



# **AIR QUALITY MONITORING AND MANAGEMENT CHALLENGES**

**By**

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**At the**

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Challenges in Nigeria. Agenda for Clean Air Action Plan**

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# Outline of Presentation



- Introduction
- Major Sources of Air Pollution
- Current Situation of Air Quality in Nigeria
- Adverse Effects of Air Pollution
- Government Action to curb Air Pollution
- Challenges
- Way Forward



# Introduction

- Nigeria is faced with myriads of environmental problems, one of which is air pollution.
- Air pollution is the introduction of chemicals, particulate matter, or biological materials/substances into the atmosphere that cause harm or discomfort to humans, other living organisms and can degrade the natural environment.
- Air pollutants are divided into two i.e. primary and secondary pollutants. Primary pollutants are those which pollute the air once they are released while secondary pollutants are those formed in the atmosphere by chemical reactions involving other gaseous compounds and include ozone.



## Introduction - II

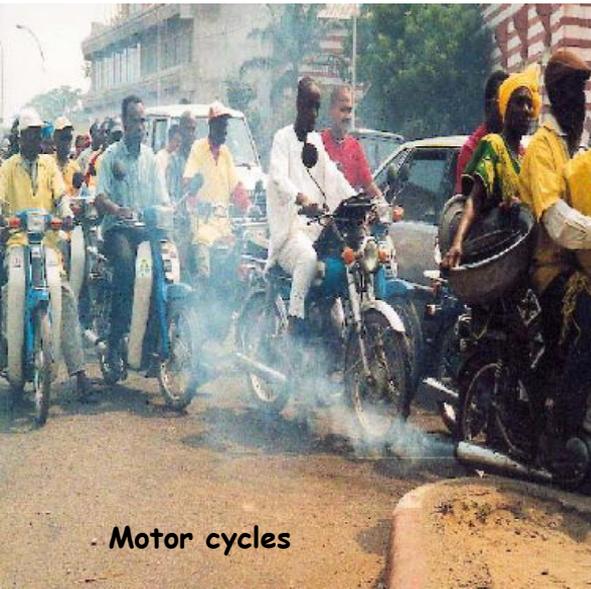
- Major air pollutants are: Oxides of Nitrogen ( $\text{NO}_x$ ), Oxides of Sulphur ( $\text{SO}_x$ ), Carbon Monoxide ( $\text{CO}$ ), Ozone ( $\text{O}_3$ ), Hydrogen Sulphide ( $\text{H}_2\text{S}$ ), Methane ( $\text{CH}_4$ ), Total Non-Methane Hydrocarbon (TNMHC), Particulate Matter (PM), and Volatile Organic Compounds/Chemicals (VOCs).
- Noise pollution is also regarded as a form of air pollution as the medium through which the sound travels is the air.
- Air pollution occurs inside homes, schools, and offices; in cities and across continents.

## MAJOR SOURCES OF AIR POLLUTION

- There are two major sources of air pollution:
  - A. Man-made sources:
    - Mobile sources- burning of fossil fuels- natural gas, coal, and oil-to power motor vehicles (eg motorcycles, cars, trucks, airplanes, trains, buses, marine engines, etc)
    - Stationary Sources - burning of fossil fuels- natural gas, coal, and oil- to power industrial processes, residential, decomposition or burning of waste, bush burning, energy production etc).
  - B. Natural Sources:
    - Forest fires.
    - Volcanic eruptions.
    - Wind erosion.
    - Pollen dispersal.



# Current Situation of Air Quality in Nigeria



Motor cycles



Trucks



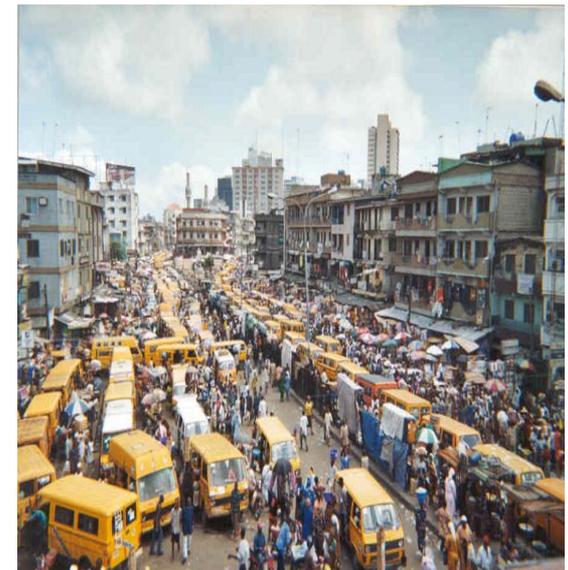
Tri-cycle (keke)



Water vessel (ship)



Air plane



Densely populated urban area



# Current Situation of Air Quality in Nigeria- II



Pollution from burning of tyres



Generators



Bush burning



Industrial air pollution



Gas flaring



Burning of e-waste like old computers, Television sets



## INDOOR AIR POLLUTION



- Pollution is perhaps most harmful inside the homes and buildings where we spend most of our time.
- Indoor air pollution comes from tobacco smoke; and chemicals released from synthetic carpets, furniture and pesticides; use of fuel wood for cooking; and household cleaners.
- Pollutants may accumulate to reach much higher levels than they do outside, where natural air currents disperse them.
- Indoor air levels of many pollutants may be 2 to 5 times, and occasionally more than 100 times, higher than outdoor levels.



Sleeping with mosquito coil



Indoor cooking with fuel wood <sup>8</sup>



# Adverse Effects of Air Pollution on the Environment



- **Smog:** Smog is intense local pollution usually trapped by a thermal inversion. Burning gasoline in motor vehicles is the main source of smog in most regions today. In extreme cases, smog can lead to mass illness and death, mainly from carbon monoxide poisoning.
- **Acid Rain:** Oxides of Nitrogen and Sulphur are carried by wind in the troposphere, they can reach distant regions where they descend in acid form, usually as rain or snow. Such acid precipitation can burn the leaves of plants and make lakes too acidic to support fish and other living things.



Plant change from acid rain



## Adverse Effects of Air Pollution on the Environment

- **Ozone Depletion:** The ozone layer of the atmosphere (stratosphere) protects life on Earth by absorbing harmful ultraviolet radiation from the sun.

If all the ultraviolet radiation given off by the Sun were allowed to reach the surface of Earth, most of the life on Earth's surface would probably be destroyed.

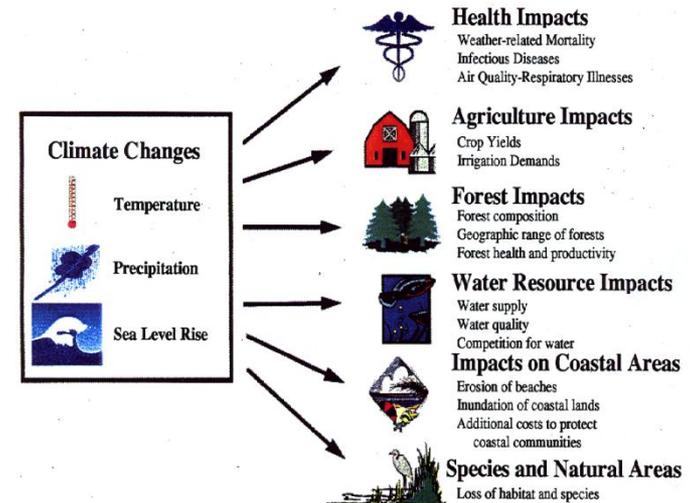
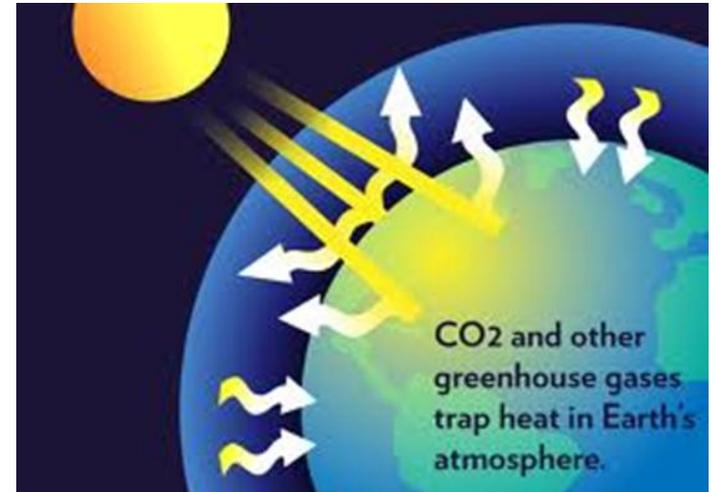
As a result of this excessive radiation, experts anticipate an increase in skin cancers, more cataracts and reduced yields of some food crops.

Several pollutants attack the ozone layer called Ozone Depleting Substances (ODS) . Chief among them is the class of chemicals known as chlorofluorocarbons (CFCs), used as refrigerants (notably in air conditioners), as agents in several manufacturing processes, and as propellants in spray cans.



## Adverse Effects of Air Pollution on The Environment - II

- **Greenhouse Effect:** Greenhouse gases (GHGs) absorb infrared radiation and prevent it from escaping into outer space. GHGs are necessary to life because they maintain the temperature of the earth. Without the thermal blanketing of the natural GHG effects, the earth would be too cold, close to  $19^{\circ}\text{C}$  ( $2^{\circ}\text{F}$ ) and inhospitable for living organisms to survive.
- **Global Warming:** Industrialization and human activities have over the years greatly increased the number of greenhouse gases in the atmosphere beyond the natural levels, this is increasing the atmospheric temperature rapidly and bringing about global warming. Global warming is the phenomenon responsible for climate change. Some adverse effects are:
  - Sea level rise causing excessive flooding; Drought; Agriculture farmlands become impoverished reducing yield and production thereby increasing poverty and threatening food security; increase in invasive species e.g. weeds, mosquitoes, etc.





# Adverse Effects of Air Pollution on Human Health

- **Air pollution makes people sick- it causes**
  - Irritation of the eyes, nose and throat.
  - Breathing problems.
  - Inflammation of the respiratory track causing coughing.
  - Aggravates asthma attacks.
  - Chronic obstructive pulmonary disease.
  - Cardiovascular disease.
  - Infectious diseases, vector-borne diseases such as malaria, yellow fever, encephalitis, Lyme disease etc.
  - Cataract.



# Government Action to curb Air Pollution



- Nigeria is signatory to and has ratified various International Conventions and Protocols, such as:
  - Vienna Convention on the Protection of the Ozone Layer (1985);
  - Montreal Protocol on Substances that deplete the Ozone Layer (1987). Phase out of Chlorofluorocarbons (CFCs) and substitution with Hydrochlorofluorocarbons (HCFCs), which cause less damage to the ozone layer than CFCs.
  - Basel Convention on the Control of Trans-boundary Movements of Hazardous Wastes and their Disposal;
  - Convention on Biological Diversity;



## Government Action to curb Air Pollution -II



Other International Conventions and Protocols are:

- Convention on Climate Change;
- The Kyoto protocol on reducing emissions of greenhouse gases;
- The Rotterdam Convention on promoting shared responsibilities in relation to importation of hazardous chemicals
- Stockholm Convention on Persistent Organic Pollutants (POPs).



# Government Action in curbing Air Pollution-III



The actions taken by the Federal Government include:

- a. Creation of the National Environmental Standards and Regulations Enforcement Agency (NESREA) (2007) as a parastatal of the Federal Ministry of Environment (FMEnv). NESREA is charged with the responsibility of enforcing all environmental laws, guidelines, policies, standards and regulations in Nigeria. It also has the responsibility to enforce compliance with provisions of all international agreements, protocols, conventions and treaties on the environment to which Nigeria is a signatory.
- b. Domestication of some of the Conventions and Protocols by promulgating relevant Environmental Regulations, some of which are:



## National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations, 2011

The purpose of these Regulations is to restore, preserve and improve the quality of air.

### **Action taken:**

Enforcement of the provisions contained in the Vehicular Emissions Control Regulations, such as:

- ban on the importation of 2-stroke engines into the country.

**NESREA has repatriated containers of 2-stroke outboard engines and generators.**

- Use of 4-stroke engines as alternative (fuel-efficient; less polluting; more durable).
- Prohibition of motor vehicles that do not have installed an approved emission reduction technology.
- Sanctions and penalties on violators.



## National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations, 2011

- Yearly testing of vehicles for toxic gas emissions.

Government approved the National Vehicular Emission Control Programme (NVECP) to be run on a Public Private Partnership (PPP) arrangement. NVECP will involve:

- the establishment of Vehicle Emission Testing Centres nationwide;
- annual testing of vehicles for toxic air emissions;
- collation of data;

The Agency is almost concluding arrangements for the formal launch of the Programme in Abuja and Lagos.



# National Environmental (Control of Vehicular Emissions from Petrol and Diesel Engines) Regulations, 2011



## Without Air Emission Testing



2010 - 2020



2020 - 2030



2030 - 2040

## With Air Emission Testing



2010 - 2020



2020 - 2030



2030 - 2040



# National Environmental (Air Quality Control) Regulations, 2014

The purpose of these Regulations is to provide for improved control of the nation's air quality to such an extent that would enhance the protection of flora and fauna, human health, and other resources affected by air quality deteriorations.

## Action taken

- Ambient air quality monitoring: the Agency has acquired Air Quality Monitoring Equipment (both mobile stations and hand-held tools) to monitor and generate accurate data on the state of our air quality in Nigeria.
- Industrial Air Quality Monitoring and Enforcement.
- Generator Emission Control - Plans are on to commence emission testing of generators under the PPP arrangement.
- Prompt response to complaints on air pollution.



## National Environmental (Noise Standards and Control) Regulations, 2009.

The purpose of these Regulations is to ensure maintenance of a healthy environment for all people in Nigeria, tranquillity of their surrounding and their psychological well-being by regulating noise levels and generally to elevate the standard of living of the people.

### Action taken:

- Public awareness campaign on noise control in public places such as markets, motor parks, schools, etc.
- Awareness campaign on noise control at the six Area Councils of the Federal Capital Territory.
- Environmental awareness creation using Information, Education and Communication (IEC) materials on noise control in public places.
- Prompt response to complaints on noise pollution especially from faith-based organization, generators, etc.
- Sanctions and penalties on violators.



# National Environmental (Ozone Layer Protection) Regulations, 2009



The purpose of these regulations is to control the manufacture, importation, exportation, consumption, selling, buying, handling, releasing, refurbishing, recovery, recycling, destruction and disposal of any product which contains any of the ozone depleting substances mentioned in the schedules of these Regulations.

## **Actions taken:**

- Enforcement of the provisions contained in these Regulations.
- Awareness Programs including production and distribution of Information, Education and Communication (IEC) materials on proper ODS handling.
- Sanctions and penalties on violators.



# National Environmental (Mining and processing of Coal, Ores and Industrial Minerals) Regulations, 2009.



The purpose of these Regulations is to minimize pollution from mining and processing of coal, ores and industrial minerals using efficient cleaner production technologies.

## **Actions taken:**

- Training workshops on Sustainable Mining Techniques for Artisanal and Small scale miners in Nasarawa, Ebony, Zamfara, Ekiti and Osun State.  
Personal Protective Equipment (PPE) was distributed to the Operators.
- Enforcement of Environmental Impact Statement (EIS).
- Environmental awareness on sustainable mining techniques.
- Environmental Audit Review of the sector.
- Sanctions and penalties on violators.



## National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, 2011.

The purpose of these Regulations is to prevent and minimize pollution from all operations and ancillary activities of the Domestic and Industrial Plastic, Rubber and Foam Sector to the Nigerian environment.

### **Actions taken:**

- Compliance monitoring and enforcement of the provisions contained in these Regulations.
- Environmental Audit Review of the sector.
- Sanctions and penalties on violators.



# National Environmental (Control of Bush or Forest Fire and Open Burning) Regulations, 2011.



The purpose of these Regulations to prevent and minimize the destruction of ecosystem through fire outbreak and burning of any material that may affect the health of the ecosystem through the emission of hazardous air pollutants.

## **Actions taken:**

- Enforcement of the provisions contained in the Control of Bush or Forest Fire and Open Burning Regulations.
- Procurement of State-of-the-Art Burn Boss (Air Cutting Burner).
- Partnership with Regulatory Bodies e.g. NDLEA, NAFDAC, CBN, Customs on sustainable disposal of confiscated goods using Air Cutting Burner.



## National Environmental (Construction Sector) Regulations, 2011

The purpose of these Regulations is to prevent and minimize pollution from construction, decommissioning and demolition activities to the Nigerian environment.

### **Actions taken:**

- Enforcement of Environmental Impact Statement (EIS).
- Assessment of Permit applications on Air Quality.
- Issuance of Air Quality Permits and Licenses.
- Sanctions and penalties on violators.



## National Environmental (Quarrying and Blasting Operations) Regulations, 2013.

The purpose of the Regulations is to control the effects of quarrying and blasting operations on the environment and human health.

### **Actions taken:**

- Environmental awareness on quarrying and blasting operations;
- Enforcement of Environmental Impact Statement (EIS).
- Environmental Audit Review of the sector.
- Enforcement of compliance with the blasting design parameters such as depths spacing of holes, charge load density of explosives. etc.
- Sanctions and penalties on violators.



# National Environmental (Energy Sector) Regulations, 2014.

**These Regulations have just been gazetted by the Federal Government**

The purpose of these Regulations is to prevent and minimize pollution and encourage energy efficiency in all operations and ancillary activities of the energy sector in achieving sustainable development in Nigeria.

## **Actions that should be taken:**

- Compliance monitoring and enforcement of the provisions contained in these Regulations.
- Awareness campaign on use of alternative energy source that are renewable and sustainable such as: hydro, wind, solar, biomass, geothermal, etc.
- Enforcement of Environmental Impact Statement (EIS).
- Environmental Audit Review of the sector.



## Challenges

- Inadequate Air Quality Monitoring equipment.
- Inadequate human resources.
- Inadequate capacity building of staff.
- Paucity of funds.
- Inadequate awareness creation.
- Erratic power supply status of the country.
- Dependence on fossil fuel, fuel wood, etc.
- Indiscriminate and clandestine quarrying and mining activities.
- Porous borders - illegal importation of 2-stroke engines, banned ODS, etc.
- Inadequate international co-operation between countries for appropriate technology sharing and transfer.



## Way Forward

- Adequate budgetary provision.
- Procurement of State-of-the-Art equipment.
- Training and retraining of staff.
- Adequate awareness creation.
- Effective enforcement of relevant Regulations on air pollution control;
- Need to address demand issues, including measures to improve energy efficiency (electricity generation).
- Use of Renewable Energy Sources;
- Need to encourage bicycling: pollution free and a great means to exercise, although the absence of proper infrastructure could lead to accidents and mishap.



## Way Forward II

- Need to encourage walking: is the safest and pollution free mode of transportation, though long distances cannot be covered.
- Need for an integrated approach to tackle air pollution, industrial development, energy and climate change, to identify the most cost-effective measures and win-win situations that will bring benefits across the various policy areas.
- Need for international co-operation for appropriate technology sharing and transfer between countries to boost innovation and technology development in the country.
- The use of electric vehicles (e-Vehicle) should be encouraged in the country to allow for further decreases in auto emissions.



# THANK YOU



**NESREA**

*... ensuring a cleaner and healthier  
environment for Nigerians*