



UNIDO Green Industry

Green Industry Policy Study: Nigeria

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Annex A Excerpts from the National Policy on the Environment

Annex B NIP—Volume III: CHAPTER 11 Environment

Annex C MAN Environment Workshop Course

Abbreviations

CEPT Common Effluent Treatment Facility

CSR Corporate Social Responsibility

ECN Energy Commission of Nigeria

EIA Environmental Impact Assessment

EPI Environmental Performance Index

FEPA	Federal Environmental Protection Agency
FMoE	Federal Ministry of Environment
FDI	Foreign Direct Investment
ICT	Information and Communication Technology
ISO	International Organization for Standardization
KEI	Knowledge Economy Index
KI	Knowledge Index
LASEPA	Lagos State Environmental Protection Agency
LGAs	Local Government Areas
MAN	Manufactures Association of Nigeria
MVA	Manufacturing Value Added
NIP	National Implementation Plan
NV20:2020	Nigeria Vision 20:2020
STI	Science, Technology and Innovation
SHP	Small Hydro Power
SEPA	State Environmental Protection Agency

Executive Summary

This report examines the institutional arrangements and policies in Nigeria that impact on the greening of new and existing industries. It identifies ways that the federal and state governments can better promote the greening of industries through effective policies, incentives and governance structures. The first two chapters of the report provide context and background information and the remaining chapters identify gaps and weaknesses in the normative framework.

Although Nigeria has a comprehensive policy and regulatory framework to support the greening of industries, it is argued that policies and plans related to green industry are peripheral or subordinate to the dominant dynamics of industrialization and urbanization. Furthermore,

funding for environmental management in Nigeria is modest and is lower today than it was ten years ago.

The potential for the uptake of resource efficient and cleaner technologies in Nigeria is severely constrained by the low productivity of the manufacturing firms, access to essential resource inputs and the failure of governments (both federal and state) to provide the supportive services.

In some developing countries, industry itself has taken initiatives to improve its resource efficiency and environmental performance. So far, however that is not the case in Nigeria. There is no evidence of an appreciable number of firms committing to corporate social responsibility, obtaining ISO 14001 certification or using eco-labels on their products.

There is a clear need to set policy targets for environmental innovation within the national innovation system and to provide incentives for those firms benefiting from multinational support to share new technologies with less well connected firms.

There is no policy mix for industrial environmental management in Nigeria; it relies exclusively on a traditional command-and-control regulatory system. Although Nigeria has a comprehensive range of quite strict discharge standards and a well designed permitting procedure, there are the usual problems of weak enforcement of these standards. To date neither the federal or state governments have introduced an economic instrument scheme, required firms to report on their pollutant discharge as part of a toxic/pollutant release inventory or to systematically report on their compliance with environmental regulations.

In conclusion implementing a RECP policy and programme in Nigeria will be a challenge. The industrial sector itself is confronted with so many problems that it is difficult to imagine that any new outreach programme would be rejected. For many firms securing a regular power supply, accessing credit at a reasonable cost, sourcing raw materials and spare parts and finding and retaining skilled workers take all the time and talent of management.. However a smart RECP policy and programme would be an opportunity for firms to obtain the essential knowledge needed to improve their competitive position by reducing their high levels of waste. A well

organized and managed demonstration of the potential of RECP within the context of subsector upgrading programmes and a realistic dissemination strategy could have the potential to spark a greening of industry in Nigeria.

1. Introduction

1.1 Country Overview

With approximately 154.7 million people, Nigeria is the most populous country in Africa. It has recently been categorized as a lower-middle income economy country. However, it ranks 156 out of 187 in the Human Development Index and is thus categorized as a low human development country (UNDP, 2011). Statistical databases, specifically those related to poverty, are limited and sometimes outdated and unreliable. However, current estimates place 70 % of the population in Nigeria living below the poverty line. Table 1 below provides information on selected basic indicators for Nigeria.

Table 1: Selected Indicators for Nigeria

Indicator	Unit and Time Period	2009
Population	Millions	154.7
Population Growth	% (2000-2009)	2.3
Poverty (population below poverty line)	%	70
GDP per Capita	USD	1,118
GDP Growth	% (2000-2009)	5.6
Agriculture (contribution to GDP)	%	31.9
Industry (contribution to GDP)	%	32.9
Services (contribution to GDP)	%	35.2

Sources: World Bank (2011), UNDP (2010)

Nigeria has experienced steady economic growth since 1989. For the most part, this growth has been attributed to the oil sector (Economist Intelligence Unit, 2011). Nigeria is the largest oil exporter in Africa and the 11th largest in the world. In addition, it has the largest gas reserves on the continent (UK, 2010). However, due to several factors including political unrest in the Niger Delta, recently, it has been non-oil growth that has contributed to the economic expansion in the

country. The country is expected to continue with a period of robust economic expansion at an average rate of 6.5 percent through to 2015 (Economist Intelligence Unit, 2011).

Contributions to Gross Domestic Product (GDP), however, have been fairly evenly split among the agriculture, industry and services sectors. The service sector, which contributed 35.2 percent to Gross Domestic Product (GDP) in 2009, is expected to continue to be the major driver for economic growth in Nigeria, in large part due to the telecommunications sector. The industrial sector, as defined by the International Standard Industrial Classification (ISIC) and as used the Table 1 above, includes mining, manufacturing, construction, electricity, water and gas (ISIC divisions 10-45). It was the second the largest contributor to GDP at 32.2 percent in 2009. The contribution of the agricultural sector was slightly less than the other two sectors but it employed the majority of the labour force (approximately 70 percent) (CIA, 2011).

Nigeria was ranked 127 out of 133 in 2010 by the Global Competitiveness Index (World Economic Forum, 2011). The top three problematic factors for doing business in Nigeria are, in order: access to financing, inadequate supply of infrastructure and corruption. Moreover, access to a consistent power supply and other infrastructure has constrained development. In an attempt to address this situation, the Nigerian Federal Government has included infrastructure as part of its national development priorities and policies.

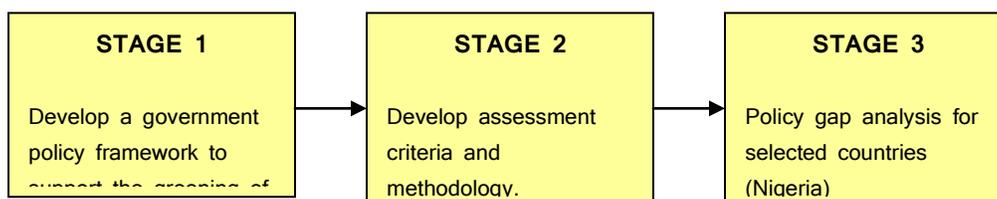
Nigeria was ranked 103 out of 118 countries in 2009 by the UNIDO Competitive Industrial Performance Index (UNIDO, 2011a). This index focuses on industrial performance, which involves a country's actual wealth creation, and not its industrial potential, which refers to factors that may ease or impede it. Not only did Nigeria have a comparatively low ranking in 2009, this ranking was lower than its 2005 ranking, 81 out of 118 countries.

1.2 UNIDO's Green Industry Programme

This report examines the institutional arrangements and policies in Nigeria, which impact on the greening of new and existing industries. *A Greener Footprint for Industry* (UNIDO, 2010) outlines a comprehensive work programme that aims to build capacity and knowledge in the institutions that support the greening of industry. More specifically, the Strategy seeks to identify ways that the federal and state governments can better promote the greening of industries through effective policies, incentives and governance structures.

This paper forms Stage 3 of UNIDO’s Green Industry Policy programme outlined in Figure 1. Stage 3 examines individual countries and assesses their policy regimes to identify gaps, weaknesses and opportunities for policy development. To date UNIDO has prepared three country reports—China, India and Vietnam.

Figure 1 – UNIDO’s Green Industry Policy Programme



Source: UNIDO 2011b

This report on Nigeria draws on existing research undertaken mainly by academics and international agencies that examines aspects of green industry development. The report is structured around the assessment methodology and policy framework outlined in Stages 1 and 2 of the programme.

This report focuses on policies that impact all manufacturing enterprises, which means that it does not look at oil and gas production and its associated environmental problems, which have attracted more attention than other industry related activities in Nigeria. To the extent possible, it includes policies that effect small to medium enterprises (SMEs) in the manufacturing sector.

1.3 The greening of industries

Governments in developing countries face mounting pressure to grow their economies in a bid to alleviate poverty, create jobs and improve standards of living but doing so within the bounds of growing environmental pressures. The greening of industries is a means through which governments, enterprises, and communities can achieve growth and development while minimizing environmental degradation and resource depletion. Breaking the link between economic growth and environmental pressures is often referred to as “decoupling”.

The greening of industries achieves resource efficiency through sustainable patterns of production and consumption. Such patterns are less materials consuming, energy efficient, non-polluting, low waste and which produce products that are responsibly managed throughout their lifecycle. Green industries also reduce impacts on the local environment. Whilst pollution prevention is the ultimate aim, firms may still need to invest in technologies and management practices that provide effective end-of-pipe solutions.

The greening of industries has become a core determinant of economic competitiveness and sustainable growth. Since resource inputs represent an important cost of production for industries, efficiency improvements can be a significant lever for competitive advantage. The greening of industries also plays a role in poverty alleviation, through promoting energy security, improving health conditions and creating jobs.

1.4 The importance of green industry policies

History shows that successful efforts to decouple economic growth from environmental pressures have been underpinned by effective policy frameworks which address a range of market, institutional and information failures. In other words, there is no single policy instrument that promotes green industries; multiple instruments must be applied simultaneously within an integrated and interconnected framework.

Governments can promote the greening of industries through a broad range of public policy measures (e.g. environmental, energy industrial, and regional development policies) and supporting infrastructures. Such measures cover both supply and demand aspects. Governments also have a key role to play in influencing certain framework conditions (e.g. finance, education, innovation), which create an environment conducive to the greening of industries.

Policy development needs to be supported by effective strategies and processes which integrate the economic, social, and environmental dimensions of green industries. This integration needs to occur both horizontally (across government agencies), and vertically (within tiers of government). Partnerships and meaningful consultation with industry and the wider community are essential if green industry policies are to be effectively implemented. Moreover, the

promotion of green industries requires resources and commitment across multiple sectors of government.

1.5 Structure

This report is structured around the policy framework presented in the *UNIDO Green Industry: Policies for supporting Green Industry* (UNIDO, 2011b). Policies and institutional arrangements have been assessed against the criteria outlined in Stage II of the Green Industries Policy Programme. The first two chapters of the report provide context and background information and the remaining chapters identify gaps and weaknesses in the normative framework.

- **Nigeria’s Industry.** This chapter provides context to the analysis of green industry policies from an industrial policy perspective. Nigeria’s industrial structure is discussed, along with an overview of SMEs in Nigeria, and the growing importance of Foreign Direct Investment (FDI).
- **Environmental Pressures.** This chapter outlines the growing environmental pressures in Nigeria, which have largely resulted from rapid industrialisation and urbanisation. Particular pressures discussed are waste, water, air pollution, energy consumption, and an overview of polluting sectors of the economy.
- **Policy Integration and Governance.** This chapter presents an overview of the institutional arrangements in Nigeria as they relate to environmental management. In particular, issues covered include policy integration, capacity development, and national strategies and legislative frameworks, which promote green industries.
- **Creating an enabling environment.** This chapter assesses some of the “enabling conditions” which impact on sustainable production in Nigeria. These measures include financial support structures, resource-efficient infrastructures, support for local action, and developing the skill-base necessary to support the development of green industries in Nigeria.
- **Supporting industry-led initiatives.** This chapter outlines a broad range of industry initiatives in Nigeria to promote efficiencies and environmental improvement. Initiatives

- include corporate social responsibility, capacity development, eco labelling, environmental management systems and standards, and the role of industry associations.
- **Harnessing environmental technologies.** This chapter discusses the role of R&D and technology transfer in Nigeria as a means of promoting resource efficiencies and cleaner production. Policies concerning the absorptive capacity of SMEs and technology transfer are discussed.
 - **Instrument mixes to promote green industries.** This chapter outlines the range of policy instruments used by the government in Nigeria to promote sustainable production and sound environmental management. The instruments have been classified into market based instruments (MBI), regulatory instruments, negotiated agreements and information-based instruments. Robust monitoring, compliance and enforcement regimes are discussed in the final part of the chapter.
 - **Policy Gap Analysis** This chapter describes policy gaps that hinder the greening of industries in Nigeria in spite of the notable efforts by the Government to introduce a conventional industrial environmental management programme. The identified gaps signal opportunities for further investigation and research by UNIDO.

2. Nigeria's Industry

2.1 Introduction

The manufacturing sector, described as industry in common usage and in this report, is limited to ISIC divisions 15-37; its economic output is measured in terms of manufacturing value added (MVA). It contributed 4.5 percent to GDP in 2009, which was a significant improvement compared to the 3.6 percent in 2000. Similarly Nigeria's share of world MVA increased from .03 percent to .05 percent between 2000 and 2009. The annual average growth rate over the period was 9.0% percent with a low of 5.7 percent in 2002 and a high of 12 percent in 2001. The manufacturing sector continues to struggle in spite of these gains due to lack of appropriate infrastructure and strong external competition. It has failed to achieve sustained improvements in productivity, incomes or employment (UNDAF, 2009).

2.2 Nigeria's Industrial Policy

Nigeria's long-term development strategy is described in Nigeria Vision (NV) 20:2020 prepared by the National Planning Commission (National Planning Commission, 2009). The goal of this strategy is to move Nigeria from the 49th largest economy in the world in 2007 to the 20th largest economy by the year 2020. It includes two broad objectives-- making efficient use of human and natural resources to achieve rapid economic growth and translating the economic growth into equitable social development for all citizens.

Major components of the industrial policy for Nigeria are found in the first NV 20:2020 National Implementation Plan (NIP) for the period 2010-2013 (NPC, 2010). The NIP states that a sustained effort will be made to re-invigorate and reposition the manufacturing sector to contribute substantially to the nation's growth and development. It identifies five priority segments: chemicals and pharmaceuticals (including hydro-carbon based) products; basic metal, iron and steel and fabricated metal; food, beverages and tobacco; textiles, wearing apparel and leather/leather footwear; and non-metallic mineral products. These represent the foremost segments of the manufacturing sector where Nigeria has or can easily develop a comparative advantage. These core areas also have the highest potential to provide raw materials for other key industries in the longer term.

The manufacturing sector will remain private sector driven. Government will however sustain efforts to provide the enabling environment that will enhance the level of operating efficiency, productivity and profitability as articulated in the business environment section of the plan. (NPC, 2010, Vol II: 97).

During this planning period, the Government will make a concerted effort to provide institutional support for SMEs and create the necessary enabling environment for them to become the engine of economic growth in the country. The thrust of this effort will include increasing the availability of common facilities in selected locations to reduce production costs and enhance economies of scale. It is planned that 12 functional SME clusters will be established across the country by 2013. (NPC, 2009, Vol II:109).

More recently, the newly elected Jonathan administration has developed a short term strategy entitled the Transformation Agenda that runs from 2011 until 2015. The Government based the Transformation Agenda on and draws its inspiration from NV 20:2020 and the first NIP of the NV20:2020. The Transformation Agenda aims to deepen the effects of government intervention and provide a sense of direction. It is based on a set of priority policies and programs which, when implemented, would transform the Nigerian economy to meet the future needs of the people. Two of its priorities that are in line with green industry development are support for transparent, equitable and effective use of resources and productivity and for a private sector-led non-oil economy, particularly in agriculture and agro-industry subsectors.

2.3 Nigeria's Industrial Structure

2.3.1 Industry Subsectors

The UNIDO Industrial Statistics for Nigeria's industrial structure are dated; the last reported results are for 1996. As alternatives, data on Nigeria's industrial structure are taken from the sampling frameworks for UNIDO's African Investor Survey (2012) and the World Bank's Investment Climate Assessments in 2007 and 2010 (World Bank, 2008 and 2011).

The UNIDO sampling framework lists approximately 3000 registered manufacturing establishments (Table 2). The greatest number of establishments is in the food and beverage subsector (21.3 percent), wearing apparel (11.3 per cent), furniture (9.8 per cent), other non-metallic mineral products (9.7 per cent), chemicals and chemical products (8.6 per cent) and fabricated metals (8.3 per cent).

The World Bank sampling framework for Nigeria includes approximately 8,300 registered manufacturing establishments. Unfortunately, information about subsectors within the framework is limited to subsector information only for food (22 percent) and garments (18.3 percent); the other subsectors are aggregated as other manufacturing.

Table 2: UNIDO Sampling Framework—Industrial Subsector Distribution

ISIC	Number	Percent
15 Food products and beverages	624	21.3
16 Tobacco products	8	0.3
17 Textiles	117	4.0
18 Wearing apparel; dressing and dyeing of fur	331	11.3
19 Tanning and dressing of leather	71	2.4
20 Wood and of products of wood and cork	93	3.2
21 Paper and paper products	45	1.5
22 Publishing, printing and reproduction of recorded media	208	7.1
23 Coke, refined petroleum products and nuclear fuel	13	0.4
24 Chemicals and chemical products	253	8.6
25 Rubber and plastics products	148	5.1
26 Other non-metallic mineral products	285	9.7
27 Basic metals	59	2.0
28 Fabricated metal products, except machinery and equipment	242	8.3
29 Machinery and equipment n.e.c.	29	1.0
31 Electrical machinery and apparatus n.e.c.	38	1.3
32 Radio, television and communication equipment and apparatus	15	0.5
33 Medical, precision and optical instruments, watches and clocks	6	0.2
34 Motor vehicles, trailers and semi	34	1.2
35 Other transport equipment	18	0.6
36 Furniture; manufacturing n.e.c.	288	9.8
37 Recycling	4	0.1
37.5 Unknown	4	0.1
Total:	2,933	100

Source: UNIDO 2012

2.3.2 Exports

When compared to other African countries, the share of manufactured exports in total exports is very small. The share was 2.5 percent in 2005 and 5.1 percent in 2009. The shares for comparative countries are 19.6 percent for Ghana (2009), 49.8 percent for Kenya (2008), 70.0 percent for Senegal (2009) and 67.7 percent for South Africa (2009). The low contribution to export earnings is attributed to lack of skills, management capacity, poor product quality, low production capacity, poor access to international markets, and lack of working capital that have resulted in the sector not being globally competitive.

2.3.3 Projected Growth of Industrial Sub-sectors

Under the NIP the Government will target investments in the following sub-sectors:

- Petrochemicals—In spite of the high demand that exists for plastic products and fertilizers in the country, there is only one petrochemical company (Indorama) that produces petrochemical products and its capacity is inadequate to meet domestic demand. Therefore, stimulation of investment in the petrochemical sector is one of the major areas of focus during the medium term period.
- Drugs and pharmaceuticals—A large proportion of the nation's drugs and pharmaceuticals is met through importation. So during this planning period, a concerted effort will be made to significantly attract investment in the production of drugs and pharmaceuticals including expansion of existing plants
- Food, beverages and tobacco—Adequate measures will be put in place to ensure that local products meet the local content bill specifications as well as international standards.
- Textiles, clothing and leather—In spite of the nation's abundant potential for producing cotton, most of the textile mills are moribund due to the unfavourable economic conditions under which they operate. Only a small portion of the nation's leather is utilized in the production of footwear and other leather products. Under the NIP, investments will be targeted at the leather subsector while the textile subsector will be revitalized and repositioned with additional investments.
- Basic metals, iron and steel and fabricated metals—In line with the Government's policy, steel and machine tool companies have been or will be privatized.
- Non-metal minerals products—The emphasis is on fast tracking private sector investment in production of cement and exploitation of coal and bitumen.

2.4 Geographic Distribution of the Manufacturing Sector

The World Bank's sampling frameworks (2007 for 10 states and the federal territory and 2010 for 26 states) describe the geographic distribution of all manufacturing establishments as well as geographic distribution of the food and garment subsectors.

Close to 50 percent of the manufacturing enterprises are located in nine states—Oyo (877), Katsina (773), Lagos (730) Edo (695), Kano (526), Osum (448), Kanduna (401), Ogun (362) and Rivers (302). Eight states have more than 100 establishments in the food subsector, accounting for more than 40 percent of the establishments -- Katsina (250), Lagos (150), Kano (130), Jigawa (114), Yobe (114), Borno (112), Kanduna (102) and Ogun (102). Only three states have more than 100 enterprises in the garment subsector, accounting for almost 25 percent of the enterprises in that subsector. The states are Oyo (187), Edo (179) and Osum (112) (World Bank, 2008 and 2011b).

In addition, the World Bank's sampling framework for the 2010 survey shows the geographic distribution by size category. Only three states have more than 10 large establishments—Oyo with 21, Kwara with 13 and Delta with 11. Also only three states have more than 500 small establishments—Oyo with 726, Katsina with 708 and Edo with 589. Both observations are incomplete because the size distribution of the 948 establishments in the 2007 survey of is not known.

2.5 Size Distribution of Establishments in the Manufacturing Sector

Again as in the case of the subsector distribution there are two estimates for the size distribution of establishments in the manufacturing sector (Table 3). The UNIDO sampling framework reports on four size categories – micro with 174 establishments (5.9 percent), small with 2,037 establishments (69.5 percent), medium with 296 establishments (10.1 percent) and large (100+ employees) with 399 establishments (13.6 percent). The World Bank sampling framework reports on only three rather than four size categories—small with 6,468 establishments (88 percent), medium with 782 establishments (10.6 percent) and large (100 + employees) with 206 establishments (2.8 percent). The World Bank's estimate is only a partial one because similar data are not available for the 948 manufacturing establishments included in the 2007 survey. Most likely the percentage of large establishments was much greater in the 2007 because the 10 states and federal territory included in the survey are said to be the more industrialized.

According to the NIP, SMEs in all sectors (including manufacturing) constitute over 80.0 percent of all business enterprises in Nigeria and cover the entire range of economic activities. They contributed only 2 percent of export earnings and 10 percent of GDP in 2006. The low contribution to export earnings has been attributed to lack of skills, management capacity, poor product quality, low production capacity, poor access to international markets, and lack of working capital, all of which have resulted in the sector not being globally competitive.

Table 3: Size Distribution of Manufacturing Establishments

UNIDO	Size	Number	Percent	WB	Size	Number	Percent
Micro	<10	174	5.9				
Small	10-49	2,037	69.5	Small	5-24	6488	88.0
Medium	50-99	296	10.1	Medium	25-99	782	10.6
Large	100+	399	13.6	Large	100+	100	2.8
	Don't know	27	0.9				
	Total	2,933	100	Total		7350	100

Sources: UNIDO (2012), World Bank (2008) and World Bank (2011b)

2.6 Foreign Direct Investment

FDI, outside of the oil and gas sector, plays a small role in Nigeria as a source of capital, modern technology and skills. The total FDI inflows were US\$1.8 billion in 2002, US\$8.6 billion in 2009 and US\$6.1 billion in 2010. Its share of GDP including that for oil and gas in 2002 was 1.7 percent in 2002, 0.7 percent in 2009 and 0.1 percent in 2010. It was lower than comparative countries—Ghana was 4.9 percent in 2010, Kenya was 0.2 percent in 2009 (latest year for which data were available), Senegal was 0.9 percent in 2010 (2.9 percent in 2009) and South Africa was 2.0 percent in 2010 (World Bank, 2011a).

2.7 Summary and Analysis

The share of MVA in GDP increased significantly between 2000 and 2009, going from 3.6 percent to 4.5 percent. However, the share was still low compared to the average share for all Sub-Saharan Africa countries, 11.4 percent in 2009, and even for all Sub-Saharan African countries excluding South Africa, 8.1 percent in 2009.

NV 20:2020 aims for a substantial increase in the share of MVA in GDP by 2020 based on significant expansion in five priority segments of the manufacturing sector where Nigeria is seen as having a comparative advantage --chemicals and pharmaceuticals (including hydro-carbon based) products; basic metal, iron and steel and fabricated metal; food, beverages and tobacco; textiles, wearing apparel and leather/leather footwear; and non-metallic mineral products.

When compared to other African countries the share of manufactured exports as a share of total exports is small as is amount of FDI directed to the industrial sector.

The MVA attributable to industrial subsectors and the distribution of MVA among the 26 Nigerian states can only be approximated because the last national industrial census was undertaken in 1996.

3. Environmental and Energy Pressures

3.1 Global Environmental Comparison

Probably the best and most current overview of environmental pressures in Nigeria is to be found in the 2012 Environmental Performance Report (Yale, 2012). The Report, which includes 132 countries, describes environmental performance in 2010 and trends in performance for the period 2000-2010.

The Environmental Performance Index (EPI) score for Nigeria in 2010 was 40.1, ranking it 119 out of 132 countries (Figure 2). This score placed it near the bottom of the weaker performance group, but kept it out of the group of weakest performers, those with a score of less than 40. Countries with similar levels of performance were Togo, Ghana, Ethiopia, Pakistan and Benin. Its pilot trend EPI rank placed it 59 out of 132 countries, placing it among those with little or no change in performance between 2000 and 2010.

Of most relevance for this report is Nigeria’s performance on environmental health, which is affected by industrial pollution. Here Nigeria’s performance is almost the worst among all countries with a score of 16.5, ranking it 131 out of 132 countries.

3.2 National Environmental Overviews

The seriousness of environmental pollution problems in Nigeria indicated by the EPI score is confirmed by two recent country specific overviews. The first overview reported that the intensity of environmental pressures, based on secondary data sources, increased due to poor sanitation, inadequate solid waste disposal, effluent discharge, rapid and unplanned urbanization, mining and increasing use of chemical fertilizers and insecticides (Babanyara, et . al., 2010). More specifically:

Figure 2: EPI Index for Nigeria

Level of Aggregation	Performance		Performance Score with Trend Shading			Pilot Trend Results	
	Score	Rank	0	50	100	Score (-50 to 50)	Rank
Environmental Performance Index	40.1	119				5.8	59
Environmental Health	16.5	131				13.1	55
Air (Effects on Human Health)	29.6	124				6.2	42
Environmental Burden of Disease	12.7	130				21.9	44
Water (Effects on Human Health)	11.2	125				2.3	81
Ecosystem Vitality	50.3	61				-0.1	52
Agriculture	66.7	26				0.0	58
Air (Ecosystem Effects)	62.6	20				50.0	1
Biodiversity and Habitat	52.7	81				0.0	88
Climate Change	60.0	41				6.7	55
Fisheries	30.5	37				-8.0	71
Forests	33.3	120				-33.3	120
Water Resources (Ecosystem Effects)	27.1	78				-36.5	78

Source: Yale, 2012.

- Toxic and non-toxic wastes from industrial and other sources degrade the land and render most surface and underground waters around urban areas unsafe for human, agricultural or recreational uses. Some industrial facilities bury their expired and hazardous chemical wastes on their premises, which threatens ground water quality
- Textile plants, breweries, slaughterhouses, sugar refineries, pulp and paper plants and petroleum industries discharge raw, untreated and often toxic liquid effluents into open drains, channels, streams and lagoons.
- In places like Kano, Kaduna, Lagos and Port Harcourt coloured, hot and heavy metal-laden effluents especially from the textile, tannery and paint subsectors are discharged directly into open drains and water channels.

The second overview (Ekiye et. al., 2010) described the degradation of water quality drawing on secondary quantitative data in the four states that are said to contain 80 percent of the nation's industries—Lagos, Rivers, Kano and Kaduna. Perhaps the extreme case is Kaduna State. While the Kaduna River has a 200:1 dilution ratio in the rainy season, it becomes an open sewer for pollutants during the dry season (November to May).

3.3 Environmental Pollution Problems in Lagos

3.3.1 Lagos Lagoon

Ogungbuyi and Osho (2006) ranked the seriousness of the sources of environmental pollution in Lagos Lagoon as of 2005 (Table 5). Not surprisingly, they ranked industrial effluents as a high priority problem. They stated that there were about 2000 manufacturing establishments in the Lagos metropolis that discharge directly into the Lagos Lagoon or indirectly via rivers that flow into the lagoon. The quality of the wastewaters from these establishments was said to exceed the effluent standards set by both the World Health Organization and the Federal Ministry of Environment. They included in their report a dated survey by the World Bank (1996-1997) in their report that found that only 7 out of 534 establishments had the potential for wastewater treatment because they discharged into a central wastewater treatment plant on the Ikeja industrial estate. Unfortunately, the central wastewater treatment plant was reported not to operate satisfactorily.

Table 4: Ranking of Environmental Pollution sources to the Lagos Lagoon (Expert Opinion)

Category	High priority	Moderate priority
Environmental pollution	Municipal solid waste	Industrial solid waste
	Sewage discharges	
	Industrial effluents	Industrial air emission
	Vehicular emissions	Oil pollution
	Agricultural waste/effluent	
	Toxic and hazardous substances and POPs waste	

Source: Ogunbuyi. and Osho , 2005.

The authors calculated waste generation based on a World Health Organization model for industrial facilities, 300 of which were located on 12 industrial estates. The majority of large and medium-sized facilities were located on five of these industrial estates. The results from the calculations showed that:

- The solid waste pollution load for Lagos industries was estimated to be 12,800 metric tons per annum with almost 8 per cent consisting of hazardous materials (solid 426 metric tons and sludge 556 metric tons). The major contributors to this load were pharmaceuticals (27 percent), tubes and tires (19 percent), pulp and paper (19 percent, brewery (14 percent) and food processing (6 percent).
- The volume of wastewater discharged by industry was estimated to be 3.2 million cubic meters per year. The major contributors to this volume were textiles (24 percent), industrial chemicals (19 percent), brewery (19 percent), soap and detergent (6 percent) and food processing (5 percent).
- The total wastewater pollution load was estimated to be 39,000 metric tons, of which about 20,000 tons came from organic matter and 10,300 tons from oil. Five manufacturing subsectors contribute 92 percent of this load as follows: textiles (54

- percent), vegetable oil milling (20 percent), foam production (12 percent), brewery (6 percent) and industrial chemicals (2 percent).
- The air pollution load was estimated to be 51,800 metric tons. The major constituents were sulphur oxides (38 percent), nitrogen oxides (31 percent) and particulate matter (26 percent). Most of the sulphur and nitrogen oxides came from emissions from steel works and diesel generators needed to maintain a consistent supply of electricity. Major emitters of air pollutants were steel (38 percent), pulp and paper (12 percent), plastics (11 percent) textiles (10 percent) and industrial chemicals (7 percent).

3.3.2 Lagos State

The 2010 Environment Report for Lagos State (Ministry of Environment, Lagos State, 2011), which claims that the State accounts for approximately 70% of the non petroleum industrial output of the country, confirms that the situation today is much the same as it was in 2005. Unfortunately there are no quantitative data in this report on the magnitude of industrial or any other source of pollutant discharge. Rather there are the following qualitative descriptions:

- The State has the largest concentration of industries within a fixed land area in the country. Most of these industries still discharge their untreated effluents into public drains, gorges and water bodies of the state. The contamination of water bodies with toxic chemicals and heavy metals such as lead and mercury has been proven scientifically;
- Air pollution is coming from three main sources, one of which is various industrial activities; and
- Soil pollution is resulting from the illegal disposal of toxic and hazardous wastes by industrial activities.

3.4 Energy

3.4.1 Energy Availability

Most manufacturing establishments are not connected to the national grid and those connected receive electricity only for a few hours per day. Hence, most establishments depend on their own backup diesel generators for their electricity needs. Due to diesel usage, the electricity costs for industries are very high resulting in increased production costs affecting their competitiveness. Roughly speaking, the cost per kWh of diesel generated electricity is about double the cost of electricity provided by the national grid. In addition to poor service, just getting access to the electricity is challenging compared to most other countries. Nigeria ranks 177 out of 183 based on the difficulty of electricity access measured in terms of time, number of procedures and costs, (IFC, 2011).

Presently, the electricity demand in Nigeria is over 15,000 MW whereas the installed capacity is around 6,000 MW and the actual generation is between 3,600 MW and 4,000 MW. This large gap is being met by using individual diesel generating sets installed by the industrial and commercial sectors and also by a few households (ECN, 2007).

There are a large number of identified Small Hydro Power (SHP) sites, approximately 400, with potential for supporting micro-hydro (less than 100 kW) and mini-hydro (between 500 kW and 5,000 kW) schemes that could support manufacturing activities. Of these sites, about 100 have been studied in some detail and of these feasibility studies have been prepared for 13 sites.

The country is endowed with significant biomass energy resources that are not being utilized. The country's biomass energy resources have been estimated to be 83 million tons of crop residues per year and 61 million tons of animal wastes per year. Most of these wastes are either dumped or burnt.

The Government has power and energy as foremost on its agenda to facilitate industrialization and rural development. The NV20:2020 calls for an installed capacity of 35,000 MW by the year 2020. The country has only about 6,000 MW of installed capacity as of now with a contribution from renewable energy of about 60 MW. Of this about 50 MW of power are generated by SHP. As part of its measures to achieve the objective mentioned above, the Federal Ministry of Power plans to scale-up SHP from its current level to 600 MW by 2015 and 2,000 MW by 2025, which is in line with the Renewable Energy Master Plan (ECN/UNDP, 2005). In the 2010 Appropriation

Act, the National Assembly approved nine new SHP projects with a combined installed capacity of 150 MW in support of the 2015 objective.

3.4.2 Industrial Energy Intensity

Industrial energy intensity in Nigeria declined from 6.4 to 4.4 tons of oil equivalents (toe) per US\$1,000 of MVA between 1990 and 2008, a reduction of 31 percent. It declined for all low income developing countries from 2.7 to 1.7 over the same period, a reduction of 38 percent. The percentage reduction was significant compared to other comparative countries in Sub-Saharan Africa. Industrial energy intensity stayed the same for Kenya (2.9) and Senegal (0.9) and actually increased for Ghana, going from 5.0 to 5.2 toe per US\$1,000 MVA. Only in South Africa was the percentage decline comparable, decreasing from 1.2 to 0.8 toe per US\$ 1,000 MVA or 33 percent (UNIDO, 2011a)

The energy intensity of Nigerian manufacturing was and remains relatively high compared to the average for all Sub-Saharan African countries, being 6.4 compared to 1.8 toe per US\$1,000 MVA in 1990 and 4.4 compared to 1.6 toe per US\$1,000 MVA in 2008. Perhaps the intensity estimates for Nigeria are incorrect given their magnitude but if reasonably correct they suggest that there is still significant potential for improving industrial energy efficiency. Unfortunately sub-sector energy use data are not available either from the Ministry of Energy or the International Energy Agency that would allow one to identify the subsectors with the greatest potential for improving energy efficiency.

3.5 Challenges to Environmental Data Collection

Much of the environment-related data in Nigeria are not readily available because they are scattered in the various government agencies in form of technical reports/publications or in files that are not easily accessible as a comprehensive database. With about 30 universities, about 28 research institutes, a number of polytechnics and colleges of education, several environmental NGOs, an expanding list of environment consultants, there is considerable potential for collecting

and analyzing environmental statistics. However no report has yet been issued that collates and harmonizes the data at the national and state levels of government.

The problems for effective environmental quality data collection in Nigeria include: (a) inadequate funding for data collection because of an inadequate understanding of the role of environmental statistics in national development; (b) non-standardization of data collection; (c) high turnover of manpower; (d) lack of appropriate materials and equipment for data collection, processing and storage/retrieval; (e) bureaucratic bottleneck; (f) poor coordination and collaboration among relevant Agencies; and (g) excessive protection of organizational secrecy for fear of taxation (Adeyinka, 2005).

3.6 Summary and Analysis

The seriousness of environmental pollution problems in Nigeria indicated by the EPI score is confirmed by two relatively recent national overviews. One overview reported that the intensity of environmental pressures, based on secondary data sources, increased due to poor sanitation, inadequate solid waste disposal, effluent discharge, rapid and unplanned urbanization, mining and increasing use of chemical fertilizers and insecticides. The second overview described significant water quality deterioration in the four most industrialized states in Nigeria. Additional reports about the Lagos metropolitan region confirmed the findings of the two national overviews regarding the seriousness of environmental deterioration due to industrial pollutant discharge.

All of the above findings at the national and state level were summaries, often quite dated, and based on secondary data. There is clearly a need for a more systematic and regular collection of environmental data particularly for air quality as none of the above reports included even secondary data.

4. Policy Integration and Governance

4.1 Introduction

Policy integration is a challenging undertaking for governments and few countries have found the perfect solution. However, effective integration is important if governments are to achieve sustainable development objectives, and foster the greening of industry. In Nigeria, like most countries, development, poverty reduction and environmental management have long been treated as separate objectives – i.e. separate institutions, policies, budgets and programmes have been established to work solely on each objective.

One of the biggest challenges of environmental planning in Nigeria has been the difficulty of keeping up with the rapid changes associated with a growing urbanization. Policy development and planning have not been flexible enough to respond to, or predict, emerging problems. Babanyara et al (2010) identify an even deeper problem in that policies and plans related to sustainable development remain peripheral or subordinate to the dominant dynamics of industrialization and urbanization. Planners in Nigeria seldom consider the environment's inherent value or long-term importance to sustainability. This contradiction between environmental uses and protection is a major stumbling block to fully integrating sustainability concerns into development planning and implementation.

The current environmental policy approach in Nigeria is almost exclusively a conventional command-and-control bureaucratic approach. It is characterized by laws, standards and regulations relating to effluents, emissions and products, and a top-down implementation of legislation. Nigeria's Federal Environmental Protection Act (Decree No 58 of 1988 as amended by Decree 59 of 1992) established the Federal Environmental Protection Agency (FEPA), which is now the Federal Ministry of the Environment (FMoE). The Act provides the legal framework and sets out the functions and duties of environmental management institutions at all levels of government. Still environmental pressures continue to grow due to the Government's top-down approach, inconsistencies of government policies, inadequate funding and inadequate awareness. (Babanyara et al, 2010).

4.2 Harnessing Political Will

In light of the rapidly deteriorating environmental quality due to pollutant discharges from industry and human settlements, substantial funding is needed for regulatory activities,

monitoring and remediation. In governance, the level and consistency of funding is usually a measure of the political will of successive administrations to address this problem.

A summary of the annual appropriations of the Government to the FMOE over the period 1999 to 2007 reveals an inadequate and declining level of funding. Apart from 1999 when funding for the Ministry was about 1.0 percent of the federal budget, funding to the Ministry has averaged less than 0.2 percent of the federal budget, which is too little to allow the Ministry to carry out its mandate.

In addition, 2.0 percent of the entire Federal budget is supposed to be spent on intervention programs in the environment sector (1.0 percent for federal programmes and 1.0 percent for state programmes). However, little is known about how the resources in this Special Fund on Environment are allocated or spent. (Babanyara et al., 2010).

4.3 Institutional Arrangements in Nigeria

Nigeria's Constitution provides for a presidential system of government in which there is an Executive, a Legislature and a Judiciary, with each acting as a check and balance on the powers of the other two arms. The Constitution further provides for the operation of three tiers of government, at the Federal, State and Local levels. These provisions are binding on all authorities and persons throughout the Federation.

The executive branch is divided into Federal Ministries, headed by a minister appointed by the President, who must include at least one member of each of the 36 states in his cabinet. The President's appointments are confirmed by the Senate of Nigeria. In some cases a Federal minister is responsible for more than one ministry (e.g. Environment and Housing may be combined). Each ministry also has a Permanent Secretary, who is a senior civil servant.

The federation is divided in 36 states and 1 federal territory (Abuja). In turn each state is further divided into Local Government Areas (LGAs). In total there are 774 LGAs in Nigeria. Kano State has the largest number of LGAs at 44, and Bayelsa State has the fewest at 9. The Federal Capital Territory of Abuja has 6 LGAs.

4.3.1 Federal environmental institutions responsible for the greening of industries

In Nigeria, there are several federal laws, regulations and standards, which seek to protect the natural environment and assure sustainable development. A number of these laws were promulgated following the Koko toxic waste episode of 1987, which led to the enactment of the Harmful Waste Act 42 of 1988 and the establishment of the Federal Environmental Protection Agency (FEPA) by Act 58 of 1988.

In 1999, FEPA and other relevant Departments in other Ministries were merged to form the FMoE. Currently, the power to enforce all activities that may impact the Nigerian environment is vested in the FMoE. The ministry has a mandate to co-ordinate the environmental protection and conservation of natural resources for sustainable development. The specific responsibilities of the ministry include:

- monitor and enforce environmental protection measures;
- enforce international laws, conventions, protocols and treaties on the environment;
- prescribe standards and make regulations on air quality, water quality, pollution and effluent limitations, the atmosphere and ozone layer protection, control of toxic and hazardous substances; and
- promote cooperation with similar bodies in other countries and international agencies connected with environmental protection.

In 2007, the Government established the National Environmental Standards and Regulations Enforcement Agency (NESERA). It is charged with the responsibility of enforcing environmental laws, regulations and standards in deterring people, industries and organization from polluting and degrading the environment. It has four departments (planning and policy analysis, inspection and enforcement, environmental quality control and finance and administration) and several units including laboratory services that report directly to the director-general of NESERA. Among other accomplishments, it has issued 24 regulations including discharge standards for several manufacturing subsectors and general guidance for a permitting and licensing system.

4.3.2 State environmental institutions

States and LGAs, which comprise the second and third tiers of government, were encouraged under Decree 59 of 1992 to set up their own environmental protection agencies. Consequently, most of the 36 States and the Federal Capital Territory (Abuja) have issued environmental regulations backed by state laws. For instance, in 2005 the Federal Capital Territory issued the Abuja Environmental Protection Board Regulation for solid waste control and environmental monitoring. In the case of Bauchi State, the State Environmental Protection Agency monitors and enforces national environmental regulations and is also charged with solid waste management.

The state environment ministry most central for industrial environmental management, given the concentration of industry in the Lagos metropolis, is the Lagos Ministry of Environment and its subordinate agencies. Within the Lagos Ministry of Environment the two most central agencies for industrial environmental management are the Lagos State Environmental Protection Agency (LASEPA) and the Lagos State Waste Management Agency. LASEPA's functions include monitoring and controlling the disposal of waste in Lagos State and advising the state government on all environmental management policies.

4.3.3 Federal energy institutions responsible for greening industry

The Energy Commission of Nigeria (ECN) was established in 1979 with the statutory mandate for strategic planning and co-ordination of national policies in the country's energy sector. The energy management, training and manpower department within the ECN is charged with energy technology assessment and dissemination, pilot projects in energy efficiency, conservation and management and energy audit. During the 2000s it sponsored walk-through audits in firms in several cities and a textile subsector workshop on the potential for energy savings, seemingly with little residual impact based on inquiries in 2011.

The National Centre for Energy Efficiency and Conservation is one of the six research centres under ECN. It is charged with the responsibility of research in energy efficiency and conservation in the residential and commercial, industrial and transportation sectors.

4.4 Policy Integration

The way in which governments organize their strategies and policies around sustainable development, and more specifically green industry policy, sends strong signals about the priority they attach to it. At all levels of government, the greening of industries requires clear processes for identifying integrated environmental, social, and economic goals and strategies to determine how these goals are implemented across responsibility areas (UNIDO, 2011b).

Development, environment and energy institutional mandates exist at the national and state level, but are separate and uncoordinated. For example, if environmental issues appear at all in development plans, as is the case with the NIP (2010-2013), it is usually a separate chapter dealing with environmental issues.

4.4.1 Environmental Mandate

The most comprehensive environmental mandate is still the National Policy on the Environment issued in 1989. It identified key sectors requiring integration of environment and development concerns. It presented specific guidelines for achieving sustainable development in fourteen sectors of Nigeria's economy. Of most relevance for greening industry are sectors/issues listed below and summarized in Annex A.

- Industry (section 4.12)
- Energy (section 4.13)
- Science and Technology (section 4.21)
- Sanitation and Waste Management (section 6.1)
- Toxic, Hazardous and Radioactive Waste Management (section 6.2)
- Air Pollution (section 6.3)
- Noise Pollution (section 6.4)
- Financing Environmental Protection_(section 10).

- Economic Instruments and Incentives in the Management of Environment and Natural Resources (section 11)

4.4.2 Energy Efficiency Mandate

The National Energy Policy (ECN, 2003) acknowledges that there is considerable scope for energy efficiency and conservation in the industrial sector. It goes on to call for establishing institutional arrangements to promote energy conservation and efficient use of energy in industry.

The National Energy Master Plan (ECN, 2007) reiterates the need to establish institutional arrangements to promote energy conservation and efficient use by:

- Designing a national programme on industrial energy efficiency and conservation in cooperation with the Manufactures Association of Nigeria and experts in higher institutions and research centres;
- Introducing an industrial energy equipment labelling programme indicating the efficiency of energy use; and
- Encouraging industries to establish energy management units

Other relevant provisions in the Master Plan call for providing adequate incentives to encourage industries to switch over to more appropriate energy types; restricting the establishment of industries based on imported energy sources and ensuring strict compliance with energy related environmental pollution standards. Interestingly, the implementing agency for the last provision is FMoE whereas the ECN is the implementing agency for all other provisions.

4.4.3 Development Mandate

The current development mandate is NV 20: 2020 and its associated National Implementation Plan (2010-2013). The development aspirations addressed in NV20:2020 cut across four dimensions:

- Institutional: to promote responsible leadership, transparency, accountability, rule of law and security of lives and property;

- Economic: to enhance productivity, diversification and competitiveness of the nation's economic sectors;
- Social: to improve the nation's prospects for achieving the Millennium Declaration Goals and to create employment in a sustainable manner; and
- Environmental: to halt environmental degradation, promote renewable energy and climate change and mitigation.

The NIP consists of three volumes--- Volume I sets out the strategic framework and investment priorities, Volume II details the sectoral plans and Volume III contains two thematic areas and states' investment plans. Regarding environmental matters, these volumes incorporate or fail to incorporate environmental matters as follows:

- Volume I. One paragraph in this volume addresses environmental sustainability with foci on mitigation of existing problems, impact assessment of new programmes and strengthening institutional capacity and regulatory framework. In setting out investment priorities, environmental matters are not incorporated as priority projects within thematic area such as manufacturing and SME development or as a separate thematic area.
- Volume II. There is no mention of environment in this volume either as a stand alone section or in sections on physical infrastructure, productive sectors (among specific sectors are manufacturing and SMEs), human capital development, knowledge-based economy, governance and general administration and regional and urban development.
- Volume III. This volume addresses governance and general administration and lists states' investment plans. Under the section on governance and general administration, there are chapters on environment (11) and water and sanitation (12). The environment chapter describes environmental problems, lists national efforts, puts forward policy thrusts and lists specific projects with associated funding. Most relevant for industrial environmental management are funding of NESREA, an air quality monitoring network in eight cities and construction of 28 integrated waste management facilities. (Excerpts from this chapter that are

relevant for industrial environmental management are to be found in Annex B). The water and sanitation chapter addresses water supply and human waste disposal problems and describes national efforts and policy thrusts. There is no listing of priority projects and associated funding.

4.5 Summary and Analysis

Nigeria faces several constraints with respect to policies and institutional arrangements that support the greening of industries. Although Nigeria has a comprehensive policy and regulatory framework to support the greening of industries, it is argued that policies and plans related to green industry are peripheral or subordinate to the dominant dynamics of industrialization and urbanization. Furthermore, funding for environmental management in Nigeria is modest and is lower today than it was ten years ago.

Policy integration is considered fairly weak in Nigeria, although this is a problem common to many countries – both developed and developing. It is argued that development, environmental and energy institutional mandates are not really integrated. Nowhere is this lack of integration more evident than in the chapters on manufacturing and SMEs in Volume II of the NIP. The chapters describe support for establishing industrial clusters and model enterprise zones with no mention of environmental safeguards either in those chapters or in the chapter on environment in Volume III of the NIP. Another telling example of the lack of integration is failure to include the imperative for energy conservation and efficiency in either chapter 2 on power or chapter 12 on manufacturing.

Challenges abound involving the decentralization of environmental management. These include problems around the multiplicity of agencies involved; unclear distinctions between roles and responsibilities between the field offices and laboratories of NESERA and the state environmental protection agencies and their laboratories (Adegoroye, no date).

Although Nigeria has sufficient policies and strategies that have the potential to promote a move towards the greening of industries, it is argued that these strategies are sufficiently vague and poorly coordinated to achieve specific targets either for more efficient resource utilization or aggregate reduction of effluent loads being discharged into already severely contaminated water

bodies. Furthermore nowhere in the NIP is there a call for energy efficiency targets for the industrial sector.

5. Constraining Conditions¹

The framework conditions of a country have an important influence on the greening of industries as they provide the environment through which industrial changes take place (UNIDO, 2011). A stable macroeconomic environment, for example, can influence the willingness and ability of firms to risk investments in environmental technologies, services, and new market opportunities. However, the current conditions for industry and particular SMEs in Nigeria make investments in cleaner production technologies a low priority. The more pressing problems for the manufacturing sector are low productivity, unreliable power and limited access to finance. Other factors that discourage investment are tax rates and tax administration, the macroeconomic environment, corruption and transportation (World Bank, 2011).

5.1 Low Productivity

The most basic measure of productivity is labour productivity, which is the value added per worker. It is calculated as the value of the goods and services that the firm produces less the cost of the raw materials and intermediate inputs used to produce the output divided by the number of workers in the firm. Firms that produce more output with less raw material and fewer workers have higher labour productivity. Differences in labour productivity can be the result of differences in technology, organizational structure, worker skills, management ability or capital use. Labour productivity is generally higher in firms that are capital intensive.

Value-added per worker remains lower in Nigeria than in comparative countries in spite of plans and strategies to improve it. Whereas the median manufacturing firm in Nigeria reports producing about US\$2,100 of value-added per worker, the median firms in Kenya, Russia, and South Africa report producing about US\$7,700, US\$9,100 and US\$18,700 of value-added per worker.

¹ The text in this chapter draws heavily on two World Bank Investment Confidence Surveys (World Bank, 2008 and 2011b). Together they surveyed all 36 States and the Federal Territory in Nigeria.

Since Nigeria is poorer than Russia and South Africa, with correspondingly lower human capital, it is also useful to compare labour productivity in Nigeria with other countries in Sub-Saharan Africa. Labour productivity in the median manufacturing firm in Nigeria (at about US\$2,100) is similar to that in Uganda, Mali, Mozambique and Rwanda, but significantly lower than in Cape Verde, Cameroon, Angola, Botswana, and South Africa. There are also significant differences between Nigeria and the best-performing low-income countries such as Kenya, Zambia, and Senegal.

Whereas labour productivity is a partial measure of firm performance, total factor productivity or technical efficiency takes into account both capital and labour use. Differences in total factor productivity between groups of enterprises (that is between enterprises in different countries or between exporters and non-exporters) are due to differences in things other than capital or labour. For example, differences might be due to firm organization, management efficiency, worker skills and education. To the extent that differences in technology are not embedded in the machinery and equipment that the firm uses, these differences can be reflected in total factor productivity.

For the most part, firms in Nigeria are less productive than similar firms in comparative countries. Firms in Kenya are about 40 percent more efficient, firms in Russia are close to twice as productive, and firms in South Africa are almost four times as productive. Also, Nigerian exporters are about 90 percent more productive than non-exporters after controlling for difference in sector of operations, size of the firms, and capital intensity. This does not necessarily imply that exporting improves efficiency – rather, it may be that only the most productive firms enter export markets.

The low productivity of manufacturing firms compared to other countries should come as no surprise because it has been declining for several years. Nigeria's productivity in relations to the United States has weakened over the years. Labour productivity in Nigeria decreased from 5.85 percent of the U.S level in 1961 to 2.2 percent of the U.S. level in 2000 (Adenikinju, 2005).

The low productivity in Nigeria compared to other Sub-Saharan African countries is attributable to several factors including (i) existing process equipment is old and depends mostly on manual loading of raw material; (ii) high cost of imported equipment and spare parts; (iii) low level of capacity utilization as seen in Table 5 due to power stoppages, lack of funds for timely

procurement of inputs, long delays at the ports and limited demand for products that are more costly than imported ones and (iv) poorly skilled workers (Adenikinju, 2005 and Bolujoko, 2009).

TABLE 5: Capacity Utilization (%) - Manufacturing sector

S/NO	SECTOR	2003	2004	2005	2006	2007	2008	2009	2010
1	Food, Beverage and Tobacco	53.70	41.32	43.73	50.25	48.05	57.5	49.88	51.10
2	Textile, Apparel & Footwear	50.75	36.20	47.50	36.60	51.25	46.40	47.57	29.14
3	Wood and Wood Products	53.45	45.25	35.50	42.40	65.00	63.50	57.27	59.93
4	Pulp, Paper & Publishing	49.65	69.00	35.38	46.10	52.4	54.65	36.13	53.34
5	Chemical & Pharmaceuticals	56.00	32.82	41.42	41.10	48.60	50.96	44.96	45.14
6	Non-Metallic Products	57.50	60.60	77.35	64.55	66.50	63.85	54.98	46.77
7	Domestic/Industrial Plastic & Rubber	56.90	43.52	52.23	50.42	48.25	50.55	52.16	57.01
8	Electrical & Electronics	32.10	41.25	50.00	38.95	56.05	45.95	44.99	36.45
9	Basic Metal, Iron & Steel	48.80	46.63	48.29	50.50	41.60	39.85	52.22	46.81
10	Motor Vehicle & Miscellaneous Assembly:	33.15	33.72	25.93	33.08	24.56	19.60	34.30	38.70
	Motor Vehicle Assemblers	23.52	22.59	19.05	10.00	9.30	10.70	8.60	9.05
	Motorcycle Assemblers	42.10	48.78	38.30	55.00	45.20	29.20	59.40	58.20
	Miscellaneous Assemblers	24.85	29.80	20.45	36.50	19.20	18.90	35.00	48.80
	Total Average	48.90	45.02	44.06	45.50	50.52	49.28	47.45	46.44

Source: Manufacturers Association of Nigeria. 2011

5.2 Access to energy

More firm managers said that electricity was a more serious constraint than any other area of the investment climate. About 83 percent of Nigerian firms said that electricity was a serious obstacle—far higher than the 52 percent that said the same that access to finance, the second greatest concern—was a serious problem. Electricity problems appear to affect firms regardless of size, ownership, gender of the owner, or sectors. Although concern was slightly more pronounced among domestic firms, it still ranked as the top constraint for each sub-category of firms.

Compared to other countries, firms in Nigeria were far more likely to say that electricity was a serious problem. In South Africa and Kenya, for instance, only 21 and 28 percent of firms respectively reported that electricity was a major or very severe problem. Of all the countries in Sub-Saharan Africa surveyed by the World Bank, Nigeria is the only country in which electricity outages are the dominant problem reported by managers.

Given the frequency and duration of power outages, Nigerian firms really must own generators in order to conduct business, and 88 percent of surveyed firms do so. Manufacturing firms reported that approximately 69 percent of their total electrical utilization comes not from the public grid, but from their own generators, with large manufacturers more dependent than small ones on generator power.

5.3 Financing the Greening of Industries

Firms in Nigeria are concerned about their access to finance and the cost of finance – after electricity outages; it was their second rated problem. About 52 percent of firm managers said that access to finance was a serious constraint and 46 percent said the same about the cost of financing. Manager of small firms and domestically owned firms were particularly concerned about access to finance.

Managers in Nigeria were more likely to say that access to finance is a serious problem than managers in most of comparative countries. About 16 percent of firm managers in South Africa said that access to finance was a serious constraint and about 42 percent of firm managers in Kenya said it was a serious constraint.

Only 19.4 percent of firms had applied for a loan in the year before the World Bank survey and 60 per cent of these were rejected. In comparison, about 20 percent of firms in Brazil, 17 percent of firms in Russia and 19 percent in Kenya said that they had had an application rejected in the previous year. This strongly suggests—especially when considered jointly with the information on perceptions—that many firms in Nigeria desiring access to external financing cannot obtain it.

What accounts for the high share of rejections? The most common reasons were that collateral or consigners were unacceptable (34 percent), the firm was insufficiently profitable (23 percent),

that the firm's credit history or report was not good enough (14 percent), and that the application was incomplete (13 percent).

As in most countries, SMEs were more likely to say access to finance was a problem than large firms. Because informational asymmetries between borrower and lender are less severe for large firms, lenders find it easier and cheaper to extend credit to them. In addition, SMEs must compete for funds from commercial banks at very high interest rates averaging 15 -20 percent. This, coupled with the poor savings culture in Nigeria, invariably reduces profitability in the sector and contributes to their high mortality rate.

5.4 Worker Skills

The skills that Nigerian workers bring to the job are a function of access to and quality of formal schooling as well as the extent of learning opportunities on the job. A comparison of the proportion of manufacturing firms in Nigeria and a set of comparative countries found that skilled labour was a major or severe constraint to operations. Ten percent of manufacturing firms in Nigeria reported that worker skills to be an impediment whereas the percentage was 6 percent in Kenya, 6 percent in Indonesia and 9 percent in South Africa. Only Russia (fifty percent) and Brazil (seventy six percent) have a considerably higher share of firms constrained by the quality of labour.

5.5 Investment in Common Wastewater Treatment Facilities

It is reported that over 60 percent of Nigeria's industrial activities, including 300 industries, are located on 12 industrial estates in the Lagos metropolitan region. Five of the industrial estates, Ikeja, Apapa, Ilupeju, Iganmu and Oshodi, contain the majority of large and medium-sized industry. Of these five estates, there are either inadequately operated common effluent treatment plants (CEPT) or no CEPT at all. The Ikeja industrial estate has a CETP with only primary treatment that collects wastewaters from several different types of manufacturing activity, but the CETP is reported to not operate satisfactorily. Wastewaters from the Iganmu and Apapa industrial estates are discharged directly into the Lagos Lagoon except of for the Nigerian Breweries, which carries out physical and biological treatment. In addition, the Agbara industrial estate has a CETP with only primary treatment that collects and treats wastewaters from about 20

manufacturing facilities, but no information is available about its operation (Ogungbuyi. and Osho , 2005).

5.6 Green Procurement in Nigeria

Green procurement is an effective way of increasing the credibility of government agencies with respect to encouraging industry and consumers and changing patterns of consumption. The Government in its submission to Rio plus 10 (2002) committed itself to making eco-labelling compulsory for all products within a decade. So far this has not happened.

5.7 Summary and Analysis

The potential for the uptake of resource efficient and cleaner technologies in Nigeria is severely constrained by the low productivity of the manufacturing firms, access to essential resource inputs and the failure of governments (both federal and state) to provide the supportive services. First, firms on average have not been able over a number of years to increase their productivity to levels of firms operating in comparative countries. At the most basic level they are challenged by outdate technologies, workers with inappropriate skills and inadequate management ability. Second, firms are handicapped by the inadequate and irregular supply of electricity and the lack of readily available financing. Third firms that locate on industrial estates most often find that there is no CETP or if there is one, it does not operated properly. For all of these reasons, firms would be challenged to make their production processes more resource efficient and cleaner.

6. Industry-led Initiatives

6.1 Introduction

Not only can government programmes encourage green industry, but industry itself can take initiatives to improve their resource efficiency and environmental performance in response to market and community pressures. The sections below describe potential measures that could be taken. Unfortunately, most of them are potential rather than implemented in Nigeria.

6.2 Capacity Development

On the job training is essential for improving the capacity of firms to improve the resource efficiency of their production processes. Unfortunately, just over 25 percent of firms in Nigeria offer training compared to more than 50 percent of the firms in Brazil, 43 percent in South Africa and nearly 40 percent in Kenya. The fortunate news is that firms in Nigeria that do provide training, though, compare favourably with comparative countries with respect to the proportion of the skilled workforce that is trained. Whereas 45 percent of the firms in Kenya, 67 percent in South Brazil and 69 percent in South Africa provided training for skilled workers, the firms in Nigeria provided training for 73 percent of the skilled workers. (World Bank, 2011).

6.3 Corporate Social Responsibility

Corporate social responsibility (CSR) is rarely practiced outside of the activities of the multinational oil companies operating in the Delta region. Otherwise firms in Nigeria face few incentives to improve their environmental and social performance.

A survey of a number of firms in Nigeria found that the understanding and practice of CSR is still largely seen as philanthropic and altruistic. This finding is at variance with the current understanding and practice of CSR in more advanced economies, where the focus is on improved working conditions and environmental responsibility (Amaeshi et al 2006).

A recent study of the extent of corporate social and environmental disclosure in Nigeria found that there are no mandatory requirements for companies to undergo social and environmental audits. It investigated the levels of corporate social environmental disclosures in the brewery and building material industry and found a higher level in the brewery industry compared to the building materials industry (Uwuigbe and Uadiale, 2011).

6.4 Environmental Management Standards

The Standards Organisation of Nigeria was established by an Enabling Act Number 56 of (1971). The mandate of the Organisation includes preparation of standards relating to products, measurements, materials, processes and services amongst others and their promotion at national, regional and international levels; certification of products, assistance in the production of quality goods and services; improvement of measurement accuracies and circulation of information relating to standards

The ISO Survey of Certifications (ISO, 2011) reports on the total number of ISO 14001 certificates issued between 1999 and 2010. The survey findings for Nigeria show that 157 certificates were issued for all sectors of the economy during this period with slightly more than half issued between 2008 and 2010. Most of the certificates were issued outside the manufacturing sector. For this sector only three certificates were issued in the food and beverage subsector. [For comparison, seven ISO 9001 certificates were issued for the manufacturing sector during this period. None were issued in the food and beverage subsector but rather four in the following subsectors—pulp and paper (1), basic metals (1), machinery (1) and manufacturing not elsewhere classified (1)].

The number of ISO 14001 certificates issued between 1999 and 2010 in absolute number (157) compares favourably with comparative countries. The number issued in Ghana was 22 (0 in manufacturing), in Kenya was 125 (0 in manufacturing), in Senegal was 29 (1 in manufacturing) and in South Africa was 5291 (661 in manufacturing).

6.5 Eco-labelling in Nigeria

There is no national or sub-national eco-labelling scheme in operation or proposed for Nigeria. However there several eco-labelling initiatives on-going in Africa. The most relevant for industry are those for energy efficiency standards and labels for major appliances and equipment —

ranging from refrigerators and clothes washers in homes to copiers and lighting equipment in office buildings. All are national initiatives, driven by the requirements of a national government policy for sustainable development around energy issues. Support for four of these initiatives (Egypt, Ghana, South Africa and Tunisia) is being provided by the Collaborative Labelling and Appliance Standards Programme (CLASP, 2012). Only in 2011 did UNDP with Global Environment Facility funding start assisting the Nigerian government to scale up energy efficient appliances through the development of standards and labels for lighting, air-conditioning and refrigerators.

6.6 Business Associations in Nigeria

The Government is actively encouraging the establishment of environmental desks in a few private sector associations, such as the Manufacturers Association of Nigeria (MAN), the National Association of Chambers of Commerce, Industry, Mines and Agriculture (NACCIMA), the Oil Producers Trade Sector (OPTS) and the Clean Nigerian Associates (CAN). Most oil companies and a few manufacturing firms have established environmental units for more effective monitoring and protection of the environment and for health and safety matters.

MAN appears to be the most active association in promoting green industry concepts. Its green workshops, a joint initiative with Rosebank Consulting, promote awareness in the areas of environmental management and sustainable development. The theme of the 2008 workshop was “Preparing businesses in Nigeria for environmental challenges and opportunities”. See Annex C for list of topics covered in the workshop.

6.7 Summary and Analysis

In some developing countries, industry itself has taken initiatives to improve its resource efficiency and environmental performance. So far, however that is not the case in Nigeria. There is no evidence of an appreciable number of firms committing to corporate social responsibility, obtaining ISO 14001 certification (only three firms all in the food and beverage subsector) or using eco-labels on their products. The most important industrial association, MAN, does offer

limited training in environmental matters, but it has yet to recognize good environmental performance on the part of its members.

7. Harnessing Environmental Technologies

7.1 Introduction

The recent history of developed and developing countries around the world has confirmed that Science, Technology and Innovation (STI) programmes are essential for sustainable industrial development. STI programmes drive improved industrial performance through research and development programmes, develop pilot plants and commercialize research results.

The comparative results of STI programmes in Nigeria compared to the programmes of other countries are best documented by World Bank's Knowledge Assessment Methodology. It is an interactive benchmarking tool created by the Knowledge for Development Program to help countries identify the challenges and opportunities they face in making the transition to a knowledge-based economy. The methodology generates two major findings—the Knowledge Economy Index (KEI) and the Knowledge Index (KI) (World Bank, 2012).

The KEI takes into account whether the environment is conducive for knowledge to be used effectively for economic development. It is an aggregate index that represents the overall level of development of a country or region towards a knowledge economy. The KEI is calculated based on the average of the normalized performance scores of a country or region on all four pillars related to a knowledge economy – economic incentive and institutional regime, education and human resources, the innovation system and information and communication technology (ICT).

The KI, a subset of the KEI, measures a country's ability to generate, adopt and diffuse knowledge. This is an indication of overall potential of knowledge development in a given country. Methodologically, the KI is the simple average of the normalized performance scores of a country or region on three of the four key variables of the KEI – education and human resources, the innovation system and information and communication technology (ICT).

As can be seen in Table 6, Nigeria has been relatively unsuccessful in its over-all efforts to become a knowledge economy based on its KEI ranking. Its comparative ranking is the lowest among comparative countries and below the African country and low income country averages. It's most recent ranking (2009) places it 129 out of 143 countries. Composite rankings for the four pillars are as follows: economic incentive and institutional regime – 127; innovation – 83; education -- 105 and ICT—111.

Table 6: Knowledge Economy Index and its four variables

Country	KEI		Economic Incentive and Institutional Regime		Innovation		Education		ICT	
	recent	1995	recent	1995	recent	1995	recent	1995	recent	1995
Upper Middle Income	5.66	5.9	5.08	4.93	6.03	6.36	5.63	5.59	5.89	6.73
South Africa	5.38	6.01	5.55	4.06	6.85	7.26	4.68	5.86	4.45	6.89
Lower Middle Income	3.78	4.27	3.01	3.15	4.96	4.93	3.32	3.64	3.85	5.38
Kenya	2.77	3.19	2.99	2.39	3.83	3.89	1.83	1.98	2.41	4.5
Africa	2.71	3.37	2.68	2.38	4.31	4.57	1.38	1.66	2.45	4.89
Senegal	2.57	3.07	3.79	2.99	2.85	3.27	1	0.91	2.63	5.11
Ghana	2.46	2.93	3.93	3.07	2.02	2.6	1.78	1.86	2.12	4.18
Low Income	2	2.83	2.05	2.16	2.52	2.77	1.61	1.85	1.82	4.54
Nigeria	1.84	2.51	0.99	1.28	2.29	2.67	1.83	1.91	2.23	4.18

Source: (World Bank, 2012)

Of more relevance for a comparative overview of its R&D efforts is the KI and within it the innovation system ranking. The KI is the simple average of the normalized country scores on three pillars – innovation, education and ICT whereas the KEI measures performance on all four pillars. Nigeria's score on the KI (not shown in the table) is 2.12 which is higher than that for Ghana (1.97), comparable to Senegal (2.16) and lower than Kenya (2.69) and significantly lower than South Africa (5.33).

The innovation system ranking score, one of the three pillars of the KI, is based on Royalty and License Fees Payments and Receipts. Patent Applications Granted by the US Patent and Trademark Office and Scientific and Technical Journal Articles. Nigeria's score of 2.29 places it above Ghana but below comparative countries. Its score also

places it below the average for all low income countries and below the average score for all African countries.

7.2 R&D in Nigeria

The 2011 STI policy was designed in tandem with the objectives and pillars of the NV20:2020 in an effort to bridge the long term disconnect between economic planning and science and technology. The new policy on STI thus has as its core mission the evolution of a new Nigeria that harnesses, develops and utilises STI to build a large, strong, diversified, sustainable and competitive economy. It was designed to provide a strong platform for science, technology and innovation engagement with economic vision for the country.

The Department of Technology Acquisition and Assessment within the Ministry of Science and Technology is a governmental initiative to close the gap that has existed between research and industry. Its mission is to co-operate with, as well as monitor, co-ordinate and supervise several parastatals that are relevant for the commercialization of R& D. The more important ones for industrial development are the National Agency for Science and Engineering Infrastructure, the National Office for Technology Acquisition and Promotion and the Federal Institute of Industrial Research.

There is little or no information on the level of public sector funding for R&D the programmes of Department and its parastatals. There is no information available from the Ministry of Science and Technology or to be found in the World Bank's World Development Indicators on R&D in Nigeria as a percentage of GDP. One independent estimate is that R&D increased from US\$ 0.01 billion in 1998 to US\$0.11 billion in 2006, which is only 0.11% of GDP and only accounts for 0.01% of global expenditures on R&D. (Isola, 2010).

In spite of its overarching potentials in STI and the availability of over 80 research and development institutes and centres, 70 functional universities with faculties of science, engineering and technology and over 100 polytechnics, Nigeria has not attained any appreciable capacity to translate the results of its R&D into desirable outcomes. Most of the technologies which Nigeria requires to sustain its modern domestic economic activities are imported from industrialized countries and other developing countries such as China. The total reliance on imported foreign developed technologies and foreign consultants and contractors for executing Nigeria's infrastructure projects such as road, power, water supply and transportation, besides being extremely costly, is also responsible for its inability to maintain them.

Studies have revealed that some of the critical challenges facing Nigeria's STI System include non-commercialization of successful research results, non-demand driven R&D activities, low value addition to industrial goods and services, lack of linkages between research institutes and the private sector. Duplication of functions among research institutions, lack of sustainable mechanism for funding R&D activities, competition from foreign imports and low technological transfer mechanisms are also problems (SciDev, 2011).

7.3 Environmental R&D in Nigeria

A review of technological innovation policy in Nigeria found that it has focused on information and communication technologies and essentially neglected environmental technologies. To some extent this lack of focus on environmental innovation has been offset by the activities of affiliates of multinational enterprises, which were found to be promoters of environmentally benign technologies in food and beverage and textile subsectors. In addition, environmental regulation has been found to play a complementary role to technology and industrial policies for achieving the dual objective of technological progress and environmental sustainability (Adeoti, 2005).

7.4 Intellectual Property

Copyright law and practice is governed in Nigeria by the Copyright Acts of 1970 and 1988 as amended amendments in 1992 and 1999. There are also several treaties and international agreements on copyright matters to which Nigeria is a party or signatory

According to Alum (2006), it would be an understatement to say copyright law and practice is still a developing aspect of Nigeria's legal system. This is summed up in the simple fact that there is still no central copyright registration office in Nigeria. However growth of the economy should lead to a corresponding amendment of all investment related laws and institutions.

7.5 Summary and Analysis

Most of the R&D activities in Nigeria are conducted in government research institutions, with modest financing from the Federal Government. Unfortunately, according the Ministry of Science and Technology there is a massive failure to commercialize existing research. The main reasons are the lack of demand-driven research and the poor links between research institutes and the private sector (SciDev Net, 2011).

Most firms in Nigeria find it cheaper to import ready-made R&D than to take up successful results from Nigerian institutes. They appear to have limited contact with government institutes and universities and knowledge of their activities because seemingly similar research efforts are fragmented among several institutes, which is needed to secure government support.

There is a clear need to set policy targets for environmental innovation within the national innovation system and to provide incentives for those firms benefiting from multinational support to share new technologies with less well connected firms.

8. Instrument Mixes

8.1 Introduction

The key challenge for policy makers in promoting the greening of industries is being able to combine policy instruments to achieve an optimal mix that promotes sustainable production and consumption outcomes, whilst operating within the bounds of political, cultural, and social constraints (UNIDO, 2011b). Nigeria's approach to industrial environmental management is almost entirely limited to a traditional command-and-control regulatory system. While market-based and information-based instruments are possible under the National Environmental Policy Act of 1989, they have yet to be used to complete the traditional system.

The continued failure and slow progress of implementing traditional environmental regulation highlights the limits of simple command and control strategies for environmental protection in developing countries such as Nigeria. Standards are easy to promulgate, but are costly and difficult to enforce. EIAs are easy to require of firms, but rarely change industrial practices. And penalties are easy to stipulate, but are very difficult to implement in the face of political opposition.

Promoting market based mechanisms appears problematic as well. Put simply, the institutions necessary to support market-based regulatory strategies do not yet function in Nigeria. The real-time monitoring required to support even a simple pollution tax does not exist. And again, the political will to impose large fines or taxes on polluting firms is still lacking.

8.2 Market-Based Instruments

The Government has recognized the importance of economic instruments and incentives in the management of environment and natural resources in Section 11 of the National Policy on Environment issued in 1989. This section acknowledges that sectoral policies, environmental laws and regulations are important, but cannot, alone, be expected to deal with the problems of environment and development. Prices, markets and governmental economic policies are seen as necessary to shape attitudes and behaviour towards the

environment. Yet, Nigeria has not introduced an economic instrument to complement its existing command and control regulations for environmental management.

It is reported that the Lagos SEPA charges pollution levies. Although the measure is expected to serve as some disincentive to discharge pollutants, it is better seen as a revenue generation effort on the part of the State government (Ekiye and Luo, 2010).

8.3 Regulation

The Government at the federal and state levels is said to operate a traditional command-and-control regulatory system for environmental management. It has established standards along with monitoring and enforcement systems to ensure compliance with those standards. However, this strategy depends on strong state enforcement capacity that can transmit instructions and incentives for compliance.

8.3.1 Environment Impact Assessment

The EIA Decree No. 86 of 1992 aims to protect the environment particularly from the industrialization process. The Decree states that no industrial plan/development/activity falling under the FEPA's mandatory list can be executed without prior consideration of the environmental consequences of such a proposed action in the form of an environmental impact assessment.

A detailed examination of the framework for the EIA process reveals that many procedures are very much at variance with intentions, especially as they affect the execution of functions. There is duplication of functions and overlapping responsibilities in the processes and procedures guiding the execution of the various impact assessment tasks. Consequently, serious bottlenecks and bureaucratic confusion are created in the process. The result is a waste of resources, financially and materially (Echefu and Akpofure 2007).

The EIA practice in Nigeria (in its present form) is a showcase for corruption and infraction of the EIA Act. Also, public access to information through the public registry is yet to be honoured in compliance with the Act.

8.3.2 National Environmental Standards

The Federal Environmental Protection Act of 1989 required FEPA (now FMoE) to issue national environmental standards for water quality, effluent limitations, air quality and atmospheric protection, ozone protection, noise control, hazardous substances, spiller's liability and removal methods.

In the absence of comprehensive scientific data, FEPA approached the task of standard setting by reviewing water quality guidelines and standards from developed and developing countries as well as from international organizations and subsequently comparing them with data on Nigeria's water quality. The standards considered included those of Australia, Brazil, Canada, India, Tanzania, the United States and the World Health Organization (WHO). These sets of data were harmonized and then used to generate the interim national water quality guidelines and standards. These address drinking water, recreational use of water, freshwater aquatic life, agricultural (irrigation and livestock watering) and industrial water uses. The guidelines are the maximum allowable limits for inland surface waters and groundwater, as well as for non-tidal coastal waters. They also apply to Nigeria's transboundary watercourses, the rivers Niger, Benue and Cross River, which are major sources of water supply in the country.

The following eight regulations are relevant for the greening of industry:

- National Environmental (Permitting and Licensing System) Regulations S.I. No. 20 of 2009
- National Environmental (Food, Beverages and Tobacco Sector) Regulations S.I. No.33 of 2009
- National Environmental (Textile, Wearing Apparel, Leather and Footwear Industry) Regulations S.I. No 34 of 2009
- National Environmental (Chemicals, Pharmaceuticals, Soaps and Detergent Manufacturing Industries) Regulations S.I. No. 36 of 2009
- National Environmental (Base Metals, Iron and Steel Manufacturing/Recycling Industries Sector) Regulations 2011
- National Environmental (Domestic and Industrial Plastic, Rubber and Foam Sector) Regulations, 2011
- National Environmental (Non-Metallic Minerals Manufacturing Industries Sector) Regulation 2011
- National Environmental (Electrical/Electronic Sector) Regulation 2011

The regulation for textiles was reviewed in detail for completeness and stringency of effluent and emission limitations and found to be satisfactory. It covers essential matters in eight parts as follows:

- Part I has 26 sections dealing with generic topics such as polluter pays principle, best practices and effluent and emission standards which are the same as or more stringent

than those found in the IFC Environmental, Health, Safety Guidelines: Textile Manufacturing (IFC,2007). However, both the NESERA and IFC effluent guidelines are only concentration based rather than a combination of concentration and load based, which combination is needed to prevent concentration compliance by dilution;

- Part II covers sampling procedures;
- Part III Permits (General Provisions);
- Part IV Industrial Effluent, Air Emission, Monitoring and Reporting;
- Part V Enforcement;
- Part VI Offences
- Part VII Penalties
- Part VIII Incentives
- Part IX Interpretations

8.4 Information and Advocacy (Transparency and Disclosure)

Information disclosure schemes are provisions, voluntary or mandatory, for enterprises and public authorities to disclose to the public information relating to the release of pollutants and/or their effect on the environment. These may serve two beneficial purposes. One is to encourage enterprises to take voluntary action to reduce their discharges to the environment and the other is to support better enforcement of existing environmental standards and license conditions. These measures include toxic release inventories, public disclosure programs and corporate rewards and reporting. None of these programmes are in place in Nigeria.

8.5 Monitoring

The NESERA field offices rely primarily on four methods of information collection for environmental management: (1) facility permits, licenses and registrations; (2) self monitoring reports from facilities; (3) agency inspections and reports; and 4) reported public complaints. The self monitoring reporting requirement is demanding in that it requires facilities to report at least quarterly on the nature, concentration and flow of pollutants. Interviews with the NESERA in Abuja and the Lagos SEPA revealed that few facilities were actually filing self monitoring reports.

8.6 Indicators

Nigeria currently does not have a comprehensive indicator system to evaluate the success of its environmental compliance and enforcement programmes. Data are however, collected and reported on an annual basis by at least the Lagos SEPA and perhaps other SEPA's. The latest report from the Lagos SEPA has characterized certain dimensions of industrial environmental management, somewhat inconsistently with other reports as follows:

- Effluent data show that discharges from 57 percent of the establishments were within the effluent limitation standards, while 43 percent were not;
- Industrial monitoring showed that only 25 percent of the industrial establishments have pollution abatement equipment in place. While the Agency has directed all industrial establishments to put in place adequate abatement measures i.e., functional effluent treatment plants, there is still low compliance. One promising action is improved operational performance of the central effluent treatment plants at the Ikeja Industrial Zone;
- The Agency states that it professionally destroys or disposes of expired raw materials and unwanted finished products of a hazardous nature from manufacturing activities. However there is no hazardous waste disposal site in the State.

8.7 Compliance and Enforcement

Only the Lagos SEPA reports on environmental compliance. Its 2010 Compliance Monitoring Report stated that 147 companies were inspected for compliance with its guidelines. Sixty five companies were found to be fully complying with its guidelines and 82 companies were non-compliant. The companies inspected covered most subsectors with the greatest number of inspections in food and beverage subsector (36 companies). The Report provides information about the reasons for non-compliance and is backed up by wastewater laboratory analyses, which documented high levels of chemical oxygen demand and biological oxygen demand for most non-compliant plants. The highest percentage of non-compliant plants as a percentage of inspected companies in each subsector was in the pharmaceutical, plastic and rubber, iron and steel and soap and cosmetics subsectors.

The national environmental regulations require two rounds of enforcement notices and may require a facility to suspend operation if it does not comply with the standards. When individuals are responsible for pollutant discharge beyond the permissible level, they are subject to fines and imprisonment. When a facility is responsible for a violation, the facility is subject to substantially higher fines.

There has yet to be a comprehensive assessment of the industrial environmental regulatory programme in Nigeria. However, the few scattered case studies shows that in reality the use of the various instruments of interventions of regulation (obtaining discharge permits, reporting on compliance and being subject to enforcement actions) is a rarity in Nigeria. A recent study found that only two out of 16 food and beverage plants investigated in Lagos and none of four tanneries investigated in Kano had permits for wastewater discharge (Lufem, 2010). Another study found high levels of pollutant discharge by two beverage plants in Lagos (Osho, 2010). Yet a third study reported that corruption is all pervasive when it comes to actual enforcement of standards (Okafor, 2008).

8.8 Summary and Analysis

There is no policy mix for industrial environmental management in Nigeria. It relies exclusively on a traditional command-and-control regulatory system. Although Nigeria has a comprehensive range of quite strict discharge standards and a well designed permitting procedure, there are the usual problems of weak enforcement of these standards. The government's inability to implement its regulations has served to undermine the credibility of the environmental management regime. It is still much cheaper to offer a bribe or to pay a fine than to change a production process or install pollutant abatement equipment.

To date neither NESERA nor SEPAs have introduced an economic instrument scheme, required firms to report on their pollutant discharge as part of a toxic/pollutant release inventory or to systematically report on their compliance with environmental regulations.

Characterized by weak enforcement of environmental regulations and the complete absence of complementary instruments, Nigeria has a long way to go in achieving an effective and optimal policy mix. Still, the activities of the Lagos SEPA and Solid Waste Management Authority show that where there is political will it is possible within the existing regulatory framework to achieve environmental results.

9. Policy Gap Analysis

This report has described environmental and energy issues, policies and institutional arrangement that directly or indirectly limit the greening of industry in Nigeria. It found that there is a significant need to reduce the discharge of environmental pollutants and to improve industrial

energy efficiency. In particular water quality is severely degraded in those states with significant concentrations of industry and that efforts to reduce degradation by locating firms on industrial estates which have the potential for cost effective effluent treatment is failing because CETPs are not being built or if built do not operate properly.

Despite the notable efforts by the Government to introduce a conventional industrial environmental management programme with supporting institutional arrangements, deterioration of the environment continues and inefficiencies in resource utilization, particularly energy use, are likely to persist. This report has identified some policy gaps that need to be addressed to move along the path towards the greening of industry. The gaps identified below signal opportunities for further investigation and research by UNIDO.

9.1 Policy Integration

Although Nigeria has a comprehensive policy and regulatory framework to support the greening of industries, the policies and plans related to green industry are peripheral or subordinate to dominant dynamics of industrialization and urbanization. It was found that development, environmental and energy institutional mandates are not really integrated. Nowhere is this lack of integration more evident than in the chapters on manufacturing and SMEs in Volume II of the NIP. The chapters describe support for establishing industrial clusters and model enterprise zones with no mention of environmental safeguards either in those chapters or in the chapter on environment in Volume III of the NIP. Another telling example of the lack of integration is failure to include the imperative for energy conservation and efficiency in either chapter 2 on power or chapter 12 on manufacturing.

9.2 Low Productivity

Overcoming the low productivity (both labour and factor productivity) is both a challenge to and an opportunity for improving resource efficiency for Nigerian manufactures. The challenge to improving productivity is formidable because (i) existing process equipment is old and depends mostly on manual loading of raw material; (ii) high cost of imported equipment and spare parts; (iii) low capacity utilization due to power stoppages, lack of funds for timely procurement of

inputs, long delays at the ports and limited demand for products that are more costly than imported ones and (iv) poorly skilled workers.

9.3 Industrial Energy Efficiency

A green industry policy needs to focus on improvements in the efficiency of energy use. Admittedly, it cannot address the need to improve the consistent delivery and supply of energy needed by the industrial sector, but it could help mitigate what is considered the major constraint on industrial production. More efficient use of available electricity would help to some extent but certainly not eliminate this constraint. In addition, improving industrial energy efficiency often comes about by reducing material and water use and improving the quality of material inputs, all of which would be positive contributions to green industry.

A survey of industrial energy efficiency policy measures in place in 31 developing countries (including Nigeria) found that only four out of 21 potential measures were in place in Nigeria. These were training for firm personnel, government agency for energy efficiency, international financing for industrial energy efficiency and industrial energy efficiency research and development (UNIDO, 2011a).

Clearly the current energy policy mix lacks many of the measures that have been used in other countries to improve energy efficiency. These measures include setting quantified and achievable efficiency targets, benchmarking the current energy use per unit of output for specific subsectors and identifying opportunities for improving energy efficiency. Once realistic targets are set, various known and successful policy approaches can be implemented. These include laws and regulations, negotiated agreements (energy efficiency contracts between government and industry, information-based instruments, new technology and innovation support and market-based instruments.

9.4 Financing the greening of industries

Firms in Nigeria have more difficulties than those in many other Sub-Saharan African countries in accessing finance and then obtaining it at a reasonable cost. They have troubles in putting up the needed collateral or finding acceptable consigners, being sufficiently profitable to qualify for a loan or even completing an application. Thus for them obtaining working capital for adoption and adaption of green technologies is a major challenge. SMEs as distinct from larger firms also

have difficulties accessing other financial sources such as venture capital, foreign funds, and capital markets, and are therefore heavily dependent upon informal credit sources.

This research did not identify any significant government-led financing schemes targeted at industry of any size which promote investment in resource efficiency measures – e.g. favourable loan and loan guarantees.

9.5 Improved infrastructure

Inadequate infrastructure for waste and water management is a serious problem in Nigeria, particularly given the country's rapid growth and urbanization. The situation is critical in the four urban areas with the greatest concentration of industrial activity and with limited if any treatment of industrial wastewaters – Lagos, Rivers, Kano and Kaduna. For example, of the five industrial estates in Lagos that contain the majority of medium and large industry, only one estate has a CEPT and that one is reported not to operate properly.

To keep pace with Nigeria's growing emphasis on clustering firms on industrial estates or in common facility centres, finance will need to come from the Government or the private sector to build CETPs and to ensure collection and proper disposal of solid wastes. Given the difficulties of securing financing for productive investments, the private sector will be challenged to secure the needed finance. Rather, the owner/managers of industrial estates, usually the government, must organize and finance construction of CETPs and then recover the costs by collecting user fees.

9.6 Creating Business Incentives

State and community pressures are often not enough on their own to encourage resource efficient practices and responsible environmental management. Motivations, opportunities, resources, and processes are all important in driving environmental improvements. Unfortunately, industry-led initiatives, such as CSR (outside of the oil producing region), eco-labelling, ISO standards and voluntary agreements, have yet to gain any foothold in Nigeria.

There is scope for the government to promote the greater use of these instruments as a means of encouraging sound environmental practices. The government could publicize the requirements by multinationals for firms to adopt codes of practice and standards that have resulted in significant benefits from the utilization of resource efficient technologies. It could also publicize community efforts that are becoming important catalysts of environmental change, through environmental complaints and citizen actions.

9.7 Policy Implementation and Enforcement

Nigeria has several national laws, regulations and standards that seek to protect the environment and ensure sustainable development. It also has put in place federal and state institutions that are responsible for their implementation. However, having laws on the books, and implementing those laws are two very different things. Issues of capacity, coordination and conflicts of interest all hinder effective policy implementation.

Although Nigeria has a comprehensive range of strict environmental quality and pollutant discharge standards that are in line with those put forward in the World Bank guidelines, there remains the problem of limited enforcement. Only in the case of Lagos state is there a noticeable enforcement effort. Otherwise the government's inability to implement its laws has served to undermine the credibility of the environmental standards and enforcement. It is much cheaper to pay a fine or offer a bribe than to change a production process or install effluent abatement equipment.

9.8 Commitment to systematic data collection

An effective green industry policy needs to be designed based on systematic and routinely collected data about the industrial sector, its energy and water use and its pollutant generation and discharge. At this time none of these data are available. Even the most basic economic data on the number and location of establishments in each subsector and their output have not been collected since 1996 by the National Bureau of Statistics. Energy use by subsector is also not known as is pollutant discharge. These data are essential for designing a cost effective strategy for greening industry and for monitoring its implementation.

9.9 Overall Potential for RECP Implementation in Nigeria

On the one hand, implementing a RECP policy and programme in Nigeria will be a challenge. The industrial sector itself is confronted with so many problems just being competitive that any new effort would be rejected. For many firms securing a regular power supply, accessing credit at a reasonable cost, sourcing raw materials and spare parts and finding and retaining skilled workers take all the time and talent of management.

On the other hand, a smart RECP policy and programme could offer firms, such as the 16 food and beverage plants and 4 tanneries identified by Lufem (2010), a path for improving their competitive position by reducing their high levels of waste. A smart RECP policy and programme perhaps under the National Productivity Centre could be an essential component of a national effort to increase the productivity in the industrial sector. It could be similar to the UNIDO programme to improve energy and resource efficiency in the Vietnamese steel industry (UNIDO, 2011c).² A well organized and managed demonstration of the potential of RECP within the context of subsector upgrading programmes and a realistic dissemination strategy have the potential to spark a greening of industry in Nigeria.

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² The initial survey of six plant had two interesting finding regarding energy efficiency. It found that most Electric Arc Furnace plants were considerably less efficient than global good practice. It also found that one plant of large size and more advanced technology was the least efficient in terms of energy use per tonne of product. Apparently better technology is important but it is not enough. A key factor is therefore is local capacity to get the best performance out of the equipment in place.

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ANNEX A – Excerpts from the National Policy on the Environment (1989)

- Industry (section 4.12) Sustainable industrial development can be achieved through policy initiatives that seek, among others to ensure: i. availability of indigenous technological materials; ii. availability of industrial raw materials; iii. possession of a viable research and development base that is capable of selecting, adapting and developing technology; and iv. creating awareness to promote and sustain technological and industrial growth.
- Energy (section 4.13) In energy production and use attention should be focused on the following: energy sources; ii mode of procuring the energy fuel on sustainable basis; iii mode of power generation; iv energy transmission and use; and v conservation.
- Science and Technology (section 4.21) There is a need to work closely with the Science and Technology Policy in implementing the programs proposed under this policy
- Sanitation and Waste Management (section 6.1): Environmentally sound management of wastes requires an understanding of the range of treatment, disposal and re-use options available for sanitary and industrial effluents, raw domestic wastes and storm water. In order to ensure that improper handling and disposal of wastes do not lead to the spread of disease and the pollution of land, air and water, priority shall be given to the

environmental studies of industrial effluents as well as the variety of solid and liquid wastes generated in the various ecological zones of Nigeria. Appropriate guidelines shall be introduced for their collection and safe disposal.

- Toxic, Hazardous and Radioactive Waste Management (section 6.2): Necessary administrative rules and legislation will be operated to govern the monitoring, introduction, manufacture, import, sales, transportation, use and disposal of toxic, hazardous and radioactive substances in Nigeria.
- Air Pollution (section 6.3): Strategies for achieving a clean air situation need to include among other things designation of national air control zones, setting ambient standards and monitoring compliance, licensing major industrial air polluters and monitoring their compliance and prescribing stringent standards for automobile emissions.
- Noise Pollution (section 6.4): Establish programs to reduce noise levels.
- Financing Environmental Protection (section 10) The financial requirements for environmental protection and natural resources conservation, calls for the need to streamline the current funding mechanism to make them more efficient and responsive. There is also the need to improve current funding levels and to provide new and additional financial resources that are both adequate and predictable to halt and reverse the current menace of environment and natural resources degradation.
- Economic Instruments and Incentives in the Management of Environment and Natural Resources (section 11) Sectoral Policies, environmental laws and regulations are important, but cannot, alone, be expected to deal with the problems of environment and development. Prices, markets and governmental economic policies also play a complementary role in shaping attitudes and behaviour towards the environment. Sustainable development requires that the exploitation of resources, the production of goods and services, the direction of investments, the orientation of technological development and institutional change are all in harmony and enhance both current and future potentials to meet human needs and aspirations. Since our national development policy objective is to achieve rapid economic growth and improvement in individual welfare on a sustainable basis, a range of enabling policies, economic instruments and incentives are required to propel the development process in the desired direction.

ANNEX B – NIP—Volume III: CHAPTER 11 Environment: Industry Related Excerpts

A major goal of Vision 20:2020 is to stimulate economic growth and launch the country onto a path of rapid and sustained socio-economic development. But rapid economic growth will be dependent on growths in many sectors such as agriculture, energy, tourism, manufacturing, etc, each of which will have significant impact on the environment. Thus pursuing rapid socioeconomic development and maintaining the natural environment must go hand in hand. The environment, as the life supporting system, must provide an equitable milieu and the raw materials needed for human existence and survival. The natural environment also purifies the air and water, produces healthy soils, cycles nutrients and regulates the climate. All these are important for developing and

maintaining human health, creating national wealth and reducing poverty. If properly managed, the environment can be geared to meeting our productive socioeconomic needs on a sustainable basis. This implies that the national environmental assets must be maintained at a level that meets the need of the present generation without jeopardizing the interests of future generations. The challenge for the country therefore is to make the development process of Vision 20: 2020 compatible with environmental protection. The major environmental threats which impede Nigeria's development include land degradation, deforestation, drought and desertification, erosion, environmental pollution, ineffective and inefficient solid waste management and climate change, all of which have resulted in the country's poor environmental performance.

Environmental Pollution

Environmental pollution in Nigeria is currently greater in magnitude than in decades past as a result of the high rate of population growth and urbanization, modernization of agriculture, especially in the growing use of agrochemicals, the introduction of new technologies and consumer products, and, the ineffectiveness of the institutional, logistical and policy arrangements that have been put in place over the years to tackle the menace. The dominant types of pollution in Nigeria are air, water, soil and noise pollution. Industries were the major sources of pollutants in Nigeria in 1980s and 1990s, through improperly disposing of effluent and wastes which eventually contaminate the soil as well as surface and ground water.

Notwithstanding, the reduction in manufacturing activities in the country, the pollution level still remains high, especially in major urban centres because the industries still functioning rely more and more on diesel-powered generators. Furthermore, the country has witnessed a tremendous upsurge in the number of automobiles and commercial motorcycles as well as electric generators. These contraptions have become the new and widespread sources of pollution in Nigeria.

Pollution from oil exploration and exploitation activities in the Niger Delta remains unabated. Oil spills from leaking underground pipelines and storage tanks are a regular occurrence, rendering vast tracts of land and water bodies unproductive in the region. National Oil Spill Detection and Response Agency (NOSDRA) recorded in first half of the year 2007 a total of 424 spill incidents involving 33,799 barrels of oil. Of these spill incidents 196 were due to equipment or operation failure, 143 were caused by sabotage while the sources of the remaining 85 were in contention. In addition, pollution from gas flaring continues unabated. The resultant heat stress and acid rain continues to degrade the ecosystem.

Pollution of air, water and soil in Nigeria also comes from extensive use of fertilizers on farms, dumping of expired and contraband chemicals and pesticides in the country, improper storage and handling of chemicals as well as improper disposal of hospital and municipal wastes.

An emerging and rapidly growing source of pollution is e-waste resulting from spent ICT.

Materials imported from developed countries contain deadly chemicals and toxins. Many poor people regularly sort through waste dumps to scavenge for anything they could sell and so unwittingly expose themselves to toxic hazards and health risks.

Waste Management

The problem of solid waste Management is a major concern in Nigeria. By 1989, an estimated 2.2 million tons of garbage per year were being generated in Nigeria, equivalent to about 20 kg of solid waste per capita. It was estimated that by the year 2000, Lagos metropolis alone was generating about 998,000 tons of solid waste per year. Waste is indiscriminately disposed such that solid waste dumps dot the urban landscape. Only about 30 -50% of urban waste is collected as most urban areas lack effective system of refuse collection. As a result, most urban households resort to open dumping of refuse. The common arrangement, in the very few urban communities where a system is in place, is for waste management authorities to collect refuse from households and public containers. Unfortunately, the operation of the waste management authorities is inefficient and ineffective as evidenced by mounds of decomposing rubbish that are a part of the regular landscape of many of the urban areas.

Global Performance

The country's large population of 140 million and its rapid growth rate of 3.2 per cent are contributing to its progressive environmental degradation. Despite its relatively low level of industrialization, Nigeria continues to rank very low in terms of its environmental performance. In 2008, the country's Environmental Performance Index (EPI) was 56.2, ranking it as number 126 out of 149 countries surveyed in the world. The low EPI figure puts the country behind many other African countries like Mauritius (78.1), Egypt (76.3), Ghana (70.8), Kenya (69.0), South Africa (69.0) and Cameroon.

NATIONAL EFFORTS

Although Vision 20:2020 aims to transform Nigeria into a more technologically improved nation, the country will, at least in the medium-term, continue to depend largely on her environmental resources. This reality raises the following key challenges for the sustainable management of the nation's environment:

- Adoption of environmentally sound technology
- Mitigation and adaptation to climate change
- Land degradation
- Pollution control
- Waste management
- Environmental hazards and disasters
- Integrated coastal management
- Inadequate environmental awareness
- Limited private sector participation
- Weak environmental governance

Objectives and Targets

- Increase Nigeria's forest cover from the present 6% to 10%;
- Enhance the capacity of Nigerians to adapt to climate change;
- Reduce environmental pollution related health risks by at least 25%;
- Have clean urban centres;
- Reduces losses and impacts due to floods, and drought by 10% by 2013;
- Enhance national capacity to implement the National Action to Combat Desertification;
- Increase public information, education and participation on environment among at least 25% of the population by 2013;
- Achieve an integrated coordination of the implementation of national environmental policies; programmes and regulation as well as international conventions.

POLICY THRUSTS

Pollution Control and Waste Management

Environmental pollution today is greater in magnitude than it was in years past. The problem is as a result of high rate of population growth and urbanization, modernization of agriculture especially in growing use of agrochemicals, the introduction of new technologies and consumer products, and, the ineffectiveness of the institutions, policy arrangements established to tackle environmental pollution related problems. Focus would be geared towards reducing the level of environmental pollution to acceptable international standards.

Environmental Governance

Environmental governance is the sum of organizations, policy instruments, financing mechanisms, rules, procedures and norms that regulate the processes of environmental protection. It is about how decisions are being made, who is responsible, how they carry out their mandate and how they are accountable. In Nigeria environmental trends continue to be negative. Some of the reasons are that some of the institutions dealing with environmental issues are weak and not properly funded. Efforts would be made to put in place an integrated coordination of the implementation of national environmental policies, programmes and regulations as well as international conventions.

Projects and Programmes

Solid waste management: The project under this programme is predicated on the need to properly dispose waste, minimize pollution-related health problems associated with poor waste management. Equally important is the need to generate wealth from waste.

Establishment of national air monitoring and management in ten (10) cities across Nigeria. The objective of this project is to monitor pollutants and generate data for

regular air Pollutants Standards Index (PSI) for air and establishment mechanism for air quality management in Nigeria. As the country develops industrially, there is the need to minimize pollution related health problems and establish parameters for determining acceptable levels of pollutants from various sources and evolve guidelines for penalizing offenders under the polluter pay principle.

ANNEX C MAN Environment Workshop Course: Environmental Management and Sustainable Development Seminar (2008)

1 . Welcome Address - Our Agenda on Environmental Sustainability in Nigeria

- Alhaji Bashir M. Borodo, MFR, President, Manufacturers Association of Nigeria.

2. Linking the Lagos Mega City to a Sustainable Environmental Framework

- Dr Muiz Banire, Hon. Commissioner for the Environment, Lagos State.

3. The Role of UNIDO in Promoting a Sustainable Environment

- Mr. Masayoshi Matsushita, UNIDO Representative in Nigeria and Head, Regional Office for West Africa.

4. Overview of Environmental Policy, Regulations & Enforcement Measures

- Hon. Duro Faseyi, Chairperson, House Committee on Environment & Ecology
- Dr. (Mrs) Ngeri S. Benebo, Director-General, National Environmental Standards & Regulation Enforcement Agency (NESREA)
- Dr. Jacob Oluwole Ameyan, Director, Environmental Impact Assessment, Federal Ministry of Environment, Housing & Urban development.
- Dr. Bamidele Ajakaiye, Director-General/CEO, National Oil Spill Detection and Response Agency (NOSDRA)
- Engineer Adebisi Adesina, managing Director, Lagos State Environmental Protection Agency (LASEPA)

5. Balancing Business Growth with Sustainable Environment Performance:

Sharing Best Practice & Challenges

- Mr George Lourandos, Managing Director, Lafarge Cement WAPCO Nigeria PLC
- Alhaji Salisu Umar, Chairman, Textile, Wearing Apparel, Carpet, Leather/Leather Footwear MAN Sectoral Group

6. Overview of Key Environmental Management Tools: Environmental : Impact

Assessment and Environmental Audit Processes

- Professor Olusegun Ekundayo, Department of Chemistry, University of Ibadan

7. Capacity Building & Training Programmes for Environmental Management and Sustainable Development

- Mr. Kehinde Johnson, Managing Partner, Rosebank Consulting