for high emitting vehicles.



George Ackom, DVLA

The regulation only discourages the importation of vehicles older than 10 years by imposing an overage penalty.

He mentioned that the principal pollutants of concern in Ghana include: Hydrocarbons, Carbon monoxide (CO), Particulate matter, Volatile organic compounds (VOCs) and Sulphur oxide.

In the absence of emission performance standards, he stated, the current emission tests conducted during vehicle inspection were for advisory purpose and for data compilation.

“The emission test result is not a criteria for adjudging roadworthiness of vehicles (so long as there is no excessive or visible smoke).”

Due to rapidly expanding wealth and business opportunities in Ghana, the number of oil companies and cars on Ghana's roads is rapidly growing, creating an ongoing pollution problem.

Mr Ackom said the process of implementing emission control in Ghana requires the following chain of activities;

- Baseline study (determine the pollution landscape)
- Fuel Quality (existing/fixed)
- Emission performance standards (established, introduced depending on fuel quality)
- Legal aspects (Transport Policies, Vehicle Laws, Regulations,)
- Funding
- Public Awareness/education
- Professional technical training
- Assigning roles and responsibilities (EPA, GSA, NPA, GRA (Customs), MoT (DVLA), Police, Judiciary, Media, etc.)
- Systems and structures (testing facilities, data/communication network)
- Compliance and Enforcement



- Technical Services (garages, parts dealers)
- Monitoring

He said, even though countries including Japan, Israel, China and some European countries had successfully implemented compliance and enforcement programmes, there were some challenges associated with it. These include:

- Vehicles not displaying an inspection sticker.
- Vehicles belching smoke despite displaying an inspection sticker.
- Absence of police or other authorities paying attention to inspection stickers or smoke belching vehicles.
- Test facilities that pass virtually all vehicles regardless of their emissions.
- Inspection test lanes that are clearly in disrepair.
- Inspection test equipment that is not functioning or are not calibrated properly.
- Inspection facility staff who are incapable of performing their duties (e.g. test lane drivers).
- Inspection staff who view their job as helping drivers pass the inspection test by manipulating the vehicle or the test.
- Inspection staff who take bribes and issue stickers.
- Absence of any oversight of, or quality assurance procedures for, test facilities.

According to the DVLA, there are some methods when adopted could help in the enforcement of the vehicle emissions inspection programme.

Vehicle Registration Sticker Enforcement is one of these strategies or methods of enforcing vehicle inspection programme. This involves passing the vehicle emissions inspection as part of the requirement for renewal of roadworthiness.



Vehicle Registration Denial is another method. This involves passing the vehicle emissions inspection as part of the requirement for vehicle first registration.

Targeting On-Road Inspections (Remote Sensing) is key in the enforcement. Target high-emitting vehicle & use validation tool to inspect vehicles exiting from inspection.

The DVLA proposed the strategy of engaging in a major program to establish a centralized inspection database, to which all testing facilities will eventually be networked, allowing for much more comprehensive management and quality assurance.

The vehicle service industry must have sufficient equipment to properly repair vehicles, and adequately train mechanics and technicians.

3.8 Promoting Cleaner and Efficient Vehicles

Taking her turn again to brief participants at the workshop about Promoting Cleaner and Efficient Vehicles, Jane Akumu of the Transport Unit of UNEP said Fuel economy, fuel efficiency, fuel intensity are all fairly interchangeable terms but was quick to add that fuel economy always refers to fuel use relative to distance travelled.



The benefits of the Global Fuel Economy Initiative (GFEI), according to Jane Akumu include reduced urban air pollution, fuel savings which is estimated at over USD 300 billion by 2025 and 600 billion by 2050 as well as CO2 reduction estimated at over 1 gig tonne a year by 2025 and over 2 gig tonnes by 2050.

On Carbon Reduction Potential Transport, Jane Akumu said there is a Potential for transport to reduce 4 GT/yr. in 2030 and 8 GT/yr. in 2050 (IEA MOMO model 2015).

She said the Objective of the GFEI is to double the efficiency of the global fleet by 2050.

On Regional fuel economy trends, she explained that countries with Fuel Economy policies in place show encouraging improvement rates.

Importance of GFEI for Africa, according to Jane Akumu is that, the project provides a good understanding of vehicles imported into the country e.g. models, sizes, technologies, allow policymakers to choose the right combination of policy instruments to meet national emission targets, energy security, and efficiency goals.

She added that GFEI baseline setting indicates that there is little progress in fuel economy improvement in countries without policies.

She mentioned that four (4) policy options were available to African countries for consideration. **Vehicle Fuel Efficiency Standards** policy which is to introduce and regularly strengthen mandatory standards, establish and harmonize testing procedures for fuel efficiency measurement is one of such.

Another policy is **Fiscal Measures**, which is to introduce fuel taxes and vehicle taxes to encourage the purchase of more fuel-efficient vehicles as well as providing infrastructural support and incentive schemes for very fuel-efficient vehicles.

Market-based approaches, are voluntary programs such as U.S. Smart Way and other green freight programs.

The final policy option which is the **Information Measures**, she said is for improving vehicle operational efficiency through eco-driving and other measures.



3.9 Promoting Efficient Public Transportation in Ghana

Engineer Samuel Bonsu, Systems Manager of GAPTE briefed participants on ‘Promoting Efficient Public Transportation in Ghana’. He explained to the participants the role of the Greater Accra Passenger Transport Executives (GAPTE). He said the executives manage integrated citywide operational projects (e.g. BRT) and customer services (e.g. ticketing, passenger information and conduct the UPT infrastructure planning in association with other mandated MDAs. GAPTE also harmonizes all regulations of UPT services and enforcement and citywide network planning.



On mobility challenges, he said that congestion on our roads, inadequate infrastructure and indiscipline as some of them. He also revealed that Bus & ‘Trotro’ carry 70% of person trips but utilizes only 30% of road space. He added that the government of Ghana wants 80% of all trips in the urban area to be done through public Mass Transit systems. The Government of Ghana has intentions of investing in urban transport systems by providing a decentralized institutional and regulatory framework, empowering the private sector to invest into buses and transport service provision and integrating urban transportation within a strategic urban development framework.

Touching on the vision of Public Transport in Greater Accra Metropolitan Area (GAMA) by 2020, he said premium will be placed on infrastructural development including developing dedicated depots, bus stops, terminals and bus priority measures.

On the Ghana Urban Transport project, Samuel Bonsu indicated that the project will improve mobility in areas of participating MMDAs and also shift more

environmentally-sustainable transport modes and lower transport-related GHG emissions along the pilot BRT corridor in Accra.

Briefing participants on the Bus Rapid Transport system, He said the buses procured for the project have Euro 3 engines and passenger information system.

According to Samuel Bonsu, the BRT ensures that passengers park their vehicles and board public transport. This will reduce emissions. Old vehicles with fumes will be parked and kept off our roads.

3.10 Eenvironmental and health implications of fuel quality in Ghana

Mr Emmanuel K.E. Appoh of Environmental Protection Agency, GHANA taking his turn at the workshop said there was a Cross-sectorial Institutional mandates such as the EPA, NPA, MoE, MOH, National Building Regulations, MoT/vehichle import policy, Ministry of Trade and Industries for non-mobile sources, among others.

He mentioned smokes from cars, refinery, and bush fires among others as some of the major sources of Air Pollution in Ghana.



Touching on **Transport and**

Vehicular Fleet, he said Road transport accounts for about 94% of freight and 97% of traffic movement indicating that the sector consumes a lot of fuel.

He said 84.96% of vehicle fleet in Ghana is privately owned and for commercial activities indicating that has increased road traffic over the past 10 years.

On Environmental implications of poor fuel consumption, Mr Appoh said it would lead to malfunctioning of catalytic converters in vehicles thereby reducing engine life due to the use of poor quality lubricants/fuels.

He added that it will also lead to incomplete combustion of fuel leading to higher vehicular emissions (*BC, CO, HC, CO₂, and NOX*). He also said *BC, CO₂, NOX* are *SLCP (GHG)* which have global warming potential and climate change consequences including flooding, pest infestations, heat waves, drought, poor plant growth and yield, etc.

He posited that emissions affect crops via multiple pathways including radioactive forcing, CO₂ and ozone concentrations, temperature change, slow and fast precipitation changes, and agriculture yield changes.

Focusing on Milestone of Ambient Air Quality & Vehicular Emissions Monitoring (AQM) in Ghana, Mr Appoh said Air Quality Programme was initiated in 1996 by EPA with programme implementation starting in 1997 at residential, commercial and Industrial areas.

He explained that there was a pioneering vehicular emission monitoring in Ghana from 1997-1998 adding that the outcome was a decision for DVLA to integrate vehicle emission testing into the licensing scheme.

On health implications of exposure to emissions from consumption of poor fuel, Mr Appoh averred that there is a respiratory infection from particulate matter exposures which is second to malaria of the 10 burden of diseases in Ghana.

He also said its decreased productivity of affected persons, brings about aggravation of asthma incidences, dizziness, lung cancer, especially BC from exhaust of diesel engines, decrease/loss of agriculture produce and productivity which have the potential of defeating the sustainable development goals on poverty eradication and death in extreme cases especially from Carbon Monoxide exposure.

He indicated that currently there is a policy on taxation on imported used and over-aged vehicles and engines into Ghana. For him, there is continuous use of poor fuel quality (high sulphur levels), congestion and poor roads, vehicle maintenance and driving pattern exacerbating the emission problem, long overdue national vehicular emission standards, funds and logistics for pollution related health studies, education/awareness creation by health workers among others as well as refinery investment commitments

The way forward, according to Mr Appoh should be restriction on age limit of imported vehicles to 8 yrs. and increasing duty over CFI value (Cost of Freight



and Insurance), Systematic plan for 50ppm sulphur level in fuels by 2020, increase public awareness & sensitization on merit to reduce sulphur in fuels, Implementation of roadmap to vehicular emission and fuel economy standards, National vehicular emission standards, better investment in refineries, Exposure Assessments for emissions/air pollutants.

3.11 Clean Fuels Roadmap for Nigeria

Mr Emmanuel Ojo, the representative of the Ministry of Environment of Nigeria presented a paper on the Fuels roadmap for Nigeria.

He said Nigeria has successfully phased out lead from fuels and is now committed to reducing Sulphur.

He cited the sub-regional workshop on Promotion of Low Sulphur Fuels held in Abuja this year.



Ojo Emmanuel, Ministry of Environment, Nigeria

Touching on the roles and responsibilities of ECOWAS, he said ECOWAS should Intensify National Awareness Programmes through active participation of Policy makers as well as the Media and Public Interest Groups; review, upgrade and domesticate common laws, regulations and standards across the region to promote low Sulphur fuels (50ppm max) and reduce emissions.

He called on ECOWAS to Import only low Sulphur fuels (50ppm max) to the country; upgrade refineries across the region with desulphurization technology and set achievable time frame of 3 to 4 years.

On the current situation in Nigeria, Mr Ojo said, the four refineries in Nigeria were designed to produce enough petroleum products for the use of Nigerians and for export, however, most of the products consumed in Nigeria are imported. The products (PMS, AGO and DPK) produced by Nigerian refineries and the imported ones do not meet the ARA standard of 50ppm of Sulphur content.

On the current actions towards cleaner fuels, he said the Ministry of Environment of Nigeria has proposed the following actions to other ECOWAS members.

- Embark on awareness and sensitization of populace on the dangers of using fuel inefficient vehicles and dirty fuels.
- Review standards.
- Use of 4-stroke engines as alternatives (fuel-efficient; less pollution; more durable).
- Ban on motor vehicles with no emission reduction technology.

He said the Nigerian refineries are currently undergoing rehabilitation to improve their production capacities including addition of refining Units.

The NNPC is working with ARA to effect AFRI specs in refineries; using current rehabilitation & colocation initiatives to drive compliance with standards by 2020. The NNPC facilities are being configured to strictly meet EURO 4 and AFRI 5 standards for petroleum products.

On the way forward, he said, adopting a standard of 50ppm Sulphur fuels for imported petroleum products and giving a three year waiver for the refineries to upgrade to produce 50ppm Sulphur fuels is critical in achieving cleaner fuels. He also added that Regional harmonization of fuels standards which will be binding on all member countries is required in order to realize the goal of achieving cleaner fuels. Promoting the use of vehicles that use more environmentally friendly fuels like CNG/LNG is also ideal in the attainment of cleaner fuels in the sub-region.

In his concluding remarks, Mr Ojo indicated the need for all stakeholders to appreciate the relevance of moving to low Sulphur fuels and also the need for international co-operation, information exchange, appropriate technology sharing and transfer between countries to boost innovations and technology development in the sub-region. He also urged ECOWAS countries to adopt a system that will make each refinery a stand-alone profitable entity.

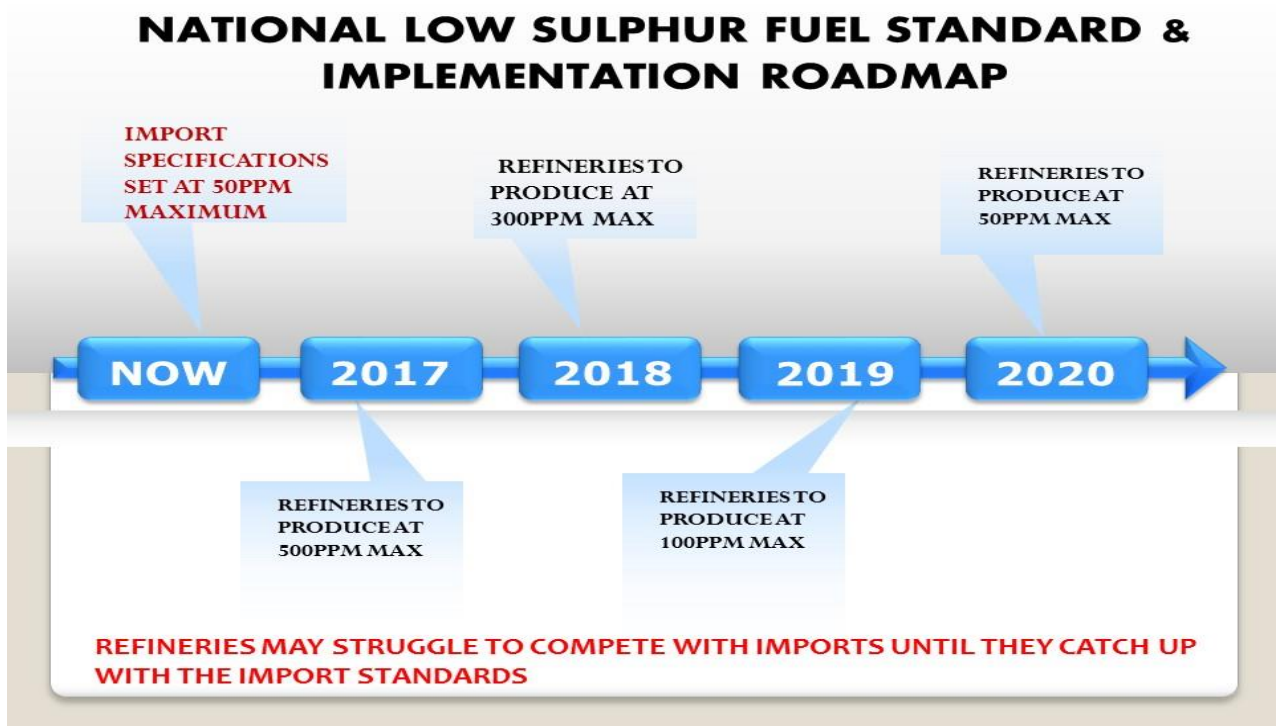


4.0 Roadmap to achieve low Sulphur by 2020

4.1 Workshop Group Deliberations

Before the organisation of the workshop, a National Task Team on Low Sulphur diesel standard & implementation was constituted to advise on the roadmap to achieve low sulphur by 2020. Members of the technical committee were drawn from the National Petroleum Authority (NPA), Environmental Protection Agency (EPA), Africa Refiners Association (ARA), Tema Oil Refinery (TOR), Ghana Standards Authority (GSA) and Chamber of Bulk Oil Distributors (CBOD).

The figure below shows the roadmap proposed by the Technical committee



4.2 Workshop Recommendations

Participants at the workshop were put into 5 groups to discuss the proposed low sulphur roadmap for Ghana as well as develop a set of recommendations for its implementation. Below are the recommendations that were made and the institutions tasked to implement them.

#	Recommendation	Responsible Institution
1	Set National Standards at 50ppm (Max) by March 2017 for diesel	Ghana Standards Authority (GSA)
2	Give TOR a waiver to deliver onto the market diesel at 500ppm by March 2017 with a plan to reach 50ppm by 2020. - Review plan annually	NPA/GSA/TOR
3	Capital Investment to upgrade TOR to produce low Sulphur diesel fuel of 50ppm by 2020	MOPET/TOR
4	Make TOR commercially independent and viable -Change the ownership of TOR by divesting 51% of government shares	MOPET/NPA
5	Define a market for TOR's 500 ppm diesel - Find alternative markets for TOR (Export, Rigs, /Marine industry) - TOR should consider blending	NPA/TOR
6	Harmonize Sub-Regional Fuel and emission Standards	ECOWAS Member States
7	Complete the development of Vehicle Emission Standards by September 2017 and ensure they match Fuel Quality Standards	GSA

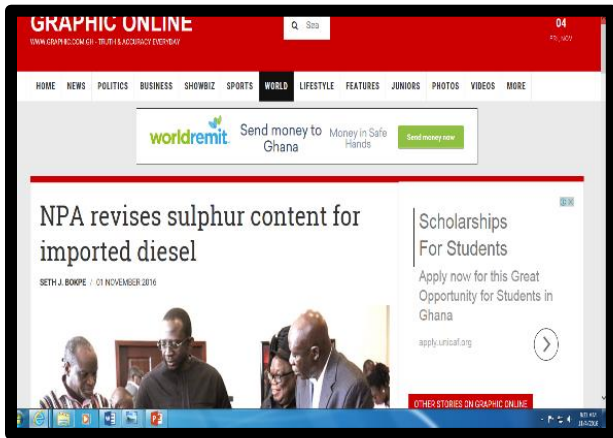
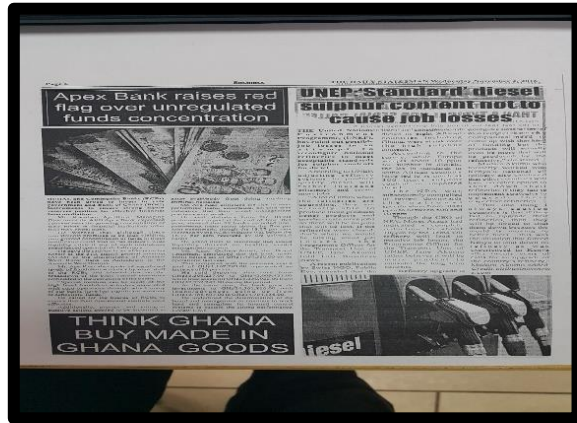
#	Recommendation	Responsible Institution
8	Develop proper vehicle emission testing and inspection procedures	DVLA/EPA
9	Commence data collection and research towards development of fuel economy policy	EPA
10	Reduce import tax on cleaner and fuel efficient vehicles	MoF/GRA
11	Reduce charges on registration and licensing of vehicles with low emissions	DVLA/MoT
12	Promote cleaner and fuel efficient public transport system	MoT
13	Create awareness on benefits of low Sulphur fuels	NPA
14	Enforcement of fuel standards and sanctioning of delinquent service providers	NPA
15	Information sharing on progress towards achievement of fuel standards per Abuja Communique among sub-regional countries	ECOWAS Member States
16	Establishment of recognized correctional centers for high emitting vehicles	DVLA/MoT

5.0 Conclusion

The workshop came to a conclusion on the second day with participants having a better understanding of the sub-region's responsibilities in ensuring provision of cleaner fuels. Ghana specifically benefited from an extensively debated stakeholder agreement on the way forward towards achieving 50ppm sulphur in fuels by 2020. Also the country identified the needed actions to be taken towards achieving low emissions, and a healthier environment. It was also agreed that Ghanaian stakeholder institutions had to work together to ensure an enforceable fuels standards and vehicle emissions standards.



6.0 MEDIA CLIPPINGS (Print & Online)



LIST OF ACRONYMS

BRV-Bulk Road Vehicles

BDC- Bulk Distribution Companies

BRT-Bus Rapid Transit

GSA-Ghana Standards Authority

EPA- Environmental Protection Agency

TOR- Tema Oil Refinery

PPM- Part per Million

LI- Legislative Instrument

UNEP-United Nations Environment Programme

NPA-National Petroleum Authority

SSA- Sub Sahara Africa

ARA- African Refiner Association

MEST- Ministry of Environment, Science and Technology

CSIR- Council for Scientific and Industrial Research

GMA- Ghana Medical Association

FOE- Friends of the Earth

AMA- Accra Metropolitan Assembly

GHS- Ghana Health Service

UG- University of Ghana

DVLA- Drivers and Vehicle Licensing Authority

MRT- Ministry of Roads and Transport

TCPD-Town and Country Planning Department



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