SUSTAINABLE DEVELOPMENT ACTION PLAN (SDAP)

"SECURING THE FUTURE FOR THE NEXT GENERATION OF GHANAIANS"

NATIONAL PROGRAMME ON SUSTAINTABLE CONSUMPTION AND PRODUCTION (SCP) FOR GHANA (2011-2016)

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ACTION PLAN FOR SUSTAINABLE CONSUMPTION AND PRODUCTION IN GHANA: RESEARCH AND EDUCATION

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ABBREVIATIONS

ADP	-	Accelerated Development Plans
ARI	-	Animal Research Institute
BRRI	-	Building and Road Research Institute
CRI	-	Crops Research Institute
CSIR	-	Council for Science and Industrial Research
DFID	-	UK Department for Information and Development
DTST	-	District Teacher Support Team
EPA	-	Environmental Protection Agency
FCUBE	-	Free, compulsory, universal basic education
FORIG	-	Forestry Research Institute of Ghana
FRI	-	Food Research Institute
GAEC	-	Ghana Atomic Energy Commission
GDP	-	Gross Domestic Product
GES	-	Ghana Education Service,
ICT	-	Information Communication and Technology
IMF	-	International Monetary Fund
INSTI	-	Institute of Technological Information
JSS	-	Junior Secondary School
MEST	-	Ministry of Environment, Science and Technology
MOE	-	Ministry of Education
NAB	-	National Accreditation Board
NABPTEX	-	National Board for Professional and Technician Examinations
NACOB	-	Narcotics Control Board
NARS	-	National Agricultural Research System
NCTE	-	National Council on Tertiary Education;
NERP	-	New Educational Reform Programme
NGOs	-	Non Governmental Organisations
NPC	-	National Population Council
NSCE	-	New Structure and Content of Education
OPEC	-	Oil Producing and Exporting Countries
OPRI	-	Oil Palm Research Institute
PGRRI	-	Plant Genetics Resources Research Institute
PNDC	-	Provisional National Defence Council
PGRRI	-	Plant Genetics Resources Research Institute
PNDC	-	Provisional National Defence Council
PNDCL	-	Provisional National Defence Council Law
SARI	-	Savannah Agricultural Research Institute
SRI	-	Soil Research Institute

STEPR I	-	Science and Technology Policy Research Institute
STI	-	Sustainable Tourist Industry
UN	-	United Nations
UNDP	-	United Nations Development Programme
USAID	-	United States Agency for International Development
WRI	-	Water Research Institute
WSD	-	Whole School Development

1.0 INTRODUCTION

In Ghana, several sustainable development initiatives intended to balance production and consumption of natural resources with environmental health have been implemented over the years. However, the country continues to suffer from environmental degradation arising from unsustainable production and consumption of natural resources such as forests, minerals (gold, diamond and petroleum, etc.) water bodies, fisheries, significant medicinal flora and fauna. Other environmental challenges include those related to urban sanitation and waste management, water scarcity and pollution, noise nuisance, indoor and outdoor pollution. Development behaviour based on sustainable consumption and production is widely recommended as an essential requirement for achieving sustainable development while at the same time addressing environmental degradation.

The concept of sustainable consumption and production is defined as “the use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations" (UN CSD, 1995). The concept suggests that basic needs could be met and our patterns of consumption changed without necessarily consuming less. It implies ensuring a balance between consumption and production at all times and reducing the burden on the earth’s natural carrying capacity. This requires efficient use of natural resources and energy to reduce economic costs and improve environmental integrity in key sectors of the economy.

Changing consumption and production patterns is a challenging and essential development agenda confronting African governments and other stakeholders. Overcoming this task successfully would require increased awareness creation about the risks and the opportunities as well as drastic policy reforms and serious in-depth culture of change. In Ghana, so far, education and research initiatives are yet to incorporate sustainable consumption and production concerns and therefore very little have been achieved in addressing environmental challenges on sustainable basis. Recognizing that environmental qualities and aspirations of society are fundamentally dynamic, it is pertinent to frame education and research experiences within an overall adaptive approach involving continual reassessment of information needs and incorporation of multi-disciplinary perspectives. In this way, education and research will likely respond appropriately to society’s changing values, address knowledge gaps and make their application more effective in addressing production and consumption demands of the 21st century and beyond. Education and research that are rooted in science and technology are perceived the world over as the functional tools for rapid socio- economic development. The rapid economic transformation in countries such as the Republic of Korea, Malaysia, Singapore, China, and India, in contrast to Ghana, is generally attributed to their greater success in acquiring and using knowledge and innovation based on science and technology. It stands to reason that the huge development differential between these Asian countries and those in sub-Saharan countries, including Ghana, is a technological gap.

A critical mass of Ghanaians including decision makers, educators, mass media, research institutions, traditional opinion leaders, law enforcement agencies and government regulatory institutions should

understand the challenges facing the nation to be able to reverse the negative trend and change the status quo. Education and research holds the key to changing negative habits and behavior patterns, improving on livelihoods systems and focusing on best ways of ensuring sustainable national development. On the eve of Ghana's independence at the last meeting of the old Legislative Assembly on the 5th of March, 1957 Dr. Kwame Nkrumah spelt out a vision of rapid development based on the application of science and technology. He said: "Our whole educational system must be geared to producing a scientifically-technically minded people. Because of the limitations placed on us, we have to produce, of necessity, a higher standard of technical education than is necessary in many of the most advanced countries of the Western world. I believe that one of the most important services which Ghana can perform for Africa is to devise a system of education based at its university level on concrete studies of the problems of the tropical world. The University will be the coordinating body for education research, and we hope that it will eventually be associated with Research Institutes dealing with agriculture, biology, and the physical and chemical sciences which we hope to establish …" (McWilliam & Kwamena-Poh, 1975:94) cited by Kwame Akyeampong (2007).

At present, Government's development agenda is to transform Ghana into a middle income country with a GDP of US$ 1000 by 2015. The strategies for achieving this growth are to improve human capital, to strengthen the role of the private sector in the development of the economy and to provide good governance. The strategic direction of improving human capital makes education central to the government's effort.

2.0 REVIEW OF EXISTING LEGISLATIONS AND POLICIES ON RESEARCH AND EDUCATION RELATED TO SUSTAINABLE CONSUMPTION AND PRODUCTION

Major Laws on Research and Education

There are many laws that govern research and education in Ghana. The major ones include the following:

- The 1992 Constitution of Ghana. Chapter Six: The Directive Principles of State Policy Section 38;
- Ghana Education Service Act
- Environmental Protection Agency Act, 1994 (Act 490);
- Management of Ozone Depleting Substances Regulations,2005;
- Council for Scientific and Industrial Research Act 521 of 1996;
- The National Environmental Policy, 1990;
- The Local Government Act, 1993 (Act 462);
- Water Resources Commission Act, 1996 (Act 522);
- Pesticides Control and Management Act, 1996 (Act 528);
- The Environmental Sanitation Policy, 1999;
- PNDCL 46 (1983) Control of Bushfire Law;

- PNDCL 229 (1990) Control and Prevention of Bushfire Law ;
- The Forest and Wild life Policy of 1994;
- Centre For Scientific Research into Plant Medicine Act,1975;
- Environmental Assessment Regulations 1999, (LI 1652).

The Constitution of the Republic of Ghana

Chapter six of the directive principles of state policy states in Section 38:

(1) The State shall provide educational facilities at all levels and in all the regions of Ghana, and shall, to the greatest extent feasible, make those facilities available to all citizens.

(2) The Government shall, within two years after Parliament first meets, after the coming into force of this Constitution, draw up a programme for implementation within the following ten years, for the provision of free, compulsory and universal basic education.

(3) The State shall, subject to the availability of resources provide -

(a) equal and balanced access to secondary and other appropriate pre-university education, equal access to university or equivalent education, with emphasis on science and technology;

(b) a free adult literacy programme, and a free vocational training, rehabilitation and resettlement of disabled persons; and

(c) life-long education.

Article 39 of the constitution mandates the major tenets of the free, compulsory, universal basic education (FCUBE) initiative. Launched in 1996, it is one of the most ambitious pre-tertiary education programs in West Africa. Since the early 1980s, Government of Ghana expenditures on education have risen from 1.5% to nearly 3.5% of GDP in 1989 and 2009 respectively. Since 1987, the share of basic education in total education spending has averaged around 67%. The units of the Ministry of Education (MOE) responsible for education are: the Ghana Education Service (GES), which administers pre-university education; the National Council on Tertiary Education; the National Accreditation Board; and the National Board for Professional and Technician Examinations (NABPTEX).

The Environmental Protection Agency Act

Under the EPA Act, 1994 (Act 490) the functions of the Agency are as follows-

a) To promote studies, research, surveys and analyses for the improvement and protection of the environment and the maintenance of sound ecological systems in Ghana;
b) To initiate and pursue formal and non-formal education programmes for the creation of public awareness of the environment and its importance to the economic and social life of the country;
c) To develop a comprehensive database on the environment and environmental protection for information of the public;
d) To conduct seminars and training programmes and gather and publish reports and information relating to the environment.

National Health Policy

The National Health Policy (2007) views health as multi-sectoral focusing on the physical, social, economic and spiritual dimensions which can bring total health to individuals, their families and communities. The policy places healthy lifestyles within the context of the physical and social environments where people live to go to school and work, emphasizing potable water, sanitation, and safe food, housing and roads as means of promoting food, health and prevention of diseases and injury.

Promoting healthy lifestyles in a healthy environment includes:

- Information for making healthy lifestyle choices
- Food safety and environmental sanitation
- Healthy setting (communities, schools, homes and work places
- Reaching people with infrastructure and services
- Enacting and enforcing legislation

Policy measures include:

- Empower individuals, households and communities to take informed choices for their health through provision of information, education and creation of an enabling environment.
- Brand and market healthy living, targeting specific population groups such as parents, children and adults with relevant messages on safe sex, healthy eating habits, exercise, rest and recreation and a life free of addictions and substance abuse.
- Develop standards and implement programmes and initiatives for promoting healthy settings in healthy schools by collaborating with MOH, GES, and private schools to facility the adoption of healthy lifestyles among students through curriculum, physical education, environmental sanitation and the promotion of healthy eating.
- Promote physical exercise, rest and recreation by making physical education mandatory in all schools and for adults.

Environmental Sanitation Policy

Environmental sanitation is an essential factor contributing to health, productivity and welfare of the people of Ghana. The National Environmental Action Plan for 1991-2000 also places a high priority on environmental sanitation. Environmental sanitation is aimed at developing and maintaining a clean, safe and pleasant physical environment in all human settlements, to promote the social, economic and physical well being of all sections of the population. It comprises a number of complementary activities, including the construction and maintenance of sanitary infrastructure, the provision of services, public education, community and individual action, regulation and legislation.

The components of environmental sanitation include:

- Collection and sanitary disposal of wastes including solid waste, liquid waste, excreta, industrial wastes, clinical and other hazardous wastes.
- Environmental sanitation education and
- Inspection and enforcement of sanitary regulations.

The Ministry of Education and the tertiary educational institutions are responsible for hygiene education in schools, universities and the technical institutions. The Ministry of Health is responsible for managing and providing health data, and supporting hygiene education activities. The Ministry uses the environmental sanitation information to contribute to disease prevention and control.

The Ghana National Media Policy

The mission is to promote and ensure a free independent , dynamic and public-spirited media that will provide access for all people to participate freely, fully and creatively at the community, national and global levels in the expression, exchange and discussion of knowledge, information and ideas and the management and operations of the institutions thereof.

The power of the media to address the educational health and other basic development needs of the country remains grossly under tapped. Large number of people particularly girls, continue to be out of school, while many of those in school do not receive any adequate or quality education. The pattern is repeated in the secondary and tertiary levels undermining the country's development ambitions to rise to a middle income status. Yet the proven efficacy of the media in distance education or formal pedagogy in support or in place of classroom teaching is still not being harnessed. At the same time media efforts at non-formal education are far too meager and insufficiently attractive, not creative.

The policy guidelines for all media are as follows:

- The freedom and independence of all media which shall be upheld and protected in full measure in consonance with the letter and spirit of the constitution.
- The power of the media shall be used to encourage the promotion and growth of local culture.
- Media shall be expected to provide support to national educational effort.
- The media shall promote technological competence and self-sufficiency in their operations.

In view of the above the common policy implementation guidelines specify that the public media shall have a special mandate to meet the information, education and communication needs of the nation and especially of the rural majority, the urban poor and sectors such as women and youth, on the periphery of the national discourse.

Again research shall be an integral part of the operations of the media. Such research shall encompass data for regular output development and evaluation. To enable the inclusion of the widest possible population the use of participatory approaches and tools in addition to quantitative methods research shall be encouraged and promoted.

Education and Industry linkages

To improve responsiveness to technical education and training to meet future needs of industry, especially in the strategic sectors. This will link education to industry to develop a critical mass of skilled workforce for industrial development. The linkages will help provide the right blend of managerial and technical skills as well as entrepreneurship for the future and integrate educational outputs with industrial labour needs. A future Skills Advisory Group will be established in collaboration with the Ministry of Education to indentify skills needs and recommend ways in which the education and training

systems can respond to meet these needs in a timely manner. Marketing as a business approach will be promoted at all educational levels and greater emphasis placed on technical education and training.

Outputs for this objective include:

- Curricula for tertiary institutes aligned to the needs of industry;
- Specialized training centers established for targeted sectors;
- Effective attachment programmes for undergraduates in industry operational;
- Effective linkages between tertiary , research institutions and industry established;
- Adequate career guidance and counseling services provided.

Education and environmental conservation linkages

The success of environmental strategies and polices for regions, countries and the entire globe depends largely on education on preservation and protection of biodiversity. The current rate of loss of species is alarming. Worldwide about 60% of ecosystem services are degraded or in decline, much of this occurred in the last 50 years with no sign of recovery. In Ghana, rate of deforestation is about 2.8 percent per annum and about 90% of nations forest cover is lost due to bush fires, logging, shifting cultivation, charcoal production and increasing human population (EPA, 2004).

Education will lead the change towards a more sustainable future. Such education will include reducing carbon footprints, decreasing energy use, improving water shed management, land use planning etc. There are many other ecosystem services which recently are under investigation including hydrologic services, recreation and other cultural services, air cleaning and carbon sequestration. Research will assist to unearth the benefits of these to humanity to encourage their sustainable use. To meet all these challenges we need to generate knowledge and understanding including scientific knowledge through research and tacit knowledge resident with the local people living with the natural resources.

National Land Policy

The Land Policy of Ghana aims at the judicious use of the nation's land and all its natural resources by all sections of the Ghanaian society in support of various socio- economic activities undertaken in accordance with sustainable resource management principles and in maintaining viable ecosystems. Research should constantly address the teething problems that confront the country on its land use and management for policy. Education must help create the requisite awareness of the country's land policy for her socio-economic development.

National Wildfire Policy

Statistics at the forestry sector reveals that the annual loss of revenue from merchantable timber to wildfire is about US$24 million. The cumulative effect of wildfires is an annual loss of 3% of Gross Domestic Product (GDP) estimated at about US$210 million. Although the devastating effects of wildfires are felt by all, it is the poor who are particularly at risk because they depend directly on land for their livelihood and often live in fragile ecosystems.

Fire has always been used as a tool for land management and plays a central role in the maintenance of many natural ecosystems, as well as in the practice of agriculture and rangeland management. This policy however only sought to persuade local communities to embrace fire management as a tool for savannah woodland management. The policy advocated for the prevention of burning farmlands and grasslands and encouraged wildfire awareness campaigns.

This policy aimed at conservation and sustainable development of the nation's forest and wildlife resources for maintenance of environmental quality and perpetual flow of optimum benefits to all segments of society. Deriving from the policy objectives, the following strategies intended to guide policy actions and execution of specific activities will be pursued:

Effective prevention and control of wildfires

High incidence of wildfire in the country would be controlled through the adoption of the following strategies:

- Development and promotion of integrated wildfire prevention and control practices based on appropriate technologies.
- Inclusion of wildfire prevention and control issues in resource management planning at all levels by relevant institutions.
- Promotion of effective communication strategies, training and environmental education to sustain public awareness.
- Inter-agency coordination, cooperation and networking at national, district, and community levels shall be vigorously pursued.
- Development of adequate infrastructure and manpower to support wildfire prevention and control.

Education and Ozone Depletion Linkages

The Management of Ozone Depleting Substances and Products Regulations, 2005 L.I. 1812 states this substance/product is harmful to the ozone layer. The Environmental Protection Agency shall carry out public awareness activities and programmes relating to the elimination of ozone depleting substances and products. The Executive Director shall, once in each year, publish in the mass media and at the offices of the Agency, a list of controlled substances and products and persons permitted to import or manufacture controlled substances and products.

Education and Agriculture Linkages

There is the need to strengthen the development, application and transfer of agro-based technologies for sustainable agriculture, food security, diversification of the economy, and industrial growth through value addition. Strategies that will be used include:

i. Sustain and improve agriculture research of the National Agricultural Research System (NARS) to raise the productivity of crops, livestock, poultry, fish resources, production tools and implements with due regard to impact on the environment.
ii. Promote the application of new technologies including safe biotechnology, which hold potential for increasing productivity;
iii. Reduce post harvest losses in agricultural production in both cash and food crops;

iv. Promote the development of food processing industries and enhance value addition for the local market and for exports;
v. Strengthen the production of non-traditional export commodities to enhance the diversification of the economy;
vi. Marketing of agricultural produce;
vii. Promote research on orphan and medicinal crops;
viii. Promote soil and water resources management;
ix. Strengthen the linkage between research and agricultural extension.

Education and Health Linkages

Education for health is to support activities and programmes to improve the quality of health of the citizenry; facilitate the sustainable exploitation of indigenous natural resources and knowledge for addressing health challenges; to educate, train and retain health professionals. Strategies are:

i. Promote preventive and regenerative healthcare;
ii. Support biomedical research in prevalent diseases in the areas of prevention, diagnosis, therapy and management;
iii. Improve access and services in the general health care delivery system;
iv. Promote technologies in support of sanitation, environmental and occupational health;
v. Promote research in bio-medical engineering and and the information technology application in the health delivery system;
vi. Enhance the development of human resource for healthcare delivery;
vii. Promote research into plant medicine to complement allopathic medicine and commercialization of the research results.
viii. Establish specialized health centers to promote health tourism.

Education and Population Linkages

Ghana's population is increasing over the years. In 1960 the population was 6.7million, in 1970 it was 8.5 million, in 1984 it was 12.2million, in 2000 it was 18.9million and in 2010 it was 24million. The National Population Council (NPC) Act 1994 (Act 485) was promulgated to handle population issues. The vision of the NPC is to maintain and achieve a population growth consistent with the aspirations and development needs and objectives of Ghana as stated in Vision 2020. The mission of the NPC is to coordinate, monitor and evaluate population programmes, recommend new population policies or changes to existing ones and promote researches and studies on population issues.

Energy Linkages

To ensure the supply of sustainable, affordable, safe and reliable energy for domestic and industrial use; and provide an appropriate mix of energy sources research is critical. Some strategies to be used are to:

1. Promote a research and development programme relating to alternate energy sources such as solar energy, biomass, wind and other renewable energy sources to supplement the current traditional energy sources;

2. Facilitate efforts to acquire and adapt sustainable safe and economical energy technologies for national development;
3. Support research aimed at upgrading hydropower energy production technology;
4. Promote research and development efforts aimed dissemination of energy technology for rural development;
5. Promote public support for energy conservation and encourage private investment in energy technologies;
6. Encourage community investment and ownership of energy systems e.g. solar farms, windmills and biomass plants;
7. Exploit the utilization of nuclear energy resources for domestic and industrial use.
8. Develop an integrated petrochemical industry to respond to the oil and gas industry.

Sports and Recreation Linkages

To promote scientific and technological methods which enhance the development of all sports.

Strategies that will be used include:

i. Promote research and development in sports medicine and nutrition, physical education and other disciplines to produce high caliber of sportsmen and sports women including the physically challenged;
ii. Facilitate the development of recreation as a health maintenance factor;
iii. Encourage STI courses related to sports at all levels of education.

Tourism

The Tourism Policy (2004) intends to use Sustainable Tourist Industry (STI) to improve the tourism industry for better service delivery. The strategies include:

i. Promote STI in marketing Ghana's tourist resources;
ii. Adopt relevant technologies in the operations of tourist industries;
iii. Design and implement training schemes to enhance the competence of the technical staff of the tourism industry.

Education, Research and Mining Linkages

To promote research and education into better ways of mining gold, diamond, petroleum and other minerals that will reduce degradation of the environment and enhance value addition for the export of the product.

Education and Consumer Behavior Linkages

Use education to teach consumer rights and help empower citizens. The strategies include:

- Educate people to buy food from a hygienic environment;
- Help to avoid false advertising in private mass transport (*trotros*) and radios;
- Make sure you understand the labeling of a product;
- Always check the date of expiry of products they buy;
- Ensure warranty is valid for their products or report to the police;
- Help citizens to direct complaints to the Ghana Standards Board or Food and Drugs Board.

Education on drug abuse and illicit drug trafficking

The Narcotics Control Board (NACOB) carries out education in schools and colleges because students are vulnerable to drug abuse and illicit trafficking. Drug abuse and illicit drug trafficking has become a growing problem and many people do not know all the dangers and risks associated with drugs. The World Health Organisation defined drug as any substance that when taken into the living organism may modify its perception, mood, cognitive behavior and motor function. People enter into illicit drug trafficking through ignorance, desire to get rich quickly, addiction, peer pressure and poverty. Drug abuse has led to many school drop outs. Strategies to be used to stop drug abuse include:

- Educate students in the school systems. The most common drugs in JHS and SHS are marijuana. There are always pupils in every school that drop out and start to deal in drugs on the streets and just forget about their education
- Awareness creation. People who use drugs become victims of unprotected sex which may result in contracting STDs.
- Use of platforms during durbars and festivals to create awareness on the dangers of illicit drug trafficking.
- There should be collaboration with fishermen to inform law enforcement agencies about sighting of packages and sea vessels.
- The media constantly educates the public on the dangers and consequences of illicit drug trafficking in the community.

Education and Migration of Human Capital

It is important to manage migration for development and to achieve the effective management of migration as a tool for the sustainable development of Ghana. Strategies to use are:

- Provide reliable data and documentary information on migratory flows and stock of the country.
- Improve the legal and policy environment for the management of migration
- Help establish more flexible policy for remittances and transfer of knowledge and skills for national development
- Create awareness in migratory flows to make for better economic growth and poverty reduction

3.0 INSTITUTIONAL FRAMEWORK FOR EDUCATION AND RESEARCH

The Ministry of Education

The Ministry of Education (MOE) is an important government institution empowered to manage education activities in the country. However there are other ministries and departments which also take charge of issues since education cuts across all sectors of society.

Ghana Education Service

This is the main institution which promotes education in the first and second cycle institutions. They are involved in the teacher education and postings to all parts of the country. Curriculum development to meet national aspirations and the infrastructural development of educational institutions are part of their mandate.

National Council for Tertiary Education

This council supervises all tertiary institutions including polytechnics and universities in the country. They are mandated to provide funding for research work at the universities and polytechnics.

Universities and Polytechnics

These are public and private institutions which are established for education, research and publication. Through their education, they provide high level manpower for the country's socio-economic development. The public universities are University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, University of Development Studies and the University of Mines. Two new universities are starting in September 2011. These are University of Health and Applied Sciences and University of Energy and Natural Resources. There are numerous private universities established mainly by religious organizations. Each of the ten regions of Ghana now also has a polytechnic.

Ministry of Environment, Science and Technology (MEST)

The MEST is the ministry which deals with scientific research in the areas of environmental sustainability and applied sciences apart from the country's universities. Under this ministry is the Council for Science and Industrial Research.

Council for Science and Industrial Research

The Council for Science and Industrial Research (CSIR) is the foremost research organisation in Ghana and for the government. This CSIR has thirteen research institutions namely Animal Research Institute (ARI); Building and Road Research Institute (BRRI); Crops Research Institute (CRI); Food Research Institute (FRI); Forestry Research Institute of Ghana (FORIG); Institute of Technological Information (INSTI); Oil Palm Research Institute (OPRI); Plant Genetics Resources Research Institute (PGRRI); Savannah Agricultural Research Institute (SARI); Science and Technology Policy Research Institute (STEPRI); Soil Research Institute (SRI), and Water Research Institute (WRI). These research institutes carry out various research work specific to their mandate though there are collaborations with other institutes within and outside Ghana.

Ghana Atomic Energy Commission (GAEC).

This commission is responsible for research work in nuclear energy for safe use in the country. They educate the public about the use of radiation to treat food as well as test imported meat and other consumables for traces of radioactive materials which are injurious to human beings. Currently they are engaged in research work on radiation in the masts. GAEC advises the country on the effects of telecommunication masts based on informed scientific work.

Food and Drugs Board

The Board has facilities to test and ensure that all food imports into the country are wholesome for consumption. They have the power to educate the public not to patronize products deemed unwholesome which should be destroyed.

Noguchi Memorial Institute for Medical Research

This institute researches into tropical diseases such as malaria, yellow fever and gastrointestinal diseases. Lately they also started research into the HIV/AIDS. Located at the University of Ghana they receive Japanese funding for their activities.

Ministry of Health and Ghana Health Service

The Ministry makes policy decisions on research into health problems such as the six killer diseases, infant mortality and other health issues. The Ghana Health Service trains nurses, environmental health officers and other paramedics. The Ghana Medical Council and the College of Physicians and Surgeons also ensure further training for general and specialist practitioners in the medical field.

Non Governmental Organisations (NGOs)

Many NGOs have ventured in the education and research fields.

Ministry of Information and National Orientation

This ministry informs the public about government policies, programmes and projects which are to benefit the people. The Information Services Department works under this ministry

4.0 POLICY FRAMEWORK FOR DELIVERY OF EDUCATION AND RESEARCH

Ghana Education Policy

The education system in Ghana has undergone enormous changes in the last 50 years. Over this period it has gone from being highly regarded among African nations, through a period of collapse and more recently rejuvenation. Although Ghana's education system had been regarded as one of the highly developed in West Africa (Foster, 1965), by the 1980s it was in near collapse (Scadding, 1989; Peil, 1995) and viewed as dysfunctional in relation to the goals and aspirations of the country. The academic standards of pupils, support for teachers, instructional materials, school buildings, classrooms and equipment had declined through lack of financing and management. In 1996 the Ghanaian government embarked on a major donor-funded reform programme called the Free Compulsory Universal Basic Education (FCUBE) programme which touched all levels of the education system and attempted to

address the perennial problems of access, retention, curriculum relevance, teacher training, provision of physical structures, and financing.

Basic education in the pre-Independence era

This first phase in the development of basic education policy and practice in Ghana was dominated by missionary activities in relation to literacy for trade and the teachings of the Bible. Formal education in Ghana dates back to the mercantile era preceding colonisation. European merchants and missionaries set up the first schools and Christian missionaries are said to have introduced western-style education into Ghana as early as 1765. Many of these institutions, established by Presbyterian and Methodist missionaries, were located in the south of the country called the British Gold Coast Colony. The main aim of these early schools was to facilitate the training of the local inhabitants as interpreters for purposes of trade and as a conversion of Ghanaians to the Christian religion. Thus the curriculum had a narrow focus on basic literacy with the Bible and scripture as the main texts of schooling.

Policy initiatives in basic education from 1951-1986

The second phase was characterised by instability in governance as a result of successive military takeovers. This political instability coupled with the rise in oil prices in the early 1970s resulted in economic decline in the country and resulted in a significant number of trained and highly qualified teachers leaving the country (Nti, 1999). Education was therefore faced with political instability, ad hoc measures, and frequent changes in education policy. Teaching and learning in basic schools had deteriorated to the extent that the majority of school leavers were illiterate, and confidence in Ghana's once enviable education system was shaken.

In 1951 Dr Kwame Nkrumah, embarked on a massive expansion of the education system to speed up the pace of educational development in the then Gold Coast. This was in response to popular demand for education and to the new Africa Government's intention to organise a planned campaign to abolish illiteracy. This initiative was followed by further developments with Ghana's Independence in 1957. In fact the next 35 years saw a wide range of developments and reform initiatives taking place in Ghana's education system. Within this period three significant stages can be discerned. These were the Accelerated Development Plans (ADPs) for Education in 1951 and 1961, the findings of the Dzobo Committee of 1973 and the following, New Structure and Content of Education Plan in 1974. The intentions associated with the new military government of the Provisional National Defence Council (PNDC) in 1981 led to further changes. These are discussed in more detail below.

The Accelerated Development Plans (ADP) for Education of 1951 and 1961

The ADP, launched in 1951, gained legal backing through the 1961 Education Act, which sought to provide free, universal and compulsory basic education (of 6 years duration) for all children from 6 years of age. The 1961 Education Act empowered Local Authority Councils to be in control of educational management whilst parents and guardians were expected to make some contribution to the running of schools in their areas. Primary education underwent a rapid and steady growth and the number of schools rose from 1,081 in 1951 to 3,372 in 1952. Enrolment doubled in a period of five years and Ghana

was acclaimed as having the most developed education system in Africa (Foster, 1965; Ghana Human Development Report, 1998; Scadding, 1989).

Realizing the importance of trained teachers for the expanded system, the 1961 Education Act opened new teacher training colleges, expanded those already in existence and made provision for the training of unqualified teachers in the field through various emergency and short-term in-service training programmes. Teachers' numbers increased by 1,000 between 1951 and 1953, with the yearly output rising from 420 to 1,108 trained teachers from teacher training colleges.

In 1961 the entire basic education system was made free and compulsory. However, even though school enrolments increased following the 1961 Education Act, the quality of teaching and learning appeared to have remained the same. The most significant factor that affected the imbalance was an inability to provide schools with trained teachers. With the increase in the number of schools, more teachers were needed and many untrained teachers were employed to teach, resulting in poor teaching and learning in schools during this period.

The Dzobo Committee of 1973 and the New Structure and Content of Education of 1974

Prior to 1972 the education system had been criticized as being elitist in character built on a selective system similar to the British grammar schools. In 1973 the military government carried out a review of the educational system, and formed the so-called Dzobo Committee to recommend appropriate measures to improve the situation (Dzobo, 1974). This led, in 1974, to the government putting into operation the first major, post-Independence, reform in pre-university education. This reform is generally referred to as 'The New Structure and Content of Education' (NSCE) and reduced the length of pre-tertiary education from 17 years to 13 years. The 6 years of primary education remained the same. The four years of junior school was reduced to three years. The five years of senior secondary school, lower stage was reduced to two years, and the period of senior secondary, upper level, remained the same (i.e. it went from a pattern of 6-4-5-2 to one of 6-3-3).

The aim was to make it possible for school leavers to leave at any point of exit from the system with skills that would enable them to be employable. The reform was expected to raise standards at the various levels so that educational standards would not be compromised as a result of the decrease in the number of years spent in pre-tertiary education. The thrust of the content of the reform programme was to vocationalize pre-university education in Ghana and to make it more functional and oriented towards contextual demands and challenges. It also constituted a bold attempt to reduce educational expenditure.

However, despite its laudable intentions, the NSCE did not have any sustainable impact on the general education system of the country. There were still unqualified teachers in the education system, inadequate resources to support teaching and learning in schools, and challenges for teachers within the context and content demands of the curriculum. This again led to intense unease among parents, employers, academics and some politicians.

The significance of the Government's White Paper on the Committee's recommendations was the acceptance of 13-years duration of pre-university education for all. It endorsed the introduction of pre-technical and pre-vocational subjects in both primary and junior secondary curricula. The period also marked the establishment of the Ghana Education Service which brought together, for the first time, teachers, educational administrators and education sector workers into a new government agency, under the Ministry of Education, to implement the new structure of education. The third significant policy development in basic education provision arose from the virtual collapse of the education system and a further military takeover in 1981.

Ghanaian Education System and the PNDC of 1981

December 1981 marked the takeover of yet another military government under the name of the 'Provisional National Defence Council' (PNDC). By 1983, Ghana's education system had seriously deteriorated in quality; enrolment rates stagnated and the percentage of Gross Domestic Product (GDP) allocated to education dropped from 6.4% in 1976 to a low of 1.7% in 1983. Government resources were no longer available to construct, complete or even maintain the existing education facilities and the down-turn in the economy resulted in the mass exodus of qualified teachers to other parts of the continent causing a significant fall in the ratio of trained to untrained teachers in the basic education sector.

Arising from the economic constraints that faced the country in the late 1970s and early 1980s, the bureaucratic bottlenecks and lack of interest and commitment from administrators, the new programme never went beyond the experimental stage. There was near demise of the experimental Junior Secondary School (JSS) system. By 1983 the education system was in major crisis through lack of educational materials, deterioration of school structures, low enrolment levels, high drop-out rates, poor educational administration and management, drastic reductions in Government's educational financing and the lack of data and statistics on which to base any planning.

The 1987 education reforms

The third phase structuring covers the period of major reform from which the Free Compulsory Universal Basic Education (FCUBE) reform of 1996 emerged. It was characterised by Ghana's participation in, and endorsement of, international agreements such as Education for all, the Declaration on the Rights of the Child, the Beijing Declaration on Women's Rights and the Lome Convention. the Government had to remain committed to her constitutional obligations as a guide to policy and was influenced by the bilateral and multilateral negotiations it had taken part in. There was strong ambition of the government to reform the education system by leaving no stone unturned in restructuring the nation's economic base to bring it into conformity with the financial credibility criteria required by the World Bank. With this condition met, Ghana had the opportunity of negotiating for credits and grants to finance major education reform. Several donor agencies came to the aid of Ghana in her reform implementation, a greater part of which was directed to basic education.

In 1987 The New Educational Reform Programme (NERP) was introduced with total restructuring of the entire pre-tertiary education system and on improving access through the provision of infrastructure whilst making the curriculum more relevant to social and economic needs. The goals of the 1987 NERP as summed up in the Sector Adjustment Policy Document of the World Bank (World Bank, 1986) included the following: (i) to expand access to education; (ii) to improve the quality of education; (iii) to make education more relevant in meeting the needs and aspirations of the individuals and the socio-economic conditions of the country; (iv) to re-structure pre-university education to 12 years (6-3-3); and (v) to ensure cost-effectiveness and cost-recovery.

A major thrust of the 1987 NERP reform was the diversification of the formal academic courses offered in pre-university institutions by the inclusion of practical courses. These changes were intended to correct the perceived elitist education that downgraded technical, vocational and agricultural education.

In 1983, Ghana embarked Economic Recovery Programme with support from the World Bank, the IMF, as well grants from UNDP, Switzerland, the United Kingdom, Norway, Canada and concessional loans from the OPEC fund (World Bank, 1990). This period reflected a policy climate conducive and committed to improving educational quality through giving schools the means and responsibility to respond to the change process being initiated at the time. The period also attracted bilateral donors within the education sector and thus witnessed the beginning of a USAID Primary Education Programme in the country.

In 1994, seven years after the inception of the New Education Reform Programme in 1987, the results of poor performance of school pupils at age 12 led to the setting up of yet another Education Review Committee to review the education system. At this time, only 6% of the pupils at grade six in public schools tested nation-wide, achieved a criterion score of 60% and above in English. Even worse, less than 3% achieved a criterion score of 55% and above in Mathematics (MOE/PREP, 1994). The Education Review Committee decided to develop and introduce new curricula for primary schools since it was argued that a large proportion of the subject matter in the curriculum was not relevant to the pupils' immediate environment. In addition, it was criticised as being overloaded in content and too rigid and compartmentalised, thus reducing the effectiveness of the teaching and learning tasks. As a result of the 1994 review, a further major reform, the Free Compulsory Universal Basic Education Programme (FCUBE) was initiated as a constitutionally mandated charge of the 1992 Constitution.

The 1992 Constitution: the Free Compulsory Universal Basic Education Programme (FCUBE) of 1996

The FCUBE initiative was the Ministry of Education's response to a constitutionally mandated charge arising from Article 39 (2) of the 1992 Constitution of the Fourth Republic of Ghana:

> 'The Government shall, within two years of parliament first meets (sic) after coming into force of this Constitution draw up a programme for implementation within the following ten years, for the provision of free, compulsory and universal basic education (Government of Ghana, 1992).

Even though the FCUBE policy was not 'new' in terms of themes and ideas, it was certainly 'new' in the emphasis placed on its implementation. By requiring that all Ghanaians receive nine years of free schooling, the Government wished to ensure that all graduates of the basic education system were prepared for further education and skill training. Article 39 (2) of the 1992 Constitution entitled every child of school-going age in Ghana to a balanced and broadly based curriculum which promised to promote the spiritual, moral, cultural, mental and physical development of pupils at the school and of society. It also aimed to prepare pupils for the opportunities, responsibilities and experiences of adult life. The expansion and reforms planned under the FCUBE were designed to equip future generations of Ghanaians with fundamental knowledge and skills, in selected Ghanaian languages, literacy and numeracy, in order to develop further, their talents through additional education or training (MOE, 1987, 1996, 1998). This was to be achieved through the four objectives of the FCUBE reform: (i) to improve the Quality of Teaching and Learning; (ii) to improve Management Efficiency and Sustainability; (iii) to increase Access and Partnership; and (iv) to decentralize the Management of the Education Sector (MOE, 1996, p 15).

According to the FCUBE Policy Document of 1996, improvement in the quality of teaching and learning were to be promoted by curriculum review and development, the provision of textbooks, teaching and learning materials and books for school libraries. In addition, there would be the development of an assessment and evaluation system for pupil performance.

The school curriculum was envisaged to develop in pupils the following: '…skills of listening, speaking, reading and writing and knowledge of the principles and skills of the numeracy, measurement and of the relationship involving space and shape. In addition, knowledge and understanding of the cultural, economic and physical heritage of the people and their neighbours should be emphasised. Research and study skills, skills of enquiry, analysis and knowledge of healthy living plus issues of gender sensitivity in text of curriculum as well as in illustration should be pursued…' (MOE, 1996)

In line with the policy document, the Basic Education curriculum was designed to achieve literacy, numeracy and to impart appropriate knowledge of culture and practical skills. In addition, exposure to, and hands-on experience in, technical and vocational skills were intended. At the beginning, the curriculum comprised as many as nine subjects. The Education Reform Review Committee later reduced this to five and six subjects in lower and upper primary respectively. This was to allow more time for the development of writing, reading and numeracy skills after the Ministry of Education conceded that subject overload was a factor contributing to the dismal performance of pupils' learning outcomes. Changes to the curriculum were introduced in 1996. Currently subjects taught at Lower Primary are English, Ghanaian Language and Culture, Mathematics, Environmental Studies and Religious/Moral Education. For Upper Primary, Integrated Science, Physical Education, Music and Dance are taught in addition to those in Lower Primary schools. The real challenge of the FCUBE is to provide and ensure that an education of comparable quality is made available to all through the evolution of a common school system.

The increasing concern for the quality of teaching and learning in basic schools (both primary and junior secondary schools) had brought to light serious problems of teacher education. In view of this concern, in 1996 the Ministry of Education tried to step up efforts towards effective teacher training, and even more importantly, to recognize that in-service training is an essential aspect of continued professional development.

On teacher education, the policy document stresses that:

> 'The implementation of the FCUBE programme will require the services of a large number of well qualified teachers in the shortest possible time. The teachers should be well-versed in teaching, particularly in primary methodology', and 'teacher development will be more 'school based' so that emphasis can be placed on hands-on-training activities in schools' (MOE, 1996, p 25).

In-service training was also linked to the training of headteachers who would in turn train teachers:

> 'After each phase of Headteachers' Continuing Education, they will organise 'school based' Continuing Education for teachers under the supervision of Circuit Supervisors. Circuit Supervisors will visit each school regularly at least once a month to support headteachers in the continuing education of classroom teachers. School Based Education for teachers will be organised at least twice a week.' (MOE, 1996).

Overall, there were two features of the 1996 FCUBE Basic Education Policy Document. The first was the strategy for the revitalisation of quality education was linked to an over-emphasis on material inputs rather than to how teachers' attitudes and behaviours in the education system could be mobilised to handle the unfamiliar pedagogical issues embedded in the revised curriculum. Secondly, arrangements for the effective supervision and monitoring of the programme at the district level, and how provision was to be made for the necessary logistical support to make such supervision feasible, were matters still left unresolved. Thus the policymakers did not consider the attitudes and behaviours of teachers who were to implement the change. In the Ghanaian situation in particular, this ignored the need for change in teachers' practices rather than simply a change in their curriculum materials.

A comparison of the FCUBE reform with its predecessors reveals that the former has directly borrowed many of its ideas from the recommendations of the previous educational policies of past governments. Whenever conferences or commissions are called upon to form a plan for education in Ghana, the tendency seems to be to maintain the existing system with slight modifications. In some places, there is direct acknowledgement of the FCUBE reform's indebtedness to the previous education policies, as illustrated on language issues which always remain one of the most sensitive issues in any education policy in Ghana. For example, the FCUBE reform goes back to the Accelerated Development Plan of 1951, with a renewed commitment to the idea of free and compulsory education for all pupils of school going age. However, one of the major results of the FCUBE reform, in contrast to previous reforms, has been its impact on donor agencies.

A major DFID response to improving teaching and learning was the Whole School Development (WSD) programme which was introduced in 1998. This is an implementation programme involving decentralizing and resourcing aimed at providing support to districts and schools to improve the quality of teaching and learning. It aimed to do this by promoting:

> '…Child-centred primary practice in literacy, numeracy and problem solving with the view to improve the quality of teaching and learning in basic schools, encourage community participation in education delivery, and to promoting the competencies of teaching and learning through school-based in-service training' (MOE, 1999).

The Whole School Development programme is a continuing process, providing support to teachers in basic schools, providing a mechanism for districts and schools to develop teachers and their schools for effective teaching and learning. It places an emphasis on literacy, numeracy and problem solving. The core focus of WSD is the classroom where quality teaching provided by competent teachers would result in effective learning. The school should have competent teachers and resources and the head teacher's capacity to manage the school built up. There should be continuing efforts at updating the competencies of the serving teacher.

WSD also envisages a new approach to teacher development or continuing in-service training. Under the new system being implemented the professional development of serving teachers' competencies does not depend on global in-service training designed by external bodies. Usually, in such top-down designs, the challenges identified do not reflect the needs of teachers. Under the WSD teachers themselves will be responsible for identifying their problems for solution. Under the leadership of their head teachers are required to find solutions to their problems through the use of lead curriculum/instructional leaders at the school level, and also through the cluster of schools arrangement. The District Teacher Support Team (DTST) which consists of head teachers and personnel from the district office is to provide support at the district level.

5.0 SUSTAINABLE CONSUMPTION AND PRODUCTION PRIORITIES

Given the many programmes outlined under section 3.0 that require implementation support, should they be addressed in the context of Sustainable Consumption and Production, prioritization is essential. Below is a list of priority concerns for Ghana in the context of the African 10-year framework programme (10-YFP) drawn from the list of initiatives already underscored in the previous sections. Along with these priorities, specific actions/activities and responsible lead institutions for sustainable consumption and production have been outlined in Table 1 below. It is anticipated that implementation of these suggested activities will lead to sustainable consumption and production of education in Ghana.

LIST OF SCP PRIORITIES IN EDUCATION AND RESEARCH IN THE CONTEXT OF THE AFRICAN 10 YFP

Table 1 Accelerating The Pace Towards Achieving Universal Basic Education For Sustainable Development

National priority Policy	Objective	Programmes /Activities	Results	Target groups/section
Accelerating the pace towards achieving universal basic education.	To rapidly increase access to quality basic education for children everywhere in the country.	Improve the quality of classroom building and other teaching and learning facilities in deprive rural areas in both the northern and southern sectors of the country. Introduce incentives that will attract and retain teachers in deprive rural areas in both the northern and southern sectors of the country. Introduce/enhance and increase access to facilities that attract and retain pupils in basic schools in the deprived rural areas capitation grant, school feeding programmes. Introduce measures that will encourage or compel parents to send their children to school.	Increased number of quality basic school classrooms in both urban and rural areas in the northern and southern sectors of the country. Improved TLM and classroom environments in urban and rural areas. Increased enrolment and retention of pupils in rural and urban basic schools Increased number of trained teachers in deprived and rural areas in northern and southern parts of the country	Rural areas Deprive urban communities Northern sector of the country.

Policy/pilot Activity	Implementing Institutions	Veritable indicators	Possible source of funding
Accelerating the pace towards achieving universal basic education.	• Ministry of Education • Ghana Education Service	• Percentage increase in number of children enrolled in basic schools in rural and deprive urban communities in both northern and southern sectors. • Percentage increase in number of good basic	• Government of Ghana • GETfund • Metropolitan, Municipal/ District Assemblies

	• Ministry of Finance	schools in rural and deprive communities. • Percentage increase in number of trained teachers in rural basic schools.	• Bilateral/Development partners • Multilateral/International

IMPROVEMENT IN SCHOOL CURRICULUM, ENROLMENT, REGIONAL AND GENDER EQUITY AT ALL LEVELS OF EDUCATION

Policy	Objectives	Activities	Results	Target group
Improving curriculum by including sustainable lifestyle in curriculum of schools	To improve the school and college curriculum with topics of sustainable development and positive lifestyles Develop capacity for promoting SC in schools	Identify national SD issues Incorporate them in syllabus Organise stakeholder forums to identify positive/ negative lifestyles. Books written on the subject and used in basic schools	SD information in curriculum Teaching of sustainable topics at all levels of education.	MOE, GES, NFS
Increase enrolment in schools Regional and gender equity of enrolment in tertiary education	To increase male and female enrolment in schools To improve equality of enrolment of students from all regions	Increase school buildings, teachers, furniture Motivate teachers in such areas Assist brilliant students to higher education	Increase in levels of enrolment in educational institutions Girls from rural areas admitted in tertiary schools	GES, Universities MoE, GES, NVTI, Universities
Training for skills development ESD in teacher training schools	To provide occupational and leadership training in schools To include ESD into induction programmes forteacher trainees.	Produce syllabus for ESD for TTC	More students equipped with new working skills	NVTI, Teacher Training Colleges
ESD in extra curricular work	Inculcate environment issues in sports and culture programmes	Identify extramural activities and promote sustainability issues		Ministries of Education, Sports

Policy area	**Implementing institution**	**Verifiable indicators**	**Possible sources of funding**
Improving curriculum with sustainable development and positive lifestyle in schools	MOE, GES, Tertiary institutions MOE, GES,	New curriculum written Workshop organised to discuss it Lifestyle included in new curricula	UNEP, GES, GoG MOE
Enrolment in educational institutions	GES, Tertiary institutions	Data on enrolment	MOE, GES,
Equity in enrolment in tertiary education	Tertiary institutions	Policy on equity based enrolment Verifiable data on enrolments	MOE, GES,
Training for skills development	GES, Private training institutes	Number of students and people trained per annum	MOE Non formal sector
ESD in teacher training schools	GES, Training Colleges	New syllabus of training colleges	MOE, GES
Environment and sustainability in extra - curricular programmes	GES, MOE,MOH, Tertiary institutions	Application of environmental issues in programmes	MOE, GES, Sports Council
Develop capacity for promoting sustainable consumption in schools		No of supervisors for schools	Second cycle institutions Third cycle institutions

PROMOTING SUSTAINABLE CONSUMPTION AND PRODUCTION THROUGH NON-FORMAL EDUCATION AND MASS COMMUNICATION

Policy /Pilot Activity	Objective	Activities	Results and Outcomes	Target Groups /
Promote collaboration amongst organizations involved in non-formal education and awareness creation.	To create a common platform for agencies and NGO's involved in non-formal education; and awareness creation on environment and poverty reduction to propagate information on sustainable consumption and production.	Identify agencies involved in non-formal education; and awareness creation on development issues. Create a database of organizations involved in non-formal education and awareness creation Organize regular review meetings to foster the sharing of experiences	Information on the activities of organizations involved in non-formal education and awareness creation collected and easily available. Experiences of practitioners shared.	NFED, EPA MOFA Forestry Commission PPA, NGOs District Assemblies
Develop teaching and learning materials (TLMs) on sustainable consumption and production.	To make available teaching and learning materials on sustainable consumption and production.	Identify available teaching and learning materials on sustainable consumption and development. Task teams to adapt TLM's for use in Publish and distribute TLMs on SCP	TLMs on sustainable consumption and production made available for non-formal education and awareness creation.	• NFED • EPA • MOFA • NGOs
Strengthen incorporate sustainable consumption and production issues in non-formal extension education.	To propagate information on sustainable development and production.	Encourage practitioners to use TLMs in their education and awareness creation activities.	Attitudinal change regarding SCP leading to sustainable use of resources.	The general population.
Use public-owned mass-media to propagate sustainable consumption and production issues.	To educate the general population on sustainable consumption and production.	Make available TLMs to public broadcasters. Use TLMs to create content and Broadcast SCP issues using the public-owned media.	Attitudinal change regarding consumption and production, leading to sustainable use of resources.	The general population.

Policy /Pilot Activity	Implementing Institutions	Verifiable Indicators	Sources of funding
Promote collaboration amongst organizations involved in non-formal education and awareness creation.	NFED, EPA, MOFA, PPA, NGOs, Forestry Commission	Number of organizations identified. Database of organizations.	Government of Ghana Donor Agencies

Develop teaching and learning materials (TLMs) on SCP.	NFED , EPA, MOFA, Forestry Commission, NGOs	Teaching and learning materials published and distributed.	Government of Ghana Donor Agencies
Incorporate SCP issues in non-formal/informal extension education.	NFED, EPA , MOFA Forestry Commission	TLMs used in education and awareness creation activities by practitioners.	Government of Ghana Donor Agencies
Use publicly-owned mass-media to propagate SCP issues.	• GBC TV • GBC FM stations	SCP issues broadcast by media Public awareness of SCP	Government of Ghana Donor Agencies

INFORMATION COMMUNICATION TECHNOLOGIES (ICTs) IN EDUCATION

Policy	Objectives	Activities	Results	Target groups
Strengthening and deployment of existing national policy framework on ICT in education	To provide guidelines for promoting and integrating ICT tools in all levels of education	Formalize framework by: ○ Organizing public consultation meetings ○ Identifying key stakeholders ○ Organize consultative meetings for focus groups and workshops ○ Setting up of cross-institutional ICT coordinating agency or council ○ Developing implementation plans	A functional national ICT in education framework established	MoEYS, GES, Heads of both public and private institutions, PTAs, educational NGOs, opinion leaders, media organisations.
Development and progressive integration of ICT across school curriculum	To integrate ICT curriculum into school curriculum at all levels	○ Define ICT-related study objectives at different levels ○ Set ICT attainment targets	Realization of ICT objectives including acquisition of ICT literacy skills by students at all levels of education	MoEYS, GES
Expansion of Physical Capital for ICT education	To improve school ICT equipment networking, at the basic and secondary level.	Acquire ICT equipment Enhance hardware quality Establish technical support infrastructure Improve internet connectivity	State-of the art ICT facilities operable	MoEYS, GES, educational institutions
Improvement of Human Capital for ICT education	To increase human capacity in ICTs for education	○ Engage experts for trainer workshops ○ Trainees to train other staff ○ Increase teachers and learners access to computers and the internet	Number of ICT skilled personnel trained	MoEYS, GES, Public / private educational institutions, ICT training institutions

Organizational Networking and Knowledge Sharing	To use ICTs to support communication, and knowledge sharing by students and teachers.	○ Foster institutional collaboration and knowledge sharing on ICT-related issues ○ Organize inter-school ICT-related competitions	Improved joint school project in ICT	MoEYS, GES, institutions, private sector
Monitoring and Evaluation	To monitor and evaluate use of ICTs for skill training in schools, to achieve sustainability	○ Evaluate organizational understanding of ICT issues in education ○ Assess institutional capacity on regularly ○ Assess impact of ICT on learning	Sustainable deployment of ICTs for development	MoEYS, GES, institutions, private sector

Policy area	**Implementing Institution**	**Verifiable indicators**	**Possible sources of funding**
ICTs in education framework	MoE, GES, all educational institutions	Framework of programmes and implementation plans on ICT in education outlining principles and priorities published	GoG, GES, Publics, Development partners
Physical Capital	MoE, GES, all educational institutions	Number and quality of hardware, technical support infrastructure, level of internet connectivity and access to computers	GoG, GES, Publics, Development partners
Capacity building	MoE, National Accreditation Board (NAB), Educational Institutions	Number of educators and learners trained	GoG, Publics, Development partners
Networking and Knowledge Sharing	All educational institutions	Level of collaboration between stakeholders	GoG, Publics, Development partners
Monitoring and Evaluation	MoE, National Accreditation Board (NAB), NCTE	Published reports	GoG, Development partners

PROMOTING DISTANCE EDUCATION FOR SUSTAINABLE DEVELOPMENT

Policy/ pilot activity	**Objective**	**Activities**	**Result/Outcome**	**Target groups/sectors**
Enhancing and Promoting Distance Education	To vigorously promote distance education	• Identify academic programmes to be offered by distance education • Commission expects to prepare appropriate modules to facilitate distance learning • Establish distance education study Centers throughout the country for tertiary education	* Number of academic programmes introduced by distance education * Number of modules published for use * Number of distance education centers established • Number of distance education programmes	• Tertiary level students • Second cycle level students • Workers

		• Use multimedia distance education • Encourage second cycle institutions to access distance education multimedia	offered through multimedia • Increased number of Secondary Schools accessing the D.E by multimedia	
Policy area	**Implementing institution**	**Verifiable indicators**	**Sources of funding**	**Remarks**
Promote distance education in schools and colleges	MOE, Universities, Nurses training On-line schools	Teachers availability Technology and books for use Increased enrolment of students	Universities Virtual universities Individuals self financing	This education is growing among workers who wish to improve themselves

NATIONAL RESEARCH AGENDA

Policy	**Objective**	**Activities**	**Results**	**Target Group**
National Research Agenda	To define national research agenda	*Identify stakeholders *Organise stakeholders workshop *Establish a functioning and well resourced National S&T Fund * Identify key areas of research *Document and disseminate	National Research Agenda on SCP identified and disseminated	MEST, MOE, CSIR, NCTE, Tertiary institution NDPC Civil society NGOs
Human and institutional capacity building for research	To develop human and institutional capacity for research for SPC	*Train staff *Acquire equipment and facilities *Acquire resources for research * Offer attractive conditions of service for research scientists	*Critical mass of researchers on SCP trained material resources for research acquired	CSIR, Univ. Industry Others
Linkage to industry	To promote ownership of research results for their actualisation or utilisation by industry and other end-users	*Conduct demand-driven research for identifiable end-users; * Organise workshops to disseminate research results * Organise consensus between researchers and end-users	Research results utilised	CSIR; Tertiary Institutions, industry, and other users.
Policy Area	**Implementing institution**	**Verifiable indicators**	**Sources of funding**	**Remarks**
National Research Agenda	NCTE, CSIR, Tertiary institutions	A critical mass of researchers for SCP trained	GOG, Development partners	
Research – Industry linkages	Industries, MEST, CSIR, NGO's, MOT Private Enterprise Foundation, Association of Industries	High level of adoption rates of research results by industry and other end-users	AGI, PEF, GEA, Ter. Inst. NCTE, CSIR	

Problem	Possible Solution
The problem of actualization of research findings. Many relevant research findings lie on the shelves without their application	The institutions responsible for facilitating the spread and acculturation of research findings such the CSIR must be strengthened to perform such activities. On the other hands, an independent body must be established to purposively gather research findings and see to their applications in relevant areas.
Inadequate funding for research activities	The government must increase its budgetary allocations for research in Ghana. In addition research institutions must be proactive in raising additional funds to augment their budgetary submissions from the government.
Lack of clear linkage between developmental Policy/Plan in Ghana and research.	Ghana needs strategic development plan with research as the backbone for accelerate development. The lack of development policy that requires targeted research inhibits research programmes on Ghana. This also reduces the political will to support and see to the implementations of research findings.
The research and educational institutions lack the facilities to train and equip young research scientists for the country S&T high level manpower development	The research institutions must be resourced to provide the required research personnel for the development of the country. The culture of research must be included in the curricular at the secondary level with the option to progress from secondary to an institution purposely established for research in technical, socio-economic, etc.

6.0 PROJECT CONCEPT

Education for sustainable consumption and production in Ghana

Background
Ghana needs to promote education for sustainable consumption and production. Globalization and its impact on consumption have created the need to raise awareness among the citizenry.

Objectives
The project is to promoting sustainable consumption and production through formal, non-formal education and mass media. Create a common platform for agencies and NGO's involved in non-formal education; and awareness creation on environment and poverty reduction to propagate information on sustainable consumption and production

Activities and duration

- Identify and publish teaching and learning materials for SCP and development. Identify agencies in formal and non-formal education; and awareness creation on SCP.
- Create a database of organizations involved in non-formal education and awareness creation. Organize regular meetings for sharing of experiences for public and private institutions on SCP.
- Task teams to adapt TLM's for use in schools, and for the general public
- Encourage practitioners to use TLMs in their education and awareness creation activities
- Make available TLMs to private and public broadcasters for use in their programmes.
- Use TLMs to create content for news publications
- Broadcast SCP issues using the public-owned media.

Inputs
Inputs for the project will be the expertise who to deliver the knowledge and skills on SCP to the public.

Outcomes
Information on the activities of organizations involved in non-formal education and awareness creation collected and easily available.
Experiences of practitioners in sustainable consumption shared
TLMs on SCP made available for non-formal education and awareness creation.
Attitudinal change regarding SCP leading to sustainable use of natural resources.

Target groups
NFED, EPA, MOFA, Forestry Commission, PPA, NGOs, district assemblies, general population.

Verifiable indicators
Numbers of students and general public educated on the programme.
Number of documents produced to assist the awareness programme for the public
Number of awareness clubs and societies formed countrywide to disseminate information

Project management
Activities to be carried out by EPA, Ministry of Education and Media

7.0 GENERAL RECOMMENDATIONS

1. **Accelerating the pace towards achieving universal basic education for sustainable development.** All efforts must be made to rapidly increase access to quality basic education for children everywhere in the country.

2. **Improvement in school curriculum, enrolment, regional and gender equity at all levels of education.** Educational experts should improve the school and college curriculum with topics of sustainable development and positive lifestyles.

3. **Promoting sustainable consumption and production through non-formal education and mass communication** It is important to create a common platform for agencies and NGO's involved in non-formal education; and awareness creation on environment and poverty reduction issues to share in ideas on propagating information on sustainable consumption and production

4. **Information and communication technologies in education.** There is need to provide guidelines for promoting and integrating ICT tools in all levels of education and to improve school ICT equipment and networking at the basic and secondary level and in rural areas.

5. **Promoting distance education for sustainable development**. The country should vigorously promote distance education for people who are willing to take advantage of it to further their education.

6. **Research.** There is need to define a national research agenda, to develop human and institutional capacity for research and to promote ownership of research results for their actualisation or utilisation by industry and other end-users.

8.0 CONCLUSION

Changing consumption and production patterns is one of the overarching objectives essential for sustainable development. Like most developing countries, Ghana's environment continues to experience degradation from increasing demands on its natural resources, partly due to unabated increases in human population, increasing socio-economic activities and lack of knowledge-based technologies able to sustain environmental integrity. Sustainable production and consumption behaviours that respond to basic human needs and confer a better quality of life, while minimizing the use of natural resources and consequential environmental degradation is the way to go. A successful devolution of knowledge for awareness creation on sustainable consumption and production among government functionaries, citizens and development partners alike, will require changes in educational curricula and research agenda focused on sustainable consumption and production concepts, if environmental degradation in Ghana is to be addressed effectively in the country. However, recognizing that consumption and production patterns are increasingly global and that international co-operation is needed to address them effectively, Ghana's effort in this direction

should be situated in the context of the African 10-year framework of programmes developed on sustainable consumption and production, in Johannesburg.

REFERENCES

1. Ministry Of Environment, Science And Technology (2009) National Science, Technology and Innovation Policy, Accra
2. Government of Ghana (1992) Constitution of the Republic of Ghana, Accra
3. Government of Ghana (2004) ICT for Accelerated Development, Accra
4. Council for Scientific and Industrial Research (CSIR) Act 521, 1996
5. Lands Commission Act 483, 1994
6. Local Government Act 462, 1993
7. The Environmental Protection (EPA) Agency Act 490, 1994
8. National Population Council (NPC) Act 1994 (Act 485)
9. National Environmental Sanitation Policy, 2007 (Revised)
10. Ministry of Health (2007) National Health Policy, Accra
11. Foster (1965) Ghana Human Development Report.
12. Ministry of Education (1996) FCUBE Policy Document
13. Dzobo N. Y. (1974) The New Structure and Content of Education
14. EPA (2004) The Ecozone and Land use land cover trends of Ghana
15. World Bank, (1990) Ghana Economic Recovery Programme
16. Management of Ozone Depleting Substances and Products Regulations, 2005 L.I. 1812.
17. P.N.D.C.L 46 (1983) Control of Bushfire Law;
18. P.N.D.C.L 229 (1990) Control and Prevention of Bushfire Law ;
19. The Forest and Wild life Policy of 1994;
20. Centre For Scientific Research into Plant Medicine Act,1975;

CHEMICALS

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1.0 Introduction

Improving the quality of life for everyone within the Earth's carrying capacity is the core interest of Agenda 21 and all those who are concerned about the sustainable use of the Earth's resources. Since the world's natural resources are limited, it is important to develop economies which are less consumptive via different and more effective production and consumption patterns. Unsustainable consumption places immense stress on the environment. Hence chemicals, like all other natural resources, must be utilized responsibly.

The word *"chemical substance"* is defined under the Food and Drugs Act, 1992 (PNDCL 305B) *as "any substance or mixture of substances prepared, sold or represented for use as a germicide, an antiseptic, a disinfectant, a pesticide, an insecticide, a rodenticide, vermicide, or detergent."*

Chemicals are indispensable in many economic activities and are a vital part of everyday life. They provide society with a wide range of benefits, particularly increased agricultural and industrial productivity and improvements in the control of disease. However chemicals have the potential to cause considerable health and environmental problems from production through to disposal. Misuse or failure to follow best practice can be costly. The presence in the environment and use of chemicals for various purposes affect the quality of the air, water, soil and human health.

Consumption and production cause diverse environmental load from all phases of the product lifecycle i.e. from extraction of raw materials, production, use, recycling and final disposal.

Sustainable consumption and production (SCP) therefore involve actors that can make the whole lifecycle more sustainable. For example industry when designing, producing and marketing products; consumers when choosing, buying, using and disposing products; Government when defining the framework conditions for business and consumer decisions.SCP potential lies in realizing synergies between these actors

2.0 Policy and Legal Framework for the Control and Management of Chemicals

The ultimate aim of Ghana's environmental policy is to improve the surroundings, living conditions and the quality of life of the entire citizenry, both present and future. The National Environmental Policy has some relevance, in a broad sense, for the management of chemicals in Ghana.

There are a number of laws that have some relevance to the control and management of chemicals, but most of these laws do not address the dangers posed to humans and the environment by the chemicals in question. Where they may be relevant, the institutions that deal with them do not have the resources to monitor or research into their disposal. Public awareness of the requirements of these laws is also low and compliance is also consequently low.

Part Two of the Environmental Protection Agency Act, 1994 (Act 490), addresses the importation, manufacture, formulation, distribution, use and transportation of pesticides in Ghana. A framework exists under the Environmental Protection Agency Act, 1994 (Act 490) and the Pesticides Control and Management Act, 1996 (Act 528) for inter-sectoral collaboration in the control and management of chemicals in the country. The EPA is the coordinating institution and the key Ministries, Departments and Agencies (MDAs) that constitute the various committees aimed at sound management of chemicals in the country include:

- Plant Protection and Regulatory Services Directorate (PPRSD) of the Ministry of Food and Agriculture;
- Ghana Standards Board;
- Ghana Atomic Energy Commission;
- Customs, Excise and Preventive Service;
- Ministry of Health/Ghana Health Service;
- Food and Drugs Board;
- Universities and Research Institutions and
- Non-Governmental Organizations (NGOs).

The existing chemicals-related legislations in Ghana include the following:

- The Environmental Protection Agency Act, (Act 490) of 1994. This Act which established the Environmental Protection Agency, seeks among other things to control the volumes, types, constituents and effects of waste discharges, emissions, deposits or other sources of pollutants and/or substances which are hazardous or potentially dangerous to the quality of life, human health and the environment through the issuance of environmental permits and pollution abatement notices. Section 10 of the EPA Act establishes the Hazardous Chemicals Committee with the following functions:
  - monitor the use of hazardous chemicals by collecting information on the importation, exportation, manufacture, distribution, sale, use and disposal of such chemicals;
  - advise the Board and the Executive Director on the regulation and management of hazardous chemicals; and
  - perform such other functions relating to such chemicals as the Board or the Executive Director may determine.

The above laws provide a framework for the management of all chemicals and pesticides. Other chemical related laws in operation in the country include:

- The Food and Drugs Law, 1992, (PNDCL 305B) which was enacted to control the manufacture, import, export, distribution, sale, use and advertisement of foods, drugs, cosmetics, household chemicals and medical devices. Drugs, cosmetics and household chemicals are made from several chemical substances that may have a negative impact on health and environment if the manufacture, distribution and disposal are not controlled and managed properly.
- The Factories, Offices and Shops Act, (Act 328) 1970, which seeks to protect the health and safety of workers from the dangers posed by chemicals to employees in the working environment;
- The Standards Decree, 1973 (NRCD 173)
- The Mercury Law, 1989
- Infectious Disease Ordinance (Cap 78)
- The Prevention and Control of Pests and Diseases of Plants Act, 1965 (Act 307).
- Cocoa Industry Regulations, 1968 (NLCD 278).
- Merchant Shipping (Dangerous Goods) Rules, 1974 (LI 971)
- Customs, Excise and Preventive Service Law (PNDCL 330)
- Local Government Act, 1993 (Act 462)
- Export and Import Act, 1995 (Act 528).

2.1. Relevant International Commitments and Obligations

Ghana participated fully during the negotiations of various Multilateral Environmental Agreements (MEAs) on chemicals and wastes and has ratified all except the Bamako Convention and the ILO Convention on the Safety of Chemicals at the Workplace (1990). Table 1 provides the list of chemicals-related MEAs and their ratification status for Ghana. Measures are being taken to give effect to our obligations under these Conventions.

Table 1: Chemicals- Related MEAs and their Ratification Status for Ghana

No	Convention	Year of Ratification
1	Stockholm Convention on Persistent Organic Pollutants (POPs) (2001)	2003
2	The Rotterdam Convention on Prior Informed Consent (PIC) Procedure of certain Pesticides and Chemicals in International Trade (1998);	2003

3	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989)	2003
4	Bamako Convention on the Control of Transboundary Movements of Hazardous Wastes (1991)	Not ratified
5	FAO International Code of Conduct for the Distribution and Use of Pesticides (as amended in 2003)	Adopted
6	ILO Convention on the safety of Chemicals at the Workplace (1990)	Not ratified
7	The UN Convention on Substances that Deplete the Ozone Layer (Vienna Convention) (1985)	1989
8	Montreal Protocol on Substances that Deplete the Ozone Layer (1987)	1989
9	London Amendment of the Montreal Protocol on Substances that Deplete the Ozone Layer (1990)	1992
10	UN Chemicals Weapons Convention (1993)	1997

3.0 POLICY MECHANISMS FOR SUSTAINABLE CONSUMPTION AND PRODUCTION OF CHEMICALS

Table 2: Policy framework and its verifiable indicators

Policy/Pilot Activity	Implementing Institutions	Verifiable Indicators	Possible sources of Funding
1. Managing the misuse of chemicals	• MoFA (PPRSD) • Fisheries Commission • MEST (EPA, GAEC, Research Inst) • MoE (Academic Institutions) • MoH (GHS, FDB) • Association of Ghana Industries • MoTI (GSB)	• Number of poisoning cases • Number of users of chemicals trained (e.g. Agrochemicals) • Number of cases of faked products reported • Number of samples analysed • Wrong labelling cases	• Government of Ghana • Bilateral/Development • Multilateral/international • Grants • Levies • Chemical industry

		reported	
2. Maintaining quality of chemicals	• MoFA (PPRSD) • MEST (EPA, Research Inst) • MoTI (GSB) • Association of Ghana Industries • MoE (Academic Insts.) • Fisheries Commission	• Number of cases of faked products	• Government of Ghana • Bilateral/Development • Multilateral/international • Chemical industry
3. Creation of Regional & District Poison Centres	• MOH (GHS, FDB) • MoFA (PPRSD) • Fisheries Commission • Minerals Commission	• Number of deaths due to poisoning • Number of poisoning cases reported. • Availability of information(fact sheets, brochures, other publications) on chemical poisoning	• Government of Ghana • Bilateral/Development • Multilateral/international • Chemical industry • Grants
4. Promote synergy between the Stockholm, Rotterdam and Basel Conventions at National and Regional levels.	• MEST (EPA) • MOFA (PPRSD) • MoTI (GSB) • Ministry of Lands and Natural resources • ECOWAS • MOH (GHS)	• Current figures on use of banned chemicals (e.g. POPS) in Ghana • Number of meetings on international conventions.	• Bilateral/Development • Multilateral/international • Grants • Chemical industry
5. Train staff in relevant	• MEST (EPA, GAEC, Research Inst)	• Number of trained personnel	• Bilateral/Development • Multilateral/international

institutions in the management and control of chemicals	• MOFA (PPRSD) • Fisheries Commission • MOTI (GSB) • MOE (Research & Academic Institutions		• Grants • Chemical Industry • Government of Ghana
6. Train policy makers and other law enforcement agencies on enforcement of legislation on chemicals	• MEST (EPA, Research Inst.) • MoE (Academic Institutions) • MoFA (PPRSD) • Ministry of Justice • Ministry of Finance and Economic Planning (CEPS) • Ministry of Interior	• Number of policy makers trained on chemical issues. • Number of culprits apprehended.	• Bilateral/Development • Multilateral/international • Grants • Chemical Industry • Government of Ghana
7. Coordinate activities of relevant institutions of SCP of chemicals.	• MoFA (PPRSD) • Fisheries Commission • MEST (EPA, GAEC, Research Inst.) • MoE (Academic Institutions) • Association of Ghana Industries. • Ministry of Interior • Ministry of Finance and Economic Planning (CEPS) • MOH (FDB, GHS) • MOTI (GSB)	• Number of meetings/workshops between stakeholder organizations. • Number of MoUs signed. • Number of fora held to facilitate information exchange and experiences of management of chemicals.	• Bilateral/Development • Multilateral/international • Grants • Government of Ghana • Chemical industry

8. Awareness creation of Sustainable Consumption and Production of Chemicals.	• MoFA (PPRSD) • Media • MEST (EPA) • Ministry of Information	• Number of awareness creation programs organized. • Number of publications on safe use of chemicals. • Radio/ T.V. Programs on safe use of chemicals.	• Local/national • Chemical industry
9. Increase cooperation with the existing Basel Convention Regional Centres and the FAO Regional Office.	• MoFA (PPRSD) • MEST (EPA)	• Number of technical support from regional centres. • Number of programs organized in collaboration with regional centres.	• Government of Ghana • Bilateral/Development • Multilateral/international • Grants • Chemical industry
10. Promote use of Chemical Information Network (CIEN) among stakeholder institutions.	• MEST (EPA) • MoFA (PPRSD) • Fisheries Commission • MEST (EPA, GAEC, Research) • MoE (Academic Institutions) • Association of Ghana Industries. • Ministry of Interior • Ministry of Finance and Economic Planning (CEPS) • MOH (FDB, GHS) • MOTI (GSB)	• Interactions between stakeholder institutions on chemical issues in terms of experiences and information sharing. • Number of publications on safe use of chemicals.	• Government of Ghana • Bilateral/Development • Multilateral/international • Grants • Chemical industry

4.0 Conclusions

To strengthen chemicals management, improve environmental quality and human health, the following steps need to be adopted:

i. Improvement in capacity to collect, collate and disseminate information on chemicals management to facilitate making informed decisions with regard to chemicals management;

ii. Establishment of an Integrated Chemicals Management Information Systems (ICMIS);

iii. Intensification of programmes on education, awareness raising and training;

iv. Enhancement in monitoring capacity, hazard and risk assessment, interpretation and communication;

v. Increase in capacity for implementing and enforcement and compliance in chemicals management;

vi. Strengthening of technical infrastructure of laboratory, capacity of NGOs and training institutes;

vii. Research and development into environmentally friendly alternative chemicals at the local level;

viii. Adoption of suitable strategy for pollution prevention and waste minimization;

ix. Adoption of risk management policy, including evaluation of safer chemical alternatives and non-chemical options;

x. Strengthening of legislation to ensure the availability of safe and effective chemicals for use at all times;

xi. Promotion of cleaner production techniques in industry

xii. Implementation of the Polluter Pays Principle

5.0 Way forward

There is no one type of approach and no single formula by which national SCP programs can or should be instituted. Every country needs to determine for itself how best to approach the development, implementation and monitoring of its SCP program considering the existing political,

cultural, economic and ecological conditions. There are certain key principles and elements of national SCP programs some of which are listed in table below

Table3: Policy activities and their expected results

Policy/Pilot Activity	Objective	Activities	Results	Target group
1.Managing the misuse of chemicals	Ensure safe use of chemicals	• Areas where there is significant use of chemicals (eg. fishing communities, mining areas, industries). • Training applicators and end users • Public education and awareness creation • Set up facilities where chemical dealers can give information to end users	• Reduced number of poisoning cases • Reduced number of faked products on the market • More people trained in chemical issues • Reduced number of wrong labelling cases.	• Chemical dealers • Farmers • Fisher folk • Hunters • General public • Mining/chemical industry
2. Maintaining quality of chemicals	• Ensure correct labelling and that products meet required standards • Ensure that chemical use result in increased productivity	• Set up a well equipped laboratory for quality assessment tests for chemicals. • Train analysts in the area of quality assessment • Periodic monitoring/ sampling of chemicals for testing	• Reduced number of fake products • Well equipped laboratories to make quality assessments together with well trained personnel • Improved efficacy of	• Importers • GSB • PPRSD • EPA • Research Institutions • Academic Institutions • CEPS

			chemicals	
3. Creation of Regional/District Poison Centers	• Create awareness on effects of misapplication of chemicals on human health • Act as a first aid centre where poison cases can be treated before possible onward transfer to hospital depending on severity.	• Organize regular seminars at the regional/district levels on effect of chemicals on human health. • Produce information materials such as leaflets, brochures, posters to disseminate information on chemical poisoning. • Put a standby medical team at post to serve the public on solely poisoning issues	• Number of Poison Centres created. • Reduction in number of deaths due to poisoning	• General public
4. Train staff in relevant institutions in the management and control of chemicals	• Keep personnel abreast with current management and control measures	• Organize capacity building workshops for staff of stakeholder institutions	• More staff of stakeholder institutions trained in management and control of chemicals	• Stakeholder institutions
5. Train policy makers and other law enforcement agencies on enforcement of legislation on chemicals	• Educate policy makers on chemical issues	• Engage policy makers regularly on issues of chemical safety through meetings and seminars	• More policy makers and law enforcement personnel educated on chemical safety issues	• Members of parliament • Law enforcement agencies (CEPS, Police)
6. Coordinate	• Monitor	• Hold appraisal	• More meetings	• Stakeholder

activities of relevant institutions of SCP of chemicals	activities of stakeholder organizations to ensure effective management of chemical use	meetings to ascertain current trend of chemical use among other issues.	between stakeholders held on chemical issues.	institutions
7. Awareness creation of SCP of chemicals	• Encourage the use of SCP practices nationwide to curb misuse of chemicals	• Organize awareness creation programmes(eg, public seminars etc) • Radio and television programmes to promote awareness.	• More radio and t.v. programmes on SCP of chemicals. • More public seminars and fora organized.	• General public
8. Increase cooperation with the existing Basel Convention Regional Centers and the FAO regional office	• Gain financial and technical support to promote implementation of international chemical conventions	• Hold annual synergy building workshops to share experiences with other African countries.	• More financial support to facilitate implementation of NIP. • More technical support as a result of cooperation.	• MEST (EPA) • MOFA (PPRSD)
9. Promote the use of Chemical Information Network(CIEN) among stakeholder institutions	• Promote information sharing between stakeholder institutions	• Organize training programs for staff of stakeholder institutions on use of CIEN.	• More staff of stakeholder institutions trained on CIEN • Improved information sharing through CIEN • More periodic	• Stakeholder institutions

			publications on issues discussed on CIEN.	

6.0 Conclusions

To strengthen chemicals management, improve environmental quality and human health, the following steps need to be adopted:

xiii. Improvement in capacity to collect, collate and disseminate information on chemicals management to facilitate making informed decisions with regard to chemicals management;

xiv. Establishment of an Integrated Chemicals Management Information Systems (ICMIS);

xv. Intensification of programmes on education, awareness raising and training;

xvi. Enhancement in monitoring capacity, hazard and risk assessment, interpretation and communication;

xvii. Increase in capacity for implementing and enforcement and compliance in chemicals management;

xviii. Strengthening of technical infrastructure of laboratory, capacity of NGOs and training institutes;

xix. Research and development into environmentally friendly alternative chemicals at the local level;

xx. Adoption of suitable strategy for pollution prevention and waste minimization;

xxi. Adoption of risk management policy, including evaluation of safer chemical alternatives and non-chemical options;

xxii. Strengthening of legislation to ensure the availability of safe and effective chemicals for use at all times;

xxiii. Promotion of cleaner production techniques in industry

Report by;

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Waste Management Working Group Report

1.0 Background

The problem of waste in Ghana is a direct result of a rapidly growing urban population, the changing patterns of population and consumption, the inherently more urbanised life-style and the consequent industrialisation. Increasing amounts of waste emanating from residential, commercial and industrial areas and the changing nature of waste over time have become a cause for concern for most District Assemblies (DAs).

The major causes of these problems include the following:

- Poor planning for waste management programmes;
- Inadequate equipment and operational funds to support waste management activities;
- Inadequate sites and facilities for waste management operations;
- Inadequate skills and capacity of waste management staff;
- Negative habits, uncoordinated attitudes and apathy of the general public towards the environment.

In an effort to address these problems, Government has over the years put in place adequate national policies and regulatory frameworks. These policies and regulatory frameworks include:

- National Environment Policy, 1991.
- Local Government Act, 1990 (Act 462)
- Environmental Protection Agency Act, 1994 (Act 490)
- Water Resources Commission Act, 1996 (Act 522).
- National Building Regulations, 1996 (LI 1630)
- Environmental Sanitation Policy, 1999
- Environmental Assessment regulations, 1999 (Li1652)

2.0 Overview of existing sectoral plans, policies and programmes over the past ten years

Existing plans, policies and programmes by the government of Ghana in the area of sustainable sanitation include;

i. National Environmental Sanitation Policy of Ghana

According to this policy document the principal components of environmental sanitation include:

a) Collection and sanitary disposal of wastes, including solid wastes, liquid wastes, excreta, industrial wastes, health-care and other hazardous wastes;
b) Stormwater drainage;

c) Cleansing of thoroughfares, markets and other public spaces;
d) Control of pests and vectors of disease;
e) Food hygiene;
f) Environmental sanitation education;
g) Inspection and enforcement of sanitary regulations;
h) Disposal of the dead;
i) Control of rearing and straying of animals;
j) Monitoring the observance of environmental standards.

ii. The Environmental Protection Agency Act, Act 490

iii. In addition to this, the Government of Ghana is committed to the principles of the Millennium Development Goals (MDGs). With respect to ensuring environmental sustainability, (MDG 7) Government seeks to work towards:

- Improving access to safe water supply and sanitation. The target is to reduce the proportion of population without access to basic water supply and sanitation by 50% by 2015 and 75% by 2025.
- Achieving significant improvement in lives of at least 100 million slum dwellers, by 2020.

Identified gaps

Even though government agencies and policy makers have designed policies and regulations to ensure the sustainable management of the environment, recommendations of the past and current waste management policies have not been effective in dealing with sanitation and waste management in particular.

Again, sustained progress in any of the eight MDGs and their targets will depend on sustaining improvements in environmental sanitation since environmental sanitation powerfully demonstrates linkages between all the eight MDGs.

In fact, the inadequacies exhibited in this sector have risen due to some identified gaps in the various policies and regulations like;

- Weak institutional linkages

Solution

Even though byelaws of Metropolitan, Municipal and District Assemblies (MMDAs) may ensure the protection of the natural and physical environment with a view to ensuring that development strategies and programmes are in conformity with sound environmental principles, these are not factored into the development plans of decentralised agencies and other implementing agencies.

It is therefore important that development plans of decentralised agencies and other implementing agencies incorporate these sound environmental principles into their policies to protect the natural and physical environment.

- The non-application of the polluter pays principle (PPP)

Solution

One of the principles of waste management is that the generator of the waste takes full responsibility of treating the waste. For this to work in Ghana there is the need for political will at the national, regional and local levels to ensure that the generator takes full responsibility for the waste and treats it as such.

- The Metropolitan, Municipal and District Assemblies (MMDAs) lack the capacity in terms of skills and technology to manage "discards."

Solution

Capacity building actions geared toward the empowerment of the local government structures for effective administration and management of their activities is also one of the key areas for sustainable development. The attainment of this objective has been linked to capacity building activities cutting across technical assistance for effective discharge of functions and roles, performance appraisals, review of organizational structures and review of planning processes and systems.

Other areas to be strengthened will be the management systems and human resource development and management. The importance of this component has been clearly underlined in the national water policy and water supply and sanitation policy.

These strategies are also in conformity with the development priorities of Ghana Poverty Reduction Strategy (GPRS II). The successful implementation of all the institutional strengthening activities will see to the growth of waste management.

- The policies did not take into consideration the issue of sustainable consumption of production; hence no life cycle analyses of products were considered.
  Technologies must be environmentally friendly.

- Lack of enforcement of exiting laws, policies and regulations.
  There is the need for political will to develop and enforce strong legislative and regulatory standards to protect waste management facilities and to guide the sector operations.

- Lack of public awareness on the existing policies and regulations.
- No economic incentives for management of sanitation, for example, recycling of waste.
- Waste has not been identified as a resource in existing laws, policies and regulation.

3.0 Supply side of production processes

It is important producers collate baseline data and research into what goes into the production of goods and services they intend to produce.

The research should cover the following:

- Your target; this includes the people you are producing for, the community, and the region
- Raw materials
- Source of materials for production
- Characteristics of the materials, i.e. whether they are renewable or non renewable,
- The impacts of production on the environment and on the climate
- Whether the technology is environmentally friendly
- Production processes
- The life cycle analysis of goods and services
- Is the packaging material biodegradable
- Transportation of goods and services
- Dissemination of research findings
- Risk analysis

4.0 Demand side of consumption patterns

To be able to identify the demand side of consumption patterns, producers of goods and services should conduct a similar research as was conducted in the supply side into the consumption and post consumption levels. Industry or producers of goods and services must be encouraged to share research finding with the general public.

Critical issues of concern should include the following:

- Health implications
- Type of packaging materials
- Labeling e.g. eco labeling
- There should be consumer associations (groups) who will monitor standards of goods from production to post consumption.
- Corporate social responsibility

5.0 Direct and indirect impact on environment

Humankind requires some kind of goods and services to enjoy life on this planet. The techniques involve the harnessing and processing of natural and other resources. Unfortunately, these goods and services have direct and indirect impact on the environment as demonstrated in the box below.

Table 1

	Direct Action	Indirect Action
Investment	• Land degradation • Waste generation • Emissions • Water pollution	• Poverty • Climate change • Public health • Reduction of hydro energy sources • Security
Projects	• Emissions • Distortion of ecosystem • Waste generation	• Ecological imbalance • Climate change • Public health
Products	• Atmospheric pollution • Water pollution • Marine pollution	• Climate change • Public health • Production of hazardous waste into the atmosphere, water and on the land
Services	• Emissions • Post consumption waste	• Climate change • Public health • Poor sanitation

6.0 ACTION PLAN ON SUSTAINABLE WASTE MANAGEMENT FOR GHANA

Background

Developed in the framework of sustainable consumption and production of Ghana's natural resources including the renewable and non-renewables, this action plan is intended to be adopted and main streamed into key sectoral policies, plans, programmes of the ministries, department and agencies (MDAs). It is also intended to be mainstreamed and adopted into the activities of the private sector to link the promotion of SCP patterns to poverty reduction.

The action plan has been developed based on the specific territorial characteristics, nature and demands of communities and towns including rural areas, small towns and the urban towns and cities.

Environmental sanitation as defined in the Environmental Sanitation Policy of Ghana seeks to develop and maintain a clean, safe and pleasant physical and natural environment in all human settlements; and to promote the socio-cultural, economic and physical well-being of all sections of the population. It comprises a number of complementary activities, including the provision and maintenance of sanitary facilities, the provision of services, public education, community and individual action, regulation and legislation supported by clearly mandated institutions, adequate funding and research and development.

According to this policy document the principal components of environmental sanitation include:

(a) Collection and sanitary disposal of wastes, including solid wastes, liquid wastes, excreta, industrial wastes, health-care and other hazardous wastes;

(b) Stormwater drainage;

(c) Cleansing of thoroughfares, markets and other public spaces;

(d) Control of pests and vectors of disease;

(e) Food hygiene;

(f) Environmental sanitation education;

(g) Inspection and enforcement of sanitary regulations;

(h) Disposal of the dead;

(i) Control of rearing and straying of animals;

(j) Monitoring the observance of environmental standards.

In connection with the targets of the Millennium Development Goals (MDGs), the Government of Ghana is committed to the principles of the MDGs and with respect to MDG 7, which seeks to ensure environmental sustain ability, will work towards:

- Improving access to safe water supply and sanitation to reduce the proportion of population without access to basic water supply and sanitation by 50% by 2015 and 75% by 2025.
- Achieving significant improvement in lives of at least 100 million slum dwellers, by 2020

Environmental sanitation powerfully demonstrates the linkages between all the eight MDGs and their related targets, sustained progress in any target will depend on sustaining improvements in environmental sanitation:

- Improved environmental sanitation is essential for sustaining productive lives
- Improving environmental services enhances and sustains enrolment and retention of girls in schools.
- Sustaining improvement in services enhances women's dignity and ability to lead.
- Sustaining improvements in environmental sanitation has great bearing on improving morbidity/mortality.
- Improving environmental sanitation reduces pre- and post-natal risks.
- Improved environmental sanitation has direct effects on health-care waste management, vector and water -borne diseases that affect millions of children and women.
- Environmental sanitation requires multi-sector partnerships to tackle cross-cutting issues.

For purposes of this action plan waste has been categorized to be either organic or inorganic. Each of this category could also either be a liquid or solid waste. There are also the gaseous wastes. Organic examples include food debris/leftovers and vegetation. Inorganic waste examples are plastics, metals, glass/bottles, textiles and inert waste.

APPROPRIATE FRAMEWORK AND MECHANISMS FOR SUSTAINABLE WASTE MANAGEMENT

The key strategies to be adopted to achieve sustainable waste management include the following:

Key Strategies

Strategy 1: Planning for Sustainable Waste Management Infrastructures

Strategy 2: Development of Sector Capacity for Waste Management Delivery

Strategy 3: Development and Evaluation of Decentralised Sanitation Technologies with Beneficial Reuse Applications.

Strategy 4: Creation of Enabling Environment for Waste Management

Strategy 5: Recycling of Plastic Waste.

Strategy 6: Promotion of Compost generation and use

Strategy 7: Recycling of sewage or liquid organics

Strategy 6: Research and Development

Strategy 1: **Planning For Sustainable Waste Management**

Infrastructure

In the context of the waste sector, effective infrastructure planning is an important approach since it ensures sustain ability of waste management facilities provided through a demand responsive approach and a shift from the dependence on government towards greater self-reliance by user communities (the COM concept).

Planning for Sustainability

At the MMDA level the functions of the planning unit must promote good planning and effective management of water resources and sanitation infrastructure. The emphasis should be on the "Potentials, Opportunities, Challenges and Constraints" (POCC) paradigm in planning. This can be ensured by considering the resource potentials and ensuring the effective utilization of these resources in the development of district plans.

This is an important consideration since the resource potential can dictate to the adoption of particular waste management technologies. Their functions must also take cognizance of the need to undertake inventory studies including socioeconomic issues to be able to get a clear definition of the problem.

This is also very vital in planning for any infrastructure provision. To also ensure harmony, all development plans in the sector must be done in the framework of the broad national development plan.

MMDAs should also not target only short and medium term planning but long term planning for sustainability.

Planning Dynamism

In the advent of world civilization it is very crucial to the sector to recognize the relevance of the dynamic nature of planning.

Planning should also be dynamic in nature and make room for constant review of all development plans including the national development plans in the light of the prevailing domestic and international economic, social and political conditions. This has been highlighted in the national environmental sanitation policy (Environmental sanitation technologies are under regular review and continuous improvement) under its strategic objectives. The Ministry of Local Government can make provision for the appointment of technical resource persons including consultants and advisers to form a committee for the effective discharge this function. The composition of this committee must come from different sectors so as to enhance the operational level of planning especially for the integrated area planning approach. This is very good for waste management sector in that it harmonises development projects of the various sectors and prevents the duplication of similar projects in the same catchment areas. This duplication of projects has been the norm of the day as at times implementers of projects become outputs oriented instead of the impacts on the beneficiaries. When there is collaboration and coordination through the integrated approach, the waste management sector will get to know of communities, towns and cities lacking development and send development projects to these areas. The implementation of this will help broaden the coverage of those with access to safe environmental sanitation facilities and hence facilitate the

government's strategy for attaining the millennium development goal of ensuring environmental sustainability.

Planning authorities must also synthesize all policy proposals for the economic, social and spatial development of the district and also ensure that the policy proposals and all other projects are in conformity with the principles of sound environmental management. It also gives significance to the operational levels of planning (project, sectoral and integrated area planning approaches). These provisions are also vital in the sector in the sense that apart from meeting the needs of the beneficiaries, they also provide some guidelines to preserve the infrastructure provided and therefore ensuring sustainability. In the sanitation sector the second part of the provision is even of a high value as enforcement will go a long way in overcoming one of the key constraints in the sector: weak and/or outdated and poorly enforced environmental sanitation legislation.

Synergy in Development Plans

Development plans provide the operational framework under which all projects by stakeholders (NGOs, donor agencies, consultants and the private sector etc.) in the sector are assessed in terms of their synergy and compatibility before giving the nod for implementation.

The sector ministry should prescribe a common format and content of development plans for the districts, ministries and sector agencies. This provision establishes focus and direction on the part of the planning structures and guides them to set SMART goals and objectives toward the achievement of the sectoral goals and ultimately the broad national development goals. The development of the District, Environmental Sanitation Strategies and Action Plan (DESSAP) and National Environmental, Sanitation Strategy and Action Plan (NESSAP) strategic documents are therefore highly recommendable.

Decentralisation and Stakeholders Participation

The main focus of this section is the transfer of functions, powers, responsibilities and resources from the central government to local government units in a co-coordinated manner. This decentralization element has been formulated to overcome the consequence of over centralization and bring in a more equity-oriented and participatory system of governance. The resultant effect of the over centralisation is the distortion of the national development process, that is, serious disparities in regional development. To this end the Local Government Act, 1993(Act 462) recognizes the establishment of these decentralized bodies at the various spatial levels of operations (district upwards to the national level) and has clearly spelt out the functions, roles and responsibilities of these structures. By this decentralization, each structure has been given the mandate to come out with its own development plan. Planning of operations and activities must also be done at these decentralized levels. The decentralization component of governance also calls for the participation of the beneficiaries especially when it comes to project planning and implementation at these levels i.e. the *subsidiarity principle which ensures that there is participatory decision-making at the lowest appropriate level in society.* The decentralization system as well as the subsidiarity principles are considered very crucial since the approaches are more sensitive to local governing structures. It also removes the following drawbacks that were paramount under the centralized approach and enhances effective planning:

- Insensitivity to community aspirations and opportunities for local level development initiatives
- Difficult to integrate analysis, synthesis and action and represents a limited and partial approach to solving development problems
- Difficulties in exploring the interactive nature of development.
- Lack of participation of the local people in the planning process.

As a remedial measure the transfer to the Assemblies of waste management functions performed by Ministries and central Government agencies should be accompanied by the transfer of adequate budgets, personnel and equipment.

Sector ministries should also adopt the Integrated Area Planning approach to enhance harmonization of similar programmes and projects so as to avoid duplication at places where provisions are not needed. This system will also remove the old traditional "top-down" approach of planning where decisions are taken at the national level without considering the views of the ultimate beneficiaries. The inclusion of the establishment of a cross-sectoral planning groups within the National Development Planning Commission to integrate and co-ordinate the planning and development activities of such sectors will go a long way in achieving this objective of the sector.

Good Performance Output

Sector ministry should also develop performance standards to guide the decentralized bodies in the discharge of their functions and roles. These standards should be used as a framework for monitoring and evaluating the performance of these decentralized bodies. The effective administration of these functions will put these decentralized structures on their toes and demand for effective and efficient performance of operations. The achievement of this output will help the waste management sector to see improvement in their services delivery since these structures are in charge of major development projects at their various spatial levels (regional, district, communities etc.) of operations.

Legal Framework for Sustainability

Byelaws of MMDAs must ensure the protection of the natural and physical environment with a view to ensuring that development strategies and programmes are in conformity with sound environmental principles. Development plans of decentralized agencies and other implementing agencies should all factor in strategies to protect the environment. Technologies must be environmentally friendly. There should also be the political will to develop and enforce strong legislative and regulatory standards to protect waste management facilities and to guide the sector operations. All these strategies have been formulated as measures to ensure protection and sustainability of the infrastructure.

Strategies for Assessment

In the project cycle of waste management infrastructure provision, the achievement of the objectives and the broader goals can effectively be assessed after performing monitoring and evaluation exercises on the project. The assessment if done properly could enhance effective implementation of similar projects and provide a platform for project replication and scaling-up.

Coordination of development policies, programmes and projects in the sector is also important as it ensures harmonization and provides a platform for replication, of success projects.

Strategy 2: Development of Sector Capacity for Waste Management Service Delivery

Institutional Strengthening

Capacity building actions geared towards the empowerment of the local government structures for effective administration and management of their activities is also one of the key areas for sustainable development. The attainment of this objective has been linked to capacity building activities cutting across technical assistance for effective discharge of functions and roles, performance appraisals, review of organizational structures and review of planning processes and systems. The other areas to be strengthened will be the management systems and human resource development and management. The importance of this component has been clearly underlined in both the National Water Policy and the Water Supply and Sanitation Policy. The element here is the development of human resources and strengthening of institutional structures for managing environmental sanitation. These strategies are also in conformity with one of the development priorities of GPRS II. It is an undeniable fact that successful implementation of all these institutional strengthening activities will see to the growth of the waste management sector.

Decision Making Processes

Since waste management delivery affects the whole populace, service providers should try and involved all stakeholders in decision-making, planning and implementation process. There must be an increased collaboration and active involvement of all actors including beneficiaries, traditional authorities and religious leaders in communicating sanitation related issues and enforcing regulations and bye-laws at the community levels. This approach ensures a wider scope of inclusivity starting with the poor beneficiaries.

Capacity Development and Research

Capacity development efforts should focus primarily on improving the enabling environment (policy reform, legislation, regulation) and human resources (particularly training), rather than on structural strengthening of sector organisations.

Sector ministries need to support waste management implementation capacity. The objective is to build long-term management and operating capacity. Governments need to develop and implement national waste management policies and action plans and to provide funds to facilitate their implementation. They can even go as far as to declare Waste management a national emergency. The monitoring and evaluation unit of the Ministries must be strengthened to carry out their function more effectively. Also, the sector ministries must strengthen the capacity building for Environmental Health and Sanitation Unit to strengthen and promote behavioural change. They must also be strengthened at all levels- upgrading the Unit at the Ministries intoDirectorates, providing the required logistics such as transport, increasing the staff strength to reach out to all communities with education and enforcement of laws and regulations.

Stakeholders Learning Alliance Platforms

All sector actors in the country need to work together to make progress in what is inherently a fraught and complex process. This might be best be carried out through learning alliances which are a series of connected stakeholder platforms, created at key institutional levels (typically national, intermediate and local/community) and designed to break down barriers to both horizontal and vertical information sharing and thus to speed up the process of identification, development and uptake of innovation. Each platform is intended to group together a range of partners with complementary capabilities in such areas as implementation, regulation, policy and legislation, research and learning and documentation and dissemination.

- The formation of sectional heads of communities.
- The adoption and celebration of national waste management week

Strategy* 3:** ***Development and Evaluation of Decentralised

Sanitation Technologies with Beneficial Reuse Applications.

Technology Choice

Technology selection for waste management facilities should be based on affordability, safety, convenience and the geographical location. It should always be a matter for household choice, informed as necessary by practical realities. The technologies should examine the whole waste management stream including collection, treatment, resource recovery and final disposal of residues after treatment. Local governments in their planning must most importantly allocate land for this.

Technology Designs and the Waste Management Ladders

The sanitation ladder is a model ladder showing a range of latrine options from a relatively unimproved type to a more improved type. A latrine can be improved in any of the three main components- the pit and pit lining (the lining is only necessary if the soil is unstable and considerations such as cost and the need to be flexible in the design by using low cost materials (local materials). The sanitation ladder should also have designs for various hydro-geological conditions such as wet ground conditions, conditions where ground is rocky and conditions where there is unstable terrain that presents peculiar slope stability problems. It should also consider other components such as transportation, treatment, and disposal.

Planning for Short, Medium, and Long term Actions/Strategies

By way of policy all MMDAs and other government institutions that have a stake in waste management must have short, medium and long term action plan to mitigate the challenges in the sector.

For sustainable waste management delivery it is important to have policy guidelines and strategic documents to guide the implementation of services. These documents must embrace a national action plan to guide the whole country and from which all sanitation related services must be guided by. These strategic documents should also guide the national ministries, departments and agencies involved in waste management delivery and finally a strategy document to guide district and other decentralised bodies in their operations. Currently the National Environmental Sanitation Policy (Draft final version, 2007) is the umbrella policy and a long term action plan document from which all other sanitation related policies and guidelines are based.

In addition to this the preparation of the National Environmental Sanitation Strategy and Action Plan (NESSAP) and the District-level Environmental Sanitation Strategies and Action Plans (DESSAPs) to hasten quality sanitation including waste management delivery in the country is very much recommendable.

Implementation of the Community Led Total Sanitation (CLTS) in Rural and Small Towns in Ghana

CLTS is an approach in which people in rural communities are facilitated to do their own assessment on sanitation, come to their own conclusions, and take their own action. They are not taught nor forced in taking their decisions. CLTS is an approach that targets the following (Box1). The approach complements the sanitation ladder and makes people stop open defaecation.

This approach should be adopted in the development plans of all MMDAs and that all consultants and other NGOs must be made to include this strategy in the bid proposals in sanitation in rural and small towns in the country.

Box 1: Core Concepts for CLTS - Igniting, Behaviour Change

1 Discourage supply-led subsidy driven campaigns.

2. Focus on 'triggering' behaviour change for the, collective, and not simply for individuals.

3. Focus on demand creation for 'total sanitation',

4. Seeks to 'find out' what causes local people to change their open defaecation behaviour. Involves identifying triggers that are defined by the local context.

5. Facilitator ensures dialogue among community member until an ignition point is reached where the community collectively decides on actions to eliminate open defaecation.

6. Emphasis of CLTS aims at triggering behaviour, change.

7. Creating awareness about the dangers of open defecation (PHAST, F-DIAGRAM)

8. Shaming the communities and generating a sense of disgust! By facilitating discussions relating to the consequences of open defecation

9. Key process involves a sanitation analysis which involves:

    - Mapping on the ground to show where people live and where they defecate;
    - Transect walks (walk of shame) to visit and stand in those places;
    - Calculations of quantities of excreta and identifying pathways to the mouth;
    - Faecal transmission routes to illustrate the faecal oral transmission

10. Process basically about facilitating community discussions, until an 'IGNITION POINT' where a collective decision is taken on actions to stop open defecation;

11. Communities install their own latrines or toilets with their own resource

12. Those that are better off help those who are too weak or poor to help themselves.

13. No standardisation or top down designs. People decide for themselves (the sanitation ladder approach)

Hygiene Promotion

For sustainable waste management delivery service, hygiene promotion should not be done on ad hoc basis. It should be continuous with or without projects. Improving sanitation delivery requires a key objective to maximise the health benefits through integration of water, sanitation and hygiene. Public education, enforcement of laws and regulations by the Nationals and a strong commitment and leadership role by the Government must form one of the strong pillars for sanitation. Hygiene education should be part of the education curriculum.

Strategy 4: Creation of Enabling Environment for Waste Management

Financial Commitment

For sustainable waste management services there should be a sense of ownership of the facilities by all actors including individuals, home owners, decentralised government structures, municipalities, departments and agencies and the central government. This draws away from the over reliance on donor funds but rather create independence in owning these facilities. There should also be adequate budget allocation on sanitation from the household level up to the central government level. It is recommended that at least 5% of an individual's or household net income should go into waste management since it is one of the strong pillars for livelihood and overall development of all nations. Part of the funds for health insurance should be put into a National Waste Management Fund for onward distribution to the decentralised structures for sanitation related services in their local communities. The following recommendations are made:

- The generation of a Waste Management Fund based on the principles of polluter pays must be adopted.
- All importers of goods into the country must pay tax for solid waste
- Part of the national Health Insurance should be put into this fund
- Individuals must be willing to pay for their own waste management
- A strategic direction for the sector should be a comprehensive and an integrated approach to manage waste for sustainability.

Private Sector Involvement

The private sector must be encouraged to get involved in the waste management process especially when waste is considered as a resource ("Futigen" - the future seeing waste as a resource instead of relegating it as nothing and of no use). The private sector even though it is in a better position in terms of skilled personnel and access to equipment and logistics than the public sector should be trained for effective sanitation management. Staff of government agencies and structures must also be trained to administer franchise contract to the private sector in the relevant components of sanitation.

MMDAs should avoid the one company monopoly in waste management and rather create competition by encouraging other companies to bid for waste management services. Smaller companies can be supported in this bid.

Institution of a National Waste Management Week

Attracting investment to the Sanitation Sub Sector

- Development of Policy Framework: the policy framework should address all vital thematic areas of waste management
- Development of Strategic Action Plan: A strategic plan which includes short, medium, and long term should be developed to come out with the remedies to the challenges in the sub

sector. The approach that will be used must be indicated for continual use. Necessary laid down structures should be indicated in the strategic action plan

- Investment Plan
- Advocacy targeting all stakeholders
- Sustainable financing and cost recovery
- Legislation/regulation should be enforced

Review and Enforcement of Sanitation Bye-laws

One of the elements of an enabling environment for waste management delivery is the existence of laws and regulations. It is vital for all government agencies to formulate bye laws and constantly review them to reflect current state of the art issues. The revision of the bye-laws must also factor in considerations from the national policies related to waste management delivery and must also target the poor who are mostly affected by improper waste management. The roles and responsibilities of all key stakeholders in the sector should be clearly spelt out. In general, policies, regulations and all other legal documents developed must be realistically implementable.

The enforcement of waste management bye-laws is also an important aspect of the service delivery process. To overcome the difficulties in enforcing the bye-laws, the general populace should be made aware of the existence of the by-laws and their provisions through strategic educational campaigns. The bye-laws can be abridged and translated into local languages to make easier reading and understanding. There will also be the need to increase the number of enforcement personnel. The creation of special courts for sanitation related cases is also important to overcome the bottlenecks that are normally encountered at the general courts especially in attending to cases. Also, community leaders should be contacted for gender sensitisation to facilitate mainstreaming of gender in sanitation and hygiene promotional activities.

Procurement Process

Procurement plans of sector ministries, agencies and departments should make provisions that will disqualify any of its members from participating in contracts or any other transactions proposed to be entered into with the entity. This provision is good for the sector especially with regards to contracts in the sector. The provision ensures good and unbiased procurement process and contract administration. This will also ensure that none of the competing parties for the contract or transaction has undue advantage over the others. The eventual winner then wins on merit.

Strategy 5: Recycling of plastic waste

Strategy 6: Promotion of compost generation and use

Strategy 7: Recycling of sewage or liquid organics

Other Strategies to Adopt

- Piloting of biogas technologies from faecal sludge (the technology should be piloted in at least one senior high school and one government hospital in every district nationwide)
- Soil acquifer recharge
- Sorting and recycling of metals
- The use of foundaries
- Franchising the operation and maintenance of waste stabilisation ponds to private operators
- Policies on the use of natural wetlands for treatment of waste treatment
- Cremation of the dead. At any cemetery site people must be made to buy a small peace of land and bury as many people in the same pit by digging deep holes. This will save land. This can be included in our waste management policies.
- Waste management policies should ban the use of polythene bags.

1. Involvement of Community based organization (CBOs)
   - In Tanzania, the involvement of CBOs in the door-to-door collection system is really working well (for various communities)- fees charged are normally relatively lower than if it were to be a private company.
2. The proposition of new names for waste
   - Futigen
   - Materials in Transit (MT) - by Operations manager, STMA
   - Discard - Waste Management Working Group (Sustainable Consumption and Production Action Plan Development for Ghana)
3. Enforcement of bye-laws
4. Total enforcement of total collection
5. Formalizing the informal sector (the bola-bola boys - those using the carts and trucks)
6. Enforcing the pay as you dump (the polluter pays principles)
7. Developing of social accountability
   - Developing of tools that communities can use to demand for their rights
   - Can be enshrined into the policies/bye-laws
   - Monies used for projects are properly utilized and accounted for
   - Involvement of CBOs and small medium enterprises (SMEs) in waste management
8. Development of Policy framework to address vital waste thematic areas
9. Development of strategic action plans (short, medium and long term plans)

10. Proper contract arrangements - accountability and integrity (governance/institutional arrangements)

11. Innovative technologies that are environmentally friendly and locally acceptable (landfills etc)

12. Legislation instrument to guide landfill designs and operations (already exist) – then probably the enforcement

13. A policy forbidding people from dumping of waste containing more than (e.g. 30%) organic waste in their waste stream at landfill sites - prevents staggering of vehicles

14. Harsher punishment to people who pollute the environment

15. Education and awareness creation to affect cultures and attitudes on waste management practices

16. Importers of goods/manufacturers paying taxes into a sanitation fund

Define objectives targets and activities required to achieve targets (will develop it soon)

Identify agencies to implement plan, time frame, costs and funding to implement* (will *shape the write up well)

- Ministry of Local Government Rural Development and Environment
- Ministry of Energy Science and Technology
- Ministry of Health
- Ministry of Finance
- Environmental Protection Agency
- The Private Sector

Government Policies on Waste Management (will shape the write up well)

- National Environmental Sanitation Policy(May 1999)
- The Expanded Sanitary Inspection and Compliance Enforcement Programme Guidelines.
- Local Government Act(1994) Act 462
- Environmental Protection Agency Act (490)
- Environmental Assessment Regulations 1999, (LI 1652)
- Environmental and Sanitation Policy of Ghana 1999
- Guidelines for the Development and management of Landfills in Ghana.
- Guidelines for Bio- medical (Waste2000)

Identify cross-cutting issues and linkages to other sectors.

Generation of waste and its management (Sanitation) cuts across every sector of the economy. This is because in providing goods and services to satisfy the basic needs of mankind, some amount of waste is generated at all levels of production (production, packaging, transportation, marketing, post consumption)

Production of goods and services involves the use of raw materials (natural or otherwise, technology, energy). The raw material and other resources go through a refining process to produce the final product which is consumed by society. In so doing, waste is generated. It pre-supposes that in arriving at sustainable production and consumption, conscious effort must be made for waste infrastructure.

Other cross-cutting issues include the following:

- Manufacturing.
- Human Settlement.
- Housing and General Construction.
- Tourism Sector.
- Services.

Health

Diseases and sicknesses are unavoidable. As part of the natural process, man will at one time or the other contract one form of diseases. This requires that health care facilities in the form of hospitals, medical laboratories, medical research centers, veterinary centers, etc., are provided to render medical services to the population. In so doing, health care waste which is infectious is generated. The health care waste requires special handling to prevent contamination and pollution of the environment. We therefore need to have a "Health Care Waste Management Policy". Ideally, every health care facility is expected to have a treatment plant to treat the pathological components of the health care waste.

Infrastructural Development

The opening up of the country requires the provision of general infrastructure. This could take the form of office buildings, institutions, residential facilities, road networks, rail networks, airports, aerodromes, ports & harbours, storm drainage systems, utility Lines (electricity & water), stadia, recreational facilities, dams, religious worship centers, public places, hospitals etc. in developing these facilities results in ecological imbalance, waste generation, carbon emissions and public health issues.

Mining

Mining is an extractive industry. In processing the minerals, a lot of waste is generated. Mining involves the use of hazardous chemicals such as mercury, cyanide etc which are poisonous. For instance, the spillage of cyanide may destroy human and aquatic lives. There is also generation of waste water (effluent) that has the potential of polluting Ground Water & Agricultural Lands.

Demonstration Project

Reduction of all forms of waste/discards.

1. Solid Waste – Organic → Composting
   Inorganic → Recycling of discards (sachet, other

plastics, broken chairs and tables in pallets)

2. Liquid Waste – To be treated using an Integrated Waste Management Technology through promotion of the following;

- Biogas technology as can be found at the Valley View University Accra, the Presidential Palace, Accra Mental Hospital etc.
- Bi-kube Technology at the Kofi An nan Peace Keeping Centre, Teshie in Accra.

7.0 Future scenarios and policy recommendations

Generation of waste is inevitable so long as man needs goods and services to live comfortably. In order to achieve the above, we wish to recommend as follows future scenarios and policy recommendations;

- Sustainable consumption and production principles be mainstreamed into national policies.
- The polluter pay principle must be integrated in the national development plan of Ghana and implemented.
- All projects must be subjected to environmental impact assessment.
- Weak institutional linkages must be strengthened.
- Inclusion of civil society in environmental regulations monitoring and evaluation.
- School curriculum must be refocused to address national technological needs.
- A research fund should be established to enable alternative technology.

ECONOMIC INSTRUMENTS (EI)

BACKGROUND TO THE DEVELOPMENT OF ECONOMIC INSTRUMENTS FOR SUSTAINABLE DEVELOPMENT AND CONSUMPTION

1.00 Introduction

Over the past five years, interest in the subject of economic instruments (EI) for environmental protection has grown and intensified. This has partly been in response to reports by World Commission on Environment and Development (WCED) in 1987 and the United Nations Conference on Environment and Development (UNCED) in 1992. While it was recognized that economic instruments could be used to protect the environment, regulations were deemed to be more desirable and efficient (WCED, 1987 pp198-200 & 319). There have been debates among economists for some time and a swing towards economic incentives as opposed to command and control methods has taken place (Pearce, Markandya, and Barbier, 1989 p155). This is also reflected in the official report of the United Nations Conference on Environment and Development, Agenda 21. Agenda 21 acknowledges that environmental laws and regulations are important but that on their own they cannot be expected to solve all the problems of environment and development. UNCED recognizes that attitudes and behaviour towards the environment will be shaped by the economic and legal contexts and that market-oriented approach can enhance a country's capacity to deal with the issues of environment and development. Recommendations are now for the use of economic incentives. The new call is for international co-operation in the use of these instruments (Agenda 21, 1993 pp252-254). Governments are now using a combination of the two approaches since it is clear that they both have merit.

With the recognition of the value of economic instruments, the number of economic instruments and innovation in their application has burgeoned. This can particularly be seen in the adoption of feebate and distributive credit systems. The focus in the application of economic instruments has also shifted to one of prevention rather than cure. They are no longer used to generate revenue to cover clean-up costs but rather to act as incentives for individuals to change their behaviour. These findings are increasingly being backed-up by empirical evidence (which is still very sparse at this stage). Examples of empirical work in this area can be found in Pearson and Smith (1991) which assesses a European carbon tax; Lotker (1991), related to the development of solar energy by Luz International Limited; and Ministry of Agriculture and Fisheries of New Zealand (1993) which looks at a case study on agricultural subsidy reform in New Zealand.

An emerging development in this field is the transition from instruments for environmental protection to instruments for sustainable development. The economic instruments are now being

discussed on a global level. While little effort (apart from the European Carbon Tax - which has still not been approved) has been made to implement any instruments on a higher than national level yet, there is currently much talk about it. Recognition that many environmental problems (like pollution) do not respect national boundaries has drawn attention to the need for some harmonisation of policy. Furthermore, harmonisation of policy would also mean that policies in one country will not undermine policies in the country nearby. Protagonists of free trade argue that international trade can only be fair trade if all parties are using the same incentives and disincentives. It is a call for harmonisation in response to the allegation that non-harmonisation is protectionism cloaked in environmental piousness. The World Trade Organisation and the General Agreement on Trade and Tariffs are investigating these allegations (see General Agreement on trade and Tariffs, 1994).

1.10 Objectives of Economic Instruments

Economic Instruments encompass a range of policy tools, from pollution taxes and marketable permits to deposit-refund systems and performance bonds. The common element of all economic instruments is that they effect change or influence behaviour through their impact on market signals. Economic instruments are a means of considering "external costs," i.e. costs to the public incurred during production, exchange or transport of various goods and services, so as to convey more accurate market signals. Those "external costs" may include natural resource depletion, environmental degradation, health impacts, social impacts, etc. Economic instruments facilitate the implementation of Principle 16 of the Rio Declaration, commonly known as the "Polluter Pays Principle." The article states: "National Authorities should endeavour to promote the internalisation of environmental costs and the use of economic instruments, taking into account the approach that the polluter, should in principle, bear the cost of pollution with due regard to the public interest and without distorting international trade and investment."

1.20 Methods of Economic Instruments

Economic Instruments can be designed in a variety of ways, and for a variety of applications, including the following:

- Increasing prices of goods and services that damage health and environment, as well as increasing financial returns in the case of more sustainable approaches that foster more environmentally- friendly production and consumption patterns.
- Reduction of compliance costs by providing flexibility to polluters or users of natural resources to chose the most cost-efficient and environmentally-effective measures.
- Incentives for investments in innovation and improved environmental technology so that both environmental and financial benefits are generated.
- Allocation of property rights and responsibilities of firms, groups or individuals in a manner so that they have both the incentive and the power to act in a more environmentally-responsible manner.
- The raising of revenues to achieve environment and health objectives via tax policies.

1.30 Categories of Economic Instruments

Economic instruments can be divided into three main categories based on how they affect a government's budget: public expenditure instruments, revenue generating instruments, and budget neutral instruments. Within these categories, policy makers have a variety of options to choose from. It is important to realize, however, that these instruments can have positive or negative effects on the environment depending on how they are implemented. Furthermore, the effects of these instruments may be neutralized by other policies which have not taken environmental consequences into account. Policy makers need to be cognisant of these factors and other criteria (discussed below) when choosing an instrument to achieve a certain environmental goal. It has also been found that economic instruments are most effective when used in conjunction with regulation (Barbier, 1992 p7; Gale and Barg, 1995 p3; OECD, 1994 p18).

1.31 Public Expenditure Instruments

Public expenditure instruments (PEIs) take the form of subsidies, grants and tax allowances and are the most familiar tool of intervention. This is generally because it is more politically acceptable for governments to hand out benefits than impose costs on individuals (Barthold, 1994 p143). The function of PEIs is to provide a financial incentive for individuals to undertake an activity they would not otherwise. Examples include grants for developing environmentally friendly technology, price supports for recycling-industries, and tax allowances for energy conservation (Barbier, 1992 p2; Gale and Barg, 1995 p9).

1.32 Revenue Generating Instruments

Revenue generating instruments (RGIs) include taxes, charges, and fees. These, to some extent, can be thought of as the "price" to be paid for polluting. RGIs have both an incentive impact and a revenue impact. However, taxes, charges and fees are generally too low to have any effect on environmentally damaging behaviour and so serve mainly as a revenue generator. Usually this income is earmarked and used for clean-up operations, new abatement technologies or subsidizing new investment. Effluent charges on sulphur dioxide emissions, tax differentiation between leaded and unleaded petrol, user charges for public waste disposal, and depletion taxes on mineral exploitation and stumpage fees for timber demonstrate how RGIs are used (Barbier, 1992 p2; Gale and Barg, 1995 p12; OECD, 1994 p18; Owens, 1993 p708).

1.33 Budget Neutral Instruments

Budget neutral instruments (BNI) represent a relatively new class of instruments within the policy arena, the most common of which is the deposit/refund system. They are designed to lay a surcharge on a potentially harmful substance or activities and then refund that surcharge if that substance is recycled, restored or use is avoided. In such cases the government acts as the intermediary transferring funds from one group to another. To date, there are three types of BNIs in use, *viz*., deposit/refund systems, fee-bates, and distributive credits. Common deposit/refund schemes are for the recycling of glass bottles, aluminium cans and other containers. Fee-bates refer to a system where producers or consumers of certain substances are required to pay a certain rate for that action regardless of the legal limits permitted. Those who consume or produce less of the substance than the legal limits are then compensated for restraint. Those consuming or producing more than the legal limit receive little or no compensation depending on how the system is set up. Examples of fee-bate systems would be reforestation rebates on timber stumpage fees, or the

Swedish nitrogen oxide charge. Distributive credits are most often used in the area of waste management where a credit against the waste collection fees is offered to households who recycle their waste. The credit should theoretically be equal to the savings incurred by not having to collect and process this waste (Barbier, 1992 p2; Gale and Barg, 1995 pp18-20; OECD, 1994 p20).

1.40 Types of economic instruments

The different classes of EI's and other incentives are set out below;

1. Charge or tax
2. Tradable permit
3. Deposit-refund
4. Subsidy on activity to be encouraged, insurance premium reduction
5. Assignment of liability
6. Voluntary agreements
7. Graduation of premiums and granting of bonuses

1.41 Charges or taxes

Charges or taxes are levied either directly on the activity that policy makers wish to see reduced (e.g. emissions of waste water) or on a surrogate product whose consumption is associated with an activity to be discouraged (e.g. lead content of road fuels). In Ghana at the moment most of EI for sustainable development are of taxes or charges.

1.42 Tradable Permits

Tradable permits involve creating a quantitative restriction on an activity (e.g. emissions of sulphur) and allowing firms to trade these restrictions among one another to ensure that compliance occurs at the least cost to the economy as a whole. Tradable permits are well developed in the developed countries. Ghana is yet to explore this class of EI.

1.43 Deposit-refund

Deposit refund schemes require firms or households to pay a deposit when they purchase certain specific goods (eg. Glass bottles, gas cylinders, batteries). Thereafter they must return the goods at the end of their useful life to the shop, outlet or other collecting agency in order to recoup the deposit. Deposit-refund has not been implemented in Ghana and it is a potential EI that could be used to check waste in the cities, towns and villages.

1.44 Subsidies

Subsidies are a common means of encouraging benign activities and have the effect of reducing the cost of carrying out a socially responsible activity. These may take the form of capital subsidies, low-interest or interest-free loans or discounts on taxes. An example might be government subsidies on insurance premiums for firms with good health and safety records, subsidies for waste management related companies. In Ghana most of the subsidies are rather anti sustainable development and consumption.

1.45 Assignment of liability

Assignment liability comprises measures to help people obtain compensation for environmental or health and safety misconduct. Examples include creating right-to-know information on the conduct of firms (for instance the US-Toxic Release Inventory or in Ghana Reclamation Bond by mining companies) or setting aside performance bonds to cover the costs of cleaning-up operations. Assignment of liability is prevalent in the mining industry.

1.46 Voluntary agreements

Voluntary agreements cover a range of non-statutory undertakings by firms (often mediated by trade associations) to report performance, undertake improvements to practices, raise awareness and publicise best practice. Insurance schemes have applied ***graduation of premiums*** **and** ***bonuse****s* for low claims for many years

In practice, policy makers often use variations on the above instruments or more than one instrument at a time. For instance, a voluntary agreement might be encouraged by a very obvious hint that a statutory tax or regulation will be brought in if solid progress is not made. The selection and design of the EI needs to take account of distribution impacts. The 'polluter pays' principle suggests that emitters or polluters should pay for the pollution they cause. This is certainly the case with taxes and charges. On the other hand, subsidies place the cost on the public purse and tradable permits impact either on the polluter (allocation of permits by auction) or on new entrants (allocation on 'grandfathering'). Voluntary agreements typically only require firms to undertake zero-cost ('win-win') options.

1.50 Relevance to policy-making

Economic instruments are often contrasted to "command and control" policy approaches that determine pollution reduction targets and define allowable control technologies via laws or regulations. In reality, however, command and control policy and economic instruments frequently operate in tandem. A government may set limits on permitted pollution levels for a region or a country in order to meet a certain health or environment objective. Market-oriented approaches such as tradable permits might then be used to allocate the allowable emissions in an efficient manner. Tax breaks or other financial incentives might be offered to groups, individuals or industries investing in cleaner technologies.

UNEP has established a Working Group on Economic Instruments for Environmental Protection. The Working Group consists of 30 developed and developing country experts from governments, research institutions and relevant international organizations. A technical document is being prepared in the framework of this working group identifying opportunities to use economic instruments at the national and international level. The document will address policy in terms of legal and fiscal issues, ministerial coordination, macro-economic conditions, industry structure, specific pollution issues, and conditions under which economic instruments can succeed. The Working Group is also currently engaged in developing a reference manual for the use of economic instruments to meet the objectives of selected biodiversity-related conventions.

Chapter 2

The Overview of Existing Economic Instruments in Ghana

2.00 The existing IE's in Ghana

Even though most of the existing tax instruments are not well defined in environmental context for sustainable development and consumption which are essential in controlling production and consumption, when they are well fashioned could achieve this. Despite the fact that the tax instruments are mainly to raise revenue to support the national budget, some are able to change the behaviour of Ghanaians towards environmental protection for sustainable development, especially the vehicle taxes, fuel taxes, the product taxes, the charges, levies and fees. More also since direct and the indirect tax system in the country can incorporate environmental tax measures it is important to discuss all the tax instruments used in Ghana.

2.1 Taxation of Road Transport and Fuels

Road transport is subject to different taxes in Ghana. Existing taxes apply primarily to motor vehicles and to the fuels they consume. There is considerable scope for environmental objectives to be reflected through restructuring of existing taxes rather than the introduction of wholly new ones.

2.2 Fuel/Petroleum Taxes

Fuel has been subjected to a number of different taxes in Ghana which include general consumption or VAT taxes, excise taxes, storage and security levies and environmental taxes. Excise taxes on the principal forms of petroleum products - gasoline, kerosene and LPG - have risen steadily since 1989. Until 2009 fuels/petroleum products attracted ad-valorem excise duty on ex-refinery price. Beside excise tax, fuels were also subject to a number of special taxes / quasi-excises. For instance it was proposed that a special VAT of 2.5 percent be levied on fuels. The other special taxes/quasi-excises imposed included exploration levies, debt recovery levy (GH¢0.0640 per litre of petroleum products), road levy/fund (GH¢00.40 per litre of petroleum products) strategic stock levy (GH¢0.0030 on every litre of petroleum product), energy fund and LPG promotional levy. The Government earned substantial revenue from the pure petroleum/fuel excises and the quasi-excises. The pure petroleum excise contributed over 60 percent of the revenue from all the categories of petroleum excises. Petroleum excises began with a modest contribution of 9 percent of total revenue in 1986 but then peaked at 22.3 percent in 1993.In 2002 however, it fell to 11.7 percent. Other energy sources also attract tax. For instance electricity attract power factor surcharge of 1 percent.

2.3 Vehicle-Related Taxes

Motor vehicles in Ghana are taxed according to their physical, age, fuel use characteristics, and/or the use to which they are put. These taxes are primarily revenue-raising measures. However, vehicle-related taxes, including negative taxes (tax expenditures) relating to commuting expenses do have the potential to alter behaviour for environmental purposes for sustainable development, particularly when tied to infrastructure reform. Existing vehicle-related taxes include: import duties, VAT, special tax, ECOWAS levy, EDIF, vehicle examination fees and processing fee. Almost all motor vehicles imported into the country attract import duty with the exception of ambulance, Hearse,

tractors (with HS code 8710.10, 8710.20 and 8710.90), special purpose vehicles (e.g. Workshop vans) motor-bikes and bicycles.

Over-aged vehicles (vehicles aged more than 10 years) imported into the country attract a penalty depending on the age of a vehicle from the date of its manufacture, the use to which the vehicle is to be put, model or the cylinder capacity of the motor vehicle.

Quite apart from the taxes, fees and levies, vehicles are also subjected to other forms of fees. There are also recurrent vehicle examination (Roadworthy certificate) fees, which ranges between GH¢ 2.00 and GH¢20.00. Vehicle owners must replace vehicle certificate or stickers every year. Other recurrent fees levied in the country include change of vehicle ownership charge. Possibilities exist for the differentiation of the fees for registration according to the environmental attributes of the different vehicles.

Tolls are imposed on the use of certain express highways and some bridges in the country (see figure 3 below) .The user charges for the use of the toll roads and bridges range from GH¢ 0.050 to GH¢1.00 depending on the vehicle type, weight and use. The following vehicles however are exempted from paying such toll charges; vehicles used by the Military, Police, Fire Service, Prisons, Red Cross, government and mission hospital ambulances and diplomatic missions. Privatization of road tolls had led to an increase in toll collection in the country. Plans are advanced to privatize the other toll roads and some toll bridges. Toll roads and bridges discourage motor vehicle users from using such routes and this invariably reduces pollution. It also encourages the use of local public transport, which is considered to be more environmentally friendly than the motorized individual transport. Above all they are levied to raise revenue for the road fund which are important for sustainable development..

2.4 Environmental Taxes on Goods and Services/Product Taxes

To help encourage production and consumption for sustainable development, excise taxes are levied on certain goods and services in the country. Excise taxes ranging between 5% and 140% are charged on malt drinks (5%), aerated and mineral waters (20%), beer (50%) and tobacco products (140%). These products also attract 12.5% VAT on the retail price or wholesale price. A concessionary duty rate of 10% is granted to hotels and restaurants under the Ghana Investment Promotion Centre Act 1994 (Act 478) on items like refrigerators and furnishing (i.e. carpets, radio sets, crockery, television sets, and air conditioners).

To enhance the competitiveness of local industry, the Government of Ghana on February 27, 2003 raised import duty from 10 per cent to 15 per cent on imported finished products. To support and make domestic production more competitive, it is proposed that the duty on rice imports be increase to help increased production of local Rice.

2.5 Environmental Provisions in Direct Taxation

Direct taxation has a very important role to play in environmental management in Ghana. For example the system of corporate taxation can provide scope for incentives to encourage investment in cleaner technologies. Currently the corporate tax rate is 25%. Even though high, certain companies have taken advantage of it and have installed pollution abatement facilities. However, some see the 25% corporate taxes to be too high to encourage them invest in cleaner technologies. Commercial vehicle owners are required to pay Vehicle Income Tax (V.I.T.) every quarter (3 months). This we envisage to be extended to the private vehicle owners. The tax aims at raising revenue to support national development but part or all the revenue from the tax could be used to subsidize the prices of friendly fuels which cause less harm to the environment.

Another form of direct taxation that supports environmental programmes is mineral royalty. The payable rate ranges from a minimum 3% to a maximum 12% based on the operating ratio of the mining company. Individual income taxes can also help the government raise revenue, which can be used to support environmental programmes for sustainable development.

2.6 Other Environmental Taxes and Charges

Airport charges are levied on landing and parking of aircrafts as well as those that fly over the Ghanaian airspace. For instance aircraft that fly over our airspace generate about 35 per cent of Ghana Civil Aviation Authority's total revenue whilst the landing and parking aircraft earns us about 25 percent of our revenue. The other 40 per cent revenue is from freight, airport charges and rentals, among other things.

Domestic and industrial consumers pay charges for the use of water. Currently, the average water tariff-indexed sewerage fee is 35%. This tends to affect water tariffs, which currently range from GH¢0.099 to GH¢0.9, 900 per 1000 litres consumed depending on the consumer. Similarly, municipal solid waste charges average GH¢10.00 Cedis per 1000kg disposed. Also water-borne wastes disposal (wastewater and sewerages) attract an average charges of GH¢15.00 each per collection. This is normally locally determined per household.

Difficulties are encountered in determining whether airport charges/fees as well as the charges made for provision of water to the domestic and industrial consumers have a fiscal character or are to be regarded as charges/fees related to the cost of providing the relevant service. The solid waste, wastewater and sewerage charges can be seen as explicit or implicit payments for various services e.g. provision of rubbish dumps, land-fills and so on. To bring sanity to the Ghanaian environment, public toilets, urinals and bathhouses implemented. This is aimed at preventing those who do not have such facilities in their various homes from defecating, bathing or urinating in the open. The use of these facilities (toilets, urinals and bathhouses) attracts charges that average GH 0.35/person per use.

Timber loggers are required by law to pay royalties, annual rent, fees and charges as may be prescribed by the ministry of lands and forestry. The Ministry of Lands and Natural Resources on the advice of the Forestry Commission prescribes timber royalties, annual rent, fees and charges. On the basis of adjustment to current Free on Board (F.O.B) prices and exchange rates, the average weighted stumpage fee for 2003 has been varied from US$10.10 to US$11.10 per cubic metre. These payments provide a basic return to the land owners (District Assemblies, Traditional Councils etc) and contribute to the cost of forest management. Section 267(6) of the 1992 Constitution of the Republic of Ghana provides that the net revenue that will accrue from stumpage after providing for the Forestry Commission's (FC) management fees and 10 percent for the Office of Administrator of Stool Lands (OASL) should be distributed as follows; 25 percent for stool, 55 percent for District Assembly and 20 Percent for Traditional Council.

To help maintain the beaches of the country, certain beaches have been put in order and levies imposed on users of such beaches (see figure 4). For example users of La pleasure beach pay an average of GH¢1.00 on an ordinary day and GH¢2.00 on an occasion days. Wildlife/forest/park and gardens conservation charges are levied on peoples who visit these sites. An average of GH¢1.00 is charged per person per visit of the parks and gardens. Wildlife/forest conservation charge of GH¢2.00 is levied on an adult and GH¢1.00 on a school child that visits the wildlife/forest conservation sites. Example of such sites are Aburi Botanical Gardens and Kakum National Park where users pay some charges/levies for their maintenance for sustainable development and consumption.

2.7 Negative Taxes or Subsidies

Negative taxes or subsidies by the government in certain areas of the economy are helping improve the environmental quality in Ghana. For instance the Government has instituted the LPG promotional levy, which is aimed at promoting the use of gas which is more environmental friendly. Other subsidies include government expenditures on research and provision of renewable energies. For the agriculture sector the subsidy is aimed at encouraging production of certain cash crops (cocoa, share nuts etc.), which can invariably help prevent soil erosion. The Government is also investing so much money in the provision of renewable energies.

Other subsidies include Government expenditures on some agricultural inputs such as insecticides, fertilizers, pre-mix fuel used by fishermen are rather anti-sustainable development. Although these subsidies may promote responsible agriculture and fishing practices it may directly contribute to negative effect on environment and over-fishing respectively and consequently sustainable development.

2.8 Enforcement Incentives

Non-compliance fees and reclamation/performance bonds are the two most important of the enforcement incentives used in Ghana. The non-compliance fees are the charges and fines levied on non-compliant polluters. For instance a holder of logging license who transfers or assigns his timber rights under the Timber Utilization Contract (TUC) contrary to the logging regulations commits an offence and is liable on summary conviction to a fine of not less than 300 percent of the annual rent payable (Forestry Commission of Ghana, 2004). The mining and logging companies in Ghana are also required by law to post reclamation/performance bonds to the appropriate authorities before they start their operations. By July 2003, mining companies had posted reclamation bond/performance bonds of US$1.5million and US$ 240 million in cash to the appropriate authorities (Ghanaian chronicle, v.11, No 125, Wednesday July 16, 2003).

2.9 Effectiveness of Environmental Taxes/Charges

Many environmental economists are skeptical towards environmental taxes claiming that it is immoral to buy oneself some right to pollute. Hardwick et al, 1994 have argued that environmental taxes /charges cannot eliminate all pollution completely as pollution is inevitable by-product of economic activity and that pollution taxes/charges can only compel polluters to reduce pollution and not eliminate it completely. Folmer and Gabel (2000) however, are of the view that environmental

taxes/charges are intended to correct for negative externalities and can therefore completely eliminate pollutants. They argue that though environmental taxes /charges are not often used in practice as one will expect because of certain implementation difficulties, they have the tendency of eliminating pollution completely. However, those who are subjected to such taxes/charges oppose them on the grounds that they impose financial burden on the payers and reduce their profits. They therefore prefer the regulatory alternatives such as "command and control", tradable permits or voluntary agreements to the eco-taxes and charges. Despite opposition from consumers, industries, political opponents, interest groups and so on, environmental taxes and charges are increasingly been used worldwide including Ghana for environmental management.

2.10 Agencies and Institutions for the Enforcement

The Ghana Revenue Authority (IRS, CEPS, VAT Service) is the fiscal agency currently in charge of or responsible for collection of the direct and indirect taxes as well as some existing environmentally related taxes. IRS collects the direct taxes and CEPS and the VAT service the indirect taxes. It is recommended that these same agencies be used for the enforcement of the environmentally related taxes to be introduced or re-structured. More also since both direct and indirect taxes can incorporates environmental taxes these fiscal agencies could be used for the enforcement of the taxes. EPA, Forestry Commission, Minerals Commission, Local Community Councils, District Assemblies, Regional Councils, Metropolitan Assemblies and other government organs are also to be charged with the responsibility of enforcing some of the environmental economic instruments.

Chapter 3

3.0 Innovation through other Policy Instruments

3.1 Recent trends I EI's

Because trading programmes, taxes and traditional regulation have limited ability to stimulate innovation, regulators around the world have sometimes relied upon other instruments to stimulate innovation. For example, several European countries and US states have used 'renewable portfolio' standards to encourage use of renewable energy. These standards require utilities to rely upon renewable energy sources for a specified percentage of output or require large-scale purchasers of electricity to buy a specified percentage of renewable energy. This sort of command and control regulation suggests recognition that a simple requirement to use more progressive technology may produce innovation more reliably than to seek to stimulate technological change indirectly through performance standards, emissions trading or pollution taxes. Recently, however, several countries and states have begun implementing tradable renewable energy certificates. Such systems combine

government technological mandates, albeit a mandate to use a range of technologies rather than one favoured technology, with the flexibility of trading to reduce the compliance cost. The international regime governing ozone depleting substances used perhaps the most effective innovation simulating approach, simply banning a traditional obnoxious technology, in this case, the use of ozone depleting substances. This can stimulate innovation, since users of banned substances and their suppliers feel an economic imperative to come up with substitutes.

Other examples include Great Britain's phase-down of coal and the US phase-out of certain pesticides. It is open to debate whether such standards are a distinct form of regulation. A ban or phase-out can be viewed simply as a stringent performance standard, requiring zero emissions of a particular substance. But unlike a zero-emission standard, a ban does not simply prohibit emissions, it prohibits the manufacture, sale or use of the substance altogether. A ban might alternatively be considered a work practice standard. While many work practice standards tell regulated entities what to do, a ban or phase-out tells regulated entities what *not* to do. Thus, a ban on ozone depleting chemicals widely used as solvents and refrigerants does not command any particular approach to refrigeration or degreasing. It leaves the field wide open to innovation. Liability rules, if sufficiently onerous, can also stimulate innovation. After the US government failed to enact a phase-out of asbestos, tort liability bankrupted asbestos manufacturers and forced the development of substitutes. But onerous liability has come under attack in the US and has never commanded much support in other countries. Also, problems of proof limit its capacity to stimulate environmental innovation.

Information regimes can sometimes stimulate innovation. For example, right to-know laws requiring US chemical companies to report toxic releases appear to have led to pollution prevention within the industry.

Pollution taxes can stimulate innovation more effectively when the proceeds pay for innovation. The idea of using negative economic incentives to fund positive economic incentives can provide the clue to designing better instruments for sustainable development. For example, New Zealand sold fishing permits and dedicated some of the proceedings to paying some fishermen to retire, thus reducing overall pressures to allow too much fish to be taken. California and other state legislatures have considered a 'fee-bate' proposal. This proposal would impose a fee upon purchasers of high emission vehicles, the proceeds of which would provide a rebate to customers who purchased low emission vehicles. Such an approach could significantly influence the incentives facing

manufacturers, encouraging them to compete to produce cleaner vehicles in order to sell to customers who have extra money in their pockets (through the rebate). One could build on this model to emulate competitive free market dynamics using an 'environmental competition statute'. This statute would require high polluting firms in an industry to reimburse their competitors who pay for the environmental improvements that allow them to achieve lower pollution levels and pay them a preset premium on top of that. Such an approach could create a race to become the cleanest facility, a race fuelled by incentives similar to those existing in competitive markets. Firms that innovate and achieve superior levels of pollution control would stand to profit and firms that failed to achieve superior levels would pay. Competitive markets tend to encourage innovation because of fear and greed. Firms' greed encourages innovation in hopes of grabbing market share from competitors. Firms' fear of losing market share to more innovative competitors encourages innovation. The environmental competition statute creates similar incentives, with the transfer payment from high to low polluting firms functioning much like a shift in market share. Such an approach would require an anti-collusion rule; otherwise regulated firms might agree not to compete to limit emissions, thereby incapacitating an environmental competition statute. Besides such collusion, a properly designed environmental competition statute may stimulate a race to the top.

Government research and development offers a very different approach to innovation. While the current era tends to de-emphasize the value of government in leading innovation, government has often brought together leading scientists to meet major technical challenges such as the development of atomic power, the internet, and the fuel cell. So, it might provide a fruitful approach to solving technical challenges in the environmental area. On the other hand, government research can be misdirected if special interest influence predominates, as the example of US government programmes aimed at 'clean coal' illustrate. But little incentive exists to deploy environmentally beneficial technologies in private markets without government in some way creating a demand for the technologies' use. All instruments of environmental regulation, even much maligned command and control regulation create some incentives to use environmental technology that free markets do not provide.

All of these points to the need for a more imaginative search for approaches capable of stimulating transformative innovation, such as the environmental competition statute described above. Secondly, it calls attention to the importance, not just of selection of instruments, but of design considerations, such as decisions about stringency, in stimulating innovation. Thirdly, it should lead

to more judicious use of emissions trading, instead of a glib assumption that trading offers some kind of panacea for sustainable development. Fourthly, it reminds us that traditional regulation, if designed to stimulate innovation, can prove effective in paving the way toward sustainable development.

Chapter 4

SUMMARY OF ECONOMIC INSTRUMENTS FOR SUSTAINABLE CONSUMPTION AND PRODUCTION

The table below summarises various types

Policy Area	Objectives	Activities	Results	Target Groups
EI for Transport Sector	• To encourage the use of environmentally friendly vehicle and thereby reduce vehicular emissions	• Introduction of higher import duties on vehicles • Over aged vehicles imported to attract penalty in the form of higher taxes/duties. • Introduction of vehicle income tax on monthly basis on both the commercial and private vehicles. • Encourage the use of Hybrid vehicles by reducing taxes on their importation.	• Less vehicles on our roads. • Reduction in carbon emission and its associated negative impact on health and climate • There will more use of environmentally friendly vehicles.	• Private and Public transport owners , GPRTU and other transport unions e.g. PROTOA • Commercial transport companies

	Implementing Institutions/Agencies	**Verifiable Indicators**	**Possible sources of Funding**	
	• Ministries of Transport, Roads and Highway and Energy • DVLA • National Road Safety Commission • Revenue Agencies (IRS, VAT and CEPS).	• Amount generated from road fund, • Amount generated from vehicle income tax • Number of Hybrid vehicles in use as against non hybrid vehicles • Reduction in road accidents	• Internally generated income. • Bilateral and Multilateral donors	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
EI for Energy Sector	• Reduce energy consumption and emissions associated with petroleum products • Generate income for environmental programmes	• Review and enforcement of the following taxes and levies; Motor fuel tax, natural gas tax and electricity levies • Set up energy fund mainly for environmental purposes • Separation of environmental tax revenues from consolidated fund.	• Reduction in carbon emissions and its associated negative impact on health and climate. • Reduction in energy consumption • More revenue generated for environmental activities	• Communities around oil fields • Oil production companies such as Tullow, Kosmos Anadarko etc • Vehicle owners • Electricity consumers
	Implementing			

	Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• GNPC, EC, NPA, MOEN,MOFAP and MEST • Revenue Agencies • Energy Commission • Public utility regulatory authority	• Amount generated from pollution taxes, • Reduction measured emissions, • Energy savings in KW, Amount energy fund	• Internally generated income • Bi lateral and multilateral donors	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Economic Instrument for Pollution Taxes	• Check environmental pollution associated with oil production (water bodies, land and air pollution)	• Introduction of oil pollution taxes and associated emission tax. • Set up oil environmental management fund.	• Sanity in the oil producing areas • Enough funds to deal with oil pollution • Reduce impact on climate and its associated environmental hazards.	• GNPC, • Oil exploration companies, • Communities around oil fields • Oil production companies

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• GNPC • Revenue Agencies • EPA • MEST • MOEN	• Clean environment in the oil production areas • Emission measured in … • Amount in the oil fund	• Internally generated fund • From multi lateral and bilateral sources	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Agriculture Environmental Taxes	• Check the dangers associated with the use of pesticides, fertilizers and organic manure on land, man and wildlife	• Introduction of Pesticides tax Fertilizers tax and organic emission tax • Enforcement of pesticide chemical sellers	• Reduce hazards on land, man and wildlife as well as climate. • Reduction in the use of pesticides and fertilizers • Reduction of organic emissions	• Chemical Sellers, • farmers, • fishermen

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• MOFA • Revenue Agencies • EPA • MEST	• Number of chemical sellers registered • Organic emission measured in……	• Internally generated sources • Multi lateral and Bilateral	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Timber/forestry related taxes	• Encouragement of reforestation and discouragement of disforestation to protect the existing forest resources for posterity	• Review and reinforce the existing fees and charges being timber royalties, Annual Rent, Stumpage fees, conservation fees. • Subsidies to encourage forestation projects	• Reduction in C02 • Increase in forest area	• Farmers • Chainsaw operators • Timber millers • Timber merchants • Traditional Council

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• Ministry of Natural Resources • Forestry Commission • Lands Commission • Forestry Department • EPA • MMDAs	• Area reforested in hectares • Area deforested in hectares • Amounted generated from forestry activities	• Internally generated • Multilateral and Bilateral	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Mining related EI	• Reduce the damage caused by mining activities and to reclaim the damaged • land and vegetation	• Reinforcement of non compliance fees, reclamation /performance bond and mineral royalty • Introduction of severance taxes and aggregates levy	• Reduction of damage to environment caused by mining activities • Citizen compensated for the extraction and loss of resource • Revenue generated to reclaim land and vegetation	• Mining companies • Quarry companies • Communities surrounding mining communities

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• Ministry of Land and Natural Resources • Minerals commission • Ghana chamber of commerce • EPA	• Area reclaimed in hectors • Area damaged in hectors • Fund generated through bonds and reclamation fees	• Internally generated • Multilateral and Bilateral	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Waste related EI's	• It is designed to discourage production of waste and to use alternative forms of waste management.	• Review and reinforce the existing taxes, fees and charges for effective management of solid and liquid waste • Introduction of Land remediation tax relief • Subsidies to encourage Clean Development Mechanism projects in Biogas and compost production	• Proper management of waste • Clean environment in the Cities, towns and villages • Reduction in malaria, cholera and other waste associated sicknesses.	• General public • Waste Management companies e.g. Zoom lion • MMDAs

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• Ministry of Local Government and Rural Development • MMDAs • EPA • Ministry of tourism	• Number of reported waste related sicknesses • No. of waste related CDM projects	• Internally generated • Multilateral and Bilateral	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Subsidies	• To reduce the cost of carrying out a socially and environmentally responsible activities	• Giving capital subsidies , low-interest or interest-free loans or discounts on taxes to institutions that embark on environmentally friendly projects and programmers	• Good health and as well as safety • Clean environment and clean technologies • Increased in the number of trees	• Waste management companies • Investors and entrepreneur

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• MOFEP, Revenue Agencies, Ministry of lands and Natural Resources, Forestry Commission	• Reduction in deaths as result of introducing the clean technologies, • Number of trees planted as a result of subsidies	• Internally generated • Multilateral and Bilateral	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Assignment Liability	• To ensure that companies /organizations that damage lands or cause health problems are made to suffer for their activities	• Disclosure requirements before permit are granted for operations. • Setting up of fund equivalent to one third of capital investment to compensate for environmental harmful effect.	• Creation of fund to cater for any harmful effect of a firm's operation on the environment and people • Proper screening before a firm is allowed to operate	• Mining companies • Oil exploration and production companies • Timber logging and milling firms • Quarry companies • Chemical manufacturing firms

	Implementing Institutions/Agencies	Verifiable Indicators	Possible sources of Funding	
	• MOFEP • MEST • EPA • Ministry of Lands and Natural Resource	• Amount deposited in the Fund created for such purpose • Availability of disclosed information to the general public	• Internally generated fund • Multilateral and Bilateral donors	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Voluntary Agreement	• To ensure that people and institutions voluntary agree on issues that promote clean environment for sustainable development	• Setting up a special unit within MEST to oversee voluntary agreement on environmental issues	• Awareness creation on environmental issues • Encouragement of firms to be environmentally conscious	• Trade associations such as Chamber of Mines, Sachet water producers association • Energy Foundation • NGO's

	Implementing Institutions/Agencies	**Verifiable Indicators**	**Possible sources of Funding**	
	• MEST • EPA	• No. of voluntary agreements • Environmental awareness level of the general public	• Bilateral and multilateral organizations	
Policy Area	**Objective**	**Activities**	**Results**	**Target Groups**
Tradable Permits	• To trade in "pollution right" so as to reduce/control industrial waste and emissions	• Establish a market that will allow polluters to trade in limited supply of "pollution rights"	• Reduction / control of industrial waste and emission	• Manufacturing industries • Energy production firms
	Implementing Institutions/Agencies	**Verifiable Indicators**	**Possible sources of Funding**	
	• MOEN • MEST • EPA • Regulatory body for the market	• No. of companies/organizations permitted to trade in the market. • No. of companies/organizations that are supposed to trade in the market	N/A	

Policy Area	Objective	Activities	Results	Target Groups
Refund- deposit	• To ensure that disposal containers are properly disposed and also to indirectly reduce the consumption of disposable containers.	• Come out with a scheme that will be used to charge more for goods in disposable containers and make a refund upon return of the disposable container	• Proper disposal of disposable containers • Create a fund for collection of disposable containers	• Supermarket/Retail shops • Manufactures of disposable containers • Manufacturers of bottled and sachet products • General public
	Implementing Institutions/Agencies	**Verifiable Indicators**	**Possible sources of Funding**	
	• MMDAs • EPA • Supermarkets/Retail shops • Ghana standard Board • Association of industries • Ghana chamber of commerce	• No. of disposable containers that are returned within a specified period • Amount in refund deposit account unclaimed	• N/A	

7.0 Summary of Economic Instruments

Over the past few years, there has been growing demand for the use of economic instruments as opposed to government regulation. With the onset of Agenda 21, the views of economists are converging on the merits of economic instruments in ensuring sustainable environmental management. Economic instruments can effect change or influence behaviour through their impact on market signals. Use of economic instruments ensures that the polluter bears the costs of pollution with due regard to public interest and free trade.

Economic instruments adopted by governments can broadly be divided into three main categories based on how they affect government's budget: public expenditure instruments, revenue generating instruments, and budget neutral instruments. Public expenditure instruments (PEIs) take the form of subsidies, grants and tax allowances and are the most familiar tool of intervention. PEIs serve as financial incentive for individuals to undertake an activity they would not otherwise. Revenue generating instruments (RGIs) include taxes, charges, and fees which are considered as the "price" to be paid for polluting. Effluent charges on sulphur dioxide emissions, tax differentiation between leaded and unleaded petrol, user charges for public waste disposal, depletion taxes on mineral exploitation and stumpage fees for timber demonstrate how RGIs are used. Budget Neutral Instruments (BNI) are designed to lay a surcharge on a potentially harmful substance or activities and then refund that surcharge if that substance is recycled, restored or use is avoided. In such cases, the government acts as the intermediary transferring funds from one group to another. Specifically, instruments such as charge or tax, tradable permit, deposit-refund, subsidy, assignment of liability, voluntary agreements and graduation of premiums and granting of bonuses are employed by government to prevent and protect the environment.

In practice, policy makers often use more than one instrument at a time. In line with the ‘polluter pays’ principle, emitters or polluters should pay for the pollution in the case of taxes and charges. However, subsidies place the cost on the public purse and tradable permits impact either on the polluter or on new entrants.

In Ghana, most of the existing tax instruments are not well defined in environmental context for sustainable development and consumption. Tax instruments are mainly to raise revenue to support the

national budget. However, some direct and the indirect tax system in the country can incorporate environmental tax measures. These tax instruments can change the behaviour of Ghanaians towards environmental protection for sustainable development, especially the vehicle taxes, fuel taxes, the product taxes, charges, levies and fees. The 25% corporate tax rate does not encourage firms to invest in cleaner technologies. A downward review of the corporate tax rate for some companies may be necessary. Vehicle Income Tax (V.I.T.) should also be extended to the private vehicle owners. The tax aims at raising revenue to support national development but part or all the revenue from the tax could be used to subsidize the prices of friendly fuels which cause less harm to the environment. The mineral sector taxation regime should take into serious consideration the environmental impact of mining activities.

Other environmental related taxes are airport charges levied on landing and parking of aircrafts as well as those that fly over the Ghanaian airspace. There are also charges on domestic and industrial consumers for the use of water.

References

UNEP, Opportunities, Prospects and Challenges for the Use of Economic Instruments in Environmental Policy Making, under preparation.

UNEP, Reforming Energy Subsidies: An Explanatory Summary of the Issues and Challenges in Removing or Modifying Subsidies that Undermine the Pursuit of Sustainable Development, UNEP/IEA, 2002.

UNEP, Energy Subsidies Reform: Lessons Learnt in Assessing Their Impacts and Designing Policy Reform, under preparation.

UNEP, Environmental Impacts of Trade Liberalization and Policies for Sustainable Management of Natural Resources: A Case Study on India's Automobile Sector, UNEP, 1999.

UNEP, Economic

c Instruments for Environmental Management - A Worldwide Compendium of Case Studies, UNEP, 2000.

UNEP, Environmental Valuation - A Worldwide Compendium of Case Studies, UNEP, 2000.

Energy Sector Working Group Report

December 2009

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Acronyms and Abbreviations

BOST	Bulk Oil Storage and Transportation Company Limited
BRT	Bus Rapid Transits
CCGT	Combined cycle gas turbine
CEB	Compagnie Energie Beninois
CFL	Compact Fluorescent Lamp
CIE	Compagnie Ivoirienne d'Electricite
CMS	CMS Energy of Michigan, USA
CSIR	Council for Scientific & Industrial Research
EC	Energy Commission
ECG	Electricity Company of Ghana
EET	Energy Efficiency Technology
EF	Energy Foundation
EIA	Environmental Impact Assessment
EPF	Energy Policy Framework
EPA	Environment Protection Agency
GDP	Gross Domestic Product
GNPC	Ghana National Petroleum Corporation
GOG	Government of Ghana
GOIL	Ghana Oil Company
GRIDCO	Ghana Grid Company
IPP	Independent Power Producers

JV	Joint Venture
KITE	Kumasi Institute of Technology Energy and Environment
KTPP	Kpone Thermal Power Project
LPG	Liquefied Petroleum Gas
MOE	Ministry of Energy
NED	Northern Electricity Department
NES	National Electrification Scheme
NPA	National Petroleum Authority
OCGT	Open Cycle gas Turbine
OMC	Oil Marketing Companies
PURC	Public Utility Regulatory Commission
ROW	Right of Way
SCGT	Single cycle gas turbine
SCP	Sustainable Consumption and Production
SDAP	Sustainable Development Action Plan
SHEP	Self Help Electrification Programme
SNEP	Strategic National Energy Plan
TICO	Takoradi International Company Limited
TOR	Tema Oil Refinery
TOU	Time of Use
UNDP	United Nations Development Programme
VALCO	Volta Aluminium Company Limited

VRA	Volta River Authority
WAGP	West Africa Gas Pipeline
WB	World Bank

OVERVIEW OF EXISTING SECTORAL PLANS POLICIES PROGRAMMES AND STRATEGIES OVER THE LAST 10 YEARS.

Electricity Supply (Power Generation)

One major thrust of policy strategy over the last 10 years has been the Energy Sector Reform. The main ingredient of this policy direction is to create an enabling environment for the participation of the private sector in the generation, transmission, and distribution of electricity to consumers. In view of this, the Volta River Authority (VRA) Development Act 46 of 1961 which created the Authority as the sole power generation and transmission company in the country was amended to enable competition by private generating companies. The Volta River Authority (VRA) Development (Amendment) Act 2005, Act 692 was passed to remove the power conferred on VRA to operate an electricity transmission system.

The amendment provided a level playing field for all participants in the power generation sector in the country. This subsequently resulted in the establishment of an independent transmission company called Ghana Grid Company (GRIDCo) to be responsible for the transmission of power in the whole country.

Demand Side

On the demand side, Government policy has been directed towards energy conservation, energy efficiency improvement and renewable energy development.

Petroleum Sector

Similar policy direction in the petroleum sector has also led to the establishment of private companies which import refined petroleum products such as petrol and diesel for sale to the oil marketing companies without recourse to Tema Oil Refinery (TOR) which imports crude oil and refines it for sale.

Renewable Energy

Another policy direction over the last 10 years is the provision of off grid electricity supply to rural areas of the country under the Renewable Energy Policy. The most widely developed and used renewable energy source has been solar energy.

Rural Electrification

Over the last ten (10) years, in order to meet the growing electricity need for economic growth in the rural areas, Government has embarked on a massive rural electrification expansion programme.

Sustainable Development

A number of sustainable development initiatives have been taken and includes:

- Encouraging the informal industries and commercial/service entities to switch to alternative fuels like LPG to mitigate deforestation
- Promotion of more efficient improved charcoal/firewood stoves.
- Utilization of biomass wastes to generate off grid electricity mainly in some large sawmills and oil palm mills (e.g. the Benso, Twifo, Ghana Oil Palm Development Company)

Institutional Framework

The energy sector of the economy is structured under the control of the Executive and the Ministry of Energy. There are three main divisions under the energy sector. These are the National Energy Policy, Planning and Regulatory Authorities, the Energy Supply Agencies and the Academic and Research entities.

The National Energy Policy, Planning and Regulatory authorities are responsible for the regulation, formulation, coordination, monitoring and review of policies and programmes for development and utility of energy resources for economic development with socio-economic priorities. These include,

Ministry of Energy: responsible for energy policy formulation and implementation;

Ghana National Petroleum Corporation (GNPC)*:* plans and implements activities to support the development of Ghana's hydrocarbon resources;

Energy Commission (EC): responsible for licensing electricity and natural gas operators and play an advisory role to the Ministry of Energy on energy policy and planning matters;

Public Utilities Regulatory Commission (PURC): responsible for economic regulation of electricity and natural gas utilities; and

National Petroleum Authority (NPA): oversees activities and regulation of the downstream petroleum industry.

The Energy Supply Agencies are responsible for the production and supply of various sources (electricity, fuel, etc.) to meet the national energy demands. The agencies are semi-autonomous state enterprises which deal principally in petroleum and power. The major agencies in the power sector are,

Volta River Authority (VRA) responsible for electric power generation,

Electricity Company of Ghana (ECG) engaged in electric power distribution in the southern sector of the country

Northern Electricity Department (NED) a department of VRA, engaged in electricity distribution in the northern sector of the country.

Ghana Grid Company (GRIDCo*)* responsible for the transmission of power from the generators to the distribution companies

The petroleum sector agencies include,

Tema Oil Refinery (TOR): imports crude oil, refines and sells refined products.

Bulk Oil Storage and Transportation Company Limited (BOST): responsible for bulk storage and transportation of petroleum products throughout the country. It is also mandated to handle the national strategic reserves of petroleum products.

Oil Marketing Companies (OMCs): a mix of private and publicly owned refined oil marketing companies supplying fuel to the general public.

Academic & Research Institutions: These are organizations which articulate and undertake a range of research activities to meet the identified needs of the production and distribution institutions. The research centers are organized under the universities, and other institutions are under the Council for Scientific & Industrial Research (CSIR).

Current Legal and Regulatory Framework

In the last ten (10) years, government has moved to streamline the energy sector with changes in the legal and regulatory environment through the enactment of several legal instruments resulting in the establishment of the following regulatory institutions such as:

Energy Commission (EC): responsible for licensing electricity and natural gas operators and playing an advisory role to the Ministry of Energy on energy policy and planning matters

Public Utilities Regulatory Commission (PURC): responsible for economic regulation of electricity and natural gas utilities; and

National Petroleum Authority (NPA): oversees activities and regulation of the downstream petroleum industry.

Policy Environment

The National Energy Policy provides for the implementation of significant reforms in the sector competitive energy markets to attract the desired institutional support for the delivery of reliable energy services in the future.

The National Energy Policy has been formulated as a long-term commitment of the Government of Ghana (GoG) to improve the living condition of the population. This is to be achieved through the provision of the requisite energy infrastructure and services to support and sustain improvements in health, education, employment and equity in the distribution of basic necessities nationwide.

The Policy seeks to provide a framework for the increase in energy supplies and facilitate the accelerated modernization and development of the energy sector to maintain the integrity of the natural environment. It is supposed to generate a renewed urgency and commitment to develop the energy sector with the active participation of private sector. In addition it makes provision to honour Ghana's obligations under all international energy conventions and protocols which it is a signatory.

The policy has been structured to achieve six principal goals in the long term, viz.

- Rehabilitate and expand energy production and supply infrastructure;
- Indigenous Energy Resource Development;
- Security of Future Energy Supply;
- Increasing Access to Modern Energy Services;
- Manage Growing Demand for Energy Services; and
- Minimize Environmental Impacts of Energy Supply and Use;

These goals are to be pursued for adequate and reliable energy supply, reduce energy intensity in the creation of wealth and economic growth; increase modern energy forms to all, especially low income households and communities, while maintaining efficient end-use energy.

Furthermore, the policy encourages an increased private sector participation in the development of the energy infrastructure and power supply.

The current policy also makes adequate provisions for the future development of energy supply and distribution systems. It recognizes that the energy sector has failed in planning to match demand with supply, which has created shortfalls resulting in power rationing.

It has identified renewed leadership drive and commitment as the main inputs required to achieve development plans in the future. The policy seeks to identify the necessary steps to build capacity and sustained commitment to implementation of development plans in the future.

Environmental Management Practices and Structures

The current environmental consideration of any energy related project is the requirement of an Environmental Impact Assessment (EIA). The EIA is prepared and submitted to the Environment Protection Agency (EPA) for acceptance and endorsement. The EPA issues a permit by which the interested party submits to the Energy Commission as a requirement for licensure.

Main Energy Resources and Usage

The main energy resources are biomass, oil, solar, hydro and natural gas.

Biomass or fuel wood is the predominant energy resource in terms of endowment and consumption. Biomass resources cover about 20.8 million hectares of the land mass of Ghana (23.8 million hectares) and is the source of supply of over 69 percent of total national energy consumption.

The second most important energy resource is hydro whose potential consist of large hydro sites along the Volta River Basin and several small hydro sites on some rivers scattered all over the country. Although a larger proportion of the nation's known hydropower potential has already been developed, there are some undeveloped sites consisting of a few large and small capacities estimated at about 1,000 MW. The largest of the potential sites is located at Bui on the Volta River with an estimated capacity of about 400 MW.

Ghana has significant renewable energy resources particularly solar and wind energy resources. Solar radiation levels are estimated at about 4-6 kWh/m^2 and the average wind speed along the coastal areas

estimated at 5 m/s. Wind speeds of 9 m/s have been recorded on the mountains along southeastern areas of the country.

Though there are indications of the possibility of obtaining energy from nuclear sources, this has not yet been exploited.

Funding Sources for Energy Provision

Financing for energy supply has been from the Government in many cases. The Government of Ghana (GoG) has at different times received financing from the World Bank (WB) to support the utility companies. The only other international source has been from the CMS Energy of the USA, which entered into partnership with the VRA for the establishment of a 330 MW thermal power plant at Takoradi.

At the individual level several private companies have invested in standby power generators to support operations in the face of rampant power shortages.

In the petroleum sector, apart from GoG which is the primary source of funding for TOR, the OMCs have been source of private capital for the importation of refined products such as diesel and petrol for direct sales to the public. A lot of banking institutions have also invested in the sector by serving as sources of business loans for the operation of the OMCs.

ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS OF THE SUPPLY SIDE OF THE PRODUCTION PROCESSES.

Energy production processes have been associated with a mix of positive and negative economic, social and environmental impacts.

Over the last ten (10) years, major development of generation plants has been mainly hydro and thermal sources.

Some of the economic, social and environmental impacts associated with both construction and operation of these plants as well as exploitation of fuel wood include the following:

Economic Impacts

- Employment Generation
- Both unskilled and skilled labour such as masons, carpenters, steel benders, electricians etc are employed in the development of the plants.

Social

- Influx of workers to the project areas put pressure on transportation, housing needs, medical services and local schools.
- Increase in prevalence of diseases such as HIV/AIDS.
- Local construction work force from project areas is employed in the development of the plants. This then provides temporary jobs to unskilled labourers in the project areas.
- The quality of life of otherwise unemployed youth are suddenly enhanced through the salaries to be paid them, reduce pressure on their families for provision of basic human needs, and hence reducing the poverty levels in the micro economy.

Environmental

- The use of heavy construction equipment and materials haulage vehicles result in the emission of dust into the atmosphere
- Possibility of oil spills from unserviced vehicles and equipment and polychlorinated biphenyls (PCBs) from transformers at project sites is also possible
- Exposure to excessive noise from construction activities, vehicles and equipment could impact

worker health.

- Smoke from diesel operated equipment could also impact the environment and worker health
- Erosion could also arise from project sites and affect public drains in the absence of suitably sized drains to carry rainfall runoff from the project sites.
- There are some unavoidable minor disruption to traffic flow when major plant components {i.e., generators, transformers) are delivered to the plant site during the construction phase.
- The potential for vehicle accidents and injury also exists.
- Air pollution arising from the emission of pollutants from use of fossil fuel for plant operations is an environmental risk.
- Increase in ambient noise levels.
- Forest degradation due to over exploitation of wood

THE DEMAND SIDE OF CONSUMPTION PATTERNS OF THE ENERGY SECTOR

3.1 Demand Scenario by 2020

Electrification is viewed mainly in the context of providing electrical energy to urban households and industries. Its demand was projected to increase from 6.58 TWh in 1997 to about 20 - 21 TWh by 2020[1]. VRA projects 16 TWh as the low growth scenario. Average demand growth has been between 6-8% per annum for VRA and about 7% per annum for ECG. The Government plans to expand the power system in order to meet this projected demand. However, as the country increases its electricity capacity, there are many decisions concerning different options of power generation that the government will have to make. The government will also have to decide as to whether to use centralized or decentralized power solutions.

The present power sector is dominated by hydropower on the Volta River – Akosombo (1020 MW) and Kpong (160 MW); which constitutes about 65% of the nation's installed capacity. To meet the growing demand for electricity, the thermal power capacity at the Takoradi plant is expected to be upgraded from 550MW to 660 MW.

Natural gas as a fuel for electricity is expected to replace light crude oil by 2010 should the West African gas pipeline project commence delivery of gas as planned and is projected to overtake hydro as the dominant primary fuel for power generation by 2010. However, depending on natural gas from the West African gas pipeline alone could put the nation's energy security at risk.

3.2 National Electrification

Universal access to electricity was initiated in 1988 as National Electrification Scheme (NES) at a time when access to electricity by the entire population of the country was 33%. The objective of the electrification programme was to support the economic recovery programme, which had been initiated in 1983 by the government, to increase the overall socio-economic development of the nation. It was anticipated that extension of electricity to rural areas would open up the country for economic development and slow down migration of the population from the rural areas to the urban centres. Since the inception of the NES, all regional and district capitals have been connected

[1] VRA forecast indicates 20 TWh by 2020 considering the average economic growth from 1990-2000.

to the national grid system. As a complementary activity to the NES, the Self-Help Electrification Programme (SHEP), which aims at assisting rural communities to obtain access to grid power, was initiated. Despite the achievements made under these projects, it is still very expensive for government to extend grid power to some remote rural communities. Some of these communities are scattered islands on the Volta Lake. Also, the low-density population of such off-grid rural communities requires the installation of longer low-line voltage per new customer.

It has been estimated that around 23% of the population would still have no access to electricity by 2020. Ghana is therefore seeking to develop all the available sources of energy for electricity generation by opening up the way for private sector investment. Various forms of energy enhancement measures are also being considered and notable among them are:

i. the energy conservation programmes
ii. expansion of VRA's thermal plant at Aboadze
iii. installation of new thermal power plants at Tema
iv. the construction of the 400 MW Bui project
v. harnessing the renewable energy resources of the country.

This brings into focus the role the renewable energy technologies could play in rural electrification. Particularly, it could guarantee sustainable development by reducing the generation of carbon dioxide emissions in the country.

3.3 Energy Efficient Technologies

There had been in existence various energy conservation efforts since the early 1990s, but the aftermath of the 1998 energy crisis spurred the adoption of energy conservation as an important scheme to help alleviate the national energy crunch. Building power plants faces time constraints and requires substantial financial commitments. The least expensive route was identified with energy conservation programmes which will reduce peak levels and curtail waste.

The adoption of the Energy Policy Framework (EPF) by the Ministry of Energy (MoE) is a major step in support of the Energy Efficiency drive in the country. The EPF is the vision of the energy sector. It is to develop an 'Energy Economy" that would ensure reliable supply of high quality energy services for all residential, business and industrial entities, and transport systems.

There are a number of programmes already in place for the promotion of Energy Efficiency Technologies (EET). The Energy Foundation (EF) has been the liaising organization for the energy

conservation programs. The Energy Foundation collaborates with the private sector, government institutions, regulatory bodies and donor agencies to implement specific programs and projects.

3.4 Barriers

i. Lack of national energy efficiency standards. This has led to the proliferation of sub-standard products.
ii. Lack of awareness on energy efficient technologies at the national level. No awareness of availability of the technologies and very little understanding of how they work.
iii. Finance for private and institutional participation. Lack of credit and loans for investments in the energy efficient technologies.
iv. Inadequate local capacity for the installation, operation and maintenance of some energy-efficiency technologies.
v. Lack of production base for the energy efficient technologies.
vi. Uneconomic utility tariff. Realistic power tariffs will compel several industrial consumers to adopt energy efficient practices.
vii. Lack of a national policy on energy efficient technologies
viii. High import duties on energy efficient devices
ix. Financing of major energy projects is a major hurdle to ultimate success of energy-efficiency project implementation.

3.5 Managing Growing Demand through Energy Efficiency and Conservation

The annual growth in the demand for fuel wood and charcoal is estimated at 3% in tandem with population growth and urbanization. Electricity demand, on the other hand, is growing at about 8% annually while consumption of petroleum products is estimated at about 5% per annum. The end-use wastage of energy of about 30% in electricity sector also contributes to increasing our energy requirements. The current and projected levels of growth in energy demand pose serious difficulties for the national economy to meet demand reliably and raising the need to manage consumption judiciously.

While increased economic growth naturally require increased energy consumption, Government intends to achieve economic development and growth at energy intensity levels lower than is currently the case and at levels comparable to the best in the world through an effective energy demand management policy platform. Improvement in energy efficiency can also have a large impact on energy supply infrastructure needs, reducing the need for new power plants and reduced requirement for investment capital. In addition, cost effective and efficient energy use will also contribute to enhancement of Ghana's domestic and international trade competitiveness. Energy Conservation and Efficiency will be the key driver of Government's energy demand management programme and intends to remove the obstacles that have, in the past, constrained the promotion and implementation of energy efficiency and conservation measures. Efforts at efficiency and conservation in electricity in Ghana were initiated over a decade ago but could not be sustained effectively owing to inadequate financing and political commitment. In recent times there has been a renewed vigour towards improving energy efficiency and conservation in the economy with the passage of legislations on minimum energy efficiency standards for some appliances. The National Energy Policy seeks to build on these efforts.

Most of Ghana's petroleum products consumption is attributable to the transportation sector. As the world prices of crude oil continue to rise its impact on the economy will continue to worsen even though there is significant opportunity to reduce petroleum products consumption in transportation through efficiency and conservation measures. Implementation of efficiency and conservation measures in the transportation sector will enable us manage the growth in petroleum product consumption and oil imports.

Government, being one of the biggest consumers of energy (electricity and petroleum products for transportation by the Government agencies), will be a principal target for the energy efficiency and conservation drive.

The strategic focus of the energy policy is to identify and remove all barriers which hinder the promotion of energy conservation and efficiency measures. The following policy directions will be pursued by Government to manage the rising energy consumption:

- *Establish appropriate pricing regime for energy services by the incorporation of appropriate instruments that would encourage (provide incentive) consumers to voluntarily manage their energy consumption;*
- *Remove institutional barriers hindering the use of energy efficiency and conservation technologies through appropriate legislative instruments including support for and expansion of the scope for the appliance standards programmes.*
- *Implement programmes and measures to help Government Agencies reduce their electricity and petroleum products use.*
- *Implement programmes to reduce petroleum product consumption in transportation*
- *Support a sustained and comprehensive public education and awareness building campaign to teach energy consumers the methods and benefits of energy conservation.*
- *Discontinue, through legislation, the local production, importation and use, in all sectors of the economy, of inefficient energy consuming equipment.*
- *Put in place financial and fiscal incentives including appropriate funding mechanisms and tax incentives for efficiency through legislation;*

THE DIRECT AND INDIRECT IMPACTS ON THE ENVIRONMENT OF ACTIONS, INVESTMENTS PROJECTS, PRODUCTS AND SERVICES

In the energy supply sector, both direct and indirect negative and positive impacts on the environment are associated especially with the development and operation of new power generation plants. Notable among these are the following:

1 Positive Impacts during construction

Employment Generation

- Employment of local construction work force.
- The generation of temporary jobs to unskilled labourers in the project areas.

Poverty reduction/improvement of quality of life

- The quality of life of otherwise unemployed youth are enhanced through the salaries to be paid them, resulting in reduction in pressure on their families for provision of basic human needs, and hence reducing the poverty levels in the local economy.
- Influx of workers to the project areas put pressure on transportation, housing needs, medical services and local schools.
- Skilled labours such as masons, carpenters, steel benders, electricians etc from other nearby localities to the project site are employed.

Gender and Women's issues

- A number of women usually get employed on the projects in various capacities with progress of the construction works. These include areas such as project management, administration, secretarial, civil inspectorate, laboratory technician positions etc.
- The development of new power plants provides opportunities for women food vendors who engage in the business of selling food and other items to the workers at the satellite markets that usually spring up in the project areas.

2 Negative Impacts during construction

- The use of heavy construction equipment and materials haulage vehicles result in the emission of dust into the atmosphere
- Possibility of oil spills from unserviced vehicles and equipments and polychlorinated biphenyls (PCBs) from transformers at project sites is also possible
- Exposure to excessive noise from construction activities, vehicles and equipment could impact worker health.
- Smoke from diesel operated equipment could also impact the environment and worker health
- Erosion could also arise from project sites and affect public drains in the absence of suitably sized drains to carry rainfall runoff from the project sites.
- There are some unavoidable minor disruption to traffic flow when major plant components {i.e., generators, transformers) are delivered to the plant site during the construction phase.
- The potential for vehicle accidents and injury also exists.
- The influx of both skilled and unskilled labour from outside the project areas could heighten the prevalence of diseases such as HIV/AIDS.

3 Negative Impacts during operation

Air Quality Impacts

The most important impact during operation of thermal power plants is that due to stack emissions of NO_x, CO, and SO_2 (from liquid fuel) and their impact on the ambient environment.

For the petroleum sector, emission of volatile organic substances (VOC) could impact on air quality.

Social Impacts

The most significant Impact from operating power plants on society is ambient noise

PROPOSED FRAMEWORKS AND MECHANISMS

Policy

a. Government should give legal backing to the policy of private participation in the energy sector
b. Government should ensure the rationalization of energy use and the development of clean energy sources.

The following measures are proposed to ensure the implementation of energy sector policies:

i. Continue to provide high supply efficiency by improving energy consumption and transformation efficiency
ii. Continue to provide high value-added service by increasing the value-added of energy consumption.
iii. Continue to provide low emission by adopting energy supply methods and consumption practices that ensure low carbon and low pollution.
iv. Promote energy conserving lighting solutions. Replace conventional lighting devices with high efficiency products.
v. Establish a fair, efficient, and open energy market through deregulating the energy sector, reducing market entry barriers, and providing high quality energy services.

TECHNOLOGICAL INNOVATION

- New technologies should be explored for power generation from sources such as :
  - Renewable systems (solar, biomass, wind, mini-hydro, and geothermal)
  - Nuclear
  - Fossil (gas, oil)
- Technological innovations in the area of energy storage, transmission, end-use and efficiency/conservation should be explored by regulatory instruments

New Public Services

- Use of prepaid electric meters to cut out waste in power used
- Promotion of mass transit systems like the tram or Bus Rapid Transit (BRT)

OBJECTIVES, TARGETS AND ACTIVITIES REQUIRED TO ACHIEVE TARGETS

The Strategic National Energy Plan (2006-2020) identified objectives that could help achieve the policy vision of the sector ministry which seeks to produce, supply and distribute energy services to sectors of the economy in a sustainable manner without compromising the environment. Some objectives relating to sustainable production and consumption, activities and targets include:

1. Consolidate, improve and expand existing energy infrastructure for poverty reduction in the off-grid areas.
2. Secure and increase future energy security by diversifying energy supply sources including renewable energy
3. Minimise the environmental impacts of energy production, supply and utilisation
4. Reduce energy consumption in general and wood fuel consumption in particular by introducing energy efficiency programmes and cleaner energy alternatives.
5. Increase penetration of modern energy into agriculture for increased production.
6. Achieve the penetration of modern energy into agriculture for increased agricultural production
7. Reduce the dependence on imported fossil fuels for transport
8. Ensure sufficient cost effective but affordable high quality energy supply to meet the increasing demand of an efficient and expanding industrial sector
9. Encourage light or non-energy intensive industrialisation
10. Produce adequate, high quality, reliable and efficient power supply to meet economic and social development needs of Ghana and for export
11. Introduce liquid biofuels as alternative transport fuels in the country's energy mix thereby improving supply security as wells as improving local air quality

TARGETS AND ACTIVITIES FOR THE DEMAND SIDE

Residential sector

Targets	Activities
• 15% penetration of rural electrification by decentralised renewable energy complementation by 2015, expanding to 30% by 2020 • Reduce average electricity intensity by 50% per urban household by 2020 • Reduce average wood fuel energy intensity per urban household by 30% by 2015 and by 50% by 2020 • Reduce firewood intensity per rural household by 10% by 2020	• Increase awareness on energy efficiency measures • Encourage substitution of LPG for wood fuel for cooking in urban areas • Encourage the use of improved cook stoves

Transport sector

Targets	Activities
• Achieve fuel consumption per GDP growth of 1:1 by 2015 and sustaining up to 2020	• Encourage fuel efficiency measures • Deregulation of the railway system to permit private sector participation • Provide incentive for the promotion of nationwide mass transport systems

Commercial and service sectors

Targets	Activities
• Reduce electricity consumption of military and police barracks, residential halls and hostels of public tertiary institutions by 50% by 2015 • Achieve 1% penetration of solar energy in hotels, restaurants and institutional kitchens using solar water heaters by 2015 and 5% penetration by 2020 • Increase LPG penetration by 20% by 2015 and 30% by 2020 • Curtail wood-fuel share of energy at 50% by 2015 with subsequent reduction to 40% by 2020 • Achieve improved efficiency cook-stoves penetration of 5% by 2015 and 10% by 2020 • Achieve 1% penetration of biogas for cooking in hotels, restaurants and institutional kitchens by 2015 and 2% by 2020	• Increase awareness on energy efficiency and conservation measures • Encourage the use biogas generated from liquid wastes as cleaner fuel in the restaurants, institutional laboratories and kitchens etc • Support energy audit • Build a testing facility to test and certify the energy efficiency of room air conditioners and CFL • Retrofitting government facilities and second cycle schools with energy efficient bulbs and sensors

Agricultural and Fisheries sector

Targets	Activities
• Achieve 20% penetration of biodiesel by 2015 and 10% by 2020 • Achieve 20% penetration of solar energy by 2020 • Increase electricity penetration to 2% by 2015 and by 5% by 2020	• Substitution of diesel with biodiesel in agricultural mechanisation • Encourage more drying of exportable farm produce with solar dryers • Displace the use of diesel for irrigation with grid electricity and mechanical wind pumps • Encourage large scale commercial poultry farmers to meet at least 10% of their electricity needs from biogas using the droppings from the birds

Industrial Sector

Targets	Activities
• Ensuring high quality and reliable (95% uninterrupted) electricity supply to the industrial sector per annum by 2015 and improving reliability to 98% by 2020 • Achieve an average of 95% power factor per annum in the industrial sector by 2015, increasing to 98% by 2020 • Introducing pollution charges in high-energy intensity industries to encourage efficiency by 2015 • Developing a local market for the industrial use of natural gas when the West Africa Gas Pipeline project is complete, including displacing all fuel use by 2015 • Providing a competitive bulk electricity price to all primary industries by 2012 to maximise wealth creation	• Institution of Energy Efficiency and Conservation Act which would spell out mandatory energy management practices, building codes, requirements on energy efficiency levels of energy consuming equipment, energy regimes for formal industries and commercial entities to give legal support to energy efficiency initiatives. • Applying the concept of monitoring and targeting to measure efficiency performance • Introduction of Time of Use (TOU) tariff system to control peak electrical demand • Development and implementation of motor testing procedures, minimum efficiency standards and labels and establishment of a local motor manufacturing facility to produce small electric fan and pump motors • Fuel substitution for natural gas when available • Use of combined heat and power (CHP) technologies for enterprises that uses both heat and electricity • Use of combustible residues to generate process heat and power by oil palm and wood industries

TARGET AND ACTIVITIES FOR THE SUPPLY SIDE

Electricity subsector

Targets	Activities
• Secure and increase future energy security by diversifying sources of supply, including increasing access to renewable energy technologies so as to achieve 10% penetration in terms of installed capacity by 2020 and 30% penetration of rural electrification via renewable by 2020	• Select from the proposals outlined in the SNEP the most feasible option to run the Osagyefuo power barge • Enabling legislation to create new entities and modification of existing entities to facilitate implementation of the power sector reform

Wood fuel and renewable energy sector

Targets	Activities
• Reduce wood intensity of charcoal production from existing 4:1 to 3:1 in the savannah zone and from 5-6:1 to 4:1 in the forest zone by 2015 • Ensure that the energy share of traditional biomass in the national final energy mix is reduced from about 60% to at least 50% by 2015 and eventually to 405 by 2020 • Increase the supply of renewable energy and modern biomass in the Ghanaian final energy supply to achieve at least 10% penetration by 2020	• Expanding forest plantation cover • Promoting fuel substitution in households and commercial cooking • Setting up a national agency dedicated solely for woodfuel production and marketing issues along the same lines with VRA & ECG for electricity and GNPC & GOIL for petroleum • Encourage tapping power from closed landfills • Consider a promotional programme to encourage urban homes to invest in solar energy for lighting etc

Petroleum subsector

Targets	Activities
• Achieve 10% penetration of liquid fuels by renewable and alternate fuel complementation by 2015 expanding to 20% by 2020 • Become self-sufficient in petroleum products by 2015 and net exporter by 2020 • Replace manganese additive with ethanol as performance enhancer in gasoline by 2015 • Reduce sulphur content in gas oil from the prevailing 2000ppm to 1000ppm by 2015 and 500ppm by 2020	• Upgrading and increasing the efficiency of Tema Oil Refinery • Expanding the total national refinery capacity which will comprise expansion of the Tema Oil Refinery as well as construction of a new refinery • Introducing renewable energy fuels (gasohol and biodiesel)and natural gas in the supply mix • Encouraging the deployment of efficiency improvement devices in vehicles • Enacting a more investment-friendly petroleum exploration and production law to attract more investment in the petroleum upstream activities and consequently intensifying exploration activities in the country • Maintaining adequate strategic stocks in the country • Introduce B5 and E10 dispensing at filling stations as a voluntary programme

CROSS-CUTTING ENERGY ISSUES AND LINKAGES TO OTHER SECTORS

The linkage between other sector and the energy sector is limited to needs of power supply, distribution and licensing issues. The need for energy and its regulation affects all the other sectors in their daily operation and sustained power and fuel availability and delivery.

Any shortfalls in energy supply make their links more critical and necessary.

The key issues confronting the energy sector and their linkages to other sector are as follows:

Agriculture

- The over reliance of wood fuels as alternative to conventional source could be a major threat to the country forest over.
- The destruction of the forest and land use cover to serve as right of way (ROW) in the transmitting of energy.
- The environmental impact of construction of dams on the land use is a problem in improving the energy supply in the country.

Education

- Inefficient public education and monitoring on the conservation of energy.
- Participation of stakeholders in the consumer's choices in the energy sector.
- Public awareness on the growing demand of energy by all sectors of the economy and the growing population.
- High levels of end-use inefficiency culminating in the waste of final energy forms.
- Capacity building and development
- Research and development

Trade

- Inadequate investments to match the growing demand in the energy sectors.
- Ensure that a secure energy supply system is set in place to meet economic development goal.
- To be able to promote green energy industry, including energy conserving industries and

renewable energy industries.

- To be able to assist small and medium sized enterprises to improve their emission reduction capacity.

Technology

- Ensure high efficiency of energy by improving consumption and transformation efficiency.
- Add value to energy by increasing the value added of energy consumption.
- Adopt energy supply methods and consumption practices that ensure low carbon and low pollution.
- Decrease the dependence on fossils fuels and imported energy.

Transportation

- To be able to raise the fuel efficiency standard for private vehicles.
- Build user-oriented and green –oriented municipal transportation systems.

Chemicals

- Sampling, analysis and detection of levels of PCB contained in transformers
- Identify appropriate storage sites for PCB contaminated transformers
- Put in place modalities and arrangements for clean-up or complete disposal of PCB contaminated transformers
- Safe disposal of transformer wastes

PROPOSED ACTIVITIES TO GUIDE CONSUMER CHOICES AND LIFESTYLES IN AREAS OF COMMUNICATION, MARKETING AND ADVERTISING, EDUCATION AND TRAINING, SOCIAL AND CULTURAL INITIATIVES

Area	Activities
Communication	• Civil society participation • Continuous public education on emerging energy issues like declining condition of the environment as a result of energy production, • Provision of information about national energy situation in the country –demand/supply ratio, factors affecting generation etc
Marketing	• Favourable policies and laws that will continue to support easy marketing of energy generated from various sources • Payment of realistic tariffs for energy use to attract investors • Continuous public education • Deregulation of electricity distribution system to break monopoly and involve the private sector
Advertising	Effective advertising of all available consumer options to break monopoly which leads to price increase
Education and training	Energy efficiency options available for the various sectors Selection of Energy saving appliances Civil society participation
Social	Awareness creation on fuel substitution for households and commercial activities, energy efficiency/conservation
Cultural	Awareness creation on fuel substitution for households and commercial activities, energy efficiency/conservation

FUTURE ENERGY SUPPLY SCENARIOS AND POLICY RECOMMENDATIONS

The Strategic National Energy Plan (SNEP) indicated the status of existing and envisaged electricity generation plants as at 2006 in Table 9.1. Since then, there have been a lot of thermal power plant developments. The current demand and supply situation as well as the long term forecasts and assumptions are provided in Tables 9.2 and 9.3 below. Table 9.4 also provides the assumptions for Medium Term Supply Plan

Table 9.1 Status of Existing and envisaged Central Power Plants (2006)

Plant	Year installed	Status	Installed Capacity (MW)	Available net capacity (MW)	Firm Energy Yield (GWh)
Akosombo Hydro	1965/1972	Operating	1038	1020	4800 (6100)
Kpong Hydro	1982	Operating	160	148	
Takoradi T1	1997-2000	Operating	330	300	2234
Takoradi T2	2000	Operating	220 (330)[1]	210 (320)	1638
Tema Diesel	1961/62	Unavailable	30	0	0
Power Barge	2000	Not commissioned	125	0	930
Tema Gas thermal	Not yet	Not built	330/900[2]	0	2500/6702
Bui Hydro	Not yet	Not built	200/400	0	960
				Total (maximum in brackets)	**13,032 (18,534)**

Table produced by Energy Commission and edited by VRA, 2006

Assumptions

[1]When TICO is retrofitted with the 110 MW heat recovery steam generator unit.

[2]Capacity could go even up to 1000 MW depending upon investment climate and the interest of the
stakeholders

	Forecast									
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Forecast Demand (GWh)										
Total Domestic	7,874	8,746	9,464	10,125	10,595	11,137	11,703	12,298	13,110	13,812
VALCO	11	12	12	12	1,240	1,240	1,240	1,240	1,240	1,240
CEB Supply	727	1,000	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314
SONABEL	5	5	5	66	66	67	68	68	69	70
System Usage (Losses+Substation Use)	350	375	392	381	423	426	443	461	487	508
Total Demand	**8,966**	**10,138**	**11,186**	**11,898**	**13,639**	**14,184**	**14,768**	**15,382**	**16,220**	**16,944**
Projected Generation (GWh)										
Hydro										
Akosombo	5,623	4,415	4,415	4,415	4,415	4,415	4,415	4,415	4,415	4,415
Kpong	1,046	885	885	885	885	885	885	885	885	885
400 MW Bui Hydro Plant					500	1,000	1,000	1,000	1,000	1,000
Total Hydro	**6,669**	**5,300**	**5,300**	**5,300**	**5,800**	**6,300**	**6,300**	**6,300**	**6,300**	**6,300**
Thermal										
Existing Generation Resources										
T1 - Combine Cycle	444	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840	1,840
T2 - Simple Cycle	998	1,402	1,402	1,402	1,402	1,402	1,402	1,402	1,402	1,402
TT1PP	645	745	745	745	745	745	745	745	745	745
MRP	7	-	-	-	-	-	-	-	-	-
Emergency Plants	-	-	-	-	-	-	-	-	-	-
Power Imports	203	-	-	-	-	-	-	-	-	-
Total Existing Thermal	**2,297**	**3,986**	**3,986**	**3,986**	**3,986**	**3,986**	**3,986**	**3,986**	**3,986**	**3,986**
Committed Generation Resources										
200 MW Sunon-Asogli (Phase 1)	-	670	1,340	1,340	1,340	1,314	1,340	1,340	1,340	1,340
TT2PP	-	182	-	-	-	-	-	15	109	88
125 MW Osagyefo Barge	-	-	-	329	657	657	657	657	657	657
126 MW OSONOR Plant	-	-	560	50	261	482	745	745	745	745
KTPP (Phase 1)	-	-	-	-	-	-	-	-	745	1,489
Takoradi 3 (T3)	-	-	-	894	894	-	295	894	894	894
Total Committed Generation		**852**	**1,901**	**2,612**	**3,152**	**2,452**	**3,037**	**3,650**	**4,489**	**5,212**
TOTAL (Existing + Committed)	**8,966**	**10,138**	**11,186**	**11,898**	**12,938**	**12,738**	**13,323**	**13,936**	**14,774**	**15,498**
Additional Generation Requirement		***0***	***0***	***0***	***(701)***	***(1445)***	***(1445)***	***(1445)***	***(1445)***	***(1445)***
Candidate Generation Resources										
T2 Expansion	-	-	-	-	701	701	701	701	701	701
OSONOR+TT1PP Expansion	-	-	-	-	-	745	745	745	745	745
Total Candidate Generation					**701**	**1,445**	**1,445**	**1,445**	**1,445**	**1,445**
Total Generation (GWh)	**8,966**	**10,138**	**11,186**	**11,898**	**13,639**	**14,184**	**14,768**	**15,382**	**16,220**	**16,944**

	Forecast									
	2009	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**
CAPACITY DEMAND(MW)										
Domestic (Including System Usage)	1,278	1,368	1,478	1,580	1,656	1,741	1,830	1,922	2,040	2,146
VALCO	1	1	1	1	153	153	153	153	153	153
CEB Supply	80	115	150	150	150	150	150	150	150	150
SONABEL	1	1	1	18	19	19	19	19	19	20
Total Projected Capacity Demand	1,360	1,485	1,630	1,749	1,977	2,063	2,151	2,244	2,362	2,468
25% Capacity Reserve Margin	340	371	408	437	494	516	538	561	590	617
PROJECTED DEMAND+RESERVE MARGIN	**1,700**	**1,856**	**2,038**	**2,186**	**2,471**	**2,579**	**2,689**	**2,805**	**2,952**	**3,085**
CAPACITY SUPPLY (MW)										
Hydro										
Akosombo	750	750	750	750	750	750	750	750	750	750
Kpong	140	140	140	140	140	140	140	140	140	140
** 400 MW Bui Hydro Plant	-	-	-	-	340	340	340	340	340	340
Total Hydro	**890**	**890**	**890**	**890**	**1,230**	**1,230**	**1,230**	**1,230**	**1,230**	**1,230**
Thermal										
Existing Generation Resources										
T1 - Combine Cycle	100	300	300	300	300	300	300	300	300	300
T2 - Simple Cycle	200	200	200	200	200	200	200	200	200	200
TT1PP	100	100	100	100	100	100	100	100	100	100
MRP	40	40	40	40	40	40	40	40	40	40
Emergency Plants	50	50	50	50	50	50	50	50	50	50
Power Imports	5	-	-	-	-	-	-	-	-	-
Total Existing Thermal	**495**	**690**	**690**	**690**	**690**	**690**	**690**	**690**	**690**	**690**
Committed Generation Resources										
200 MW Sunon-Asogli (Phase 1)	-	180	180	180	180	180	180	180	180	180
TT2PP	-	45	45	45	45	45	45	45	45	45
125 MW Osagyefo Barge	-	-	-	100	100	100	100	100	100	100
126 MW OSONOR Plant	-	-	100	100	100	100	100	100	100	100
KTPP (Phase 1)	-	-	-	200	200	200	200	200	200	200
Takoradi 3 (T3)	-	-	-	120	120	120	120	120	120	120
Total Committed Generation		**225**	**325**	**745**	**745**	**745**	**745**	**745**	**745**	**745**
TOTAL (Existing + Committed)	**1,385**	**1,805**	**1,905**	**2,325**	**2,665**	**2,665**	**2,665**	**2,665**	**2,665**	**2,665**
Additional Generation Requirement	***315***	***51***	***133***	***(139)***	***(194)***	***(86)***	***24***	***140***	***287***	***420***
Candidate Generation Resources										
T2 Expansion	-	-	-	-	100	100	100	100	100	100
OSONOR+TT1PP Expansion	-	-	-	-	-	100	100	100	100	100
Total Candidate Generation	**-**	**-**	**-**	**-**	**100**	**200**	**200**	**200**	**200**	**200**
Total Available Capacity	**1,385**	**1,805**	**1,905**	**2,325**	**2,765**	**2,865**	**2,865**	**2,865**	**2,865**	**2,865**
Reserve Capacity (MW)	**(315)**	**(51)**	**(133)**	**139**	**294**	**286**	**176**	**60**	**(87)**	**(220)**

** Bui Capacity based on Firm Capacity of 340 MW

Table 9.4 Medium Term Supply Plan

Plant	Dependable Capacity (MW)	Timing	Type of Project
Sunon-Asogli (Phase 1)	180	June 2010	IPP
Tema Thermal 2 Plant	45	Jan. 2010	VRA/GoG
125 MW Osagyefo Barge	100	June 2012	IPP
126 MW OSONOR Plant	100	Jan. 2011	IPP
KTPP	200	June 2012	VRA/GoG
Takoradi 3 (T3)	120	Jan. 2012	GoG
TICO Expansion	100	Jan. 2013	VRA/GoG
Osonor & VRA Expansion	100	Jan. 2014	VRA/IPP JV
TOTAL	945		

Assumptions

1 Valco plant brought on line and operates 2 Potlines from January 2013

2 WAGP Gas to be available from July 1, 2010 for 4 gas turbines and thereafter (i.e. foundation gas only)

3 Ghana Gas (from Jubilee Field) to be available from July 1, 2012 for Osagyefo Barge

4 All T1 (TAPCO) units assumed to run on WAGP gas from July 1, 2010

5 One T2 (TICO) unit assumed to run on gas from July 1, 2010

6 Sunon-Asogli assumed to run on WAGP gas from July 1, 2010

AGENCIES TO IMPLEMENT PLAN, TIME FRAME, COSTS AND FUNDING TO IMPLEMENT

1 IMPLEMENTING AGENCIES

1a ENERGY POLICY DEVELOPMENT

MNISTRY OF ENERGY

1b POWER GENERATION

VRA/TICo	(TT1PP, TT2PP, KTPP, T2 CONVERSION, T3 EXPANSION)
TOPL	OSONOR POWER PLANT
TICO	T2 CONVERSION-
MINES CONSORTIUM	MINES RESERVE PLANT Completed
IPPs	SUNNO ASORGLI POWER PLANT, CENPOWER PLANT
MINISTRY OF ENERGY	RURAL ELECTRIFICATION PROJECTS

PRIVATE CAPITAL INVESTORS IN RENEWABLE PLANTS

1c POWER TRANSMISSION

GRIDCO	NATIONAL TRANSMISSION NETWORK

1d POWER DISTRIBUTION

ECG	SOUTHERN GHANA DISTRIBUTION NETWORK
NED (VRA)	NORTHERN GHANA DISTRIBUTION NETWORK

1e REGULATORY/LICENSING AGENCIES

ENERGY COMMISSION, ENVIRONMENTAL PROTECTION AGENCY

1f SUSTAINABLE ENERGY USAGE

ENERGY FOUNDATION	PUBLIC EDUCATION

2 FUNDING AGENCIES

GoG, VRA, IPPs, World Bank, IFC, Development Partners, Local Banks

INDICATORS FOR MONITORING AND IMPLEMENTATION

Some variable indicators to ensure implementation of activities are listed below

Indicators	**Element**
Household with access to electricity or commercial energy	• Total number of households • Household without electricity or commercial energy
Energy used by the various sector groups: household, industry, commercial etc	• Energy use per sector • Total energy supply
Energy savings resulting from efficient technologies	• Energy efficient technologies used • Decrease in peak levels
Energy use per capita	• Total population • Energy use
Energy produced per unit of GDP	• Energy use • GDP
Energy conversion and distribution efficiency	• Losses in transmission
Proportion of energy resources/reserves already tapped	• Estimated energy resource/reserve • Total energy production
Industrial energy intensities	• Energy use by industries • Corresponding value added
Agricultural energy intensities	• Energy use by agric sector • Corresponding value added
Service/commercial energy intensities	• Energy use by service/commercial sector • Corresponding value added
Household energy intensities	• Energy use by household • Number of households, persons/household,

	appliance owned
Transport energy intensity	• Energy use in passenger travel and freight by mode
Fuel shares in energy and electricity	• Primary energy supply & final consumption, electricity generation and generating capacity by fuel type • Total primary energy supply, total final consumption, total electricity generation & total generating capacity
Renewable energy share in energy and electricity	• Primary energy supply, final consumption and electricity generation and generating capacity by renewable
End use prices by fuel and sector	• Price of energy
Net energy import dependency	• Energy imports • Total primary energy supply
Stock of critical fuels per corresponding fuel consumption	• Stocks of critical fuel • Critical fuel consumption
Effluent discharges from energy systems that affect water quality	Pollution load of effluent discharged
Aerial emissions from energy systems and concentrations of air pollutants in urban areas	• Air pollution emissions • Concentration of pollutants in the air
Rate of deforestation attributed to energy use	• Rate of depletion of forest • Consumption of Woodfuel
Solid waste generated per	• Quantity of solid waste generated • Total amount of energy

energy produced	

EVALUATION OF AVAILABLE DATA, STUDIES ON CONSUMPTION AND PRODUCTION (PATTERNS IN THE ENERGY SECTOR)

PB POWER FEASIBILITY STUDIES ON 330MW THERMAL POWER PLANT

VRA have produced a long term forecast that was made available to this study. The forecast energy sales are listed in Table 2.2.9.

Table 2.2.9: Summary of base case total sales forecast for VRA (GWh)

Year	2010	2015	2020	2025
ECG	6647	8350	10388	12292
NED	696	916	1221	1552
Mines	2359	3257	3564	3886
Direct Customers	155	172	211	252
VALCO				
Firm Exports	366	369	370	370
Sonabel	66	69	70	70
CIE	0	0	0	0
CEB	300	300	300	300
Total Sales	10223	13064	15755	18351
Tx Losses (%)	3.0%	3.0%	3.0%	3.0%
Tx Losses (GWh)	316	404	487	568
Total Generation	10539	13468	16242	18919
Peak Demand (MW)	1706	2182	2642	3085

Source: PB Power feasibility report for a 300MW thermal plant

In summary the forecast predicted:

- **VALCO:** It is assumed, in the base case demand forecast, that VALCO is not operational. This assumption is to ensure that the TTPP is not built on the back of unsecured sales to VALCO only for it to become a stranded asset should the smelter not continue operations in the long-term.

- **ECG:** The base case forecast for ECG is forecast to increase at an average rate of 4.9 per cent between 2006 and 2016. Thereafter the growth rate reduces slightly, averaging 3.9 per cent per annum between 2017 and 2025. Total sales to ECG increase to over 12,000 GWh by 2025.

- **Mines:** It is noted that the mining load contributes a significant proportion of the overall load growth, with sales increasing from about 1500 GWh in 2007 to about 3900 GWh in 2025, an average growth rate of 5.6 per cent per annum.

- **Exports:** PB Power have carried out an independent assessment of the potential level of imports/exports to or from the VRA system by creating capacity and energy balances for Ghana and its neighbours. Through this assessment it was shown that there is an opportunity for Ghana to increase its level of net exports to neighbouring countries above historical levels if surplus power is available. As stated above, the purpose of deriving this load forecast is to test the need for the proposed thermal power plant. In the base case load forecast, therefore, only the contracted exports of 300 GWh to CEB was included. The opportunity to increase the level of exports to Burkina Faso will be limited by the VRA network and the capacity of the interconnector to 70 GWh by 2016, equivalent to about 15.5 MW at a 50 per cent load factor.

Additional Generation

In addition to the existing emergency diesel generation in Tema (136 MW), the following additional generation facilities are at various stages of completion:

- The construction of the Tema Thermal 1 Power Plant (TT1PP) which is a 126MW SCGT at New Tema currently in operation.
- The construction of the Mines Reserve Plant an 80MW SCGT plant, currently in service
- . The construction of the Tema Thermal 2 Power Plant (TT2PP) which is a 50MW plant at New Tema currently in commissioning stage.

Planned Generation

- Commissioning of the Osagyefo Barge plant, 125 MW of SCGT plant, due to enter service in 2009.
- Conversion of the Takoradi 2 plant to combined cycle operation (incorporating an addition of 110 MW), due to be completed by 2009.
- Complete construction of 126MW SCGT Tema Osonor Plant at New Tema
- Complete construction of Sunno Asogli Power Plant

These thermal plant additions will together increase the total installed capacity by approximately 700 MW by the end of 2009 and complement the existing hydroelectric plants.
In the longer term, the construction of the Bui hydroelectric plant by 2013 will provide an additional 400 MW of generation capacity and 1000 GWh per year of average energy generation.

Future Need for New Generating Plants

Base case demand forecast

Under the base case demand forecast in the PB Power feasibility study, VRA will be able to meet consumer demand up to and including 2011 under normal hydro conditions. Further new generating capacity will need to be in service for the year 2012, and again in later years to cater for load growth and to replace capacity lost through the retirement of the emergency diesel generating plants.
The feasibility of converting the New Tema open cycle gas turbine (SCGT) plant to combined cycle operation and concluded as follows:.

If the New Tema SCGT is not converted to combine cycle operation the next plant to be added to the system should be a combined cycle gas turbine (CCGT) plant in 2012.
If the New Tema SCGT is converted to combined cycle operation then our generation planning work shows that the optimal timing for this is 2012.

The conversion of this plant from SCGT to CCGT yields a lower lifetime system cost (US$ 13 million) compared to a scenario where the conversion does not take place. This confirms that the conversion forms part of the least-cost generation expansion programme. Although the conversion to combined

cycle operation some 4 years after the construction of the first SCGT unit would carry a cost penalty in terms of the higher total capital costs (as compared to building a CCGT plant in a single programme) the associated benefit is to optimise the programme for adding new capacity to the system. In particular, this programme prevents too much capacity being brought onto the system before it is needed.

Converting the New Tema plant in 2012 will delay the need for the first generic CCGT plant until 2019. The second generic CCGT plant will not be required until 2022. Following the conversion of the New Tema plant in 2012, additional 110 MW OCGT plants will be required in 2015, 2017 and 2025.

After the introduction of Bui in 2013, no other hydroelectric plants are introduced as part of the least cost generation expansion plan.
In total an additional 1329 MW of new capacity is required by 2025, comprising 1000 MW of combined cycle plant and about 330 MW of open cycle plant.

High Demand Forecast

Under the high demand forecast (which includes sales to VALCO and increased export sales) the programme for building new power plants is brought forward. It has been determined that converting the New Tema plant to combined cycle operation forms part of the least cost generation plan. The optimal timing for this conversion is in 2011 as this would yield a cost reduction of about US$ 29 million compared to a scenario where conversion does not take place. This finding would indicates that, compared to the base case load forecast scenarios, the fuel cost savings arising from the early introduction of CCGT plant in 2012 under the high load forecast are sufficient to off-set the capital cost penalty of conversion.

With the conversion of the New Tema plant to combined cycle operation in 2011, two additional 110 MW SCGT plants will be required in the same year. A third OCGT plant will be required in 2023. The first generic CCGT plant is still needed by 2012, with additional CCGT plant needed in 2017, 2020 and 2024.

Location/Site

The review of the various VRA studies shows that there will be a need for new generating plant by 2011 or 2012, depending on whether the VALCO aluminium smelter is brought back into service and whether a contract is signed to supply 150 MW of firm capacity to CEB.

The least cost choice of new plant is a combination of CCGT and SCGT plant; the possible timetable for the addition of new CCGT plant is summarised in the feasibility study.

The VRA studies evaluated a number of sites in the Tema area for power station development. These are the CenPower site adjacent to the coast, the ‘Marathon’ site and the VRA's New Tema substation site.

REVIEW OF EXISTING LEGISLATION AND POLICIES RELATED TO SUSTAINABLE CONSUMPTION AND PATTERN.

There is a dearth of legislation particularly targeted solely at sustainable consumption of electricity in the country. At best, there have been public education and awareness creation programs aimed at changing consumer behavior in the direction of reducing electricity use.

Some of the few legislation and policies are listed below:

Energy Policy Platform

The National Energy Policy is intended to achieve six principal long term goals. We must maintain energy supply adequacy and reliability, achieve self-sufficiency in energy supply, reduce energy intensity in the creation of wealth and economic growth; increase modern energy forms to all especially low income households and communities, and achieve high levels of end-use efficiency.

With the significant endowment of natural resources including energy resources, Ghana could achieve its energy goals even in the face of the several issues and constraints which threaten to limit the ability to meet the goals. Resolving these major issues, however, require significant investments in revamping and expansion of energy sector infrastructure. Government alone cannot provide the huge investment capital required hence the need to reach out to the private sector to participate in partnership with Government in the capitalization of the energy sector.

The National Energy Policy provides directions as to our commitment to address the challenges in order to achieve our goals and make significant impact on the national development agenda. The National Energy Policy presents Government of Ghana's position on critical energy sector issues covering the following:

- Rehabilitation and expansion of energy production and supply infrastructure;
- Indigenous Energy Resource Development;
- Security of Future Energy Supply;
- Increasing Access to Modern Energy Services;
- Managing Growing Demand for Energy Services; and
- Minimising Environmental Impacts of Energy Supply and Use;

Managing the Future

The policy directions also make provisions for the future with regards to how we intend to construct the necessary structures to ensure sustainability in the energy development process. The growing mismatch between energy supply and demand has come about primarily because we failed, in the past, to successfully implement our energy plans. We need a renewed leadership drive and commitment to execute the energy plans that we develop. As we move into the future we intend to build the capacity and commitment to pursue the full implementation of our energy policy and plans.

The National Energy Policy provides for the implementation of significant reforms in the sector so as to create competitive energy markets and also bring about the desired institutional support to enable us deliver reliable energy services far into the future. The Policy also provides a "Blueprint" of arrangements to facilitate implementation of the provisions of National Energy Policy.

The National Energy Policy is a testimony of Government's commitment to provide the necessary platform and create the conditions to grow the national economy and improve the well being of all Ghanaians.

Electricity Infrastructure and Supply

Electricity is produced from two main sources: hydro and thermal. Two hydro power plants with a total installed capacity of 1,180 MW provide the bulk of electricity produced in the country. Thermal power generation sources comprise two plants of 330MW and 220 MW. To meet total system demand, these power plants are supplemented with imports (up to 250 MW) from neighbouring La Cote D'Ivoire.

The Volta River Authority (VRA), a state-owned electricity generation and transmission entity, owns the first 330 MW Combined Cycle Power Plant at Takoradi Thermal Power Complex. Together, with its joint venture partner, CMS Energy of Michigan, USA, VRA owns the second plant comprising two 110 MW Combustion Turbine units.

Ghana has a relatively extensive electricity transmission network spanning over 4,000 kilometers and covering a large area of the country. The transmission system includes 42 transformer and switching stations for the transfer of power to the distribution utilities.

Electricity distribution is undertaken by two utilities, Electricity Company of Ghana (ECG) and Northern Electricity Department (NED), a department within VRA. The two utilities, together serve about 1.5 million customers with ECG serving a larger proportion.

National access[2] to electricity is estimated at 48% with 77% of urban households having access to electricity compared to only 17% of households in the rural areas. Even though all the 10 regional capital and 130 district capitals are connected to the national grid, there is regional disparity in access. Access in the southern part of the country is much higher than in the northern part. Access to electricity in rural areas is currently being enhanced through a Government-funded Rural Electrification Programme under which over 4,000 towns and rural communities have been connected to the national electricity grid system since it was initiated in 1989.

Petroleum Infrastructure and Supply

The petroleum products marketed in Ghana are (i) Premium Gasoline; (ii) Kerosene; (iii) Gas oil; (iv) Residual Fuel Oil; (v) LPG; and (vi) Premix. Approximately 70%of products are produced by Tema Oil Refinery (TOR) and the remaining 30% from imports. The country imports all of its crude oil requirements which is refined at TOR. The TOR, whose capacity is 45,000 Barrels-Per-Stream-Day (BSPD, is wholly owned by the Government of Ghana.

Bulk supply petroleum products are fairly reliable and are done through an extensive infrastructural network comprising of storage depots located at strategic parts of the country, pipelines for the movement of petroleum products, bulk road vehicles (BRVs) and also barges located on the Volta Lake. Secondary distribution and retail activities comprise (i) transportation of refined products from the bulk storage depots by road and (ii) retailing of the products at the pump. Thirty (30) oil marketing companies (OMCs), including five (5) LPG distribution companies are currently involved in the petroleum distribution and retail market. The of the companies namely, Shell, Total and Ghana Oil Company (GOIL) account for about 61% of the market share. With the exception of GOIL, all the OMCs are private companies.

In 2005, consumption of petroleum products was 1.787 million tones. On the average, total consumption of petroleum products has increased by about 17.4 % between 2000 and 2005. It is projected that the requirement for the major petroleum products -gasoline, kerosene, gas oil and LPG-

[2] The percentage of households that have electricity connection.

will increase significantly from 1.62 million tonnes in 2005 to 2.49 million tonnes by 2015 representing an average annual growth rate of 5.3% over the period. The consumption of these products could grow faster if the strong economic growth experienced in the past 5 years should continue. On the basis of these projections, Ghana will continue to import refined products to meet national consumption requirements except for kerosene. At its current capacity, kerosene production from the refinery will continue to outstrip national consumption over the period up to 2015.

Access to petroleum products in Ghana is satisfactory but has to be improved as the population grows. There are presently a total of 1,700 petroleum products retail outlets of which 37% are service stations[3] (SS), 20% are filling stations (FS) and 43% are reseller outlets (RO). The total number of retail outlets represents an access ratio of 71 retail outlets per million people. There are also vendors, who sell mainly kerosene, in all rural communities thereby increasing the accessibility of petroleum products in most parts of the country. In addition to the service stations and reseller outlets, the Ministry of Energy, under the Rural Kerosene Distribution Improvement Project (RKDIP), has extended the reach of kerosene retail outlets to 1,540 rural communities out of a target of 2,200 communities by installing surface tanks (each tank has capacity of 5,000 litres) for the retailing of kerosene.

[3] The Service Stations and Filling Station are big retail outlets located mainly in the cities and big towns while the Reseller Outlets are small outlets serving mainly the rural areas.

PROPOSED ACTIVITIES FOR DEMAND AND SUPPLY SIDE MANAGEMENT

Demand Side Management

Pilot activity	Objective	Activities	Results	Varifiable indicators	Target group/sector	Implementing institution	Possible sources of Fundin
Demand side management on energy use							
Energy efficiency in domestic and commercial areas	To accelerate penetration of the use of high efficiency lighting systems	Promotion and installation of energy efficient lighting systems - CFL & T5 flourescent	Reduction in peak demand levels	Reduction in peak demand levels	Residentila facilities	MoE, MEST,VRA, ECG, EF, EC, KITE, GRIDCo	GOG, Development partners (WB, AfDB, IFC), Private/corporate entities
	To enhance customer service	Public education - slogans, radio & TV adverts	Reduced customer bills	Economic savings per household	Commercial centers-bars, restaurants, schools		
		Provide technical assistance to target sector	Customer satisfaction	Energy efficient technology used			
			More power for distribution	Number of high efficent lighting systems installed			
			Green environment as a result of reduction in diesel used in power generation				
Energy efficiency and conservation in industries	To promote energy efficiency and conservation in industries	Monitor energy use to identify high consuming industries		Reduction in energy consumption by industries	Industries	EF, MoE, ECG, Ghana Standrads Board, KITE	
		Installation of capacitor banks		Number of capacitor banks installed			
		Efficiency labelling of equipment		Higher efficiency equipment in use			
Tarrif structure	To set appropriate tarrif sufficient to ensure financial viability of the utility			Increase in revenue collected	residential, commercial & industrial establishments	ECG, PURC, VRA	
	To send signals to customers not to over use energy			Decrease in customer energy consumption			
Supply side management	To increase energy supply	Install and operate more power plants	More power for distribution	Increase in energy supply into the system	Neighbouring countries eg Burkina Faso, Mali, Cote d'Ivoire	VRA, EC, GRIDCo	GOG, Development partners (WB, AfDB, IFC), Private/corporate entities
	To increase energy supply at reduced cost/kilowatt hour	Fuel switch by converting oil fired to gas fired thermal plants	Reduce cost of power generation and consumption	Decreased production cost translated to decreased consumption tariff	Residential, commercial & industrial establishments	VRA, EC, GRIDCo	GOG, Development partners (WB, AfDB, IFC), Private/corporate entities
	To reduce greenhouse gas emissions associated with power generation	Install and operate renewable energy based (solar, wind etc) power plants	Green environment as a result of reduction in fossil fuel used in power generation	Reduced CO2 and other greenhouse gas emissions	Society at large enjoying cleaner environment	MoE, MEST,VRA, ECG, EF, EC, KITE, GRIDCo	GOG, Development partners (WB, AfDB, IFC), Private/corporate entities

Supply Side Management

Pilot activity	Objective	Activities	Results	Varifiable indicators	Target group/sector	Implementing insti	Possible sources of Fun
Supply side management	To increase energy supply	Install and operate more power plants	More power for distribution	Increase in energy supply into the system	Neighbouring countries eg Burkina Faso, Mali, Cote d'Ivoire	VRA, EC, GRIDCo	GOG, Development partners (WB, AfDB, IFC), Private/corporate entities
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Tourism

1.1 Introduction

The current global financial crisis, multiple environmental threats and the continued global poverty challenge have brought forward the global need to adopt more sustainable consumption and production patterns to move towards low-carbon lifestyles and green economies. Food, energy, and water are under increasing pressure as the global population is projected to increase by 42 per cent between 2008 and 2050 and resource intensive consumption patterns rapidly expand across the world. It is increasingly evident that current economic growth and development patterns cannot be sustained without significant innovation in both the supply (production) and demand (consumption) sides of the market. The concept of sustainable consumption and production (SCP) encompasses the need to maintain an optimum balance between the production and consumption of goods and services with conscious efforts at conserving the environment.

The concept of Sustainable Consumption and Production (SCP) has been defined as: *"The production and use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the ability to meet the needs of future generations."*

The development of SCP initiatives has received particular encouragement following the 2002 Johannesburg World Summit on Sustainable Development, and the subsequent launch in June 2003 of the "Marrakech Process" on SCP. The impact of these programmes can only be measured if appropriate performance indicators are available; furthermore, effective indicators are critical in assessing current production and consumption patterns and informing the design of effective SCP programmes.

Mainstreaming SCP and resource efficiency into development strategies provides an essential contribution to the achievement of the UN Millennium Development Goals. The overall message of SCP and resource efficiency is not necessarily about consuming less but rather about consuming differently. It is about doing more with less by creating a better quality of life while minimizing the use of energy, natural resources, toxic materials, and emissions of waste and pollutants throughout the lifecycle of products and services (its design, manufacturing, use, waste and recycling).

2.0 Tourism development in Ghana

Tourism has become a global and highly competitive socio-economic and environmental activity in both developed and developing countries. It has become the largest and fastest growing industry world-wide, and stimulates other sectors such as agriculture, finance and manufacturing. Apart from generating foreign exchange earnings and revenue for governments, tourism has the potential to become a powerful tool in pro-poor development strategies. It has the ability to create jobs and wealth for local economies, as well as contribute to conserving natural resources. Tourism is an amalgam of visitors' consumption of goods and services which include transportation, accommodation, food and beverage, recreation and entertainment, travel and tour operations, and souvenirs. It is envisaged that tourism will be one of the pillars of productive and sustainable source of national revenue, decent employment and poverty reduction.

Tourism development has been pursued in Ghana since the 1960s. Nevertheless, the industry is still in the early stages of development. The diversification of the Ghanaian economy in 1985, which addressed the need to shift focus from the over-reliance on traditional commodities such as gold, timber, and cocoa, brought the tourism sector into the forefront as a major economic activity with the potential to resuscitate the ailing economy. This policy direction was justified by the fact that Ghana can offer a wide range of unique and exciting natural, cultural, and historical resources which could be developed on a competitive and sustainable basis. The establishment in 1993 of a Ministry of Tourism (MOT) emphasized Government's commitment to the development of the tourism sector.

Tourism has largely been dominated by the public sector until Government relinquished all interests in many commercial enterprises during the early 1990s. Since then, the private sector has been expected to lead the tourism industry to greater heights. This has, to some extent, been realized. The tourism sector has been experiencing substantial growth since 1996. The growth rate of arrivals in 1996 was 6.6%; by 2000 it accelerated to 7%. However, the private sector has not been able to take full control of the sector, partly because of challenges that have not been adequately addressed by public policy.

2.1 Existing policy framework

The preparation of the 15-year National Tourism Development Plan (1996 – 2010) provides a planned approach to tourism development in the country on a sustainable base. In order to fast-track the benefits that can be derived from tourism, the Ministry of Tourism and Modernization of the Capital City

(MOT/MCC), as it was then called, in collaboration with the private sector, prepared a 5-year Strategic Tourism Action Plan (2003 – 2007) outlining clearly defined objectives, outputs, activities, and milestones.

The vision and overall goal of the Government so far has been to realize the potential of the tourism sector in contributing to the nation's economy by generating growth of 20% per annum by the year 2007. In order to achieve this, Ghana needs to become a competitive and quality tourism destination within the framework of respect for the country's cultural, historical, and environmental heritage.

Specific objectives relate to the need for upgrading and expanding the stock of tourist attractions, facilities, and supporting infrastructure, as well as tourism services. In addition, marketing efforts need to become more effective, while the standards and quality of human resources in the tourism industry require upgrading. Lastly, domestic tourism should be promoted, as this is still a largely untapped market.

Government has targeted to increase tourist arrivals to one million and foreign exchange earnings to US$1.5 billion by 2007. Tourism is also expected to create at least 300,000 jobs by the year 2007, making it the largest employer in the formal sector and the second largest after agriculture and retailing taking into account the informal sector as well.

2.2 Current performance of the tourism sector

Tourism currently plays a relatively moderate but growing role in the economy of Ghana. It is currently considered to be the fourth largest source of foreign exchange earnings (estimated at US$1.4 million in 2008), and contributes approximately 7% to the country's GDP. In terms of its contribution to formal employment, the tourism industry employs an estimated 150,000 – 300,000 people directly and indirectly.

Tourist arrivals in Ghana have steadily increased over the past 15 years from approximately 145,000 in 1990 to 700,000 in 2008. Ghana receives visitors from various parts of the world. The principal source markets in order of importance are Ghanaians abroad, the West African sub-region (Nigeria, Togo, Cote d'Ivoire), Northern Europe (UK, Germany, France, The Netherlands), and North America (mainly US). The majority of visitors tend to be business travellers and those visiting friends and relatives (VFRs). Ghana is also attracting visitors through promoting itself as homeland for the African diaspora.

All tourism indicators show a consistent trend of growth; in terms of contribution to GDP, in contribution to foreign exchange earnings, in the number of visitors, in total tourism receipts, number of hotels, number of

rooms, number of beds, hotel occupancy rates, number of restaurants, car hire companies, and tour and travel operators. Tourism is currently the fastest growing sector of the Ghanaian economy (The real tourism GDP which grew by 10.3% in 2004 is currently provisionally estimated at 12.28% in 2005).

In spite of the substantial growth of the tourism industry recorded over the past 15 years, the true wealth-creating and poverty reducing potential of the sector is not really fully grasped by policy-makers. Unless tourism is seen as strategically important to the development of Ghana and the necessary plans, policies, actions and resources to support this sector are put in place, tourism will remain a missed opportunity. Research has confirmed the fact that timber is very difficult to renew and gold is a non-renewable resource. Besides, only about 20% of the export earnings from gold come back to Ghana. Additionally, cocoa production is subject to major price fluctuations and requires large tracts of forest land and its demand may fall rapidly when the artificial substitute begins to compete with cocoa fully. Remittances from Ghanaians abroad will most likely decline as future generations become more removed from their motherland. Given the above expectations, sustainable tourism may be the answer, as it is showing a continuous growth both worldwide and in Ghana. See Appendix A for detailed statistical fact sheet on tourism in Ghana.

2.3 Review of existing legislations

Most tourism related legislation is outdated (stemming from the 1960s and 1970s), and is therefore incompatible with modern tourism requirements.

The National Redemption Council Decree 224 established the Ghana Tourist Control Board in 1973 and spelt its functions until 1977 when it was amended under the Supreme Military Council Government. The continuous adherence to the existing regulatory instruments is out of tune with best practices worldwide. The existing legislation does not enhance the achievement of goals set out in the Strategic Action Plans of the Ministry of Tourism since its establishment, i.e., incentives and disincentives to promote responsible tourism are not attractive enough hence operatives flout regulations/legislations with impunity.

The major challenges facing the tourism sector with regards to developing the sector could be outlined as follows;

- Weak enforcement of regulations, certificates, licensing, etc.
- Legal mandate for management and administration of tourism resources is fragmented; i.e. spread over various ministries, departments, and public agencies.

- Job entry requirement in the industry is not established and enforced to ensure quality service delivery.
- Land acquisition processes impacts negatively on securing land for tourism investment/development and deter potential investors.

3.0 Identify cross-cutting issues and linkages to other sectors

The overall approach to tourism development in Ghana can be referred to as *responsible and sustainable tourism*. This implies a conscious approach by all tourism industry stakeholders to develop, market, and manage the tourism industry in an environmentally friendly-, economically viable-, and socio-culturally acceptable manner, so as to maximize the positive impacts on wealth creation and poverty reduction, and to minimize the negative side effects.

Key cross-cutting elements of such an approach include:

3.1 Waste management and sanitation

Tourist facilities in the form of hotels, restaurants and camping sites generate waste. If the waste management practices put in place are not adequate or where no such practices are available, this can create problems for the environment.

In terms of liquid waste there are many facilities in both rural and urban areas which do not treat waste water before discharge into open drains and sewers. This has serious implications for sanitation. The offensive stench which emanates from sewers is a public nuisance.

On solid waste the use of appropriate technology such as the biogas technology, which turns waste to energy could be used. The energy is then channelled back to the facility to be used in the kitchens. The concept of reuse, recycle and recovery should be encouraged. This is because solid waste such as bottles and packaging may find their way to landfills which in most cases are already full or may not exist at all.

3.2 Infrastructure

Tourism development goes with various modes of travel- by road, water, air and rail.

Roads of high quality will have to be constructed to meet link roads and link roads constructed to link tourist sites or attractions. The better the road network, the more tourists the area will attract. Most long haul

destinations are done via air transport. The more tourists patronise airport terminals and services, the more the expansion in air transport.

Some tourists use rail for movement from one destination to another. Admittedly in Ghana, the use of rail for tourism purposes is negligible and above all there is no statistics to show any trend. It is however suggested to take into consideration an expected expansion in the rail sector in view of the recent oil find in the Western Region- the region whose capital Sekondi-Takoradi is one of the three important railway terminals in Ghana, the other two being Accra and Kumasi. The possibility of extending the railways from southern Ghana to the north has been a major political campaign issue of Ghana's political parties.

With regards to water, there is an enormous opportunity for water sports in view of the splendid network of water bodies Ghana has. The water bodies include the sea, estuaries, rivers and streams, plunge pool of waterfalls, lagoons and above all, the two important lakes of Ghana, the Volta Lake- one of the largest manmade lakes in the world and Bosomtwi- a crater impact lake. Standards need to be set for which type of water craft to use, the size, the number of people it can carry and more. In addition, issues of oil spillage especially on the land locked Bosomtwi must be factored into the scheme of things. The constant drowning of people in the Volta Lake should be researched in detail to forestall future occurrences.

Standards need to be set for areas where swimming is to be permitted and all areas prone to hazards be identified and marked out clearly to warn swimmers. The net effect is job creation and increased revenue generated to providers of tourist services and to the government.

3.3 Health

Tourism has a ripple effect on the health sector. As the number of tourists increases so will the demand for more and better health facilities. To ease the burden on the public sector, health service providers, private health institutions such as hospitals, clinics and health centres would spring up to take care of visiting tourists.

Tourism as such leads to the need for health and leisure facilities. Of late a number of health farms, SPAs and sanatoria are coming up in various forms spatially distributed in Ghana. There is the need to control the development with standards set and maintained. Of particular worry is the issue of the health/leisure facilities failing to register with the Ghana Tourist Board as a tourism facility on account of a court ruling that such facilities is considered as merely health facilities. What makes the case complex is that a number of

them offer accommodation, food services, organise cruises on the Volta River and in addition have conference rooms that handle both local and international conferences. The provision of the health/leisure facilities generate income through jobs created directly and indirectly.

3.4 Education, youth and sports

The awareness that the tourism sector has become a highly competitive socio-economic, cultural and environmental activity has made it an important subject in educational institutions in the country.

A number of institutions such as polytechnics, universities and other tertiary institutions now have tourism as a core subject on offer. The students learn about how when tourism properly developed and promoted can stimulate the economy. They are also taught that apart from tourism being a foreign exchange earner, it also has the potential to becoming a powerful tool in pro-poor development strategies. This would help students develop in the tourism sector and take up jobs in this sector thus developing the sector.

The youth play a major role in sports development. To satisfy the demand of the youth as far as sports and games are concerned, there may be the need to develop parks and playing fields and stadia. These facilities require space for their construction. In order to make judicious use of land space for the construction, there may be the need to use land that may not compete with other areas in need, for example, a prime area for hotels may not be sacrificed for a football park.

3.5 Mining

In the mining sector, educational tours are organised for interested visitors. The products of mines such as gold and diamond are of tremendous interest to tourists. Quite apart from touring mining areas, underground tours are also organised for tourists to go down the belly of the earth to see how miners ply their trade several feet below sea level. Underground tours are popular with Obuasi mines. Another source of mining is that of the extraction of salt or salt winning along the coastline with special reference to special areas bounded by lagoons such as Keta lagoon, Songhor lagoon, Muni-Pomadze and Elmina areas. The salt ponds do attract several bird species including migratory species such as terns and sea gulls. Birding and bird watching is a special interest activity that commands universal popularity among most adventure tourists.

3.6 Manufacturing

As a result of increased growth in tourist activities there is a demand for manufactured goods to service the tourist industry. Such items as bottled water, detergents, toiletries, food and beverages including alcoholic beverages go with the tourist industry. In some cases, special packaging to suit the tourists is made, for example small size cakes of soap for daily use by the visitor. The demand for goods eventually leads to the establishment of manufacturing industries which in turn employ labour directly and indirectly.

3.7 Agriculture

The needs of tourists are many and varied. Any increase in tourism leads to agricultural production of particular crops such as vegetables and fruits. Certain species of animals and fishes are preferred by some tourists. Often there is a problem with demand for certain food items by visitors vis -a -vis the local people. The demand for vegetables especially in urban areas often leads to market gardening and peri-urban agriculture.

3.8 Consumer behaviour

Tourism involves a lot of copying from foreign cultures and these lead to life style changes. Different nationals visit Ghana as tourists. From the interaction between the local people and the tourists, a lot of cultural exchanges take place. Tourist sites have therefore become places where both negative and positive cultural exchanges take place.

3.9 Human settlement, housing and construction

The development of any tourist facility takes place on land. Most of the tourist facilities are located close to water bodies such as beach fronts and on mountainous areas. There is often the tendency of man competing for space for housing and construction, vis-à-vis, the need to provide for tourism accommodation facilities. The Town and Country Planning Department is to ensure judicious use of space to meet the various demands.

Where the tourism sector is not well regulated, an amorphous form of development takes place to the detriment of the city and town planning authorities. In some cases, facilities are put so close to the water body and liquid and solid waste end up being directly discharged into the water body. For proper housing to be in place there is the need for investors to get the appropriate building permits.

4.0 The tourism business

The tourism business is a complex and fragmented and from the time that visitors arrive in the destination, until they leave, the quality of their experiences is affected by many services and experiences including public and private services, community interactions, environment and hospitality. Delivering excellent value will depend on many organisations working in unity. Destination management calls for a coalition of these different interests to work towards a common goal to ensure the viability and integrity of their destination now, and for the future.

4.1 Demand side/Consumers

Ghana's resource base for tourism is quite immense and diverse. Some of the features which make Ghana attractive for tourists include: Natural environmental heritage, Historical heritage, Cultural heritage, and other man-made attractions, as well as Ghana's central location on the world map.

- ***Cultural heritage:*** festivals, crafts and arts, music and dance, architecture, traditional shrines, beliefs and practices, Ghanaian cuisine, and traditional village life.
- ***Historical heritage:*** over 30 forts and castles (some of which have been declared world heritage sites by United Nations Educational, Scientific and Cultural Organisation (UNESCO)), slave markets, defence walls, museums, monuments, mosques, churches, mission stations, and archaeological sites.
- ***Natural environmental heritage***: wildlife species include 222 mammals, 128 reptiles, and 38 amphibians. Some are endemic to Ghana. The birdlife is particularly rich with 721 species. Several Ramsar sites exist in Ghana. There are currently 20 national parks and reserves covering approximately 5% of Ghana's total land surface, while forest areas outside the designated protected areas occupy a further 10% of Ghana's total land surface. In addition, Ghana boasts of waterfalls, several good quality beaches, lakes and rivers, crocodile ponds, hippopotamus sanctuaries, gardens and zoos, as well as scenic landscapes.
- ***Other man-made attractions:*** the Akosombo Dam and the Lake Volta, colourful markets, conference facilities, bustling nightlife, casinos, and art galleries.
- ***Image:*** A unique character or image is crucial in attracting visitors to a destination. Ghana's peaceful image is a plus to increase visitation.

Given the wide range of tourism resources, Ghana is capable of attracting visitors for various purposes; business, leisure and recreation, educational studies, and health treatment. Because of its ***central location on the world map***, Ghana is well situated to take advantage of being easily accessible to tourists from West Africa, Europe and North America. Ghana has a favourable reputation abroad and is known for its political and economic stability. Health and safety issues are not considered a major deterrent for tourism.

Although Ghana possesses a diverse variety of potential attractions, the key to the success of these features in attracting tourists is their proper development and management on a sustainable basis. Tourism is a fiercely competitive business and for Ghana to become, and remain competitive, it will need to manage its

stock of natural, historical, and cultural resources wisely, complemented with adequate and innovative man-made facilities.

4.2 Supply side/Operatives:

The supply side are the wide range of services and facilities which support the visitors' stay including the following:

- Accommodation: hotels, motels, guest houses, inns, home lodges and hostels, camping sites
- Catering services: restaurant and bars, local chop bar, drinking bars and parlors
- Recreational facilities: golf courses and parks
- Entertainment: night clubs, sport fishing, scuba diving and hiking,
- Attraction: museums, forts and castles, areas of extra-ordinary scenic beauty
- Transportation: road, rail, air and sea,
- Guide services
- Shopping facilities
- Travel and tour operation services

Initiatives on SCP and resource efficiency are helping to green existing industries and link new initiatives to economic development through green investment and green jobs. For example, improving the energy efficiency of buildings and construction of tourist facilities is another area with the highest potential for reducing greenhouse gas emissions and creating jobs. Buildings are responsible for 30 to 40% of all energy use, greenhouse gas emissions and waste generation. Through the Marrakech Process, governments are encouraged to invest in energy-efficient buildings.

Although tourism is one of the world's fastest growing industries and an important source of foreign investment and employment for many countries, it is also an industry that places heavy pressures on natural systems and leads to the consumption of large amounts of energy and other natural resources which impacts on climate change tremendously. Travel over long distances requires a large amount of time and/or energy. Generally this involves burning fossil fuels, a largely unsustainable practice and one that contributes to climate change, via CO_2 emissions. Air travel is perhaps the worst offender in this regard, contributing to between 2-3% of global carbon emissions. Car travel is the next worst offender. Mass transport is the most climate friendly method of travel, and generally the rule is "the bigger the better" - compared to cars, buses

are relatively more sustainable, and trains and ships are even more so. Travel by bicycle, solar powered car, or sailing boat produces no carbon emissions.

To mitigate the effects of tourisms impact on the environment, public sector institutions must begin to partner the private sector; non-governmental agencies, civil society and the media through education and information exchange promote awareness of linkages between climate change and tourism and adapt best practices in providing services to their guests.

5.0 Impact of tourism on the environment

A well-managed tourism industry has the potential to contribute to the conservation of natural, cultural, and historical resources. So far, Ghana has not been able to adequately manage and protect its tourism resources. The country is experiencing several environmental problems that affect the sustainability of tourism development emanating from the provision tourists products and services. Some of these are pollution, declining wildlife populations, deforestation and coastal erosion.

Tourism development can put pressure on natural resources when it is not properly planned and managed. The impact of tourism on the environment could be mainly classified as follows;

5.1 Water resources

Water, and especially fresh water, is one of the most required natural resources in providing tourists services and products. The tourism industry generally overuses water resources for hotels, swimming pools, golf courses and personal use of water by tourists. This can result in water shortages and degradation of water supplies, as well as generating a greater volume of waste water.

Golf course maintenance can also deplete fresh water resources. Golf courses require an enormous amount of water every day and, as with other causes of excessive extraction of water, this can result in water scarcity. If the water comes from wells, over pumping can cause saline intrusion into groundwater.

Water sports activities engaged in by tourists pollutes the water bodies through leakages and spillage of oil. Also, this activity disturbs the tranquil of the water bodies and reduces the spawning of fishes and other aquatic organism.

5.2 Land degradation

The increased and expansion of tourism and recreational facilities has exacted pressure on important land resources such as fertile soil for farming, forests, wetland and wildlife and other scenic landscapes. Direct impact on natural resources, both renewable and non-renewable, in the provision of tourist facilities can be caused by the unplanned use of land for accommodation and other infrastructure provision, and the use of building materials.

5.3 Pollution

Tourism can cause the same forms of pollution as any other industry: air emissions, noise, solid waste and littering, releases of sewage, oil and chemicals, even architectural/visual pollution.

Air pollution: Transport by air, road, and rail is continuously increasing in response to the rising number of travels. **Transport emissions** and emissions from energy production and use are linked to acid rain, global warming and photochemical pollution. Air pollution from tourist transportation has impacts on the global level, especially from carbon dioxide (CO2) emissions related to transportation energy use. And it can contribute to severe local air pollution.

Noise pollution: from airplanes, vehicles, is an ever-growing problem of modern life. In addition to causing annoyance, stress, and even hearing loss for humans, it causes distress to wildlife, especially in sensitive areas.

Sewage: Construction of hotels, recreation and other facilities often leads to increased sewage pollution. Wastewater has polluted seas and lakes surrounding tourist attractions, damaging the flora and fauna. Changes in salinity and siltation can have wide-ranging impacts on coastal environments. And sewage pollution can threaten the health of humans and animals.

Aesthetic Pollution: Often tourism fails to integrate its structures with the natural features and indigenous architecture of the destination. Large, dominating resorts of disparate design can look out of place in any natural environment and may clash with the indigenous structural design.

In mountain areas, trekking tourists generate a great deal of waste. Tourists on expedition leave behind their garbage, oxygen cylinders and even camping equipment. Such practices degrade the environment with

all the detritus typical of the developed world, in remote areas that have few garbage collection or disposal facilities.

Solid waste and littering: In areas with high concentrations of tourist activities and appealing natural attractions, waste disposal is a serious problem and improper disposal can be a major despoiler of the natural environment - rivers, scenic areas, and roadsides.

Direct discharge of excreta into the sea at Korle-Gono Beach-Accra

5.4 Adulteration of local cultures & lifestyle changes

There is some concern that tourism development may lead to destinations losing their cultural identity by catering for the perceived needs of tourists – particularly from international markets. This is based on the observations of other "destinations" having compromised their sense of identity. Most tourists travel, not to visit home away from home, because they want to experience the personality and true character of destinations, towns, Communities and attractions. The tourism experience is different to what they can see or do at home and this includes experiencing the real life and lifestyle of the destinations they visit.

This means that social structures, the culture and traditions can be influenced, changed or even completely substituted due to tourism by impacting on the choices and consumption of goods and services. This can be mainly noticed by the local communities themselves and is less obvious for the tourists. . Local people sometimes blindly copy foreign cultures thinking that it is the "modern" way of life. These lifestyles greatly adulterate local cultures. In Ghana, for example, some ladies have taken to the wearing of jeans so much that the local "kaba" is finding it difficult to survive.

In the extremes, tourism contributes to a wide range of issues – many of which seem insignificant but detract from the quality of life of local residents. Intrusion on daily life, loss of privacy, and a sense of crowding contribute to ill feelings and resentment towards tourism development in line with Doxey's Irritation Index.

5.5 Physical impacts

Attractive landscapes, such as sandy beaches, lakes, riversides, and mountain tops and slopes, are often transitional zones, characterized by species-rich ecosystems. Typical physical impacts include the degradation of such ecosystems. The ecosystems most threatened with degradation are ecologically fragile areas such as rain forests, wetlands, mangroves, coral reefs and sea grass beds. The threats to and pressures on these ecosystems are often severe because such places are very attractive to both tourists and developers.

Physical impacts are caused not only by tourism-related land clearing and construction, but by continuing tourist activities and long-term changes in local economies and ecologies.

5.5.1 Physical impacts of tourism development

- **Construction activities and infrastructure development:** The development of tourism facilities such as accommodation, water supplies, restaurants and recreation facilities can involve sand mining, beach and sand dune erosion, soil erosion and extensive paving. In addition, road and airport construction can lead to land degradation and loss of wildlife habitats and deterioration of scenery.

- **Deforestation and intensified or unsustainable use of land:** Construction of accommodation and facilities frequently requires clearing forested land. Coastal wetlands are often drained and filled

due to lack of more suitable sites for construction of tourism facilities and infrastructure. These activities can cause severe disturbance and erosion of the local ecosystem, even destruction in the long term.

5.5.2 Physical impacts from tourist activities

- **Trampling** Tourists using the same trail over and over again trample the vegetation and soil, eventually causing damage that can lead to loss of biodiversity and other impacts. Such damage can be even more extensive when visitors frequently stray off established trails.

Trampling impacts on vegetation	**Trampling impacts on soil**
Breakage and bruising of stems	Loss of organic matter
Reduced plant vigour	Reduction in soil macro porosity
Reduced regeneration	Decrease in air and water permeability
Loss of ground cover	Increase in run off
Change in species composition	Accelerated erosion
Source: University of Idaho	

- **Alteration of ecosystems by tourist activities** Habitat can be degraded by tourism leisure activities. For example, wildlife viewing can bring about stress for the animals and alter their natural behaviour when tourists come too close.

A tourist interacting with mona monkeys at Boaben Fiema monkey sanctuary

Safaris and wildlife watching activities have a degrading effect on habitat as they often are accompanied by the noise and commotion created by tourists as they chase wild animals in their trucks and aircraft. This puts high pressure on animal habits and behaviours and tends to bring about behavioural changes. In some cases, as in Kenya, it has led to animals becoming so disturbed that at times they neglect their young or fail to mate.

5.6 Coastal Impacts of Tourism

Economic development activities in any sensitive natural area pose a partner challenge for sustainable development. Coastal areas host the most productive marine ecosystems and serve as spawning grounds for the oceans. The degradation of coastal areas in many countries, with the resulting impact upon coastal settlement and fisheries justify street local control on further coastal development. Since coastal areas are the most highly populated regions on earth, their protection requires unique attention and the effective management of numerous competing interests. See development of tourist facilities at the La- beach area below;

Panoramic view of La – beach area

In many coastal areas, tourism development is destroying or marginalizing dwindling habitats for marine animals and spawning fish, as well as the livelihoods of traditional fishing families and villages. Unregulated water sport activities and machinery are adding to this toll. Lack of effective waste water treatment for tourist facilities is making a significant contribution to coastal water pollution. Excessive private tourist development is denying equitable human ace to beaches and coastal waters, cutting off local populations from their coastal heritage. Inappropriate development in high risk storm areas is costing families, local economies and governments billions of dollars annually.

6.0 Specific objectives and strategies

In order to develop Ghana's tourism on a sustainable base within the framework of SCP, the proposed important specific policy objectives and strategies should be considered for the following thematic areas:

6.1 Tourism resources management and protection

Policy objective:

- To effectively manage and conserve the cultural, environmental, and historical resources of Ghana, balancing economic utilization with sensitivity, preservation and conservation.

Policy strategies:

1. Promote and encourage sustainable and responsible tourism development by means of incentives to private enterprises and communities.
2. Make mandatory the conduct of integrated environmental management planning and environmental impact assessments or equivalent procedures for all new tourism projects.
3. Encourage social and environmental audits of tourism projects to be conducted in an inexpensive, rapid and participatory way.
4. Encourage tourism development in areas where tourism offers a competitive form of land-use and ensure that tourism is integrated into land-use plans for such areas, and ensure that plans involving tourism are monitored and enforced.
5. Explore creative means of ensuring that neighbouring communities participate in and benefit from economic activities generated in and around conservation areas.
6. Promote sustainable and responsible consumption of resources such as water and energy in tourism plants, using readily available technology and encouraging sustainable waste disposal, green packaging and recycling.
7. Support mandatory environmental management practices in ecologically sensitive areas such as the coastal zone, wetlands, semi-arid lands, etc.
8. Ensure tourism facilities do not deprive communities of access to natural resources needed for their livelihoods.
9. Encourage the established tourism enterprises to take full note, and attempt to make use, of the natural, cultural and historical heritage resources within specific communities and environments; and maximise use of local inputs/resources.
10. Manage cultural and historical resources to the negotiated benefit of all interested parties within the communities.

11. Include effective protection and sustainable utilization of cultural and historical resources in land use planning and development projects for tourism.
12. Encourage communities and districts to make inventories of actual and potential resources that are available for tourism.

6.2 Product development

Policy objective:

- To enhance the quality, diversity, and complementarities of Ghana's tourism products in order to lengthen the stay of tourists thereby maximizing benefits for both the national economy and local communities.

Policy strategies:

1. Encourage the improvement of existing products.
2. Promote the development of new types of tourism products (e.g. educational, sports-, medicinal-, agro-tourism) and encourage the provision of facilities, training, marketing and promotion to give emphasis to the development of these types.
3. Encourage horizontal integration across sectors and businesses to create synergy and improve competitiveness.
4. Emphasize the development of products that offer good opportunities for involvement of local entrepreneurs and communities (i.e. filling gaps in the tourism supply chain).
5. Foster the development of community-based tourism products, and encourage tourism facilities and services to reflect Ghanaian culture, architecture and materials (e.g. in accommodation, food, etc).
6. Foster innovation and creativity in the products being developed.
7. Promote developments that are appropriate to the structures and strategies of local governments and communities.
8. Acknowledge the role of, and encourage the participation of, the private sector in the provision of tourism facilities and services at national parks and other protected areas.
9. Continuously maintain and upgrade existing infrastructure in order to improve accessibility and mobility.

10. Make full use of modern computer and communications technologies to effectively market, promote and distribute travel and tourism products, services and information domestically and internationally.
11. Facilitate the funding of major tourism infrastructure projects that would have considerable impacts on the development of the tourism industry.
12. Ensure that agencies responsible for infrastructure development and management do consider tourism as a priority in the design, construction and management of infrastructure facilities.
13. Consider the regional West African tourism potential in the development of major tourism-related infrastructure projects.
14. Work closely with other ministries, departments and agencies (MDAs) in coordinating the provision of tourism infrastructure.

6.3 Quality and standards

Policy objective:

- To ensure and maintain high standards of services and facilities in order to be internationally competitive.

Policy strategies:

1. Ensure that visitors get good value-for-money.
2. Ensure that visitors' satisfaction levels are high in order to benefit from repeat visitors, as well as from favourable word-of-mouth marketing.
3. Introduce or review legislation that include provisions for:
    a. Definition of facilities for classification purposes
    b. Licensing board
    c. Registration requirements
    d. Conditions and minimum standards required for certification, licenses and ratings
    e. Licensing of managers
    f. Conditions for suspension and cancellation of license or registration certificate
    g. Penalties for violation of regulations and procedures
    h. Appeals process

i. Powers of entry and inspection
j. Annual subscription fees

4. Introduce the development and promotion of quality tourism standards in a consultative manner.
5. Apply international standards to all tourism enterprises and not only to the accommodation sector.
6. Ensure that inspections are undertaken by experienced and well-trained staff, and that standards are applied consistently.
7. Encourage, and assist where necessary, all local and foreign investors to conform to the standards.
8. Ensure that standards and their related costs do not act as barriers to entry into the tourism industry.
9. Encourage all establishments, particularly smaller establishments, to upgrade their standards of service.
10. Lobby for legislation that stimulates competition in the sky which should allow for in-bound scheduled and charter flights as a means to reduce air fares.
11. Re-establish, and use the presence of, a strong national carrier to promote the growth and development of the Ghanaian tourism industry but on an equal footing with other airline companies.
12. Expand the range, quality and accessibility of different transportation options to visitors.
13. Improve standards and quality control among all forms of transportation.
14. Improve the linkages and coordination among different institutions related to transportation.

6.4 Marketing and promotion

Policy objectives:

- To ensure the promotion and expansion of international, regional and domestic tourism by developing Ghana as one of the preferred tourist destinations in Africa.

Policy strategies:

1. Put in place an agreed national tourism marketing programme (for international, regional, and domestic tourism) and budget with contributions from both public and private sectors.
2. Ensure that Ghana becomes known as the "homeland" for Africans in the diaspora.

3. Establish a marketing platform involving the public and private sectors which will oversee, coordinate and implement the national marketing programme.
4. Establish and maintain a comprehensive tourism data collection, management, and analysis system that will enable the industry to know about source markets, market segments, levels of expenditure per segment, accommodation used, length of stay, attractions visited, satisfaction levels, perceptions on value-for-money, suggestions for improvement.
5. Pursue cooperative advertising and promotion opportunities.
6. Establish mechanisms to monitor the effectiveness of promotional expenditures.
7. Ensure the coordination of tourist information provision to all interested parties.

6.5 Tourism investment

Policy objective:

- To promote investment in tourism development by both local and foreign investors.

Policy strategies:

1. Establish a policy of finance and investment to develop the tourism sector.
2. Provide the following: tax holidays, exemption (zero rating) of import duties on basic furnishings, equipment and their spare parts and environmentally friendly, subsidies, grants, and locational incentives.
3. Encourage foreign investments that meet the following criteria:
    a. Investors and companies that develop, promote, and implement responsible and sustainable tourism.
    b. Investors and companies that develop, promote, and implement high quality facilities and services.
    c. Investors that invest in rural communities and less developed geographic areas.
    d. Investors that develop products which diversify the tourism product (e.g. adventure tourism, ecotourism, beach tourism, fishing, boat cruise, water sports, agro-tourism, etc.).
    e. Investments that will result in the transfer of skills and technology to Ghanaians.

f. Investors who are interested in joint ventures with local partners and local communities.
g. Investors who have a proven track record in the industry.

4. Consider using investment conferences to encourage inward investment into the tourism sector.
5. Ensure that foreign investment in tourism-related MSMEs and the ancillary services sector does not take away opportunities that are of interest to, and clearly within the reach of, local entrepreneurs and businesses.
6. Provide concessions to investors, such as franchise arrangements and package tour arrangements only upon *some* assurance that substantial leakages do not occur, and that sufficient socio-economic benefits accrue locally, and that negative impacts on local communities are minimized.
7. Do not limit incentives to the hotel and the tourist accommodation sector only but also apply to restaurants, tour operators, recreation and entertainment establishments, conference facilities, tourism related MSMEs, and community based enterprises, and any other strategic or major tourism initiative.
8. Provide assistance for the development of MSMEs.
9. Provide assistance to effectively organized communities towards the development of community based tourism projects.
10. Evaluate the allocation of incentives to proposed nationally owned ventures using the following criteria:
    a. Nature and extent of employment creation drawn from local community (urban and rural).
    b. Nature and extent of outsourcing the delivery of supplies and services to local entrepreneurs and communities.
    c. Nature and extent of investment in rural areas.
    d. Nature and extent of investment in infrastructural developments also accessible by local community.
    e. Nature and extent of investment in education and training of own staff, students on attachment, and the general public.
    f. Nature and extent of investment in career development of local staff.
    g. Application of appropriate environmental management procedures in order to become more environmentally friendly.

h. Nature and extent of investment in community projects and incurring related socially-responsible tourism expenses.

11. Prepare a national tourism investment prospectus to guide prospective investors, and launch it both domestically and internationally.
12. Provide support to the public and private sectors in preparing corporate and business plans for tourism (including product development, marketing, training, investment, etc).

6.5 Human resource development

Policy objective:

1. To ensure that the human resource capacity (quality and quantity) required for tourism development is in line with demands of the industry so as to ensure its competitiveness (i.e. professionalize staff at all levels).

Policy strategies:

1. Create a dedicated funding mechanism for training.
2. Establish more professional industry training schools.
3. Establish a high level industry-based advisory council to efficiently coordinate the training, certification, and accreditation procedures for advancement of tourism.
4. Embody in legislation certification as job entry requirement in the industry.
5. Engage the private sector in constant dialogue concerning requirements.
6. Develop a framework of incentives that encourages the private sector to invest in staff training.
7. Establish accreditation of training institutes, standardized across the entire tourism training sector, linked with international accreditation systems, in line with the national Technical, Vocational, Educational, and Training Policy (TVET).
8. Develop and enforce national training regulations; minimum qualification levels for all tourism positions, linked to licensing of tourism enterprise.
9. Improve access to training opportunities through a system of scholarships, student revolving loans, incentive schemes supporting internships and practical attachments.
10. Provide training in best practices for tourism planning and management to public officials for administering and regulating Ghana's tourism.

6.6 Security, safety and privacy

Policy objective:

- To ensure the health, security safety, and privacy of all tourists and tourist sites while safeguarding against negative side effects of tourism on local communities.

Policy strategies:

1. Undertake both short and long term actions and strategies to reduce traffic accidents, crime and violence on tourists, and incidence of visitor harassment by hawkers and beggars in collaboration with relevant institutions.
2. Provide adequate information to visitors that will help to improve their health, safety, security, and privacy, as well as how to avoid creating a negative impact on local communities.
3. Ensure that adequate resources are devoted to providing for the health, safety, security, and privacy of tourists and local residents, paying particular attention to people with disabilities.
4. Ensure that all tourism enterprises adhere to national labour laws.
5. Consider and enforce the safety and standards of ground, air, rail, and water transportation services to satisfy the needs of tourists (domestic and international).
6. Coordinate cooperation among appropriate stakeholders to work together to ensure the health, safety, security, and privacy of all tourists and of local communities, and protection of tourist sites.
7. Address the health needs of tourists by improving food and water safety, health services, and by addressing health hazards.
8. Address the following in order to improve safety standards for tourists and residents:
    a. Improving the day-to-day patrols of crime prone areas, highways patrols.
    b. Establishing tourism police as in Egypt, Thailand and Morocco.
    c. Reducing the problem of road and other accidents through better and regular training of drivers as well as improved roads, railway system, aircrafts, boats, better licensing procedures and better road signs.
    d. Increasing the level of fire safety and ensuring that vehicles, hotels, night clubs, restaurants, tourist clubs, etc. have fire certificates, fire insurance, fire extinguishers, etc.
9. Provide warning mechanism systems and undertake awareness-raising campaigns as part of disaster preparedness.

10. Address negative aspects of tourism such as sexual exploitation of children (paedophilia and child pornography) and other forms of sex tourism, and any deviant threats to Ghana's national stability and territorial integrity.

6.7 Regional and international cooperation

Policy objective:

- To collaborate with neighbouring countries in support of tourism development initiatives on the continent and in West Africa in line with NEPAD, ECOWAS, UN World Tourism Organisation (UNWTO) as well as other UN protocols and agreements.

Policy strategies:

1. Establish appropriate bi-lateral relations with neighbouring countries in order to ease travel, lift restrictions, and promote movements.
2. Collaborate with neighbouring countries on joint product development and marketing initiatives, tourism training, investment promotion, etc.
3. Participate in, and seek support from, relevant international tourism development forums.
4. Participate in environmental conservation initiatives and the development of related products such as trans-border protected areas.
5. Promote adoption of a common visa regime for tourists to ECOWAS countries in order to facilitate cross-border visits between these countries while collaborating on immigration and security matters. (i.e. using the Schengen visa agreement in the EU as a model)

6.8 Tourism research and management information systems

Policy objectives:

- To have an accurate and up-to-date understanding of the tourism industry for effective and efficient tourism planning, marketing and promotional purposes.

Policy strategies:

1. Establish tourism research and management information systems for all the themes and at all levels (national, regional and district).
2. Ensure thorough information on tourism attractions and facilities, and adequate road signage to ensure maximum customer satisfaction.

6.9 Tourism education and awareness

Policy objective:

1. To create and promote tourism awareness at all levels of society.

Policy strategies:

1. Introduce a country-wide sensitization programme aimed specifically at policy and decision makers regarding the potential role of tourism in the national and local economy, and how their leadership is required at the various levels to realize this potential.
2. Introduce country-wide education and sensitization campaigns aimed at the general public addressing issues of littering, solid waste disposal, visitor harassment, resource use etc.
3. Introduce country-wide awareness campaigns aimed specifically at local communities on the potential benefits of tourism and the role required of the local communities in ensuring that such benefits are indeed developed and sustained.
4. Integrate sustainable tourism as a subject in the national educational curriculum.
5. Introduce a forum where private sector financial institutions and investors meet with experienced private sector tourism practitioners, policy makers and planners to discuss potential tourism development initiatives.

7.0 Identify indicators for monitoring and implementation

Some of the indicators identified showing evidence of sustainable consumption and production include:

2. Establishment of standards for development at all levels in the tourism sector
3. Certification of all tourism plants
4. Controls of economic leakages in the local economy
5. Conservation of local cultural heritages
6. Satisfaction of both tourist and host communities

For each of the issues raised above, indicators with practical information sources are required to measure the impact of tourism at all levels in the life cycle of the tourists product in question.

8.0 Demonstration Projects

Even though several areas can be selected for demonstration projects, two (2) sites have been selected on account of their peculiar circumstances. The sites are follows;

i. Ada – Foah(Volta estuary and its environs)
ii. Boti Falls (Huhunya)

N.B- please refer to Appendix B & C

9.0 Agencies to implement plan

A number of agencies will implement the plan. These agencies include:

- Ministry of Tourism
- Ghana Tourist Board
- Ministry of Environment, Science and Technology
- Environmental Protection Agency
- Metropolitan, Municipal and District Assemblies
- Town and Country Planning
- Private Sector
- Non- Governmental agencies
- Civil Societies
- Media

10.0 Funding sources:

- District Assemblies
- Banks
- Donor Agencies
- Grants
- Creation of a special Tourism Fund

Appendix B

ADA- FOAH LITTORAL

1.0 BACKGROUND

The goal of the project is to demonstrate and capture best practices and technologies for the reduction of land based pollution resulting from coastal tourism – a collaborative action for Sustainable Tourism Development.

The project is a proposal on how the beach area of ADA-FOAH in the Greater Accra Region could be developed within the framework of Sustainable and Consumption Production.

Ada- Foah is located in the Dangme-East District. The road network linking Accra to Ada-Foah is in good condition. The team visited three (3) places at Ada-Foah. These were the Cocoloco Beach Resort, the Dangbe-East District Assembly and the Manet Paradise Hotel.

The rationale for selecting Ada – Foah for a demonstration project are the persistent coastal erosion peculiar to sandy beaches in Ghana, indiscriminate disposal of waste and pollution of water bodies providing an opportunity to develop a system that can be replicated in areas with similar problems.

1.1 Cocoloco Beach Resort

This beach resort is a little above sea level. Some amount of sea erosion was seen on the coast line. It was a white sandy beach with some accommodation located across the road from the beach.

1.2 Dangme East District Offices

Along this coastalline over 300 metres of coastal line has been eroded. Former historic buildings such as the Fort, the Post Office, Dumas House a textile distributing house, had all been washed away by the sea. The most important surviving building is the Presbyterian Church.

1.3 Manet Paradise Resort

The resort is located opposite the RAMSAR site. The hotel accommodation has forty-three (43) rooms, sixty (60) beds and has a three star status. The facilities at the resort include swimming pool, bars, tennis court, and facilities for nautic sport, conference room and restaurant.

2.0 GEOGRAPHICAL FEATURES

2.1 Location

Ada-Foah is a town in the Greater Accra Region of Ghana, lying on the Atlantic Ocean of east Accra, on the estuary of the Volta River. It is 112km (70 milies) East of Accra.

2.2 Vegetation

The vegetation of Ada-Foah is that of the coastal strand and mangrove swamps (red and white), different plant species, oil palm, royal palm and mangoes.

2.3 Climate

The climate is warm tropical climate, characterized by very low, scanty unreliable rainfall regime (29inc) and high temperatures (86oF) and high humidity.

2.4 Settlements

The main settlements are Big Ada, Ada Foah, Azizanya, Ada Junction which are separated settlements.

3.0 ECOSYSTEMS

3.1 Water Bodies

Ada-Foah is characterized by estuaries, wetlands, coastal forests, swamps, flood plains, creeks, rivers, sandy beaches, salt ponds and islands. There are eight islands across the river from the Manet Paradise Hotel.

3.2 Flora/Fauna

There are a number of mangroves including white, red mangroves, Cacti, wild mango trees, oil palm and royal palm. There are unique habitats which serve as sacred groves. There are also migratory birds such as sea gulls, terns and resident birds such as the egrets and swallows.

3.3 Aquatic Animals

The area is a core-nesting ground for sea turtles and also, occasionally plays host to some few manatees, dolphins and whales.

3.4 Crustaceans

The sea abounds in squid, shrimps, lobsters, snails and clams

3.5 Fish

The variety of fish that can be found in the Volta River which flows through Ada include barracuda, sharks, loud mouthed bass, tarpon, tuna species, grouper, skates, rays, anchovies, herrings, sardines, sardinella, top minnow etc.

3.6 Sandy Beaches

The area is well known for its sandy and beautiful beaches

4.0 ECONOMIC ACTIVITIES

There is evidence of rural poverty in the area depicted by the infrastructural development of the area and houses built. This has culminated in the migration of most natives to the city as many homes appeared empty, even though there are a number of educational institutions, guesthouses and a health post in the town. The major economic activities in the area are fishing, farming of particularly tomatoes, water melons and pepper, petty trading and rearing of livestock. The soil in the area is alkaline and does not promote varied agriculture.

There is however a great ecotourism potential in the area. They include amongst others turtle watching, bird watching, river cruising, speed boating, canoeing, water-skiing, jet skiing, swimming, sport fishing, wind surfing, scuba diving, para-sailing, beach foot-balling and beach volley ball. If these activities are promoted it would lead to increased tourism and more economic activities which would alleviate the poverty of the local people.

Sailing on the Volta estuary- Ada foah

As the area is predominantly rural in nature, indigenous raw materials such as clay, palm branches and wood are used for construction.

5.0 INFRASTRUCTURE

There are good roads between Accra-Ada Foah, Ada-Foah-Lome; Ada-Foah-Keta. The major road from Accra to Ada is good and travel time is one (1) hour. The town roads are however in a deplorable state.

In terms of tourism facilities, few hotels, drinking bars, boating facilities exist.

Manet Paradise- Ada Foah

The town is served by electricity from the national grid and also has portable water and telecommunication infrastructure.

5.1 Health Infrastructure

There are the follwong health facilities: Dangme East District Hospital and Ada Foah Health Centre.

5.2 Education

There are a number of junior and senior high schools and a training college in the area. The type of waste disposal system in place is the collection and disposal system.

5.3 Historical attractions

The old European buildings that once stood along the coast are in ruins. These include the old ferry port where launches plied between Ada-Foah-Akuse-Kete Krachi, Ada Foah-Anyanui, the old market and the cemetery have all been destroyed by the coastal erosion.

Fort Kongenstein-Ada, which was built in 1783 by the Danes and was purchased by the English in 1850 was well fortified but was destroyed by the constant battering from the sea and finally got lost by the late 1960s.

There are eight islands of varying sizes with some inhabited and others not.

6.0 MARINE ENVIRONMENT

The main threats to the marine environment in Ada-Foah are pollution with regards to littering, solid waste and sewerage disposal. Erosion of the coastline is a very serious problem. Along the coast where the Dangbe East District Assembly is situated a number of historic buildings have been washed away by erosion. Hundreds of coast line is continually being eroded.

Other threats to the marine environment include constructional activities such as sand winning; the loss of biodiversity and mosquito infestation in the mangrove swamps.

7.0 GENERAL COMMENTS

The level of environmental management in the area is low. There is evidence of indiscriminate littering and uncontrolled rearing of animals, together with haphazard development of settlements. The policy tools used for economic investment are user fees and charges. The tourism facilities go through regulatory procedures of environmental impact assessment (EIA, Zoning and Environmental Management Plans).

Focus for intervention in the area includes:

- Pollution control
- Biodiversity conservation
- Resource management
- Institutional strengthening of regulatory authorities to enforce environmental by-laws
- Improvement of infrastructural development
- Education/awareness creation on environmental issues
- Restoration of degraded habitats
- Coastal protection
- Land use and conflict resolution
- Cost and revenue sharing

8.0 CONCLUSION

Given the objective of the concept of sustainable consumption and production (SCP) which encompasses the need to maintain an optimum balance between production and consumption of goods and services with conscious efforts at conserving the environment, the Ada-Foah area could be developed with the following guidelines;

1. To capture Best Available Practices and Technologies for the contaminant reduction and sustainable collaborative tourism investments initiatives.

2. To develop and implement mechanisms for sustainable governance and management that measurably reduces degradation of coastal ecosystems from land-based tourism sources of pollution and contamination.

3. To assess and deliver training capacity requirement, emphasizing an integrated approach to sustainable reduction in coastal ecosystem and environmental degradation in the area.

4. To develop and implement information captured information processing and management mechanisms to promote information dissemination and sharing.

There are many advantages for promoting tourism in Ada. These include the following:

1. There is beautiful scenery made up of islands, beaches, the estuary and mangroves.
2. Proximity to Accra by good access/networks from other points by road, marine/river
3. There is enormous potential for the development of water sports such as water skiing, jet skiing, canoeing, and scuba diving.
4. Ada-Foah was an important slave trading port.
5. There are important festivals, Asafo Fiami Festival (firing of musketry) which is held in August.

6. The Tourism Master Plan for Ghana (1996-2010) made provision for developing Ada as a major coastal destination.
7. There are a few o hotels and guest houses in Ada

APPENDIX C

BOTI FALLS

Waterfalls are some of the most visited attractions in Ghana. None of them have been developed to handle large volumes of tourists therefore the need to develop a system using Boti as a model for replicability considering its proximity to the national capital- Accra.

Boti Falls is a 30m high waterfall within the Boti Forest Reserve about 30 minutes drive east of Koforidua. A small hike down some stone steps takes one to the waterfall with a plunge pool at the base, which is safe for swimming; Guided walk of the forest and some caves is healthy. Boti Waterfall is a sacred site and is home to a famous festival every July.

Boti Falls- Huhunya

Boti fall is actually made up of two waterfalls. According to the local people the big one is the male and the smaller one, a female. When the two merge, it is said that they are mating. The merging forms a rainbow.

Traditional beliefs and practices have it that the following are prohibited in the Boti Falls:

Women in their menstrual cycle

Golden ornaments should not be worn to falls side

No soap bath should be done at the waterfall side

Goats are not to be slaughtered at the waterfall side

No goat is permitted in the water side

Since it is very likely that people may not obey all these don'ts, the fetish priest, Lawrence Kwame Appiah performs a pacification and purification rites on some special occasions

The immediate environs of Boti falls can be found a cluster of secondary tourist attractions and these include the following;

Three Headed Palm Tree

The three-headed palm tree has a huge stem base and from this singular stem base are three separate stems growing into the sky. The diameter of the base is about 126cm and the three stems have a diameter of about 70cm each. The height of the three headed tree is about 3.2m. It has huge lushly green leaves like any other palm tree.

Akaah Falls

This fall is about 400metres away from the three headed palm tree and has an uncharacteristic rocky plunge-pull.

Umbrella Rock

Other attractions in the Yilo Krobo District include the Umbrella Rock. The Umbrella Rock is about a thirty minutes walk in the forest from Boti falls and the Three Headed Palm tree is about a ten minutes walk away from the Umbrella Rock (see picture below.

Umbrella Rock near Boti- falls

ENVIRONMENTAL ISSUES

Effect of Human Activities on the Environments

The waterfall is a creation by the Ponpon stream which has its source form Ahenkwa Amalakpo in the Yilo Krobo District, Ponpon meanders and flows through about 10 villages before reaching the fall at Boti Langmasi. At Boti langmasi, the river falls over a height of about 30.3 meters to the ground without splashing on a rock. The sound of the water calibrated in decibels varies with respect to the peak season of the river. At its peak season the sound of the river can measure between 50-65 decibels (this is said to be a loud conversation sound. At it lean season the sound of the river is about 10 decibels (this is a quite whisper).

The Ponpon is currently under threat from human activities, particularly the villages through which it flows. The threat to life and the right to live is being gradually denied the river by human beings whose interest it greatly serves.

Green Earth Organisation an NGO whose activities are centered on environmental awareness and promotion, have been cultivating trees along the banks of the stream to save it from dying. However, their efforts are being thwarted by two key factors. These are the Non-availability of funds needed for education campaigns, human resource maintenance, logistics and effective legislation by the appointed government agency. The Water resources Commission is the government agency mandated by (Act 552) to be the steward of all water bodies within the country. Thus, it is the responsibility of the Water Resources Commission to coordinate the District Assemblies and start a process of implementing a buffer zone policy.

There is the need for a proactive educational campaign in the management and conservation of the source of the Ponpon stream is embarked on immediately via all the ten communities and three tributaries the river depend on. However, the frightening fact is that: farmers are farming too close to the two sources of the stream. The proximity between the nearest farms to any of the sources is less than 30 meters and this is frightening. Considering the use o f agro-chemicals by farmers upstream and the use of the stream by downstream dwellers, then there is need to protect the waterfall.

Traditional Protection Methods

To protect River Ponpon from dying the traditional authorities enacted the following regulations:

- No farming activity along the River Ponpon on Fridays
- No black cooking utensils should be used in collecting water from the river
- It was an abomination to have sex in the valley of River Ponpon
- Women in their menses should not go to the river side to collect water
- Using lantern after 18:00 to the riverside was forbidden
- No female should have her bath in the river

Proposed Protection Method

Forest in Ghana plays a vital role in the ecological conservation and in the generation of income for the local communities. However, the forest are continuously degraded due to increasing farming activities, demand for wood by the growing population and lack of higher rate crop rotation timber species, alternative to the harvesting of native forests. It is imperative that planned actions for rehabilitation be implemented in order to compensate for the negative impact of deforestation.

The proposal seeks to promote sustainable forest plantations management on the degraded forest lands and along the Ponpon River through the involvement of the local communities in rehabilitation activities to generate social, economic and ecological benefits. Its specific objectives are:

(a) To restore degraded forestlands and protect the Ponpon River through participation of local communities.

(b) To develop and strengthen the export capacity of the Paulowania timber products

(c) To improve the socio economic status of local communities

PAULOWNIA TREES

Characteristics

Paulownia trees cultivated in temperate regions generally result in timber with the most decorative grain pattern due to the seasonal variation with the cool weather producing more slowly grown dense timber, than that produced during summer. In addition, the more variable the climate the greater the number of dark lines in the wood grain, as a cold week during summer or a period of stress due to extreme heat will result in a temporary slowing of growth with a band of more densely pack wood cells produced, followed by more open cells when rapid growth resumes. Tropical regions will result in evenly grained timber grows faster and can be harvested sooner.

The Paulownia tree has several distinguishing characteristics. They include:

- Very large dark green fleshly leaves contains 18% proteins.
- Masses of bell shaped flowers occurring in the beginning of their growth season
- The ability to grow rapidly in a short period of time
- Distinctly growth and dormancy seasons.

Water and Sanitation

TOR 5.

Review of Existing Legislation and Policies Related to Sustainable Consumption and Pattern on Water and Sanitation

Preamble

Since time immemorial, water use and sanitation were of concern to communities in Ghana and other parts of the world. This is reflected in cultural or traditional norms regarding the use of water and some level of sanitation practices the world over. It is common knowledge in some traditional settings in Ghana that water bodies are respected as gods in themselves and for that matter one must not enter water bodies with footwear. Several other cultural citations could be made to drive home the regard people have for water and how much sanitation is dreaded.

The cultural or traditional beliefs in Ghana on water and sanitation backed by research findings had been appreciated over considerably long period and influenced the incorporation of water and sanitation issues into the 1992 Constitution of the Republic of Ghana. Article 269 of the 1992 Constitution, Section 1, provides that 'Parliament shall, by or under an Act of Parliament, provide for the establishment, within six months after Parliament first meets after coming into force of the Constitution, of a Minerals Commission, a Forestry Commission, Fisheries Commission and such other Commissions as Parliament may determine, which shall be responsible for the regulation and management of the utilization of the natural resources concerned and the co-ordination of the policies in relation to them.' The Constitution mandates the water and sanitation related commissions to give rights or concessions to entities that intend to exploit water or any of the natural resources as well as the regularization of their use in cases where the use has already been established. In the process of regulating natural resources use, the Commissions and the Metropolitan, Municipal and District Assemblies are supposed to ensure that environmental, sanitation; climate change and climate variability issues are addressed for the benefit of all and sundry.

In essence, the natural resources commissions exist to ensure sustainability and optimal exploitation of the resources. In a lot of cases, the commissions get compelled to develop legislative instruments to actualize the Acts of Parliament.

International Conventions on nature conservation are an incentive to water governance and sanitation within the natural and worked environment. A handy example is the International Convention on Wetlands that promotes the conservation of wetlands. The Ramsar Convention among others considers that wetlands function as kidneys for polluted water natural cleansing as well as giving the premise to use migratory birds, fish and water quality to determine the environmental quality of wetlands for humans in Ghana and other areas of the world where wetlands of international importance exist.

The Water Sector in Ghana recognizes sanitation within the environment as a major factor that determines the quality of water for various purposes. Poor sanitation results in poor water quality. On the other hand, good sanitation is known to impact good water quality.

The legislation on water and sanitation in Ghana has gone through drastic changes over the last two decades. Firstly, there were institutional reforms that led to the reassignment of responsibilities to existing organizations or agencies and creation of new ones to institute some form of division of labour to enhance efficiency. For instance the erstwhile Ghana Water and Sewerage Corporation became the Ghana Water Company with the focus on water treatment and supply to mainly urban communities, while the issue of management of the sewerage and sanitation in general was made the responsibility of the various Metropolitan, Municipal and District Assemblies. Additionally, the Community Water and Sanitation Agency was established to provide rural and peri-urban communities with water from groundwater sources mainly and occasionally from surface water sources after treatment.

These efforts by the Government of Ghana brought into play the passing of new legislations or Acts of Parliament to augment already existing ones to ensure that the pressure on water resources and poor sanitation as a result of population explosion and poorly planned settlements are addressed to ensure sustainability of the consumption and regeneration of water resources as well as improving the sanitation situation in the country at all.

Review of Water and Sanitation Laws

To review existing legislation and policies related to sustainable consumption and production of water and provision of sanitation services to understand the pattern they follow, there would be the need to identify all the main relevant legislation governing water and sanitation. The existing main laws or legislation relating to sustainable utilization and management of water resources as well as the provision of sanitation services are as follows:

- Beliefs and rules on water use and sanitation that are well entrenched in the traditional settings in Ghana
- 1992 Constitution of the Republic of Ghana
- Local Government Act 462 of 1993
- Ghana Water Company Act 461 of 1993
- The Minerals Commission Act 450 of 1993
- The Environmental Protection Agency Act 490 of 1994
- The Volta River Development Act 46 of 1961
- Water Resources Commission Act 522 of 1996
- Council for Scientific and Industrial Research Act 521 of 1996
- PNDCL 256 Fisheries Law of 1991
- Community Water and Sanitation Act 564 of 1998
- Lands Commission Act 483 of 1994
- Public Utilities Regulation Commission Act 538 of 1997
- National Water Policy of 2007

It is important to note that the laws outlined in the fore going continually evolve legislative instruments that had not been mentioned here for convenience.

The table below shows the relevance of the laws assembled above and how they seek to enhance adequate and good quality raw water for various uses as well as production of potable water for domestic and industrial use. In addition, the sanitation laws have also been fairly considered in this effort.

Water and Sanitation Legal Document	Relevant Section	Review / Remarks
Traditional beliefs and rules on water and sanitation	Specific traditional beliefs related to water resources management, hygiene / sanitation	The traditional norms that conserved water resources and ensured sanitation were effective in the good old days. Modernity disregarded the traditional beliefs and rules on water conservation and sanitation to the detriment of water resources and healthy environmental sanitation. However, in a good number of Ghanaian rural areas the old norms that protected water bodies and provided for healthy environmental sanitation are still complied with or are effective.
1992 Constitution of the Republic of Ghana	Article 269, Section 1	Article 269 of the 1992 Constitution makes provision for the setting up of Natural Resources Commissions such as the Fisheries Commission, Forestry Commission, Minerals Commission, and Water Resources Commission among others to conserve and protect all or most of the natural resources and sustain the natural ecosystem. These Natural Resources Commissions were established by Acts of Parliament to strengthen the water and sanitation sectors.
Local Government Act 462 of 1993	Sections 10, 14, 38 and 61 - 64	These sections of the Local Government Act 462 provides for the functions of the Metropolitan, Municipal and District Assemblies to set up Departments such the Environmental Health and Sanitation, Waste Management and Works Departments to see to sanitation, hygiene and orderliness within the environment. This goes a long way to ensure fairly clean raw water for various purposes. Issues relating to encroachments are partially addressed in Sections 61 to 64 especially. Water catchments could be protected by these Sections of the Act.
The Statutory Corporations (Conversion to Companies) Act 461 of 1993	Schedule Section 1: 35	Act 461 of 1993 served the purpose of converting fifty-one (51) state corporations into companies, including the one-time Ghana Water and Sewerage Corporation that was set up by Act 310 of 1965, to the current Ghana Water Company Limited. For purposes of efficiency and effectiveness the aspect of managing sewerage was made the responsibility of the Metropolitan, Municipal and District Assemblies. In spite of these efforts neither the Assemblies nor the Ghana Water Company are meeting the expectations of the Ghanaian populace. The performance levels of the

		Assemblies as well as the Ghana Water Company Limited leaves much to be desired.
The Minerals Commission Act 450 of 1993 and The Minerals and Mining (Amendment) Act 475 of 1994	Section 15 of Act 450 of 1993	Section 15 of The Minerals Commission Act states that 'Government departments and agencies and all public authorities shall co-operate fully with the Commission in the performance of its functions under this Act.' This provision gives the opportunity for the water sector institutions to push to the fore water resources management and conservation agenda in the interest of communities that might suffer any consequences as a result of mining activities. The Environmental Protection Agency as well as the Water Resources Commission had worked quickly to protect the interest of communities ensuring that mining of minerals is conducted in such a way that ecosystems serving as the location of mining activities is not adversely affected. The sector Minister has absolute control over the Commission so its activities and functionality could be manipulated.
The Environmental Protection (EPA) Agency Act 490 of 1994	Sections 2 (h) and 3	Section 2(h) states as part of the functions of the Agency that the Agency exists 'to prescribe standards and guidelines relating to the pollution of air, water, land and other forms of environmental pollution including the discharge of wastes and the control of toxic substances.' It therefore goes without saying that the EPA Act 490 correlates with water and sanitation management and prescribes standards and guidelines to conserve water and related resources as socio-economic goods while sanitation services are monitored to meet expectations. However, the Section 3 which states that 'The Minister may give to the Agency such directives of a general nature as to the policy to be followed by the Agency in the performance of its functions as appear to the Minister to be necessary in the public interest.' This gives the Minister the mandate that could be used to manipulate the efficiency and effectiveness of the Agency. This provision of the Act gives politicians the chance to inhibit strict enforcement of well-meaning legislation to the detriment of the whole country.
The Volta River Development Act 46 of 1961	Section 10 (d) and (e), Section 14 (2), Sections 18 and 29	In spite of the fact that the Volta River Development Act has had five amendments from 1962 up to 2005 the relevant sections on water and sanitation remains unaltered. The Act which provides for the establishment of the Volta River Authority (VRA) with the primary responsibility to generate and transmit hydro-electric-power provides also for the management of the water resources of the Volta River; more especially within the immediate environs of the Akosombo Dam. The Act provides for the development of the lake of the Akosombo Dam as source of fish and for the transportation of goods and

		passengers as well as recreational amenity for the health and well-being of fringe communities. Sections 14 (2), 18 and 29 relates to catchment protection/conservation in collaboration with public institutions which by extension is to cater for flood resettlement issues among others. The Act unlike the other Acts under consideration operates at the whims of the President and Ministers of the Republic of Ghana. This further emphasizes the risk of manipulation and weakening of the enforcement of the law. The VRA concentrates mainly on the Akosombo Dam area which is a disincentive to the management of the entire Volta River.
Water Resources Commission Act 522 of 1996	The entire Act and more especially Sections 1, 2, 3 (2), 7, 12 to 38	The Act in its entirety provides for collaboration with key stakeholders that normally could lead to the establishment of committees to manage and regulate the use of water resources as well as co-ordinate policies in relation to them. The President appoints the members of the Commission as well as the Executive Secretary and the entire business of the Commission is being carried out on behalf of the President. In the process of resolving water resources issues, the Commission might advise Government and bring aboard pollution control agencies such as the EPA to build synergies to carry out various tasks. The President and for that matter Government controls the Commission. The Commission also has strong links with the Ministry of Water Resources, Works and Housing. It is therefore not an independent entity. Hence, the operations of the Commission are moderated by politicians and that could be favourable or not.
Council for Scientific and Industrial Research (CSIR) Act 521 of 1996	Sections 2 (b, c, e, h), 16 and 28	The CSIR Act 521 of 1996 provides for setting up of research institutes, units, centres and projects as it considers necessary for the carrying out of its functions. On water and sanitation issues, the Water Research Institute (WRI) stands tall. In accordance with the Act, the WRI and the other sister research institutes as implementing wings of the CSIR could carry out research on natural resources such as water, co-ordinate and collaborate in research efforts as well as conduct relevant and cost effective contract research. The Council is also to advise the Minister on scientific and technological advances likely to be of importance to national development. This provision of the law could be geared towards stepping up the technologies for waste management to stimulate sound and sustainable sanitation nationally. In this instance we might be considering efficient central sewerage systems for managing liquid waste to replace the outmoded systems we have currently. However, Section 28 of the Act indicates that the Minister of Environment, Science and Technology shall have ministerial responsibility for the CSIR – and therefore the WRI and give

		directives as to the policy to be followed with respect to the functions of the Council at large. This point to the fact that the CSIR and its institutes are controlled by Government or politicians. This provision of the Act might be favourable or adverse.
PNDCL 256 Fisheries Law of 1991	PART II 3, PART IV 16, 20 and 23	This law prescribes the issuance of fishing licences, prohibition of fishing in specified zones and restrictions on the use of some fishing methods and gear to sidestep over fishing and pollution of the various water bodies. These are to ensure that Ghana's water resources as well as fish stocks and other related resources are exploited on sustained yield basis. Government again has absolute control over fishing countrywide and that might manipulate the effective operations of the Fisheries Department or the Fisheries Commission.
Community Water and Sanitation Agency (CWSA) Act 564 of 1998	Sections 2, 3 and 5	The CWSA Act 564 of 1998 established the Agency to facilitate the provision of safe water and related sanitation services to rural communities, small towns and to provide for connected purposes. The Agency is to mobilize resources through projects and programmes to support the provision and management of safe water and sanitation services through the Metropolitan, Municipal and District Assemblies. Additionally, the Agency is to collaborate with the key water and sanitation sector organizations, public and private alike, whose mode of operation relate to the provision of safe water and sanitation services in rural communities and in small towns. The Agency, in accordance with the provisions of the Act shall have a Board that shall see to the implementation of its functions, investments and the formulation of policies for the proper management of the Agency. According to the Act, the Minister for Water Resources, Works and Housing may give to the Agency such directives of a general nature on the policy to be followed by the Agency in the performance of its functions as appear to him to be in the public interest. It therefore stands to reason that the Agency is not an independent entity and could be manipulated anyway.
Lands Commission Act 483 of 1994	Sections 2 and 3	The Lands Commission Act established the Commission to on behalf of the Government manage public land and any land vested in the President by the Constitution or by any other law or any other lands vested in the Commission. The Commission also exists to advise Government on issues relating to public lands as well as traditional authorities/stools, families and individuals on the policy framework for the development of particular areas of Ghana to ensure that the development of individual pieces of land is co-ordinated with the relevant development plan for the area concerned. The other responsibilities of the Commission are to formulate and submit to

		Government land use policy programmes. The Commission is also to collaborate with public and private institutions such as the Land Title Registry among others. For instance, the Executive Instrument 130 of 1977 demarcates the Weija Dam Catchment as a 'no-go-area' in the interest of national security. Such legal arrangements are to protect water catchments as well as ensure the prevalence of sanitation in such areas. The Lands Commission is independent. However, the Minister for Lands may, with the approval of the President give general directions in writing to the Commission on matters of policy in respect of the management of public lands.
Public Utilities Regulation Commission (PURC) Act 538 of 1997	Sections 1, 3, 4, 29, and 47	This Act provides for the establishment of the Public Utilities Regulatory Commission to regulate and oversee the provision of utility services by public utilities to consumers and to cater for related issues. The Commission has a Water Directorate that monitors the production of potable water for communities or consumers in general. The Commission through its Water Directorate collaborates with institutions within the water and sanitation sector in accordance with the Act. In one of such co-operation effort with key stakeholders, the Water Directorate of the Commission spearheaded the drafting of a Drinking Water Safety Plan. The plan covered activities to rehabilitate and protect the Weija Dam Catchment to the tap. The Commission checks the quality of service of consumer water delivery among the other utilities, promotes fair competition, examines and approves rates chargeable for provision of utility services, protects the interest of consumers and providers of utility services and the rest of it. The PURC takes complaints from the general public and do justice to such. However, the Commission does not have the power to investigate any matter which is before a court. The PURC Act does not apply to supply of water provided in a community, where the supply of the water is operated and managed by the community concerned. Subject to the provisions of the Act, the PURC is independent and therefore not controlled by any person or authority in the performance of its functions. At any rate, this clause could capriciously be violated.
National Water Policy of 2007	Entire document	The National Water Policy of Ghana is intended to provide a framework for the sustainable development of Ghana's water resources. Although not yet a law, it is an agreed action plan for all water users, water managers and practitioners, development partners or investors, decision makers within the central Government and the decentralized institutions, the private sector, the Non Governmental Organizations and international agencies. The policy also considers all the link issues with respect to sanitation, agriculture, transport,

		energy among others. The Policy recognizes the Millennium Development Goals, the New Partnership for Africa's Development and several other obligations and agreements. It provides the impetus to sustainable development of Ghana's water resources and sanitation services.

The main laws on water and sanitation as outlined above appear adequate. As population grows, it is just prudent to use water judiciously. This would then dictate minimizing wastage of water, water reuse for appropriate purposes and institute technologies for recycling and recovery of materials that would have been otherwise waste, with the tendency to pollute water bodies. The CSIR Act is meant to take care of such issues. It is abundantly clear that Ghana has so far, enough legislation on water and sanitation and that no gaps exist in the current laws governing water and sanitation.

Law Enforcement Challenges and Trends in Water Supply and Sanitation Services in Ghana

It is common knowledge that in spite of all Ghana's laws and institutional reforms in the realm of water and sanitation, the country experiences inadequate water supply in several parts especially in the dry season. Cultural practices, poverty, bad attitudes to the extent that blatantly violates laws and poor planning schemes are known to account for the bad sanitation situation found especially in several urban centres countrywide. The Metropolitan, Municipal and District Assemblies all over Ghana as well as international and local waste management companies are doing their best to manage waste for better sanitation to prevail but it is still not enough because the factors militating against national waste management are overwhelming due to poor attitudes. The trends currently are that Ghana's major cities and towns have bad sanitation situation and water shortages; making life difficult for most people in Ghana.

Educational campaigns and heavy investments into waste management are in progress to change these negative trends but that has not yet yielded the desired result because attitudes are normally not easily changed. It has to do with the mentality and to some extent the biochemistry of people.

Ghana has a good deal of water and sanitation laws as could be seen in the table in Section 1.2 of this document. These laws and several others that have not been cited; that relate to health and development planning with links to water and sanitation, require strict enforcement. However, law enforcement in Ghana and as pertains in most developing countries, is poor and this is all the reason for the negative trends with respect to water and sanitation. Factors that constitute law enforcement challenges in Ghana are as follows:

- Familiarity among the Ghanaian populace that is derived through family relations, school and work place colleagues, church membership links, etc.
- Attitudes of people that are not willing to change
- Poor planning, management and maintenance culture
- Poverty and
- Lack of the requisite logistics or equipment for law enforcement agencies.

Each of these challenges would have to be drastically dealt with to realize adequate water for all and good sanitation countrywide.

Recommendations and the Way Forward

The following recommendations are essential for the development and maintenance of water and sanitation in Ghana:

- Strict law enforcement schemes must be instituted that would not allow making favours to ones relations
- There is the need to sharpen law enforcement agencies through rigorous training, adequate provision of relevant logistics and or equipment
- Better wages and salaries must be determined and paid by employers of law enforcement officials to motivate them
- Town planning must be done properly and co-ordinated to ignore future sanitation problems. There is the need to strengthen management and maintenance schemes of providers water and sanitation services
- Poverty reduction programmes must be intensified and sustained by Government and development partners to break recalcitrance

Conclusion

It is worth noting that in the early nineties, water resources management studies were commissioned by the former Ministry of Works and Housing that recommended a number of the laws (Acts of Parliament) that have been cited so far. In there course of the reviews, references were made to these studies to inform the selection process to carry out this segment of the assignment on Water and Sanitation.

Finally, it must be stressed, for emphasis that Ghana has enough laws in the form of Acts of Parliament and connected Legislative Instruments, Executive Instruments and related health, building regulations among others that are all meant to ensure the conservation of water resources as well as the prevalence of good sanitation in the worked and natural environment.

Sustainable Developing Action Plan of the WASH Sector: Overview of Sector Policies, Plans and Strategies

Introduction[4]

The Growth and Poverty Reduction Strategy (GPRS II, 2006–2009) considers access to safe water, sanitation and hygiene (WASH) a prerequisite for economic growth. Priority areas include: (i) accelerated provision of safe water in rural and urban areas, and (ii) accelerated provision of adequate sanitation. The role of WASH in school attendance, women's workload and participation in economic activities is also appreciated.

[4] E. Larbi, 2009; Improved Sanitation and Water Supply Service Delivery to the Urban Poor in Ghana through Tripartite Partnerships project

The National Water Policy developed in 2007 endorses IWRM as a holistic approach to water resources management. The strategies for urban water supply and community water and sanitation are outlined. Key principles are the fundamental right to adequate water for basic needs and the improvement of equity and gender sensitivity. The NWP recognises the need for increased domestic investment and clearer responsibilities for water quality monitoring.

The Sector Reforms during the last decade resulted in the establishment of sector institutions with responsibilities to meet sectoral priorities as follows:

- GWCL (Ghana Water Company Limited): Management of water in urban areas; retains asset management and development.
- AVRL (Aqua Vitens Rand Limited, international consortium): Management of 87 urban systems; 5 year contract (since 2006).
- CWSA (Community Water and Sanitation Agency): Facilitate provision of water supply and sanitation services to rural areas and small towns.
- MMDAs (Metropolitan, Municipal and District Assemblies): Sanitation delivery including human waste disposal.
- WRC (Water Resources Commission): Regulation and allocation of all water resources and water rights (established in 1996).
- PURC (Public Utility Regulatory Commission): Established as an independent body in 1997 to regulate utilities, including water. The PURC developed a social policy in 2005 requiring that the GWCL/AVRL include pro-poor criteria in their water supply projects.

Institutional Framework for WASH in Ghana

The Ministry of Local Government and Rural and Development (MLGRD)

The MLGRD is the principal institution overseeing the socio-economic development of especially rural Ghana and the management of human settlements. MLGRDE is responsible for environmental sanitation, in the same manner as MWRWH is responsible for water. The Sanitation Directorate of the MLGRDE deals with environmental health and sanitation issues.

Community Water and Sanitation Agency- CWSA

The CWSA is the Government Agency mandated through an Act of Parliament (Act 564) to facilitate the provision of safe drinking water and related sanitation services to rural communities and small towns in Ghana. The Agency has been implementing Ghana's National Community Water and Sanitation Program since 1994 using the decentralized structures at the district and community levels as prescribed by the Act.

Ghana Water Company Limited

The main objects of the Ghana Water Company Ltd. (GWCL) by the establishment Act 310 of 1965 are to provide, distribute and conserve water for domestic, public and industrial purposes. GWCL has since 1999 been operating as a limited liability company following the enactment of the Statutory Corporations (Conversion to companies) Act 1993 (Act 461). GWCL operates in all 10 regions of Ghana with a total of 86 systems.

Metropolitan, Municipal and District Assemblies

The Metropolitan, Municipal and Di

strict Assemblies (DAs) are the basic units of government at the district level and are the statutory deliberative and legislative bodies for the determination of broad policy objective of the development process within their jurisdictions. They are responsible for the planning, implementation, operation and maintenance of water and sanitation facilities as the legal owners of the communal infrastructure. DAs have a significant role to play in rural and small towns' water and sanitation delivery but not in urban or peri-urban water supply

WATSAN and Water & Sanitation Development Boards

WATSAN Committees are responsible for rural water systems – which are typically point sources. Water and Sanitation Development Boards (WSDB) are elected and gender-balanced voluntary representatives responsible for the mobilisation of community members, operation and maintenance of small towns water and sanitation facilities.

Private Sector

The Private Sector provides a range of goods and services. These services include but are not limited to:

- Consultancy (design and construction supervision, hydro geological, training, community sensitization and mobilization, hygiene promotion, institutional support, etc.);
- Construction of civil works;
- Supply and installation of electro-mechanical equipment, spare parts, etc.;
- Operation and maintenance of water supply and sanitation infrastructure including electrical/mechanical equipment; and
- Management of Water Supply Schemes

NGOs

NGO activity is also very high, particularly in the Northern regions of Ghana. International NGOs such as WaterAid, World Vision International, Plan International and others are providing support to WSS delivery, either directly or through partner organizations. These NGOs have formed an association known as Coalition of NGOs in Water and Sanitation (CONIWAS), which has the basic objective of promoting the role of NGOs in the delivery of WASH services.

Policy Framework for WASH delivery[5]

Ghana Poverty Reduction Strategies

First, there was the Ghana-Vision 2020, with its first medium term plan of 1997-2000. This was followed by the Ghana Poverty Reduction Strategy (GPRS I, 2003 – 2005) and the current Growth and Poverty Reduction Strategy (GPRS II, 2006- 2009). In all these documents water and sanitation are considered important developmental issue that features as a key focus for poverty reduction. In Ghana Vision 2020, water is considered as "essential to human life and the search for good quality water supplies has been a fundamental" and policy programme objectives including :(i.) providing basic water and sanitation services to rural communities; (ii.) ensuring sustainability of facilities for water production and sewerage maintenance; (iii.) improving health through the drastic reduction and ultimate eradication of waterborne diseases. The GPRS II states that: "Improving access to potable water and sanitation is critical to achieving favourable health outcomes, which in turn facilitate economic growth and sustained poverty reduction. In particular improvement in access to safe water enhances school attendance, reduces women's workload and frees them to participate effectively in economic empowerment and governance activities. On the other hand, adequate sewerage and sanitation facilities are important for environmental cleanliness and prevention of many infectious diseases such as diarrhoea and dysentery"

Ghana Water Policy (June 2007)

The overall goal of the NWP is "to achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations" – in line with the GPRS II broader objectives. The NWP builds on earlier policies and programmes including the National Community Water and Sanitation Policy. The policy is a significant step forward towards, but does not yet constitute a national sector framework (NSF). The segregation of responsibilities for urban and rural water, sanitation and sewerage presents a major challenge for the MWRWH (and the MLGRDE which is in charge of sanitation) to combine the three sub-sectors of water resources management, urban and rural WSS into a NSF. In general, the NWP considers water as a right of all people; Recognises water as a social good whilst acknowledging its economic value.

National Environmental Sanitation Policy (NESP Revised 2007)

The National Environmental Sanitation Policy (NESP) was first promulgated in 1999 and revised in 2006/2007 to take into consideration the changing context of the national and international development priorities (GPRS II, MDGs, NEPAD). MLGRD is responsible for implementing the Environmental Sanitation policy including management and regulation of solid and liquid waste by the local government bodies. The Environmental Health Sanitation Directorate was transferred from the Ministry of Health to the Local Government Ministry in 1995 by a Presidential Directive to ensure compliance with the decentralization process which gave the environmental health and sanitation responsibilities to the local assemblies. Environmental Health and Sanitation Directorate (EHSD) is mandated to provide guidance to MLGRD on

[5]P. Agyare-Kwabi, 2009; Review of current school sanitation demand and practice

environmental sanitation, sector planning, policy and legislation. The policy firmly states that sustained progress in any target will depend on sustaining improvements in environmental sanitation. Specifically in relation to school sanitation it says that improving environmental services enhances and sustains enrolment and retention of girls in schools and also has great bearing on improving morbidity/mortality specifically in relation to children.

A National Environmental Sanitation Policy Coordinating Council (NESPOCC) comprising of all relevant stakeholders has been constituted. NESPOCC meets regularly to analyse policy and give direction to environmental sanitation management. The EHSD has embarked on the development of key strategic plans such as Sector Environment Strategic Plan (SESIP), the National Environmental Sanitation Strategic Action Plan (NESSAP) and District Environmental Sanitation Strategic Action Plan (DESSAP) which will form the basis for the implementation and monitoring of sanitation activities.

The DESSAPs have been developed by all 170 Districts and have already been validated at various workshops. These will provide the critical "bottom up" feedback needed for consolidating the final draft of the NESSAP expected to be ready by December 2009. The NESSAP is a reflection of the revised NESP (2007) which places emphasis on the strategic sanitation approach that matches facilities with housing segments and affordability of residents. It also targets to reach total access for environmental sanitation through incremental achievements. The basic challenge of the sector regarding excreta management include training staff to manage a vigorous national wide scaling up of home toilets promotion through emerging techniques such as Community Led Total Sanitation (CLTS) to achieve modest country wide target of 75% by 2015 (Interim NESSAP: 2008). The process of finalising the strategies remains critical to avoid overlaps and ensure incorporation of the key emerging trends.

The Expanded Sanitary Inspection and compliance Enforcement (ESICOME)

This programme is an expanded and upgraded version of the existing Sanitary Inspection Programme. It is specifically targeted at mobilisation of owners and occupants of premises, residential and others, to develop, provide for and maintain good sanitation on their properties and their environs. In order to lay the basis for effective and systematic environmental sanitation education and enforcement management, ESICOME will be maintained as a core programme for sanitary inspection and enforcement.

Attitudinal and behavioural changes are central to achieving sustainable progress in environmental sanitation. Therefore, environmental sanitation education, effective communication and dissemination of information are considered as integral elements of all environmental sanitation activities complementing the provision of sanitary infrastructure and services. Awareness raising and participatory engagement of all stakeholders to ensure informed decision making on policies, plans and programmes is also critical. Improved approaches of environmental sanitation education based on problem solving and active participation by the target groups must be developed and implemented (Revised NESP: 2007).

Financing and Cost Recovery[6]

Transfer of environmental sanitation functions to MMDAs without accompanying budget, adequate allocation of resources for environmental sanitation, unsustainable financing of environmental sanitation services have been identified as the main challenges militating against sustainable delivery of environmental sanitation services to Ghanaians especially the poor. The sector policy on financing and cost recovery is aimed at recovering operation and other costs on services whilst cushioning the poor. In fact cost recovery in most areas is targeted at the middle and high income population as for example, for solid waste collection communal collection (usually for the low income) is at no direct cost to the users whilst door to door services is for a fee to the users. Main sources of funding of environmental sanitation services are from Government of Ghana and Donors (Danida/PMMS, UNICEF, Royal Netherlands Embassy, the World Bank, etc).

Community Responsibility

Environmental sanitation is a public good. Improper waste disposal by one individual affects all community members; mosquitoes that breed in one place may bite people in another; contamination of foodstuffs will affect all who consume them, not just the seller. Ensuring good sanitation is therefore the responsibility of all citizens, communities, private sector enterprises, NGOs and institutions of Government.

Assessment of policy framework for pro-poor WASH service delivery

Consistent with the GPRS, the overall goal of the National Water Policy is to "achieve sustainable development, management and use of Ghana's water resources to improve health and livelihoods, reduce vulnerability while assuring good governance for present and future generations". The policy is thus driven by the GPRS II, which is also in conformity with the MDG targets, NEPAD, and, above all, the Constitution of Ghana. The key pro-poor related principles that provide the basis for policy direction for sustainable management, development and use of water in Ghana include the following:

- the principle of fundamental right of all people without discrimination to safe and adequate water to meet basic human needs;
- the principle of meeting the social needs for water as a priority, while recognising the economic value of water and the goods and services it provides;
- the principle of improving equity and gender sensitivity; and
- the principle of the greatest common good to society in prioritising conflicting uses of water.

[6] WASHCost, 2008; Rapid assessment of the water sanitation and hygiene services sector in Ghana

Demand side of consumption patterns of the WASH sector

The Urban sub sector

In 1948, the ratio of the urban population to the total population for Ghana stood at 13%. This increased in 1984 to 32%, and in 2000 it further increased to 44%. The number of urban localities rose from 39 in 1948 to 188 in 1984 and 364 in 2000; About 34% of the urban population live in the 5 largest cities, namely Accra, Kumasi, Sekondi -Takoradi Tamale and Tema. While it took 36 years for urban y localities to increase by149 in 1984, it took only 16 years for the figure to double in 2000. This implies that, Ghana would have more of its population living in the urban areas much earlier than the estimated 2025.[7] Water and sanitation services are already overstretched, and could worsen without adequate steps to meet the ever growing demand. The urban population using an improved water supply declined from 86% in 1990 to 79% in 2006 as investment was not sufficient to cater for population growth. Service failures occur frequently. It was established from a strategic investment study undertaken in 1998 that for GWCL to be able to meet the demand in urban water supply by 2020, the company required an investment of about USD1.6 billion. A sector program document prepared by GWCL in 2006 indicated that the company still required USD 1.49 billion to meet urban water demand by 2020 (Source: GWCL at a Glance, 2008). The total population covered by GWCL is estimated at bout 10 million people, with a total daily demand of about 1,101,032 m3/day for the year 2008. (Source: GWCL presentation to CONIWAS at AVRL conference room, 2009.)

POPULATION & WATER DEMAND PROJECTIONS

	Projected Population		**Projected Water Demand (m^3/Day)**	
Year	2015	2025	2015	2025
Greater Accra	4,929,335	6,941,016	650,849	937,561
Ashanti	1,767,045	1,977,830	190,461	280,625
Brong Ahafo	670,678	901,471	58,867	87,669
Central	1,306,158	1,643,406	89,474	125,869
Eastern	831,064	1,070,214	73,569	108,444
Northern	673,219	921,905	58,689	88,735
Upper East	189,636	262,376	21,210	31,789
Upper West	111,652	157,496	12,840	19,687
Volta	697,380	901,458	54,517	78,444
Western	658,925	810,953	48,378	63,984

[7] B. Abeiku Arthur, Presentation at Urban Platform at the Institute of Local Government Studies, Accra, 2009

Total	12,045,878	16,234,446	1,258,854	1,822,806

Source: GWCL, 2009

The national sanitation situation is even grimmer, with a coverage rate of about 40%. Most of the poor areas in cities / towns do not access to any municipal waste management. Diarrhoea accounts for 25% of all deaths in children under 5 according to UNICEF. Within the context of the WASH services delivery to poor urban populations, the key problems which justify the project's proposed interventions are as follows:

The last five years have seen a growing priority given to pro-poor water supply and sanitation services delivery in a number of recent pilot projects. However, these projects have suffered from a number of constraints which have prevented widespread uptake of their results.

The Ministry of Finance and Economic Planning (MoFEP) provides the finance to support the delivery of WASH infrastructure as well as the operational and capital expenditure budgets of the sector institutions. Most development assistance from Donors is channelled through the ministry. As the figures illustrate, the sector relies substantially on donor funds, given the relative sizes of Government and donor contributions. Based on the specifics of loan or grant agreements, funding from Development Partners (DP) may be transferred directly to the DA for procurement of goods and services while other transfers may be done through MWRWH or CWSA for small town water projects.

MoFEP often 'writes off' the debts of the company by converting these into equity. It is also significant to note that in recent years the ministry provides a budget line for subsidies paid to the utility companies, including GWCL.8 The availability of information on subsidies to GWCL provides a good indication of actual costs of service delivered by GWCL, as returns sent to PURC in support of tariff applications.

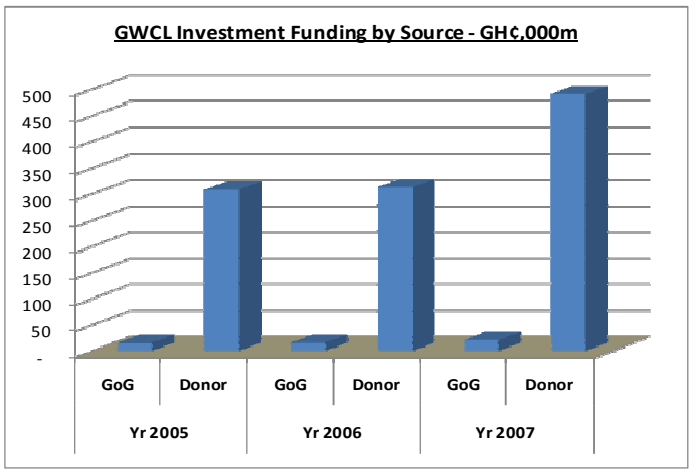


Figure 3.1: GWCL Investment Funding by source

The country has as yet not adopted a sector-wide approach to WSS financing, even though attempts have been made to realise this. The sector remains essentially project-driven. In recent years many donors provide budgetary support through the Multi-Donor Budgetary Support arrangement (MDBS), allowing government to decide the allocation of funds between sectors. This is in addition to projects that they fund at the sector level. At the level of the WASH sector, the proliferation of individual projects, rather than funding from a common basket, still persists.

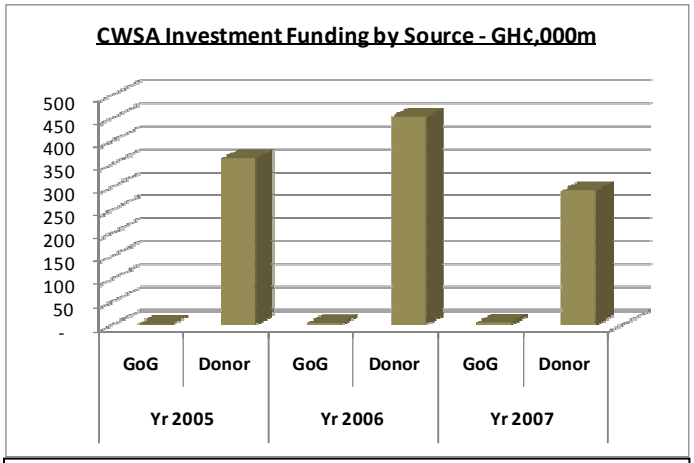


Figure 3.2: CWSA Investment Funding by source

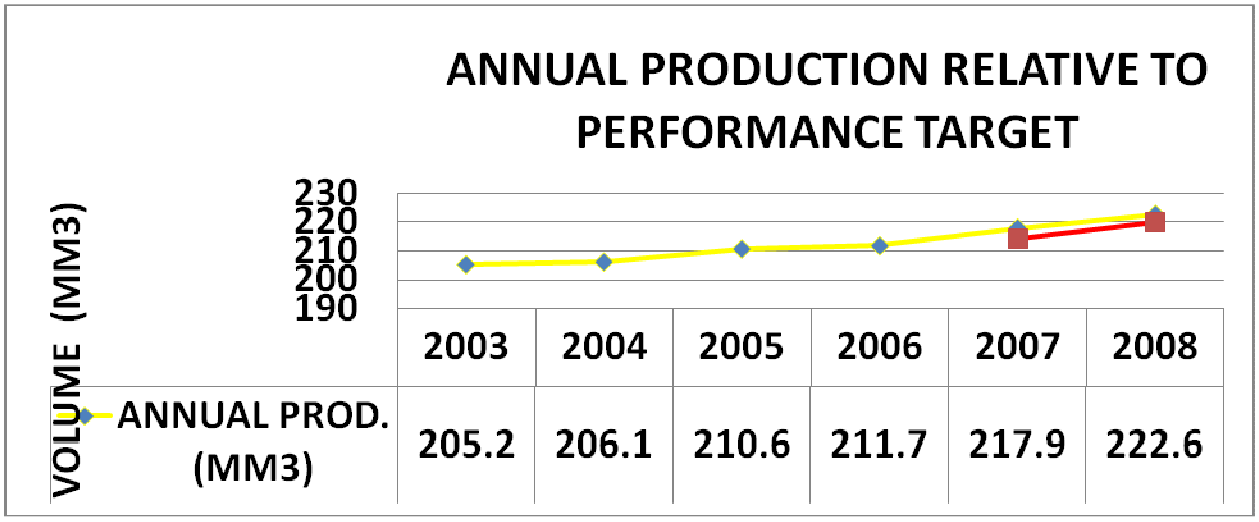
[8] These subsidies are in respect of payments of external loans contracted on behalf of the utilities, as well as the shortfall between the utilities' cost recovery tariffs and what are approved for them by the PURC. The latter also covers the difference between tariffs approved by the PURC and those advised by Government where Government believes considers too high for the 'ordinary man'.

Supply Side

Current Situation – Urban Water Supply

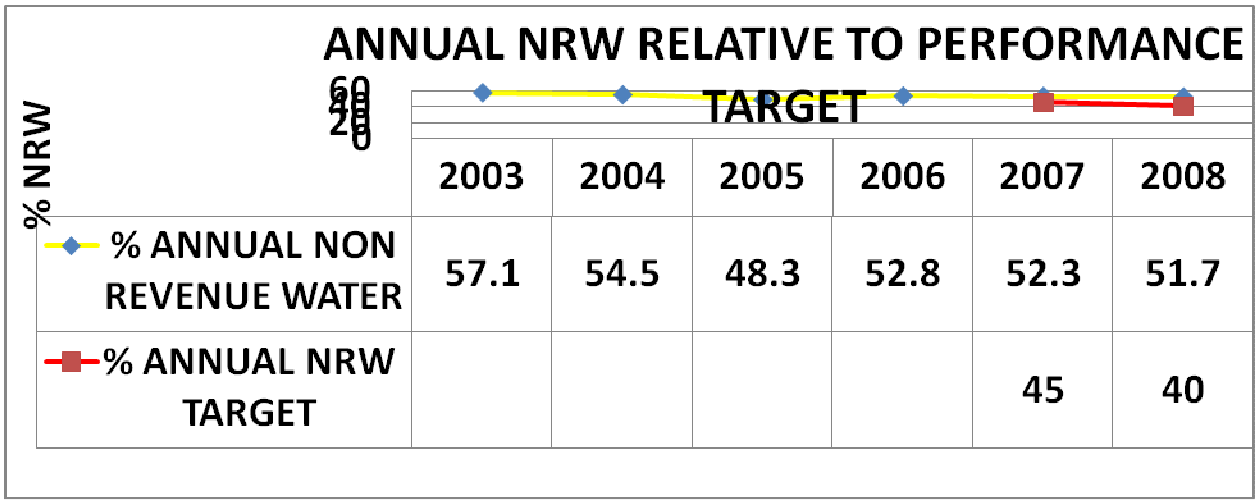
Rising population and poverty in urban areas exceed the capabilities of GWCL to provide water and sanitation services due to inadequate infrastructure, under investment and managerial inefficiencies. GWCL has responsibility for the production, distribution and conservation of water for public, domestic, commercial and industrial use in urban areas of Ghana. GWCL's supply area constitutes about 50% of the population in the country. In 2009, urban coverage stood at 59%. GWCL operates 81 pipe-borne systems with a total installed capacity of about 949,000m3/day. Production is about 646,494m3/day while demand is 1,101,032 m3/day for the year 2008. Current capacity utilization is 75%. Average monthly sales is 900,000 m3/day which translates into a monthly billing of GH¢ 8.42million. Out of this an average monthly collection of GH¢ 7.64million is made. Customer strength is currently 400,410 of which 72% are billed and 28% are unbilled. To balance the shortfall in supply, the company embarks on rationing programmes which is negatively affecting socio-economic growth of cities and towns.

Water production, 2003 - 2008



Source: GWCL, 2009

% Non Revenue Water 2003 -2008



Source: GWCL, 2009.

Regional Coverage in Urban Water Supply (2008)

REGION	POPULATION	DEMAND (m^3/day)	SUPPLY (m^3/day)	COVERAGE %
ASHANTI	2,000,728	187,118	91,500	49
BRONG-AHAFO	602,840	48,125	14,385	30
CENTRAL	1,129,733	90,225	38,415	43
EASTERN	1,015,155	77,995	21,470	28
GT.- ACCRA	3,837,236	532,570	401,800	75
NORTHERN	560,820	44,449	20,375	46
UPPER-EAST	172,168	13,239	5,665	43
UPPER-WEST	106,735	8,539	1,180	14
VOLTA	575,287	43,974	17,115	39
WESTERN	694399	54,799	34,535	63
NATIONAL	10,689,366	1,101,032	646,494	59

Source: GWCL, 2009.

Less than 30% of people with piped water supply have water supply every day. About 60% of population (GWCL estimate 2003) have no direct access to piped water, but rely on tertiary vendors. 71.1% of medium wealth and 94.8% of high wealth households have indoor pipe connection. Only 28.8% of poor households have indoor pipe connections (Boadi 2004). The poor pay much more for water than the rich (sometimes 10 to 12 as much)

because they get most of their supply from water vendors. The current tariff structure, in which unit cost of water increases with quantity consumed, means that poor people who live in compound housing and use shared connection pay more for unit of water consumed.

SUPPLY/DEMAND GAP FOR 2008

Regions	Actual Production (m^3/Day)	Demand (m^3/Day)	Gap (m^3/Day)
Greater Accra	368,239	476,593	108,354
Ashanti	97,356	139,434	42,078
Brong Ahafo	14,699	40,766	26,067
Central	42,987	66,355	23,368
Eastern	14,604	52,381	37,777
Northern	16,967	41,096	24,129
Upper East	6,958	15,228	8,270
Upper West	1,320	9,073	7,753
Volta	18,905	37,472	18,567
Western	24,169	38,039	13,870
Total	**606,204**	**916,437**	**310,233**

Source: GWCL, 2009

ON GOING / COMPLETED PROJECTS: 2009

Project Title	Installed Capacity (m^3/day)	Additional Production Capacity (m^3/day)	Targeted 2020 Population	Project Cost (€)	Yrs	Source of Funding	Start Date	Comp Date
CAPE COAST	27,300	30,000	510,360	36,970,000	2	NETHERLANDS	Nov-05	Jan -08
BAIFIKROM	2,270	11,400	120,771	25,763,000	2½	NETHERLANDS	Apr-06	Oct-08
TAMALE	19,550	25,000	757,233	45,000,000	2	NETHERLANDS	Aug-06	Aug-08
EAST WEST	204,545	66,000	877,654	25,000,000	18mth	GHANA	Mar-07	Oct -08
KOFORIDUA	5,450	19,200	206,618	35,500,000	2½	BELGIUM	Aug-06	Feb-09
BAREKESE	95,000	27,200	1,455,577	37,426,000	2½	NETHERLANDS	Jan-07	Oct-09
SUNYANI	6,800	44,000	266,567	65,384,615	2	U.S.A	Dec-09	Jan-11
WA	2,800	15,000	124,441	35,000,000	2½	AUSTRIA / ITALY	Dec-09	Jul-12
KPONG	220,450	186,000	683,339	152,307,692	4	CHINA	Dec-09	Jan-14
KWANYAKU	14,000	21,000	724,830	24,136,000	2½	NETHERLANDS	Jan-05	Jul-07
Urban Water Project				57,000,000	5	W/B, Nordic fund, GoG	2004	2009
TOTAL	598,165	471,800	5,727,390	539,500,000				

Source: GWCL, 2009

Financing Requirements to Meet Demand in 2020

In the urban sector, a Strategic Investment Plan has been prepared to allow for systematic development of all urban water supply systems in the country. It is estimated that about $1.8 billion will have to be invested if current urban coverage is to be increased to about 100% country-wide by 2025. Analysis indicate that if the desired coverage levels are to be achieved over time, then about US$100million per year has to be invested in sector infrastructure development. However average inflows over the past several years amount to just about 35% of desired inflows to achieve MDG of 85% coverage. For development projects, sector funding is primarily from three sources.

i) About $30 million per year from external support agencies

ii) About $2 million from Government's annual development budget and other development votes and

iii) About $3 million from internally generated funds through water sales.

INVESTMENT REQUIRED TO MEET NATIONAL GOAL (85% COVERAGE)
OR
MILLENNIUM DEVELOPMENT GOALS

REGION	**POPULATION 2000-CENSUS**	Investment to meet 85% Coverage	**Investment to Achieve Millennium Dev. Goals**	Coverage on Attaining MDG Targets
ASHANTI	1,914,953	US$146m	US$98m	70%
B/AHAFO	671,710	US$162m	US$102m	62%
CENTRAL	591,523	US$115m	US$85m	76%
EASTERN	729,918	US$155m	US$ 94m	61%
GT. - ACCRA	2,539,221	.-	US$215m	94%
NORTHERN	487,993	US$114m	US$ 80m	75%
U-EAST	139,174	US$ 28m	US$ 20m	75%
U-WEST	100,851	US$ 28m	US$ 18m	58%
VOLTA	434,456	US$100m	US$ 68m	71%
WESTERN	668,836	US$ 44m	US$ 31m	74%
NATIONAL	**8,278,634**	**US$891m**	**US$ 811m**	**80%**

Source: GWCL, 2009.

Current situation: Wastewater

In 2009, the total design capacity of all 3 faecal/sludge treatment sites in the Accra-Tema metropolitan area was 0.0133 km3/year. Actual treatment is however, only 19% of design capacity (0.0025 km3/year). Estimated waste water production of waste water is about 0.11 km3 per year (based on water produced 2007), or about 0.15 km3 per year (based on optimal water use). Existing treatment capacity is only about 9-12% of estimated waste water produced. Actual treatment is only about 2% of estimated waste water produced, due to high densities of shared latrines, and high incidence of open defecation which are the only realistic sanitation services available to the poor. The poor have to pay more for sanitation services and often cannot afford the costs of shared latrines. The actual sanitation problem is underestimated as many of the community latrines are badly maintained and often not appropriate for use. Waterborne sewerage is not a realistic option for the urban poor as they have no access to a sustained and ample water supply needed for water born sewerage.

Current situation: Storm drainage

Large part of wastewater, especially grey water is drained though storm drains. All storm drains are clogged with solid waste.

The Rural Sub sector

Rural water coverage according to the 1993 SIP was 28%. Sixteen (16) years down the line, following the establishment of the CWSA, coverage is now 57% against a rather high national annual population growth rate of 2.7%. This translates into about:

- 400 conventional small towns water supply schemes,
- 50 unconventional pipe schemes,
- 21,500 boreholes (point sources),
- 4,300 hand dug wells, about 30 rain harvest systems and

some few communities hooked onto the network of urban water supply schemes subjected to the tenets of the community management and ownership concept (GWCL Connections).
There is an elaborate network of spare parts distribution outlets in the country, with a central depot each located in Accra, Kumasi, Tema and Tamale with agents sprouting out in all the 10 regions.

Year	Coverage Rate
1990	27
1999	30
2001	41
2002	41.3
2003	46.4
2004	51.1
2005	51.9
2006	52.6

Source: CWSA SIP: 2008 – 2009

Investments: 2003 -2006

System Type	2001		2002		2003		2004		2005		2006	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Boreholes - new	550	198	1,500	622	1,600	1,290	2,000	2,098	1,647	1,112	1,152	1,325
Hand dug wells –new	50	629	240	65	220	61	100	64	35	1	49	9
Total: New Water points	**600**	**827**	**1,740**	**687**	**1,820**	**1,351**	**2,100**	**2,162**	**1,682**	**1,113**	**1,201**	**1, 334**
Small Communities pipes-new	10	92	20	4	15	19	10	40	1	2		5
Small Towns pipes – new	10	63	20	25	48	46	40	57	27	2	89	12
Total: New pipe systems	**20**	**155**	**40**	**29**	**63**	**65**	**50**	**97**	**28**	**4**	**89**	**17**
Hand dug wells – rehab		6		2						6		9
Boreholes - rehabilitated	500	606	140	407	100	115	130	85	49	31	118	77
Conversions	20	932	5	362						31		4
Total: Rehabilitation	**520**	**1,544**	**145**	**771**	**100**	**115**	**130**	**85**	**49**	**68**	**118**	**90**
Sanitation	**2001**		**2002**		**2003**		**2004**		**2005**		**2006**	
	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual	Target	Actual
Holehold latrine	3,400	10,295	8,000	4,275	10,000	10,485	10,000	5,501	4,655	3,092	6,179	5,295
Institutional latrines (KVIP)	150	679	260	144		246	5,000	465	539	77	500	230
Total: Latrines	**3,550**	**10,974**	**8,260**	**4,419**	**10,000**	**10,731**	**15,000**	**5,966**	**5,194**	**3,169**	**6,679**	**5,525**

Source: CWSA SIP, 2008 - 2015

The Implementation Path for the MDG Coverage Target

Year	Projected Coverage	Existing Coverage	Donor Commitments	Expected	% Deficit
2006	52.86	52.86	0	52.86	0
2007	54.16	52.4	1.75	54.73	0.58
2008	55.11	51.94	3.17	54.73	1,96
2009	55.7	51.47	4.23	60	4.3
2010	56.05	50.99	5.06	63.16	7.12
2011	55.67	50.51	5.16	65.8	10.13
2012	55.05	50.01	5.04	68	12.95
2013	54.43	49.51	4.91	70.1	15.67
2014	53.81	46.01	4.79	72.72	18.92
2015	53.19	48.51	4.68	76	22.81

Source: CWSA SIP: 2008 – 2015

Rural Sanitation

The definition of sanitation as specified in Act 564 is hygiene promotion and disposal of faecal matter as they affect water usage. The Hygiene and Sanitation focus of National Community Water and Sanitation Programme (NCWSP) is to achieve behavioural change through intensive promotion to generate demand and capacity strengthening of the private sector to construct facilities. The traditional approach of the CWSA in fulfilling this mandate involved the construction of facilities (Household Latrines and Institutional Latrines), User education and the provision of financial subsidies to create demand for latrines among households, among others. Despite huge investments made since inception of CWSA in 1994, the results as of 2008 were not impressive. Majority of rural inhabitants still contended with non improved sanitation and hygiene conditions, the demand for latrines was still low, a culture of dependence had grown and long term sustainability of facilities provided was in danger. Ghana's sanitation coverage, based on the MDG standards is 11% as of 2009. Following these challenges, the CWSA has since 2007, shifted its strategy for sanitation towards testing new models and concepts to create demand and congenial environment for households to invest in sanitation. The Strategic Investment Plan highlights four main areas for sanitation, which include:

- Support to district credit schemes for sanitation
- Social marketing /CLTS
- Extensive hygiene promotion
- Support for technology development and creation of sanitation markets
- Key areas of intervention for hygiene promotion/education include:
- Proper disposal of faeces: promotion ,use and maintenance of latrines
- Safe Water: safe water sources, maintenance of sources, transportation, storage, and use of water
- Water and sanitation-related diseases: causes, prevention and management

- Hand washing with Soap and Food Handling: Critical times of hand washing, condition and presentation of cooked and uncooked food
- Personal Hygiene: care of the body
- Environmental Cleanliness: disposal of waste materials, management of domestic waste water and run offs

Direct and indirect impacts on the environment of actions, investments, projects, products and services

Introduction

Environment management assessments of some selected establishments were examined to identify environmental concerns that affect sustainable development. This is to give a reflection of the contribution of different production sectors to environmental sustainability.

Data gathered include;

1. Name of Establishment
2. Product/produce generated
3. Rate of effluent generation
4. Environmental concerns to water and sanitation (those exceeding proscribed limits)
5. Treatment / mitigation processes
6. Plans to upgrade treatment processes
7. Effect of processes on immediate and distant environment
8. Reference/citation of data gathered

Findings

Industries

A. Akosombo Textiles Limited

a. Produce: African prints for Ghana (Java and Real wax), production – 15Mt/annum

b. Workforce: Maximum recorded 5000 (1970's), currently 1700

c. Effluent generation: 45,000m^2/month, discharged into Aboma Kwadjo stream, a tributary of the Volta River, from wastewater treatment plant

d. Wastewater treatment plant capacity: 2,175m^3, takes care of water treatment and wax recovery

e. Environmental concerns: Some parameters of discharged wastewater quality not within environmental limits; pH=11.2 (limits: 6-8.5[9], 6-9[10]), Ammonia=1.7mg/l (limits: 0.5mg/l[1], 0.1mg/l[2]), Turbidity=8FTU (limit: 1NTU[1])

f. Plans to upgrade treatment process: Yes, newer technology being sought to enhance screening, filtration and colour removal

g. Citation: Technology Impro Associates,1996, Environmental Management Plan, Akosombo Textiles Limited

h. Other: SD issues exist including;

- Water recycling and conservation
- Energy conservation
- Regular monitoring of effluent quality
- Health and safety issues for workers (potential diseases) from chemical fumes, vapours and fine fibres
- Insufficient scrubbing in incinerators to improve quality of combustion emissions
- Oil spill containment

B. Coppon Wood Processing Limited

a. Produce: Processed timber for Ghana and for export - >8000m^3/annum

b. Workforce: 318

c. Effluent generation: No liquid effluent discharged directly into stream however, washout from runoff after rains transport wastes into stream (leachate, spilled fuel and lubricants), accumulation of sawdust and wood waste on site that in addition produce leachate that wash into stream

d. Waste treatment process: water in boilers is recycled, sawdust is made available to individuals and companies requiring them, excess sawdust is openly incinerated

e. Environmental concerns: aesthetics, stockpiling of sawdust and wood waste, leachates from sawdust and wood wastes, spilled fuel and lubricants, broken down equipment, vehicles, deforestation, water quality of nearby stream is however adequate

f. Plans to upgrade processes:

g. Citation: Environmental Management Plan, Coppon Wood Processing Limited, May 2005

[9] EPA limits for water

[10] CSIR-WRI, 2003, Ghana Raw Water Criteria and Guidelines, Volume1 – Domestic Water Use, WRC

h. Others:

- Deforestation leading to loss of biodiversity, climate change, soil erosion
- Carbon emissions from boiler operation/firing
- Solid waste (sawdust) disposal

C. Ghana Oil Palm Development Company Limited (GOPDC)

a. Produce: fresh oil palm fruit (135,000 T), palm oil and palm kernel oil (30,000 T)

b. Workforce: 2589

c. Effluent generation: 400m^3/day effluent discharged into Abrewa stream from treatment ponds, thence to dam where substantial dilution takes place to improve quality

d. Waste treatment process:

e. Environmental concerns: most water quality parameters from treatment plant not in conformity with established limits; Conductivity=6,640-9,600µS/cm (limits:1,500µS/cm^1), TDS=3,300-11,730mg/l (limits:1,000mg/l), SS=10,050-18,500mg/l (limits:50mg/l), BOD=4,700-8,400mg/l (limits:50mg/l), COD=18,204-27,542mg/l (limits:250mg/l), Turbidity= >1,000NTU (limits:75NTU), Oil=235-270mg/l (limits:50mg/l)

f. Plans to upgrade processes: No immediate plans to upgrade processes

g. Citation: SAL Consult Limited, 2009, Environmental Management Plan, Ghana Oil Palm Development Company Limited, Sept 2009; SAL Consult Limited, 2009, Quarterly Effluent Quality Monitoring Results, Ghana Oil Palm Development Company Limited, July 2009

h. Others:

- Contamination of land with oils, fuel and lubricant spillage
- Provision of borehole water to communities has become an excuse to minimise waste treatment processes
- Limited recycling and reuse of stream water
- Carbon dioxide and boiler combustion emissions

D. Tema Oil Refinery (TOR)

TOR refines crude oil and atmospheric residue into valuable petroleum products including liquefied petroleum gas, gasoline, kerosene, aviation turbine fuel, diesel and fuel oil. The refinery activities start with receipt and storage of crude oil in the refinery. The refinery employs a wide variety of processes that potentially have significant impacts on employee health and safety and environment. Since 1995

there have been significant changes in technologies with corresponding changes in pollution management and policies and practises. TOR employs over **865 workers**

The total industrial and domestic effluents discharged into the central drainage currently run through the wetlands of Chemu Lagoon into the Tema Fishing Harbour

The potential water pollutants that have to be controlled to prevent pollution of the Chemu lagoon and sea are hydrogen sulphide, biological oxygen demand, suspended solids and ionic strength. Annual averages for 2005 were above EPA permissible levels in oil content, BOD, COD, TSS and TDS. Potential ground water pollution includes overflow /leakage/collapse/over draining of storage tanks; accident involving a bulk road tanker loaded with products; overflow of API oily separator or storm water holding basin etc. There is a proposal to mechanise treatment of oily sludge to replace the manual feeding of lime and sludge and transferring them into dry containers into a mixer.

All effluents are channelled into the waste treatment units. There are two units; modified existing waste treatment unit and the new Residue Fluid Catalytic Cracking (RFCC) waste water treatment units

Solid wastes generated from the refinery are metal scraps, wood wastes, spent catalyst, oily sludge (Slurry waste) coke and food left over. About 110 to 125 tonnes of catalyst is in circulation in the Reactor and Regenerator at any given moment and it contains poisons such as sodium, vanadium nickel etc.

There is a proposal to mechanise treatment of oily sludge with lime to replace the labour intensive one where there could be spills on the floor which could find its way into underground drainage system and also siltation of the drainage system.

There are also plans to rehabilitate the waste treatment units to achieve compliance with EPA maximum permissible limits. This have been awarded to SCAL Corporation, USA. In the mean time TOR budgeted to repair a portion of the municipal drain in 2007 as a measure to improve the flow of effluent in 2007

Citation- Environmental Services Department. Tema Oil Refinery 2007

E. NESTLE GHANA LTD EMP 2007-2009

Nestle Ghana Ltd is a food processing industry. The products obtained from the factory's operations are Recombined Milks, Milo, Family and Infant Cereals (Cerelac), Chocolim, Chocomilo, Nescafe (3in 1), and Nesquik.

Potential Liquid Waste Releases

Though water is not used in most of the production average water used for the whole factory is about 27,125 cubic meters per month. The main sources of liquid waste generation thus are: Boiler House Effluent (Blow Down and Cooling water), Effluent from Cleaning of Factory Premises (Process Water), Occasional accidental spillages spent lubricants and rain water. Other sources of liquid effluent are from kitchen, sanitary areas, offices,

The major effluent factors are:

Temperature, BOD, COD, Nitrates, Total Suspended Solids pH, Oil, Grease, Coliforms

Effluent parameters collated indicate that pH, COD and BOD values are out of EPA values. The management of Nestle have a waste treatment plant under construction.

Rate of effluent: was not provided

Medium of discharge: Discharge of effluent into Chemu lagoon

Solid Waste: The annual solid waste of about 2.664% (2.969% in 2003) was managed through recycling. The factory generates approximately 10.017 tons of process waste from the processes of beans and maize and rejected and expired food masse. The waste flows into animal farms and the stones are sent to the Kpone dump site

Water Consumption averages for 2005 and 2006 was 26,978 and 34,394cubic meters.

Energy Consumption for 2005 and 2006 was 964,464 and 983,937 KWh

Citation: Nestle Ghana Ltd EMP 2006

F. UNILEVER GHANA LIMITED EMP 2003-2006

Unilever produces keysoap, frytol, lux, geisha soap, margarine, royco cubes, pepsodent

Medium of discharge: Discharge into the Chemu lagoon

Rate of effluent: 0.09 metric3 tons for 2002, 2.48 GJ/ ton energy, 2.07 m3/Ton of water was consumed for the same year. And assorted refuse and sludge generated for 2002 was 432550kg and 545230 kg of spent earth was generated in 2002. 738.2m3 effluent was generated in 2002

Sources of liquid effluent: From kitchen, offices, sanitary areas, edible oil production unit, liquid soap production unit, personal product unit, food production department.

Environmental concern: Effluents from Unilever have issues with the following: TFM, TSS, COD, BOD

Treatment process: The liquid discharges from the processing operations are composed of degradable vegetable oils and detergents. The process effluents from the food oil refinery is sent to the soap making unit and fats are grained out and the fatty portion is then sent to the soap making section and the rest is sent into a physical effluent plant.

An average 4.7 tonnes fat is recovered monthly

Solid waste: Consist of spent earth, sludge, metal waste, paper, plastic medical and food. The spent earth, sludge is sent to the municipal dump site, the office and damaged fiberites are incinerated. Empty drums, wood and plastics are sold to workers and the food is sent to poultry farms.

Plans to upgrade: Plans have been put in place to construct a new modern effluent treatment plant that will filter the effluent before discharging into drains. Plans are also underway to put filter press to filter the effluent before it is discharging finally into drains.

Citation. Unilever Ghana

A.

B.

C. OCA COLA BOTTLING COMPANY LTD EMP 2007-2010

TCCBCGL is a major soft drinks and bottled waster producing company.

It operates a 2000m3/d Capacity Biological Wastewater Treatment Plant (WWTP) the over 55m3/hr effluent eventually flows into the Onukpawahe and ends up in the Sakumono lagoon.

Liquid Effluent

The waste water collects into a collecting tank for solids separation. The waste water buffered into balancing tank to provide a continuous flow to a biological reactor. At the BTS the waste water flows by gravity where the heavy ingredient of sludge is separated. The sludge is further returned to the BTS and the regenerated sludge is further supplied to the Biological Reactor for a new absorptive changing with organic matter being difficult to degrade TDS,TSS, BOD, COD, Oil/Grease averages for 2006 were above the EPA permissible levels. This according to them was due to operational problems. In 2006 an estimated 10.625 tons of sludge was generated. Oil and grease treated effluent 2006 averaged 18.1mg/l

The receiving water bodies are the Onukpawahe stream which is a tributary of Mamahuma stream and Dzorwulu stream which has the Gbagbla-Ankonu stream as a tributary.

To ensure that the effluent quality is within acceptable levels and at no risk to human health, the company established a fish pond as an attachment to the WWTP on experiment basis to monitor the impact of the effluent on aquatic fauna and for ecotoxicological tests.

The report was silent on future upgrading plans

Solid Waste.: Solid waste generated are mainly broken glass, empty sugar bags, paper cartons, empty concentrate and beverage base plastic containers, plastic wrappers, crown cork, damaged crates, cartons concentrate/beverage, base/chemical containers, and office/kitchen waste are usually segregated.

Quantities of broken glass generated and exported in 2007 was 1,395,194kg. The crown corks are disposed off at Kpone Landfill. The company loses about 8 crowns for every 1000 pieces used. The crates and PET are sent to Qualiplast Ltd. Empty sugar bags and concentrate/beverages base plastic containers are sold to the public.

Citation. AY&A Consult Ltd, Accra 2008

D. TEMA LUBE OIL COMPANY LTD-1998

TCL produces lubricating oils. The Plant releases liquid plant spill of about 20litres per month. The effluent is discharged into the Chemu lagoon wetland

Parameters of concern (with concentrations above EPA levels) include: Conductivity, Turbidity, Suspended Solids, physical Chloride, BOD, COD, Oil, Aluminium, Chromium.

The liquid effluent is however treated by an API separator, a sedimentation system which separates the solids from liquids. After the settlement, the clear supernatant is discharged into the drains and the sludge is removed manually by waste management Dept of TMA for disposal.

Solid waste: Steel materials, brackets and straps carton etc. The steel materials are sold to the steel industries plastic containers are recycled at the factory. Wood pallets coagulated paints and factory litters are disposed of through the TMA Waste Department.

Waste oils are sold to certified EPA waste collectors for preservation of wood in the industries

There are no plans to upgrade the effluent treatment plant

Total non-process water usage is approximately 225,000 litres per annum

Citation .Tema Lube Oil Tema. 1998

E. VOLTA ALUMINIUM COMPANY LTD 2003

VALCO produces aluminium. They have a labour force of 315

Rate of Effluent. Weekly

Medium of discharge: Drains into the Chemu lagoon

Liquid waste generated is from automotive and lubricating oil, kitchens, laboratory and sanitary areas. In 2002 a total of about 20,818 cubic meter of water was used per month. Water consumption per month for

2002 was 20,818 cubic meters. Waste oil generated from 2000-2002 was 770gallons. They are sold to wood dealers for preservation

Treatment Processes

Water is sampled weekly after oil skimmer before discharge

Medium of discharge: Drains into Chemu Lagoon

Rate of Effluent 770gal/month from 2000-2002. Parameters were within EPA permissible limits

Solid waste includes carbon cathode, spent refractory bricks, dross powder, carbon dust and domestic garbage. 16.5 kg/mt of aluminium is produced. All these waste are sold to Tema Steel. Other solid waste which is not sold are sent to the company's dumpsite and landfilled.

Treatment process: The treatment plant is in place especially to treat oil collected in oil skimmer

Citation: Valco 2003

F. GHACEM LTD EMP 2005-2007

Ghacem produces cement liquid waste from non process activity such as sanitary areas, workshops, laboratory, offices, cleaning surface, storm water and cooling water.

Medium of discharge all effluents are currently discharged into the sea

Key parameters monitored and of serious environmental concerns include TSS, Sulphate, Conductivity, Turbidity, oil and grease, COB and BOD.

Ghacem operates a dry process. Parameters such as TSS, COD, Oil and Grease were above EPA's range for the periods 2002-2005

Treatment Process

Acid and alkaline solutions from laboratory are collected into drums, neutralised before discharge. Sanitary effluents are treated by septic tanks. All other effluents are monitored for the quality to meet permissible levels before discharge.

Solid waste type includes domestic waste, waste oils, non-process industrial waste and hazardous waste. The oily waste is channelled through an oil interceptor. The factory in Tema generates 60m3 per month of domestic 20% and non-hazardous industrial (30%) wastes and 200 litres of waste oils.

Ghacems operating power factor is 0.93

Effect on environment: Effluents released/discharged have very minimal impact on environment as most of the parameters that constitute the effluent are being controlled.

Citation: GHACEM 2004

G. ABOSSO GOLDFIELDS LIMITED, DAMANG GOLDMINE -2008-2011

AGL produces gold from mining operations of shallow, low-grade ore and reprocessing of old tailings.

Medium of discharge: The Abosso concession lies within the Bonsa and Huni-sub-basins of the Ankobra River main drainage basin. At the Damang site, the general flow of the rivers is from the west to the east towards Bonsa River. The main rivers in the area are the Tamang, Beni and Ayaasu, and their tributaries. As part of the mine development programme, the rivers crossing the mine site were re-routed to the north and south of the main pit. The Beni and Ayaasu Rivers were re-routed to the north and east of the project and the Tamang River to the South. The Beni and Ayaasu River join the Bonsa River to the South of the old village of Kyekyewere and the confluence between the Tamang and the Bosa downstream. The southern portion of the AGL Mining lease (Amoanda and Rex project areas) is drained by the Huni River. Other water sources for domestic uses are wells about 10m deep, open pits recharged from groundwater and shallow pits dug along side rivers.

Rate of effluent: This is provided in their monthly and quarterly returns submitted to the Agency

Environmental concern: According to the EMP the degradation of the local water supplies is due to poor disposal of garbage, poor sanitation, erosion and the activities of the artisanal miners. The report identified the following activities as having impact on water quality: Exploration that is clearing of vegetation, construction of roads, machinery maintenance and servicing, alteration of drainage, run-off from mine site, in-pit dewatering, acid formation, sediment run off, potential hydrocarbon formation, milling and processing, tailings disposal and transport of storage and hazardous materials.

Treatment process: Water samples are collected from all possible pollution points and monthly and quarterly as well as yearly results are submitted to the EPA. They ensure that they meet EPA water quality standards as well as international water quality standards. All operational areas that have potential to release contaminated water into the environment are located in a closed water management system. There is no excess water from the system-all tailings supernatant is reused in the mill process. Rivers diversion works and structures have been designed to accommodate runoff and flow from a storm event of average return interval of 100 years. The river diversion works reduce the catchment area and flow of

water through the mining area that is drained by a single constructed drain. The drain has an average grade of 0.1% and discharges into a broad vegetated drainage basin prior to leaving the mine area, giving opportunity for suspended sediments to settle prior to effluent leaving the mining area

Solid waste generated from mining operation are deposited in designated mine waste dumps. This waste is used in the filling of pits. The dumps after reaching their design limits and heights, and where practicable, are re-sloped and prepare for rehabilitation. Dewatering of in pit precipitation is either used for dust suppression or make up water in the mill. Some are allowed to drain freely or into the Beni River. In 2007, 3,392,000 tons of ore and 27,427,586 tons of waste were mined in open pits. Majority of the water used in processing's obtained from recycled tailings thickener overflow and from recycled tailings return water.

Tailings from the processing plant are sent to a tailings storage facility. The embankments of the facility are said to be sound. Recycled water made up 94.7% of the mill make up water. Knight Piesold Ghana was contracted to verify the soundness of the embankment and it is said to be sound. However in 2004 construction works commenced on the raising of the embankment walls to 983.5. Independent assessment by AGL's cyanide management was commissioned in 2004. The analysis carried out in 2007 revealed issues which where addressed before international certification was issued. Auditors report showed that AGL's management of tailings and cyanide materials was good and that no critical risk or urgent issues were found. AGL's was reported to be in 'substantial compliance' with International Cyanide Management Code) ICMC.

Citation. AGL 2008

H. E-WASTE

Shipment of e- waste and hazardous goods into the country is increasing with large volumes ending at landfill sites.

Agbogbloshie in Accra is now a global reference as an e- waste dumping site.

The wastes pose significant human health, environmental and financial risks to Ghana but unfortunately there was no framework, legal or institutional, to guide monitoring and control.

The issue of illegal trans-boundary waste shipments have received international concerns requiring seaports through which they most often pass through or are off-loaded put in measures to ensure that international waste trade is not only legal but safe.

Internally generated e- waste is also to be looked at

8th Conference of Parties (COP) meeting of the Basel Convention features e- waste as an important item on the agenda.

PARTNERSHIPS

Ghana had entered into partnership with the Netherlands to collaborate in detecting, determining and preventing e- waste and hazardous shipment in Ghana.

There is the Waste Shipment Enforcement Network which is interim. EPA, Ghana Port Authority, Customs and Standards Board are members. Other members include National Security, Police Service, Ministry of Trade and Industry, Radiation Petroleum Board. There will be room to co-opt other members from various institutions when the need arises.

The network was to partner with existing bodies involved in preventing illegal waste shipments such as international professionals from both industrialised and developing countries involved in inspection and monitoring trans-boundary movements and hazardous waste through seaports..

Measures Adopted

Draft waste shipment guidelines on e- wastes being developed

Adoption of policies such as take- back from suppliers, e- tax on electrical, electronic appliance to take care of their disposal among others. Nigeria had adopted that policy with Nokia on their mobile phones entering Nigeria. Ghana may have to consider pursuing that plan which already exists in advanced countries

Waste Recycling Ghana Limited has been licensed to accept e- waste for dismantling and recovery of reusable components.

Citation: Minutes of meeting on E-waste handling in Ghana's Port- 2009.

Agriculture:

Very little information concerning environmental impacts of Irrigation projects on sustainable development in Ghana available at GIDA. As such documented data are unavailable however, it is known from IWMI's study (Cofie and Kranjac-Berisavljevic, 2004) that a number of negative environmental impacts arise from irrigated agriculture among which are;

a. Water logging and swamp formation from drainage and maintenance problems

b. Emergence of water borne diseases – malaria, schistosomiasis, guinea worm. Malaria cases are very prominent in all the communities where irrigation schemes are located. On only two of the schemes, was there evidence of health awareness creation carried out by the community health teams from the district. There were no schemes where HIV/AIDS and STD monitoring was conducted. However, awareness creation was carried out on three projects. Several cases of tuberculosis have been revealed in Southern Ghana, but there were no cases reported in Northern Ghana. (Cofie and Kranjac-Berisavljevic, 2004)

c. Scanty or complete lack of information required to ensure a sustainable management of irrigation schemes especially in informal schemes. There is a general lack of interest and knowledge of project performance at the management/scheme level for both formal and informal water developments, with informal developments being worse-off in terms of information. This is

especially pronounced in the area of environmental impact and health related issues, where hardly any studies have been carried out at the selected schemes. Environmental problems observed include impacts on wildlife, weed and pest infestation, soil erosion and sedimentation, poor soil fertility and water logging. (Cofie and Kranjac-Berisavljevic, 2004)

d. Salination

Faecal Sludge and Wastewater Treatment Plants

There are several Faecal Sludge and Wastewater Treatment Plants in Ghana in various stages of disrepair. As indicated in IWMI 2008, it is clear through observation that most of the treatment plants surveyed are not functioning as designed. Effluent quality is not known since there are no monitoring records. Lack of effluent quality records for all the plants, makes it difficult to propose specific treatment alternatives or improvements which will meet the requirements for re-use in agriculture or the appropriate discharge guidelines. Functionality of Activated Sludge Plants

Another reason for the lack of functionality of these plants is the energy requirements and the absence of replaceable mechanical parts.

There is a lack of standard guidelines on operation and maintenance of the main treatment systems. This means that routine maintenance activities are not carried out and the necessary funding needed to ensure an adequate Operation and Maintenance regime is persistently absent. Additionally insufficiently skilled and mostly inadequate staffing is usually tasked with handling the complex process of Operation and Maintenance.

Generally plants with little or no mechanical components tend to work better since the operation and maintenance costs are relatively lower. The operation and maintenance activities are mostly labour intensive with a periodic need to dislodge sludge by mechanical means. These plants are generally more robust and should be the preferred method of treatment.

Some Water Projects and the incidence of Urinary Schistosomiasis and Malaria in Ghana

Type of Water Development and Location	**No. of Respondents**		**Bilharzia sufferers (%)**		**Malaria sufferers (%)**	
	Bilharzia	**Malaria**	**Before project**	**After project**	**Before project**	**After project**
a)Irrigation Project						
Tubakrom	100	100	20.0	24.0	79.0	83.0
Vea	150	40	0.7	0.7	72.5	77.5
Dawhenya	40	150	37.5	30.0	4.0	12.0
Tono		39			84.6	97.4
b) Water Supply						
Agona	200	200	6.0	0.5	29.0	29.5
Kwanyako	198	198	20.2	3.0	67.9	86.9
Weija				32.0		
c) Hydro-Power						

Mepe	150	150	2.0	32.0	82.7	98.7
Adawso	190	190	0.5	27.4	58.4	65.8

Source: Sam (1993)

Type of Impact	Indicators
Socio-economic Impact	
Job creation	• Number of households involved in irrigation scheme
Food security	• Income generated from irrigated farming
Improved standard of living	• Acquired assets through irrigated farming
Improved domestic water supply	• Proportion using water for domestic activities
Change in population	• immigration / emigration due to scheme
Environmental Impact	
Area inundated	• Population displaced • Habitat damaged
Reduced downstream water flow	• Stream diversion
Poor water quality	• Solid concentration and oxygen loading • Concentration of nutrients and trace elements • Pesticide levels; microbial contamination
Low ground water levels	• Declining water table
Water logging	• Soil moisture content
Reduced yield compared to non irrigated farms	• Soil salinity • Soil fertility
Increased weed growth	• Species identification and abundance
Increased sedimentation of channels	• Sediment load of drainage water
Aquatic weeds	• Species identification and abundance
Algal blooms	• Oxygen loading; Nutrients; Trace elements; Pesticide levels; Biological parameters
Pests invasion	• Species identification and abundance
Soil erosion	• sediment loads in stream
Health Impact	
Improved nutrition and well being	
Poor health status	Incidence or prevalence of : • Malaria • Schistosomiasis • Diarrhoea • Other water related diseases

Source: Cofie and Kranjac-Berisavljevic (2004)

Water Investment Requirement

- SIP study undertaken in 1998 established that **GWCL** to be able to meet demand in urban water supply by 2020, the company requires an investment of about USD1.6 billion throughout the period.
- Sector development programme in 2009 show investment required for expansion of water supply facilities to meet demand up to 2020 stands USD 1.49 billion
- Management contract – World Bank provided $103 million, Nordic Dev. Fund $5million and $12million from Republic of Ghana to support Urban Projects for the following:-
    i. System expansion
    ii. Public Private Partnership Development.

iii. Capacity Building and Project Management
iv. Severance Programme

Systems (Plants)

85 water treatments plants for urban water are available.

Water demand

Estimated demand for urban water supply = 1 million m3/day

Supply of water = 644,000m3/day

Coverage = 64.4% (urban water)

GHANA WATER COMPANY LIMITED

LIST OF COMPLETED PROJECTS (2001 – TO-DATE)

Item	Project Title	Total Cost	Description	Location(s)	Date Completed
1.	Akwapim Ridge Rehabilitation	$10,000,000.00	Transmission replacement and Distribution Improvement.	Adukrom, Awukugua, Akropong Mampong upto Peduase Lodge.	March 2002
2.	Six Town Water Supply Project	$10,000,000.00	Replacement of equipment, transmission and distribution mains.	Koforidua, Asamankese, Nsawam, Nkawkaw and Akim Swedru, Anum Boso.	2004
3.	Winneba Water Supply Expansion	€7,650,000.00	Construction of 3 million gallon a day treatment plant /intake transmission and distribution.	Winneba and environs.	2002
4.	Sekondi-Takoradi Rehabilitation	€29,000,000.00	Dredging of reservoir, replacement of transmission pipeline and laying of distribution mains. Engineering Supervision.	Inchaban, Sekondi-Takoradi.	2005
5.	ATMA Contract 1C	€30,000,000.00	Distribution improvement of Western Accra; Effluent treatment at Weija Plant; Emergency repair works on Weija Dam. Engineering Supervision.	Weija, Kasoa, Western Accra Area.	2005
6.	Kwanyaku Water Supply Rehabilitation and Expansion	€24,136,000.00	Construction of new treatment plant; Dredging, Laying of transmission and distribution mains.	Agona Kwanyaku, Swedru, Bawjiase.	2007
7.	Adenta Water Supply Improvement	GH¢2,000,000.00	Drilling of boreholes. Supply and installation of pumps. Construction of Transmission and Distribution Pipelines.	Dodowa-Adenta, Ashalley Botwe	2007
8.	Dredging of the Brimsu Dam	€2,500,000.00	Dredging of Reservoir	Brimsu	2005

Item	Project Title	Total Cost	Description	Location(s)	Date Completed
9.	Cape Coast		Construction Supervision:	Cape Coast,	

	Water Supply Project	€40,065,000.00	Construction of new 6mgd Treatment Plant. Construction of Booster Stations and Reservoirs. Laying of Transmission Distribution Mains.	Sekyere Hemang, Komenda, Elmina	2007
10.	Baifikrom Water Supply Project	€25,760,000.00	Construction of 3.4mgd Water Treatment Plant. Laying of Transmission and Distribution Pipelines and Construction of reservoirs.	Baifikrom, Mankessim, Saltpond, Ekumfi, Gomoa.	2008
11.	East/West Interconnection	$32,000,000.00	Construction of 700mm/ ` 500mm Pipeline (14km). Connection between Weija Treatment Plant and Accra Terminal Reservoir. Improvement in distribution system, pumps at Accra Booster and additional treatment plant at Weija.	Madina, Adenta, Ashalley Botwe, Frafraha, Dome, Kwabenya, Teshie.	2008
12.	Tamale Water Supply Expansion Project	€45,000,000.00	Construction of new treatment plant (5.5mgd); Construction of Reservoir; Laying of Transmission and Distribution Mains and Water Assets Management Training.	Tamale Township and environs, Dalun, Nawuni.	2008

GHANA WATER COMPANY LIMITED

LIST OF COMPLETED PROJECTS – (1992-2000)

Item	Project Title	Total Cost	Description	Location(s)	Date Completed (Contractor)
1.	Completion of Four Towns Water Supply Schemes	€9,870,487.00 ¢1,594,571,092	Completion of Water Treatment Plant Transmission Replacement Distribution Construction	Ho, Assin Fosu, Konongo-Odumasi, Techiman	1992 – 1996 (M/S Biwater)
2.	Mac-Charthy Hiill Reservoir and related works.		Construction of Reservoir	Mar-Cathy Hill	M/S China Int. Water & Elect. Corp.
3.	Contract for Supply of Pump Plant and Diesel Alternators for IAP.		Supply of Electromechanical Equipment	Countrywide	
4.	Supply and delivery of equipment, materials for the Rural Water Supply.		Supply of Electromechanical Equipment	Accra-Tema Metropolitan Area	
5.	Accra-Tema Water Supply Rehabilitation Project No.3 Pumping Station Equipment Rehabilitation.		Supply of Electromechanical Equipment	Accra-Tema Metropolitan Area	
6.	South Eastern District Water Supply Schemes	£13,500,000.00 ¢4,926,500,000	Construction of New Treatment Plants Reservoirs Transmission and Distribution Mains, Stand Pipes.	Sogakope, Anloga, Keta, Ada	
7.	Water Sector Rehab. Project (WSRP):		Replacement of Equipment, Rehabilitation of Water Treatment Plants, Supply of Equipment and Construction of Offices/Workshop	Countrywide	

Item	Project Title	Total Cost	Description	Location(s)	Date Completed/ Contractor
(a)	Contract for Supply of Water Meters.	FF3,180,140.95			
(b)	Rehabilitation of Water Supply system in Central/Western Region including Consultancy Services.	ATS310,991,963	Rehabilitation of Water Treatment Plants, Supply of Equipment, Distribution Improvement.	Kwanyaku, Axim Prestea, Sekondi-Takoradi	1996 Strabag
(c)	Supply of 202 Vehicles between GWCL and Africa Autombile	¥473,371,500.00	Supply of Operational Vehicles	Countrywide	
(d)	Supply of Tools and Equipment for GWCL	¥1,397,743,942	Supply of Working Tools	Countrywide	
(e)	Two Regions Project	£8,023,421.49		Kumasi, Sunyani	
(f)	Rehabilitation of Upper West and Northern Regions		Rehabilitation of Plants, Replacement of Equipment.	Tamale/Wa	SADE
(g)	Package – Civil Engineering Works (Ashanti/Brong-Ahafo	¢9,895,641,440		Berekum, Dormaa, Sunyani, Mampong, Tepa, Effiduasi	1998 Base Workshop

Item	Project Title	Total Cost	Description	Location(s)	Date Completed/ Contractor
8.	Contract 2A Transmission and Distribution Mains			Teshie	Vermeer
9.	Contract 2B Transmission and Distribution Mains	NLG29,972,800.00 NLG748,460.00		Nungua	Vermeer
10.	Contract for 4mgd Water Supply to Obuasi		Construction of Treatment Plant reservoirs, Transmission and Distribution Pipeline		1999 Biwater
11.	Peki Water Supply Project	FF75,209,796.95 ¢294,536,368.00	Construction of Treatment Plant reservoirs, Transmission and Distribution Pipeline	Peki Area	1997 SADE
12.	Supply and				

	Installation of one Raw Water Pump of Weija Canadian Intake	FF2,240,091.45	Supply of Electromechanical Equipment.	Weija	
13.	Expansion of Adam Clarke Water Treatment Plant at Weija – Contract 1A & 1B	NLG			Vermeer
14.	Akwapim Ridge Water Supply Project	USD 10 million	Replacement of Transmission Pipelines and Pumps.	Akoley, Adukrom and towns on Akwapim Ridge	2003
15.	Winneba Water Supply Project	NLG15,320,000.00	Construction of Water Treatment Plant, Transmission and Distribution Pipelines, etc.		Spaans Babcock

GHANA WATER COMPANY LIMITED

LIST OF COMPLETED PROJECTS

Item	Project Title	Total Cost	Description	Location(s)	Date Completed
1.	Akwapim Ridge Rehabilitation	$10,000,000.00	Transmission replacement and Distribution Improvement.	Anum Boso, Adukrom, Pawbe, Awukugase, Akropong Mampong upto Peduase Lodge.	March 2002
2.	Six Town Water Supply Project	$10,000,000.00	Replacement of equipment, transmission and distribution mains.	Koforidua, Asamankese, Nsawam, Nkawkaw and Akim Swedru.	2004
3.	Winneba Water Supply Expansion	€7,650,000.00	Construction of 3 million gallon a day treatment plant /intake transmission and distribution.	Winneba and environs.	2002
4.	Sekondi-Takoradi Rehabilitation	€29,000,000.00	Dredging of reservoir, replacement of transmission pipeline and laying of distribution mains. Engineering Supervision.	Inchaban, Sekondi-Takoradi.	2005
5.	ATMA Contract 1C	€30,000,000.00	Distribution improvement of Western Accra; Effluent treatment at Weija Plant; Emergency repair works on Weija Dam. Engineering Supervision.	Weija, Kasoa, Western Accra Area.	2005
6.	Kwanyaku Water Supply Rehabilitation and Expansion	€24,136,000.00	Construction of new treatment plant; Dredging, Laying of transmission and distribution mains.	Agona Kwanyaku, Swedru, Bawjiase.	2007
7.	Extension of Water Supply from Awutu-Bawjiase to Mankrong and all communities en-route	¢5,000,000,000	Laying of distribution mains	Mankrong, Peduase, Donkonitwe, Ayensu Starch Factory	2005
8.	Pipeline Mains Extensions	¢1,000,000,000.00	Laying of distribution mains	Burpela	2005

9.	Water Supply Improvement to some Educational Institutions in Central Region	¢45,470,000,000.00	Rehabilitation/Replacement of equipment.	St. Augustines College, Mfantsipim, Adisadel, Aggrey Memorial Wesley Girls, Ghana National University of Cape Coast, Ankaful Hospital.	2005
10.	Akim Oda Water Supply	¢2,890,000,000.00	Rehabilitation/Transmission and Distribution Mains.	Akim Oda	2005
11.	Pankrono-Ahwiaa Buokrom Water Supply	¢1,800,000,000.00	Construction of Booster Stations and replacement of equipment	Pankrono, Ahwiaa, Buokrom	2005

Item	**Project Title**	**Total Cost**	**Description**	**Location(s)**	**Date Completed**
12.	Teshie Water Supply Improvement	¢781,000,000,000.00	Rehabilitation and laying of pipelines	Teshie	2005
13.	Adenta Water Supply Improvement	¢20,000,000,000.00	Drilling of boreholes, supply and installation of pumps, transmission and distribution pipelines.	Dodowa	2007
14.	Tolon Water Supply Project	¢1,000,000,000.00	Laying of Pipelines	Tolon	2005
15.	Dredging of the Brimsu Reservoir	€2,500,000.00	Dredging of Reservoir	Brimsu	10th Feb. 2005
16.	Ashalley Botwe Water Supply Project Phase I	€6,500,000.00	Laying of Pipelines	Ashalley Botwe	2006
17.	New Tafo Water Supply	¢1,450,000,000.00	Rehabilitation of equipment. Laying of Pipelines	New Tafo	2005

Suggested Initiatives and Action Plans

Ghana is developing water utility goals for sustainable development and usage of water for all domestic, industrial and public. There is therefore the need to develop initiatives to help companies, residents and business reduces their water consumption while improve potable water production. Commitments, therefore, in the following directions are necessary:-

i. Increase water production by 20% by 2020
ii. Reduce water consumption at all MMDAs by 15% by 2020
iii. Reduces water losses at the plants by 5%
iv. Reduce water losses in the distribution system by 10% annually
v. Reduce domestic water losses by 15% annually
vi. Reduce industrial water losses by 50%
vii. Develop water efficient usage laws and standards for both old and new developments

Outline of action plan

1. Require and implement treatment plant regulated water used for treatment – not > 10% of production capacity
2. Include settling and recycling of waste water at treatment plants
3. Require, implement and track demand side management program – water reduction strategy (over all water reducing strategy)

- track internal and external consumption data to ensure consumption patterns are keeping with reduction targets
- include citizen participation in demand side management
- work with all MMDAs and corporate consumers to develop demand side management plans that reflect the overall corporate reduction objectives

4. Enhance consumer reduction through effective social marketing programs

- Implement water conservation programs using economics and consumers education.
- Develop relationships with high water users in all customer classes and work with them to develop reduction strategies
- Incentive base social marketing programmes
- Directly assist all customers who need to reduce water use

Link water conservation to development approvals

- Water use plan to be submitted
- Require new developments and retrofits of existing facilities and homes – best available technologies
- Mandatory landscaping standards
- Tie major infrastructure funding to demonstrate water conservation plan.

Ensure full cost pricing with volume base pricing structures

- Ensure equitable assess through rates
- Target high and excessive users and send strong signal during peak demand periods
- Penalize heavy users and reward low users (revenue neutrality promotions)
- Review opportunities for alternative metering technologies as part of meter replacement program.
- Full cost pricing

Reduce water system leakages that results in water loss -

Confirm percentage of water system losses as part of the utility's overall unaccounted for water formula. Identify its cost associated with delivery and loss of revenue.

- Implement and enhance leakage detection program – leakage surveys
- Revolving 5 year plan to rectify leakage

Promote and ensure use of water efficient fixtures

- Latest technologies
- Mandatory water efficient fixtures
- 2 year plan that require neutrality
- Involve Factory Inspectorate Division in assessing water conservation and losses in factories.

Explore and develop water resume opportunities

- Identity water usage opportunities within country
- Explore new installation potential where waters usage makes sense

7. Proposed Project(s)

1. WATER USE-EFFICIENCY (WUE)

2. WATER EFFICIENCY WATCH (WEW)

Introduction:

In Ghana most of us do not know close to what volumes of water we use in our houses per day. It might be more interesting to note that even some industries which use water as a major raw material are unable to tell how much water they use for operations per day. What about the volumes of water the passes through their meters and yet lost through poor usage and inefficient fittings? This should be in a campaign form so that households and industries for the gains sake will buy into the idea.

The proposed project has its objective to save the water produce for domestic, public, commercial and industrial by re-examining our own attitude and the fixtures available in our premises, changing attitude and retrofitting by choosing water use efficient fixture.

Project	Objective(s)	Time Frame	Planned Activities	Result/Outcome	Cost	Target Groups / Agencies	Funding Sources
Water use-Efficiency or water Efficiency Watch	• Wise and economic usage of water • Save water produce from our water treatment plants • Environmental safety	5 Years	**1. Retrofitting: Household** - check leakage of toilet cistern -replace cistern with one that uses 20% or even 50% less water per flush -replace leaky faucets (taps, valves and joints) -use shower(45-60 litres) more often than bath-tub (315 litres) or replace shower with bath-tub -brush with cup of water either than running tap -wash full loads either than in bit (dishes and cloths)	1.less water used -more water available -time saving for cleaning	GH₵1.0 million over the five-year period.	-Utilities / Regulators GWCL CWSA WATER BOARDS PURC WRC -Households -Industries / Factories -MMDAs -schools -Hospitals	-Gov. of Ghana (national/local) -development partners -NGOs -individuals -communities -MDAs -Water Funds

			-use efficient garden sprinklers **2. Retrofitting: Industries** - privately meter water consumption in establishment -replace and install efficient faucets -treat and recycle waste water from industry 3. Water utilities -replace inefficient machinery -treat and recycle waste water -use power efficient equipment -replace old and unreliable pipe lines -attend smartly to bust pipes -institute award for water wise use -punish or institute levies for poor water use	2.less water used-more water available -time saving for cleaning -more savings of funds for re-investment -meeting EPA emission guidelines and environmental prudence 3.Reduced NRW -more water available -more water for sale (billing) -more savings of funds for re-investment -meeting EPA emission guidelines and environmental prudence -attitude change for the better			

Proposed Demonstration Projects in Water and sanitation

Background

There are about 70 wastewater (WW) and faecal sludge (FS) treatment plants in the country with a total design capacity to serve about 25% of the urban population but fewer than 10% are operational (IWMI, 2009). Thus, more than 85% of WW and FS that is generated everyday is discharged into the environment without any effective treatment. Achieving environmental and public health benefits of improved sanitation, demands adequate collection, treatment and disposal/end use of the waste to go along with the provision of toilet facilities

Response

One possible solution is to adopt a market and reuse-oriented approach to sanitation to show that effectively capturing and allocating the resource value of WW, FS, and treatment by-products can serve to finance sanitation systems that simultaneously close the water and nutrient loops thereby ensuring environmental and public health

PROJECT 1: REHABILITATION OF SELECTED WASTEWATER TREATMENT PLANTS

Objectives: Rehabilitate the plants towards reuse of WW for irrigation and aquaculture

Activities

- Wastewater quality and quantity monitoring: monitor wastewater flow and identify temporal variations; monitor wastewater quality to determine retention time in treatment system; quantify expected concentration in effluent and resource available for agriculture or aquaculture
- Assess potential for connecting unserved residential buildings in immediate vicinity of WWTPs
- Rehabilitate treatment plants depending on the need; implement conveyance infrastructure from WWTPs to fields/storage reservoirs for use
- Determine size and location/distribution of storage reservoirs
- Train personnel at the TPs and reuse end
- Cost-benefit analysis

Expected Result:

- At least 2 rehabilitated treatment plant tailored for reuse in irrigation and/or aquaculture
- Farmers and/or WWTP operators trained and equipped to conduct routine O&M

- Cost-benefit analysis of incorporating reuse for irrigation compared to baseline of effluent disposal by WWTPs and rain-fed irrigation by farmers;
- Quantification of return of investment/payback time on infrastructure necessary for reuse (e.g., conveyance pipes, storage reservoirs)

Duration: 2-3 years
Location: Tema waste stabilization ponds and Roman Ridge, Accra WWTP, Greater Accra
Budget: GH₵500,000
Funding Agency: Development partners- AfDB, USAID, World Bank
Implementing Agencies: Ministry of Local Government and Rural Development (MLGRD) through its Municipal and Metropolitan Waste Management Departments, contracted treatment plant operators, Environmental Health and Sanitation Departments in Tema and Accra, IWMI, etc

PROJECT 2: COMMUNITY BASED PRODUCTIVE SANITATION SYSTEMS

Objectives: Promoting community based productive sanitation systems that enhance synergies between food production, sanitation and bio-energy production. This project will be based on the principle of resource recovery and ecological sanitation for agriculture, horticulture and forestry as possible leverage at household and community scale:

Activities

- Quantify potential biogas generation given selected locations
- Develop a cost-benefit matrix of all biogas collection and end-use options given expected biogas production (e.g., direct use for cooking or water heating, bottling, conversion to electricity, sludge for agriculture)
- Implement a biogas recovery project for various use options

Expected Result

- Comprehensive plan for implementation of cost-effective biogas option
- Transferable guideline for incorporating biogas recovery into sanitation facilities in Ghana, including institutional analysis of all relevant stakeholders (e.g., government agencies, technology suppliers, end users)

Duration: 3 years
Budget: GH₵**500,000**
Funding Agency: Development partners- AfDB, USAID, World Bank
Implementing Agencies: Ministry of Local Government and Rural Development (MLGRD) through its Municipal and Metropolitan Waste Management Departments, contracted treatment plant operators, Environmental Health and Sanitation Departments in Tema and Accra, IWMI, etc

Training for Implementation – Hand washing Pilot Project (Schools Health Programme)

S/N	Training of School Health Management Committees & Coordinators under the School Health Education Programme (Installation of Handwashing Facilities in 1000 Pilot Basic Schools in Ghana)	Regions	No. of Basic Schools under Pilot	Consultancy fees (Per Sch.)	Total Consultancy fees (All Schools)	Total DSA for Consultancies (All Schs)	DSA for Consultants (All Schs)	Equipment per School	Total cost of Equipment (All Schs)	Report per Sch.	Reports (All Schs)	Total Amount (GH₵)
1	Procure Consultants to train School Management Teams of Pilot Schools	10	1,000	8,500.00	8,500,000.00	800.00	800,000.00	500.00	500,000.00	250.00	250,000.00	10,050,000.00
2	Procure Consultants to train School Health Coordinators of Pilot Schools	10	1,000	8,500.00	8,500,000.00	800.00	800,000.00	500.00	500,000.00	250.00	250,000.00	10,050,000.00
	TOTAL AMOUNT				17,000,000.00		1,600,000.00		1,000,000.00		500,000.00	**20,100,000.00**

Procurement of Polytanks, etc - – Hand washing Pilot Project (Schools Health Programme)

S/No.	Procurement and Installation of Polytanks/Procurement IEC Materials for High Impact Campaign under the School Health Education Programme in 1000 Pilot Basic Schools in Ghana)	Regions	No. of Basic Schools under Pilot	Number	Cost per Unit	Total Amount (GH₵)
3	Procure 1250 Polytanks (1,000 litres) for Institutional Latrines	10	1,000	1,250	350.00	437,500.00
4	Install 1250 Polytanks (1,000 litres) on concrete platforms in 1000 Basic Schools	10	1,000	1,250	200.00	250,000.00
6	Procure Audio-visual Aids/Information, Education & Communication Materials (Banners, Wooden frames, twine, etc) - Lumpsum	10	1,000	1,000	500.00	500,000.00
7	Prepare and produce awareness creation and user education brochures for Schools	10	1,000	1,000	500.00	500,000.00
8	Implement High Impact Campaign on Handwashing With Soap in Pilot Schs	10	1,000	1,000	1,000.00	1,000,000.00
	TOTAL AMOUNT					**2,687,500.00**

Future Plans and Policy Recommendations

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
1. Supply-Side: Increase in coverage of potable water	MWRWH: • GWCL • CWSA • WRC MLGRD • MMDA's • CBRDP MEST • CSIR-WRI NGOs Individuals Private firms	No. people with access to potable water Total volume of water produced per day Number of production plants/ Boreholes Capacity utilization of water production plants Number of buildings with rainwater harvesting systems	GoG Budgetary allocation to MMDA's Development partners User fees Water Fund Individuals NGO's

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
1. Supply-Side: Increase in coverage of potable water	Increased Access to Potable Water	Increase household connections to mains Increase production capacity (Expansion and Development) Reduce losses at production level Increase efficiency of system Reduce transmission losses Reduce illegal connections Increase revenue collection Increase number of rainwater harvesting systems	Increased coverage/access Reduced water losses Increased revenue Increased investment	Residential homes Industries Utilities Communities Public Government Institutions Individuals

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
2. Water loss (physical and commercial)	MWRWH • GWCL • CWSA • Water Boards MLGRD • MMDAs	-Percentage of unaccounted for water -Percentage of lost revenue -frequency of pipe-burst -Age of equipment (pipe, pumps, motors etc.) -Length of 'spaghetti' pipes -Number of illegal connections -Number of in-line pumps -quantity of water spilled during tanker services	-Gov. of Ghana (national/local) -Budgetary support -allocation of MDAs -Water Funds

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
2. Water loss (physical and commercial)	-reduce losses in water supply -increase water supply -increase revenue collection	-repair leakages at plants -replace aging pipes -attend quickly to burst pipes -retrofit household taps, Pipes -increase revenue collection -meter successfully -institute deterrents for pilfering -encourage people to report and give incentive.	-Minimal or losses during production -leak -proof mains/distribution system -reduced losses during pipe-burst -accrued enough funds fir investment -be informed of the amount of water lost	-Utilities -Household -Industries -other users

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
3. Access to Sanitation Service	MWRWH • CWSA • Water Boards MLGRD • MMDAs MOH • Public health directorate MOEd • GES – SHEP programme NGO, CBO, FBO Private Sector	-number of waste water treatment plants -number of functioning waste water treatment plants -number of improved latrines -number of public places (lorry parks/markets/schools) with access to improved latrines -distance trekked to access sanitation -number of functioning Sanitation facilities -access to waste disposal sites	-Gov. of Ghana (national/local) -Budgetary support -allocation of MDAs -NGOs -Direct taxes -Private sector support

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
3. Access to Sanitation Service	-reduce by half population without safe sanitation by 2015 -develop local market for recycling products	-replace existing pan-latrine with improved -conduct public awareness and education on sanitation. -increased density of improved sanitation facilities -encourage households to promote sanitation -improve solid waste collection infrastructure -provision of recycling and reuse plants	-phasing out of pan-latrines -increased awareness and choice for sanitation facilities -improved access to sanitation services -reduced pressure on existing facilities -increased access to sanitation facilities -improved life-span of sanitation facilities -increased per capita access to sanitation facilities -improved environment -sustained recycling capacity -reduced waste for disposal -Created jobs and capital	-MMDAs -Households -Industries/factories -markets -schools -Hospitals -Churches -communities

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
4. Water Pollution	MWRWH	-number of waste dumps along water bodies	-Gov. of Ghana (national/local)

	• WRC MLGRD • MMDAs MOE • Universities MTI • Factory inspectorate department MEST • EPA • CSIR-WRI Communities/Individuals	-number of development within buffer zone of water bodies -number of factories/industries without wastewater treatment facilities -number of defunct waste water treatment plants -monitor raw water quality -number of factories/industries not meeting emission guidelines -level of pollution awareness -norms of societies regarding water bodies -cost of water treatment	-NGOs -Private sector support -permits -Licensing -Bills -charges/penalties -Budgetary support -allocation of MDAs -Water Funds

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
4. Water Pollution	Safeguard and improve the quality of water bodies	-carryout education/awareness on human activities and pollution of water bodies -decongesting/protection of buffer zones -enforcement of EPA bye-laws on effluent discharges -sampling and analysis (monitoring) of raw water quality	-reduced dumping of waste in water bodies -clean buffer zones and easy access to flows -cleaner environment - Cleaner water bodies - higher biodiversity -reduced fish kills -improved livelihood for riparian (rivers)	-Utilities -Household -Industries - MMDAs -Households -Industries/factories -schools -Hospitals -Churches

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
5. Water Resource Development	MWRWH • GWCL • CWSA MLGRD • MMDAs • Communities • Individuals MoFA • GIDA MES • Universities MEST • CSIR-WRI NGOs, FBOs, CBOs	-number of new recharge systems -number of new domestic rainwater harvesting systems -number of new flood retention reservoirs -number of new dams/dugouts -number of new wells/tube wells/shallow groundwater wells	-Govt of Ghana (national/local) -Development partners -NGOs -individuals -communities -MDAs -Water Fund

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
5. Water Resource Development	To increase the per capita quantity of freshwater available	-construct wells/boreholes -construct rainwater harvesting systems -harness flood and runoff waters -construct groundwater recharge systems -construct dugouts/dams	-increased and sustainable volumes of accessible fresh water	-GWCL -CWSA -communities -individuals -farmers -industries/factories

IMPLEMENT AND MONITOR

Policy/Pilot Activity	Implementing Institution	Verifiable indicators	Possible Source of funding
6. Water Resource Management	MWRWH • WRC • GWCL • CWSA MLGRD • MMDAs/Water Boards • Communities • Individuals MoFA • GIDA MEST • CSIR-WRI • EPA MLNR • Forestry Commission NGOs/FBOs/CBOs	-well developed and updated water resources database -number of water resource management programmes -increasing availability of freshwater (spatial and temporal) -number of available basin boards -number of effective basin boards -enhanced ecosystems (rivers, lakes, dams, forests, communities, farmlands, markets) -ecologically responsible and responsive communities / individuals	-Govt of Ghana -Development partners -NGOs -individuals -communities MMDAs -Water Fund

DEVELOP

Policy/Pilot Activity	Objective	Activities	Results/Outcomes	Target Groups/Sector
6. Water Resource Management	To ensure ecological soundness of resources	-institute water basin boards -collate and document information on water resources -carry out water resources monitoring activities -carry out basin-wide monitoring -create, intensify and sustain awareness on water and sanitation -improve aquatic flora and fauna -improve basin flora and fauna	-improved water resource base (quantity and quality) -enhanced ecological behavioural attitudes of individuals -increased access to reliable and adequate data	-GWCL -CWSA - MMDAs/WRC -communities -individuals/farmers -ecosystems -industries/factories -MWRWH

Linkages with other SCP Sub-groups

The following linkages were identified to exist between the Water and Sanitation sub-group and the following other sub-groups under the Sustainable Consumption and Production.

a. Agriculture

Agriculture tends to pollute the ecosystem including the water resources downstream of the activity. Pesticides, herbicides and other toxic substances leached from the agricultural activity mainly because of improper use by the vastly illiterate administers of these substances end up in the river/stream systems. Agriculture also uses substantial quantities of water and when this is extracted from rivers/stream, create problems of equity in the distribution of the resource. Improper drainage of agricultural land create logging conditions that promote the proliferation of water-borne diseases. The practise of harvesting rainwater and flood water could go a long way in addressing some of the negative attributes of mechanise agriculture and put to use water that could rather have gone waste.

b. Waste Management

Waste management is a global problem in the Ghanaian context. Communities tend to site waste disposal sites too close to water bodies and solid waste as well as polluting leachates end up in the water bodies, silting and contaminating the resource. In the urban areas, landfill facilities not only spew toxic leachates into nearby communities and water bodies, but also cause extensive and pervasive stench around surrounding communities.

c. Human Settlement (drainage planning, rainwater harvesting)

The development of settlements have been fraught with poor planning. Drainage, open spaces etc are neglected to the detriment of water bodies. These water bodies face the onslaught of reclamation with the result of dwindling streams and ponds. Water channels are block thus preventing the smooth flow of water. The lack of a rainwater harvesting policy also means that all the hard surfaces resulting from the development of settlements concentrate rainwater that would have infiltrated the soil and this water ends up flooding the same or other settlements.

d. Transport

The transport sector introduces some challenges to the sustainable development of the water and sanitation sector. Hydrocarbon spills from ill-conditioned vehicles, garages and washing bays are sources of pollution to river resources including flora and fauna. A large number of garages and washing bays are located close to or directly in water courses and are a constant source of pollution into them.

e. Energy

The high dependence on fuel wood is having a heavy toll on forest cover and especially on water catchment areas with the result that flows in these rivers are constantly degrading. Runoffs are steadily increasing with the result that moisture infiltration into deeper soil layers is reducing. Additionally the

bare earth resulting from deforestation is leading to increased solar absorption / reflection that promote adverse climate change impacts. Water detention on land is reduce due to eroded soils, reduced organic matter in topsoil and increased solar radiation incidence.

f. Tourism

Nature and recreational tourism has a negative impact on the fragile ecosystem leading to disruption and degradation of river catchments and the ecosystem. Additionally recreational activities in rivers result in pollution due to excessive pressure from tourists.

g. Manufacturing

Effluents of manufacturing industries are the main polluting agents of river ecosystems. Heavy use of water by manufacturing industries is additionally a source of concern as far as equitable water distribution goes. Industries could take advantage of their large roof surface areas to harvest and use rainwater for substantial portions of their water demand.

h. Chemicals

Chemical spills, improper disposal of wastes and incorrect use of substances are main areas that affect sustainable water exploitation.

i. Research and Education

Research could provide solutions for resource conservation, efficient use of water, better and cheaper methods of waster disposal, cleaning etc that could help with sustainable water use. Proper education of the populace on the right way of resource conservation, waster management and general ecosystem management could bring about proper attitude for sustainable resource use.

j. Economic Instruments

Economic instruments mainly focus on deterrents however the institution of incentive packages that spur people on to do the right thing could help achieve the aim of sustainable exploitation of resources for increased development. This could be applied across all the sub-groups which could lead to more water and sanitation services.

k. Mining

Mining tends to pollute rivers and the ecosystem. River flow is disrupted and vegetative cover, the main protection of water resources is removed en masse creating heavy disruptions of the entire ecosystem. Reclamation activities only barely recover the natural state of the ecosystem.

l. Consumer Behaviour (changing negative attitudes and behaviour)

Human attitudes and behaviour is the major culprit on sustainable development. Excessive consumption generates large quantities of waste that is difficult to manage and which affects the environment. Negative attitudes create problems regarding the sustainable use of resources. Pollution, waste

disposal, abiding by the law, care of the environment etc are all issues that consumer behaviour can help address.

References

B. Abeiku Arthur, 2009, Presentation at Urban Platform at the Institute of Local Government Studies, Accra,

Cofie Olufunke and Gordana Kranjac-Berisavljevic (2004) Comparison of formal and informal agricultural water development using appropriate environmental and social indicators, in Ghana. IWMI Internal Report

Community Water and Sanitation Agency (CWSA) Act 564, 1998

Constitution of the Republic of Ghana, 1992

Council for Scientific and Industrial Research (CSIR) Act 521, 1996

CSIR-WRI, 2003, Ghana Raw Water Criteria and Guidelines, Volume1 – Domestic Water Use, Water Resources Commission

E. Larbi, 2009; Improved Sanitation and Water Supply Service Delivery to the Urban Poor in Ghana through Tripartite Partnerships project

GWCL, 2008, Ghana Water Company Limited at a Glance

IWMI (2008). Feasibility Study– Evaluation of the Faecal Sludge and Wastewater Treatment Plants. IWMI Internal Report

Lands Commission Act 483, 1994

Local Government Act 462, 1993

National Environmental Sanitation Policy, 2007 (Revised)

National Water Policy, 2007

P. Agyare-Kwabi, 2009; Review of current school sanitation demand and practice

PNDCL 256 Fisheries Law, 1991

Public Utilities Regulation Commission (PURC) Act 538, 1997

The Environmental Protection (EPA) Agency Act 490, 1994

The Minerals Commission Act 450, 1993 and The Minerals and Mining (Amendment) Act 475, 1994

The Statutory Corporations (Conversion to Companies) Act 461, 1993

The Volta River Development Act 46, 1961

WASHCost, 2008; Rapid assessment of the water sanitation and hygiene services sector in Ghana

Water Resources Commission Act 522, 1996

SUSTAINABLE DEVELOPMENT ACTION PLAN

CONSUMER BEHAVIOUR

INTRODUCTION

At the UN World summit on Sustainable Development in Johannesburg in 2002, all governments were called upon to shift from unattainable patterns of consumption and production to sustainable consumption and production (SCP). In order to accelerate the shift towards SCP governments were called upon to promote the development of a 10-year framework of programmes on SCP. The international collective effort to develop their framework of programmes was named the "Marrakech Process" since the 1st international expert meeting on the 10-year framework programme took place in Morocco.

Sustainable consumption and production maximises business' potential to transform environmental challenges into economic opportunities and provides a better deal for consumers. The challenge is to improve the overall environmental performance of products throughout their life-cycle, to boost the demand for better products and production technologies and to help consumers in making informed choices.

Consumer behaviour is key to the impact that society has on the environment. The actions that people take and the choices they make – to consume certain products and services rather than others or to live in certain ways - all have direct and indirect impacts on the environment, as well as on personal (and collective) well-being. This is why the topic of 'sustainable consumption' has become a central focus for national and international policy.

This report was commissioned by the Sustainable Development Research Network as a preliminary review of the research on consumer behaviour and behavioural change. These issues are becoming increasingly important in the context of emerging debates about consumption, consumer behaviour and sustainable development. Policy development in the context of behavioural change is notoriously difficult. One of the reasons for this is the enormous variety of factors that influence behaviour. Another is the 'value laden- ness' of behavioural and lifestyle issues. At the same time, there is a widespread recognition of the need to engage in this difficult terrain and to develop 'evidence-based policies' to support behavioural change. Nowhere is this more relevant than in the domain of sustainable consumption.

Supply side of production processes

In the future, competitive industries will need to design for environment, health and safety as well as for productivity. Although the new areas of pollution prevention and clean production have evolved to address the design of production processes with concerns for the ambient environment, current pollution prevention models do not include explicit concerns for health, safety, and the work environment. The field of occupational health and safety has much to contribute to improve current pollution prevention approaches and solutions.

The application of work environment disciplines will need to be expanded from the conventional focus on end-of-pipe assessment and solutions, which take the production processes and resulting hazards as a given, to include a new focus on materials selection and process redesign. To make this shift, a new

framework called sustainable production is proposed. The basic unit of sustainable production is the production process. The framework integrates a focus on the ambient and work environment along with a focus on productivity and the economic viability of the business enterprise in setting production process design parameters.

By shifting the focus of occupational and environmental health and safety from exposure control to process design, sustainable production reduces the likelihood that concerns for health, safety, and the environment will be seen as antagonistic to productivity and economic development. To move a firm toward sustainable production, occupational health and safety professionals will need to participate in interdisciplinary workplace teams that design and build new production processes and that continuously evaluate and redesign existing processes.

This new strategy requires an expansion of the role of the occupational health and safety professional to include evaluation and redesign of processes that produce goods and services as well as the conventional evaluation of chemical, physical, and biological agents, work practices, and ergonomics. This expansion of occupational and environmental health and safety requires new research to develop the scientific and public policy basis of sustainable production

Demand side consumption patterns of

Satisfaction of customer's demand seems highly dependent on the supply side. Nevertheless, in order to understand better firm's decisions on their products and services we should investigate the demand side as well. Parallel to the re-think strategy of product development, firms should define their answer to customers' expectations in a new way. This means companies need to understand better the motivators of consumption.
Several studies revealed the trends of today's consumption.

- Are these trends forming according to the sustainability concept? Do these trends have any contact with sustainability?
- Can they be transformed in a sustainable way or at least apply them in any way connected to sustainability?
- Can they be used when segments are formed according to consciousness?
- Should there be conscious segments formed or corporate competitiveness will force firms to integrate triple bottom line of sustainability – and this way every product and service will be involved?

Neither one of these questions are easy to answer. Nevertheless, there are 'good' examples, where customers' and suppliers' interest overlap the concept of sustainability.

Promotion of Sustainable Consumption and Production

As the growth pattern is defined by the sum of production and consumption patterns, sustainable consumption can be an opportunity for improving the eco-efficiency of economic growth. Changing production patterns has taken a very good speed and cleaner production is relatively enhanced by various governmental initiatives throughout the region. Enhancing the consumption patterns of the society needs to be taken more seriously now, when the countries are setting up their development patterns, since this is directly reflected and has strong impact on the lifestyle and forming consumer behaviour. Demand side management is emerging as a tool with critical importance that can regulate

and stimulate sustainable consumption. The role of the public sector is to create a conducive environment for more investments necessary to provide for sustainable consumption choices and in applying demand side management with the active support of citizens groups and the civil society.

Demand-side Management

As economic growth continues, demands for basic services such as transportation, safe drinking water, energy and housing rapidly increase. One particular case acutely highlighting this issue is urbanization.

Many towns in Ghana are experiencing rapid urbanization. Urbanization poses a serious challenge to policy makers on how to meet exploding demands arising from large population congregated into a compact space of a city.

Conventional approach to simply increase the supply of basic services is not enough. Now we have to look into the issue of how to manage and control exploding demands arising from rapid economic growth. In managing demands, we can use regulatory measures such as efficiency standards as well as market instruments.

Improving the eco-efficiency of demand is crucial for improving the eco-efficiency of economic growth pattern, which is determined by the eco-efficiency of the production and consumption patterns. Eco-efficiency of production side generally improves as economic growth continues. However, the eco-efficiency of production rather deteriorates with income rise, thus the need for demand-side management.

Action Plan for Sustainable Consumption, Production and Industry

Our current patterns of consumption and production have significant environmental impacts, including greenhouse gases, pollution and the depletion of natural resources. Much can be done to make the way we consume and produce in Ghana more sustainable, without additional costs for companies and households, and can bring benefits. There is the need to propose a package of actions and proposals to improve the environmental performance of products and stimulating the demand for more sustainable goods and production technologies. The Ghanaian industry should be encouraged to take up new opportunities and innovate in order to ensure its continued leadership in environmental performance. The Action Plan also explores means for promoting sustainable production and consumption internationally.

The list of actions encompasses:

- Ecodesign requirements for more products;
- Reinforced energy and environmental labelling;
- Incentives and public procurement for highly performing products;
- Green public procurement practices;
- Consistent product data and methodologies
- Work with retailers and consumers;
- Supporting resource efficiency, eco-innovation and enhancing the environmental potential of industry;
- Promoting sustainable production and consumption internationally
-

A New Framework for environmental Product Policy

A range of policies at national level already foster resource efficient and ecofriendly products and raise consumer awareness. The Action Plan complements and integrates the potential of different policy instruments such as the Food and Drugs Law 1992, PNDCL 305B , the Standards Decree, 1973 (NRCD 173) and provides for new action where gaps exist.

Energy and Resource-efficient Products: The Eco-design Directive

The **Eco-design Directive** so far allows setting compulsory minimum eco-design requirements for energy-using products, such as boilers, water heaters, computers, televisions or industrial fans. Energy-using products consume a large proportion of energy and other natural resources in Ghana. It is proposed to extend the directive to all **energy-related products** – products which do not consume energy during use but have an indirect impact on energy consumption, such as water-using devices or windows. For example, water-saving taps and shower heads can reduce water consumption and therefore the energy used for hot water, and by consequence save resources and money, without altering the user's perceived well-being. Next to minimum requirements, the Eco-design directive will also define **voluntary benchmarks of environmental performance,** achieved by highly performing products. If some water boilers reduce their energy consumption to a larger extent than other similar products, this high performance should indeed serve as a benchmark for industry.

Reinforced Energy and Environmental labelling

While the Eco-design ensures a technical improvement of products, labelling enhances transparency for consumers by indicating the energy or environmental performance of products. The Energy Commission proposes that mandatory labelling of products according to their energy or environmental performance is extended to a wider range of products, including energy-using and energy-related products. As a regulatory body, the Energy Commission encourages building energy efficiency standards and insists on energy efficient appliances. This it has done through the enactment of L.I 1815 namely Energy Efficiency Standards and Labeling (Non-ducted Air Conditioners and self-ballasted Fluorescent Lamps) Regulations, 2005. A wider range of products will be labelled about their energy or environmental performance to improve consumers' awareness. For example, labels indicating the insulation capacity of windows would help consumers to choose better windows when renovating their home, and save money on their electricity.

The Ecolabel is a **voluntary label** which is awarded to the most environment friendly products on the market. It enables private consumers and public authorities alike to identify and buy 'greener' products. The scheme will be strengthened by widening the number of products covered and making the system less costly and bureaucratic. It will thus act as an incentive for manufacturers to go beyond the mandatory minimum product standards. Due to its broader scope the Ecolabel will also cover products and services, including food and drink products, for which ecodesign and energy related requirements will not be set.

Setting Incentives

The Action Plan proposes that only products attaining a certain level of energy or environmental performance can receive incentives and be procured by stakeholders. Incentives to consumers that buy eco-friendly products should be granted for very different levels of energy or environmental performance.

Promoting Green Public Procurement

Public authorities spend large amounts on the purchase of goods and services. In particular in certain sectors such as construction, transport, office equipment, cleaning services, public purchasers could give strong signals to the market place by asking for greener goods, thereby stimulating the supply of more environmentally friendly goods and services. In addition to the instruments above, further voluntary measures aim to increase the potential benefits of Green Public Procurement. The Ghana Public Procurement Authority will provide guidance and tools for public authorities to green their procurement practices. This will include common environmental criteria, the setting of targets and providing model tender specifications.

Consistent Data and Methods on Products

To implement this policy, consistent and reliable data and methods are required to assess the overall environmental performance of products and their market penetration and to monitor progress. The relevant authorities will build on ongoing work in this field, so that, inter alia, data on products and related environmental impacts collected under different tools are shared.

Work with Retailers and Consumers

Retailers are in a strong position to influence sustainable consumption. Individual retailers will commit for example to offering more sustainable timber products, to promote the purchase of energy-saving light bulbs, and to reduce their own carbon footprint.
A Retail Forum should be set up to promote the purchase of more sustainable products, to reduce the environmental footprint of the retail sector and its supply chain, and to better inform consumers. Other stakeholders, such as producers, consumer and other non-governmental organisations, will also be involved. Actions to increase consumer awareness and help them make more informed choices, for instance by developing tools to inform young people and on-line education tools for adults on sustainable consumption.

2. Promoting Eco-friendly and Cleaner Production

A range of actions will provide further impetus to promote resource efficient and eco-innovative production:

Boosting resource efficiency

Resource efficiency means creating more value while using fewer resources. This means that Ghana has to stabilise resource use in a growing economy. Tools to monitor, benchmark and promote resource efficiency will be further developed; detailed material-based analysis and targets will be addressed in a second step.

Supporting eco-innovation

The level of innovation can be measured by the amount of patents in the area. Tools should be developed to monitor benchmark and boost the uptake of eco-innovation in the Ghana.
Furthermore, an environmental technology verification scheme should be established to provide reliable third-party verification of the environmental performance of new technologies. This will be voluntary and based on a regulatory framework. It will help to provide confidence to new technologies emerging on the market.

Developing industrial policy initiatives for environmental industries

Environmental industries provide solutions for measuring, preventing and correcting environmental damage to water, air and soil, and for problems such as waste, noise, and damage to eco-systems. They include sectors such as waste and waste water management, renewable energy sources, environmental consulting, air pollution, and eco-construction.
The Government must first analyse the barriers to the expansion of eco-industries and to their full uptake by traditional industries, such as administrative burdens and obstacles to financing of innovation. The objective is to create a friendly regulatory environment for the development of industries in the Ghana.

Helping Small and Medium Size Enterprises

Channels to encourage SMEs to adopt environmentally friendly and energy efficient solutions. The action will also aim at developing content for training and disseminating tailor-made information and knowhow about energy saving and environmental compliance for small companies.

3. Contributing to Sustainable Consumption and Production Internationally

Promote sectoral approaches in international climate negotiations

Industry sectors are starting to develop agreements in order to commit to specific emission reductions or energy efficiency targets. Businesses in emerging as well as developed economies thus commit to reduce their greenhouse gas emissions. It also avoids that some companies of a sector suffer from carbon constrain while others competitors benefit from carbon havens. Government should support such approaches in the context of future international negotiations on climate change. Activities will include capacity-building in key emerging economies and determining key elements to build such approaches as part of a comprehensive international climate change agreement for the period after 2012.

Promote and share good practice internationally

Sustainable consumption and production policies (SCP) will be promoted, in particular as part of the United Nations SCP 10-Year Framework Programme (Marrakech Process). The Action Plan will provide a contribution for future work that is carried out in collaboration with the UN, and additional action will be taken to strengthen partnerships in this field.

Promote international trade in environmental goods and services

The government should continue its efforts for trade policy and industry dialogue to work towards the elimination of tariffs for trade of low carbon technologies and environmentally friendly products and services.

On the Road to Sustainable Lifestyle

Trends of activities and policies

Recent trends indicate that many pressures on the environment from household consumption continue to grow despite improvements in resource efficiency. Consumption growth in the country is closely linked to lifestyle changes. The size of households is becoming smaller. Standards of comfort are rising. Ready meals are becoming a common habit. Dependence on private cars is increasing. People are travelling more frequently and with longer distances (especially via low-cost airlines). Electrical appliances are growing in numbers and varieties. This continuing increase in total resource consumption is accompanied by an extreme inequality in consumption between developed and developing countries. The overall consumption of the richest fifth of the world's population is 16 times that of the poorest fifth, with the latter deprived of basic human needs. Thus, raising consumption levels of the poor is also one of the most urgent SCP issues.

At the Costa Rica meeting in 2005, it was recognised that it is important to have a forward-looking vision of sustainable lifestyles in order to effectively promote sustainable consumption. Policies can then be formulated based on that vision and appropriate measures devised, which include wise use of products and services as well as consideration on the level of consumption in general. Typical policy interventions clearly have a significant role to play in promoting sustainable consumption. The current trend in the development of environmental regulations is driven towards increasing the focus on products and their associated life-cycle impacts. Informational instruments aim at increasing overall consumer awareness with regard to consumption choices. Education, media channels, and labelling mechanisms are often used. However, many studies have illustrated that information provision is not sufficient to achieve required behavioural change.

People need to have sufficient incentives or peer pressure to consider actually changing their consumption behaviour. Consumers need to be engaged in more effective ways, for example, by using innovative communication strategies and better branding of sustainable lifestyles to motivate and inspire them. Local community-based actions encourage bringing behavioural changes collectively. Environmental information can be more effective to shift consumer behaviour when it is related to other consumer concerns such as health (e.g. organic food) and reduced cost of ownership (e.g. energy efficiency of electronic appliances). Other methods include collaboration with advertising agencies and trend-setters for elaborating "sustainable marketing". Pioneering companies can take on the imperatives of sustainable consumption as their innovation opportunities. Providing consumers with environmentally and socially sound choices such as organic food and Fair Trade products is becoming successful business models as awareness among citizens is growing. Understanding what concerns people as citizens would help businesses to identify new product and service development prospects as well as to avoid being vulnerable to criticism or civic campaigns. However, the level of awareness of sustainable consumption is still low among businesses in Ghana. Governments have an important role to prepare a policy framework to create a business case and provide a level-playing field for encouraging businesses to conceive innovation that makes sustainable lifestyles realise, for instance, by ruling out high-impact products and charging fees for pollutive choices.

With respect to developing countries, which tend to follow the development path of developed countries, there still are opportunities to avoid many of environmental and social problems associated with affluent consumption by addressing their consumption issues sooner rather than later.

Challenges

- Despite availability of various public policy instruments, little changes have been seen in the behaviour of consumers. The challenge is that governments create right conditions in which consumers are encouraged to rationally behave towards sustainable consumption by combining different types of policy instruments wisely.
- The development of national action plans on SCP can be a cornerstone for achieving progress towards sustainable consumption. It is important for countries to first build a vision for sustainable lifestyles and then to develop national action plans based on it. These plans need to address how to empower consumers to make sustainable choices, taking into account their social and cultural conditions.
- There is a need to develop methodologies and indicators to measure and encourage progress towards sustainable consumption. Addressing consumption impacts in a life-cycle framework poses particular methodological challenges.
- Given the pivotal role of education, a clear link between school and consumer education for SCP and the UN Decade of Education for Sustainable Development is still yet to be established.
- Communicating effectively about sustainable lifestyles is a challenge. Public communication and advertising have key roles to play to make sustainable consumption understandable and fashionable.
- Making a strong business case for sustainable consumption is a major challenge. Business leaders need to be aware of their potential role to drive consumers towards sustainable lifestyles.
- Sustainable consumption tends to be seen as irrelevant to developing countries. There is a need to clarify the consumption issues for developing countries as well as to elaborate a vision of sustainable lifestyles at which people in those countries (especially the “global consumer class”) can aim.

GREEN PUBLIC PROCUREMENT/SUSTAINABLE PUBLIC PROCUREMENT

The unachieved potential of Green Public Procurement (hereafter referred to as GPP) also known as Sustainable Public Procurement is defined here as a process whereby public and semi-public authorities seek to procure goods, services and works with a reduced environmental impact throughout their life cycle when compared to goods, services and works with the same primary function that would otherwise be procured. It is a process that promotes, but does not necessarily lead to, the purchase of a "green" product. GPP procedures can bring a number of different benefits, the extent of each benefit below depending on both the product group and the criteria used in purchasing.

• **Direct financial benefit to purchasing authorities**

For products that consume resources over their lifetime, the purchase of more resource efficient products can significantly cut costs for users, even where the initial expenditure is higher. Examples are office equipment, lighting, vehicles, buildings. Example: A Life Cycle Cost evaluation of alternative HVAC Systems (Heating, ventilation and air conditioning systems) carried out in the US in 2005, has led a public authority to buy a HVAC system, based on an alternative energy-efficient "green" technology, whose energy consumption was markedly lower so that cost savings outweighed higher capital and maintenance costs as well as yielding
environmental benefits in terms of reduced greenhouse gases and other air pollutants.

• Stimulating development and diffusion of environmentally beneficial technologies

Our current consumption in Ghana causes environmental damage at rates that are unsustainable. If the world as a whole followed traditional patterns of consumption, global resource use might quadruple within 20 years. It is necessary therefore to stimulate the faster development and diffusion of environmentally beneficial products.

There are two effects:

- Environmentally better goods are often niche products for which increased demand will lead to economies of scale, allowing products to move into mainstream markets. Ultimately, the economic benefits from the reduced costs may accrue not to the public procurer but to other buyers.
- The pull of public procurement may stimulate greater and faster technological innovation or breakthrough that will ultimately lead to lower unit costs and mass market availability. A recent OECD Report on the Environmental Performance of Public Procurement (2003) refers to several examples of green product invention in response to procurement initiatives, including the development of highly energy efficient clothes dryers, electric motors, and office copiers (Westling 2000).

Cost efficient achievement of environmental goals

Where GPP leads to the purchase of greener products, the reduced environmental impact from those products will contribute to achieving existing environmental goals
– and could do so more cheaply than other available policy instruments. This would lead to a reduction in the cost of achieving those environmental goals. For example, it may be cheaper for an authority to meet local air quality standards through the additional cost of purchasing cleaner buses than by setting (more costly) restrictions on pollution from domestic boilers.

• Maximising social benefit from public expenditure

Environmental problems impose costs on society, for example through sickness from poor air quality or social costs from waste disposal. As the goal of public expenditure is to improve social benefit, where purchases contribute to environmental problems, they are reducing the real social benefit from the expenditure. GPP helps to reduce the environmental problems resulting from public purchases, better achieving the efficiency of public spending. It is rare that the operation of good GPP would lead to a decision that did not increase the social benefit.

By way of example, a recent German study has established that, for instance, the "green" electricity generated by renewable electricity producers who received €2.4bn through Germany's "feed in" preferential tariffs in 2005, allowed avoiding €2.8bn of social costs that would have occurred if it had been produced in fossil fuel power stations.

Background: The Scope for Impact of Green Public Procurement

Public authorities in Ghana have purchasing power equivalents which are quite on the high side. Office machinery, transport, food and catering, energy, construction, waste management are all areas with major environmental impacts where public authorities, because of their relatively large spending power in those areas, have the capacity to trigger the supply of products with improved environmental performance and reduce their own environmental impact.

Example 1: Public procurement represents for instance about 33 % of the European bus market: specifying requirements aimed at reducing CO^2 and pollutant emission.

Specific Problems

Expert studies, have identified the specific problems which hinder the realization of the potential benefits of Green Public Procurement (GPP).

i. *Lack of awareness of benefits, misperception of the extent of costs, and lack of political priority for GPP.* There is a common misperception that GPP will always lead to additional costs. In many cases, this perception results from sub-optimal budgeting practices or from a lack of life cycle costing20 in award procedures. Lack of appreciation of the benefits partly arises from uncertainty on how to take account of wider non-monetary benefits from green purchasing: this is for instance the case of organic food, where the economic benefits are indirect and acknowledged through reduced health care costs at a later stage.

ii. In general, a lack of high level political support results in a lack of resources for implementing GPP. Where strong government support exists, as in the UK, France and the Netherlands -who have all issued ambitions to be amongst the leaders in sustainable public procurement- resources are made available to make studies, draft criteria, monitor implementation, facilitate country wide uptake of GPP. A lack of a strong centralized political message on GPP is reflected down the individual purchasing organizations who display a lack of management support for GPP by their purchasers, which further increases the effects of the problem.

iii. The lack of political support may result from a lack of clarity on the leadership and accountability for GPP, at ministerial level as well as within procuring authorities.

iv. Legal Problems: - All Stakeholders have raised the need to clarify certain outstanding legal issues. In particular, it needs to be clarified to what extent purchasers can include in their tender documents environmental criteria which relate to the production process. Technical specifications are minimum conditions that all bids need to comply with. Award criteria will be used by the contracting authority to compare the offers against each other and choose the bid offering best value for money. If given a significant weighting, most bids will comply with an environmental award criterion, but not necessarily. If the "relevance" for the product is to be determined on a life cycle basis, this may include for instance the inclusion of criteria related to emissions to water and air during the production process. It also needs to be clarified how to specify methods of proof (to verify compliance of claims by suppliers with technical specifications or selection criteria).

v. Different environmental criteria apply in different geographical markets (different areas and levels of environmental performance, different measurement methods), causing various problems:

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Appendix: GPRS Document – Policy Matrix on Mining

1.0 Introduction

The entire global community has realized the need to ensure sustainability in consumption and production practices in order to satisfy the needs of society today whilst securing supplies for future generations. This desire has been expressed at various global fora such as the UN Conference on the Environment and Development (UNCED) in Riode Janeiro, Brazil, 1992 and the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa in 2002. The Agenda 21 document, a blue print on the principles of sustainable development, could not have been a better expression of this desire by the international community.

Ghana has committed itself to mainstreaming sustainable consumption and production (SCP) issues in key sectoral policies, plans and programmes of Ministries, Departments and Agencies (MDAs) as well as in the activities of the private sector, mining operations inclusive, to link the promotion of SCP patterns to poverty reduction.

The concept of sustainability in consumption and production practices implies that the operations have built-in safeguards that ensure adequate protection of the environment, equity in the socio-economic distribution of benefits as well as fair returns to the state by way of adequate revenue generation to meet its responsibility to the people.

2.0 Overview of the Minerals Sector in Ghana

After four decades of stagnating fortunes due to economic, financial, institutional and legal problems that impeded investment in the sector, mining in Ghana began a steady and impressive growth with the launch of the Economic Recovery Programme (ERP) in 1983. Currently, mining contributes significantly to the country's export earnings (US$2.32 billion in 2008), government revenues and employment opportunities. In terms of total merchandise exports, the proportion accounted for by minerals rose from under 20% in the mid 1980s through 35.21% in 1991 to 45% in 2008 (Min.Com, 2009).

The formal mining sector employed 15,000 workers whilst it is estimated that about 500,000 people were engaged in small-scale and artisanal operations in gold, diamond, sand winning, quarrying etc in 2004 (Min Com, 2004). The minerals industry is a significant private sector supplier of social infrastructure including schools, clinics and other essential facilities in the host communities.

Ghana is ranked 11th in global output of gold (2,796,955 oz in 2008) and 2nd to only South Africa in production on the continent (Minerals Commission, 2009). Ghana also produces manganese, diamonds and bauxite, although their contribution to the national economy and government revenue is much smaller. Total production of manganese, bauxite and diamonds was worth

US$30.2 million, US$10.6 million, and US$26.0 million respectively in 2004 (Chamber of Mines, 2004). Limestone, sand and gravel as well as salt are all produced but in smaller quantities. Others produced are industrial minerals (silica sand, brown clay, quartzite, aggregate and dimension stone, kaolin, limestone, mica, etc.) as well as clam shells and lime (oyster shell).

Small-scale mining of precious minerals currently contributes significantly to Ghana's foreign exchange earnings. By 2007 total gold production of the country by small-scale miners had risen from 2.2% in 1989 to 12.1%. For diamonds, small-scale mining was responsible for 894,225 cts out of a total of 967,864 cts (92.4%) in 2006 (Minerals Commission)

3.0 Legislative Framework and Policy

The country's policy objective in the minerals sector is premised upon the need to establish a legal and macroeconomic environment that would attract investments in new exploration and encourage further investments and expansion of existing mines. To this end a number of legal instruments, institutions and regulations have been carved out to guide the administration and management of the minerals and mining sector in Ghana. These are:

- Minerals and Mining Act (Act 703), 2006,
- Draft National Mining Policy of Ghana, 2007,
- Draft Minerals and Mining Regulations,
- Minerals Commission Act (Act 450), 1993,
- Ghana Environmental Action Plan I(GEAP I), 1991
- Ghana Environmental Action Plan (GEAP II), 1994
- Environmental Protection Agency Act (Act 490), 1994,
- Environmental Assessment Regulation LI 1652, 1999
- Ghana Poverty Reduction Strategy II Vol. I (GPRS II), 2005
- Guidelines for Mining in Production Forest Reserves, 2004
- Water Resources Commission Act (Act 522), 1996

The fundamental principles of the minerals sector policy are:

- Ensuring that Ghana's mineral endowment is managed on a sustainable economic, social and environmental basis
- Ensuring an equitable sharing of the financial and developmental benefits of mining between investors and all Ghanaian stakeholders
- Achieving a socially acceptable balance between mining and the physical and the human environment and ensuring that internationally accepted standards of health, mining safety and environmental protection are observed by all participants in the sector
- Promoting additional and alternative livelihoods in rural areas and supporting the development of Ghanaian mining skills, entrepreneurship and capital by encouraging and facilitating the orderly and sustainable development of small-scale mining in precious and industrial minerals

On its turn, the principles of the National Environment Policy as contained in GEAP I are:

- Optimum sustainable yield in the use of resources and ecosystems
- Use of most cost-effective means to achieve environmental objectives
- Use of incentives in addition to regulatory measures
- Delegation of decision-making and action to the most appropriate level of government
- Polluter pays for the cost of preventing and eliminating pollution and nuisances caused
- Public participation in environmental decision-making
- International co-operation

3.1 Minerals and Mining Act (Act 703), 2006

Surrender of mineral right (Act 14.3)

Where a mineral right is surrendered, the holder shall:

(a) leave all parts of the title area surrendered and everything thereon in a good and safe condition; and,

(b) comply with all regulations and other laws regarding site restoration, reclamation and protection of the environment.

3.2 Draft National Mining Policy of Ghana, 2007

The principal tool for the management of national mineral resources is a system of allocating rights to private sector mining companies and persons to carry out minerals exploration and mining operations in return for the performance of explicit and enforceable obligations. Two types of procedures exist for granting and keeping mining rights. One procedure relates to artisanal small-scale mining and the other procedure pertains to other mining operations that are not considered as small-scale. Both procedures require a license in order to exercise a mineral right.

3.2.1 Mining of Tailings (Reg 4.4)

The system of rights is sufficiently flexible to enable recovery of minerals by reclaiming mine dumps and tailings to take place.

3.2.2 Community Participation (Reg. 4.7)

Effective participation of communities in the licensing process may not be limited to the publication of the application at the Districts. The conduct of “public hearings” as part of the licensing process will keep the people informed about proposed mining activities coming on-stream in their area and allow them to fully participate in decisions that may affect them as a result of the mining activities.

3.2.3 Security of Tenure (Reg. 4.8)

Terms and conditions that guarantee security of tenure to mineral right holders and the right to proceed from prospecting to mine development once the commercial feasibility of mining are established under the new mining law (Act 703, 2006), in return for specific and enforceable commitments from mineral right holders, including the following obligations:

- To carry out prospecting operations in accordance with an approved programme of prospecting operations;
- To progressively relinquish portions of the area held for prospecting as prospecting advances;
- To move efficaciously towards determination of the commercial feasibility of mining following the discovery of minerals;
- To support an application for a mining lease with a comprehensive mine development plan (including a financing plan, market plan, environmental impact assessment and such other studies and proposals as are required under applicable legislation and obligations into which the applicant has entered under a mineral agreement) to demonstrate that the operations will ensure the efficient, beneficial and timely use of mineral resources;
- To conduct mining and related operations in accordance with the approved programme of mineral operations; and,
- To provide satisfactory undertakings to guarantee or secure performance of the mineral right holder's obligations at the prospecting and mining stages

3.2.4 Efficient Exploitation Methods (Reg 4.9)

Given the wide range of minerals found in Ghana and the numerous methods that can be employed to exploit them; provision is made for regulations to be developed that are suited to different methods and classes of mineral operations. This is necessary to ensure that mining operators employ techniques that are modern, efficient, safe and environmentally sound.

3.2.5 Securing Maximum Benefits and Minimizing the Cost of Mining (Reg 9.6) - Adding value to the country's minerals:

To minimize the cost of mining whilst reaping maximum benefits, captains of the industry have thoroughly examined the option of value addition to the country's minerals. The Government of Ghana on its part, will strategically and periodically, review economic and other measures to stimulate and encourage, especially, beneficiation. Where specific types of mineral beneficiation have been identified as beneficial to the economy, the sector Minister will collaborate with other Ministries and Agencies to facilitate the realization of the project. Besides, mining companies will be required to:

- include in their mining development proposals the case for or against minerals beneficiation

- submit to the Minerals Commission, reviews of beneficiation options periodically as agreed

3.2.6 Rural Transformation and Community Participation (Reg 9.8)

Mining has the greatest potential to stimulate the growth and development of the economies of rural Ghana. District Mining Committees – comprising the District Assembly, mining companies and the communities, is supposed to provide the forum for the exchange of ideas, planning and implementation of projects within the communities. As part of their corporate social responsibility to the people, mining companies shall be encouraged to actively participate in and support the realization of community initiatives, especially in the areas of health care, education, water and sanitation as well as other social infrastructure.

Government realizes that the benefits generated by mining in the form of fiscal receipts must be rationally disbursed, having regard to the needs of local communities most directly affected by mining. Government finds it necessary to introduce improvements to existing modalities for sharing and directing mining fiscal receipts to projects in local communities affected by mining.

Additional and supplementary measures intended to maximize the accruing benefits whilst minimising the negative impacts of mining on local communities are proposed as follows:

- training programmes and business development schemes developed by mining companies should give special emphasis to local beneficiaries
- mining companies address the provision of social amenities and infrastructure in their mining development proposals
- mining companies address the provision of support for health programmes in the workplace and the local community in their mining development proposals, with special emphasis on HIV/AIDS in accordance with national HIV/AIDS policies
- mining companies make proposals on community liaison and consultation arrangements in their mining development proposals
- local authorities, together with relevant government agencies, establish policies and procedures for full engagement of local representatives and other relevant stakeholders in planning and supervising local community development.

3.2.7 Exit Regime – Creation of Opportunities after Cessation of Mining (Reg 9.9)

Post-mine economic viability and sustenance of local communities has been a matter of grave concern to local authorities, NGOs as well as other stakeholders. Currently, mining companies are required to address opportunities for post-mine viability issues in their mining development proposals. The proposed measures meant for post-mine closure that should benefit the communities are to be implemented prior to closure, in consultation with Government agencies and the local community.

3.2.8 Recognition of the Rights and Interests of Landowners (Reg 9.10)

Government will balance the needs of mining companies with the interests of landowners and lawful occupiers of land by elaborating principles to govern amongst other things, the continued enjoyment of rights to graze livestock and cultivate the land subject to mineral rights, the payment of compensation by mining companies in respect of disturbance of owner's and occupier's surface rights in accordance with transparent and predictable compensation principles and procedures for the assessment of compensation claims and the settlement of disputes concerning compensation.

3.2.9 Occupational Health and Safety (Reg 6)

The National Mining Policy has an objective to ensure that all mining activities in the country are conducted in such a manner as to protect the physical environment, the workers and the general public. This will be achieved through the compliance with applicable environment, health and safety laws and regulations.

The various mining operations in Ghana are associated with different types of health and safety hazards thus requiring the national health and safety policy to implement different measures and systems to reduce mine-related deaths, injuries and generally, diseases associated with mining in the country.

Surface mining operations, which are capital intensive, have introduced their own peculiar health and safety hazards, which may result in increased lost time injuries at workplaces. Further, surface mining operations have brought mining into very close proximity with the mining communities thereby creating new health and safety risks.

Some of the occupational health and safety measures in-place are as follows:

- There shall be established health and safety standards for all mining operations in the country
- All companies shall conduct risk assessments to identify the various hazards inherent in their operations, rank these risks and ensure that effective controls are in place to ameliorate the risks
- Sustained educational campaigns shall be carried out in all mining areas in order to reduce the incidence of HIV/AIDS in mining communities and thereby stem the increasing incidence of opportunistic diseases such as tuberculosis that the HIV/AIDS pandemic has brought in its wake in mining areas
- District Assemblies and other local level structures shall ensure that children are not allowed into areas where mining operations are being carried out, particularly within artisanal mining/quarrying areas

3.3 Ghana Environmental Action Plan (GEAP I and II)

Provision has been made in respect of mineral resources, mining and processing and management of wastes and chemicals in the above document.

Sections of the document touch on the impacts from mining and processing on the environment. These include:

- visual impact
- solid waste disposal
- air pollution
- water pollution
- noise and blast induced vibration
- soil and land degradation

Some management practices have also been proposed to mitigate the potential impacts. These include:

- Land rehabilitation involving engineering and biological components
- Adoption of various chemical treatment processes
- Rational use and management of release of process water
- Usage of new technologies for processing of ore which hitherto had to be roasted to emit toxic gases

The relevant sections are:

1) Mineral Resources (Pg 42, GEAP I)

2) Mining and Processing (Pg 4, GEAP II)

3) The Management of Mining Wastes and Chemicals (Pg 8-12, GEAP II)

3.4 EIA Administration (Environmental Assessment Procedures- LI 1652, 1999)

Environmental impact assessment in Ghana has been developed primarily as an aid to the environment planning of new development projects, the expansion of existing development projects or the management of existing facilities. It differs from technical and economic planning techniques (feasibility studies) in that, it deals with the utilization of a common resource, that is, the environment. It is therefore appropriate that the procedure be mandatory, and be administered by a public agency.

The Ghana EIA Procedures were developed, published and launched in 1995. The procedures formed the basis for the Environmental Assessment Regulations

(LI 1652), 1999. The Regulations are divided into three parts with five schedules; the document deals with the various procedures to be followed prior to the grant of a permit; procedures for filing complaints; offences and penalty.

Environmental assessments are required to be carried out on specific undertakings in Ghana as a means of ensuring environmental soundness and sustainability in the development of the undertakings. Mining undertakings form one of the nine sectors to be considered for environmental assessment in Ghana.

Mining projects in Ghana that may be the subject of environmental assessment systems may be grouped as follows:

- Precious minerals
    - Gold
    - Diamonds, etc
- Industrial Minerals
    - Quarries (aggregates, limestone, sandstone, granite & marble, etc.)
    - Sand (dredge, pit, etc.)
    - Salt
    - Bauxite
    - Manganese, etc.
- Land Reclamation
- Mineral Processing

The environmental assessment systems refer to the relevant procedures for ensuring that:

- The planning phase follows and satisfies the provisions for environmental soundness and sustainability in the various decision-making processes, alternatives and options for eventual preferred scheme of development
- The operational phase follows the required management provisions to achieve environmental soundness and sustainability in the implementation of the undertaking. The operational phase is covered by environmental management plan (EMP).

3.4.1 Funds for Reclamation

An undertaking in respect of which a reclamation plan is required shall be required to post reclamation bond based on approved work plan for reclamation.

3.4.2 Suspension, Cancellation or Revocation of Permit and Certificate

(1) The EPA may suspend, cancel or revoke an environmental permit or certificate issued under these Regulations where the holder of the permit or certificate –

a. fails to obtain any other authorisation required by law in relation to his undertaking before commencement of operations;

b. is in breach of any provision of these Regulations or any other enactment relating to environmental assessment;

c. fails to make any payments required under these Regulations on the due date

d. acts in breach of any of the conditions to which his permit or certificate is subject; or

e. fails to comply with mitigation commitments in his assessment report or environmental management plan.

(2) The EPA may also suspend an environmental permit or certificate in the event of occurrence of fundamental changes in the environment due to natural causes before or during the implementation of the undertaking; and upon such change the environmental assessment report and the environmental management plan shall be revised on the basis of the new environmental condition.

3.5 Ghana Poverty Reduction Strategy II (GPRS II) Document, 2005

One of the key areas of focus recommended by the GPRS document is the restoration of degraded environment and sustainable means of natural resources management. The issues identified here are the destruction of the environment and the widespread pollution of especially, water bodies, by the activities of illegal miners. Whilst, currently there is no policy on the matter, the recommended strategy is for the control of the menace of mining, especially, illegal mining. *(GPRS Policy Matrix document is attached as Appendix)*

3.6 Guidelines for Mining in Production Forest Reserves, 2004

Mining in Production Forest Reserves

Ghana's forest reserves (FR) contain economically viable mineral resources which, have been identified in accordance with the *Operational Guidelines for Mineral Exploration in Forest Reserves for Selected Companies.* In response to concerns raised regarding the progression from exploration to mining, *Environmental Guidelines for Mining in Production Forest Reserves* were produced in 2001 to ensure that the negative environmental impacts of mining, specifically, in production forest reserves were addressed and all significant issues were taken into account in the decision making process for each potential mining project.

The adoption of environmental guidelines to specifically focus on mining in productive forest reserves has therefore been crucial to the nation's economic development. The step has proven to be sustainable and beneficial to Ghana, the reserves as well as the local communities.

Essential features of the Guidelines are outlined below:

- A maximum of 2% of the production areas of forest reserves shall be made available for exploration activities in-line with the agreed operational guidelines
- Adequate security measures must be in place from the pre-construction stage since mining activities shall open up the forest reserve to encroachment (e.g. galamsey operators) and ward them off.
- Selection of mining method should be guided by the following principles
    - minimize area of FR to be disturbed by project construction and operation
    - minimize land-take for support infrastructure
    - avoid disturbance to surface drainage features
    - avoid loss of high-value forest and habitats
    - adopt a design which is amenable to reclamation

- only the mine workings (e.g. mine pit) shall be located in the FR; all other facilities, e.g. process plant, offices, accommodation, waste repositories, etc. shall be sited outside the FR
- primary processing of mined ore prior to transport from the mine workings (e.g. crushing and screening) shall be carried out within the mine working area (i.e. within the open pit or underground)
- all mercantile/economic timber species shall be salvaged prior to commencement of mining
- 0.3% of the revenue generated shall be reserved for undertaking development projects in the forest fringe communities
- Establish a regulatory body to augment the efforts of the mining sector regulatory agencies to be known as the "Liaison Group". Additional 0/3% of the revenue generated ($\Sigma = 0.6\%$) shall be set aside to be used to finance the work of the "Liaison Group".
- The policy of 2:1 in the mining of minerals in FRs shall be strictly enforced (i.e. plant a forest in a different locality the size of which shall be double that impacted by a mining operation in a FR)
- A Reclamation Bond to provide financial surety against non-compliance under the approved Reclamation Plan must be submitted to the EPA before commencement of the project

4.0 The Supply Side of the Production Process

The constituents of production in the mining sector of Ghana are: land, labour, consumables and other resources such as water and power.

4.1 Land Area

As at September 2009 the area of land for mining activities totaled 70,898.85km^2. Table 1 gives the breakdown.

Table 1: Land Area for Mining Activities

Type	Land Area (km^2)
Reconnaisance License	31,425.25
Prospecting License	35,733.93
Mining Lease	3,260.60
Industrial Minerals	479.07
-Sand	
-Kaolin	
-Limestone	
-Quarry	
Total	**70,898.85**

It may be noted that the issue of land take from farming areas leads to reduced food security in mining communities

4.2 Labour

The statistics on labour employed in the mining sector specifically in the gold, bauxite, manganese and diamond exploitation from the year 2004 to 2008 for Ghanaian senior and junior staff and expatriate staff is presented in Table 2 and Chart 1.

Table 2: Labour Statiatics in the Mining Sector (2004-2008)

Year	*Expatriate Staff*	*Ghanaian Senior Staff*	*Ghanaian Junior Staff*	*Total Staff*	*Expatriate Staff/ Ghanaian Senior Staff*
2004	166	1,736	13,622	15,525	9.6%
2005	181	1,905	13,310	15,396	9.5%
2006	363	3,291	15,088	18,742	11.0%
2007	356	2,734	16,150	19,240	13.0%
2008	408	3,211	15,098	18,717	12.0%

Chart 1: Labour Statiatics in the Mining Sector (2004-2008)

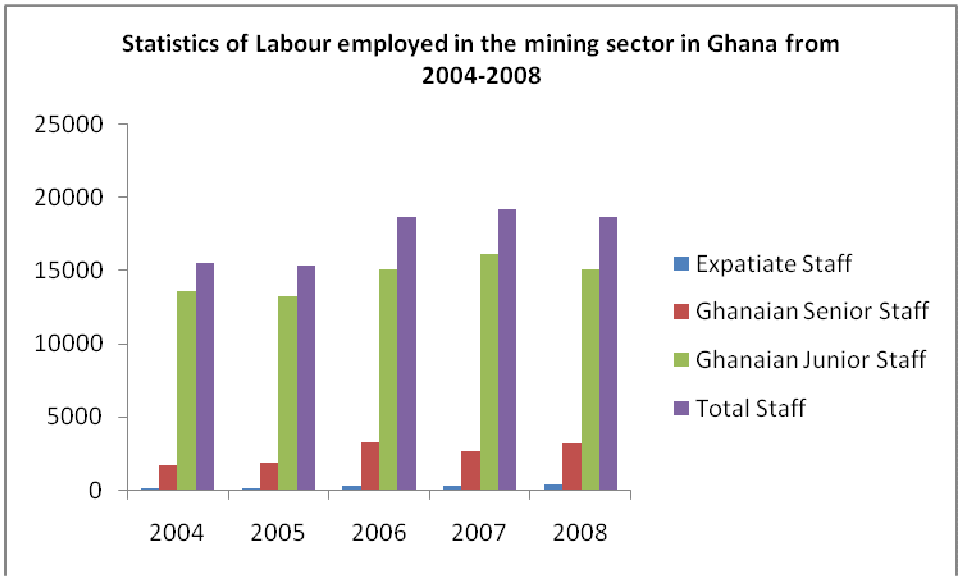

Table 3: Consumable and Utility Consumption Summary 2nd Quarter 2009

Consumable and Utility Consumption Summary 2nd Quarter 2009					
Consumable/Utility	**Major Country(s) of Origin**	**Consumption**	**Foreign Component (US$)**	**Local Component (US$)**	**Total (US$)**
Activated Carbon(t)	Philippines, Australia, Netherlands, United Kingdom, Ghana	550.90	79,165,332.31	36,210.00	79,201,542.31
Caustic Soda (t)	Australia, United Kingdom, China, Belgium	823.32	973,302.02	-	973,302.02
Cement (bags)	Ghana	192,135.00	-	1,428,773.14	1,428,773.14
Explosive (kg)	Ghana	3,241,315.38	214,724.91	3,046,063.36	3,260,788.27
Explosive (m)	Spain	14,650.00	4,816.30	-	4,816.30
Explosive (pieces)	Spain, Ghana	113,053.00	345,002.12	187,373.00	532,375.12
Floculant (t)	India, United States, Ghana, South africa	383.05	2,454,281.76	62,752.86	2,517,034.62
Fuel (Diesel) (l)	Ghana	30,631,134.54	-	21,421,878.82	21,421,878.82
Hydroclolic Acid (t)	South Africa, Ghana, Belgium, United	-	-	-	-

	Kingdom				
Hydrogen Peroxide (t)	Italy, Germany, South Africa	-	-	-	-
Lime (t)	Ghana, United Kingdom	7,637.00	3,671,148.00	3,274,250.24	6,945,398.24
Lubricant (l)	Ghana	202,779.90	534,714.77	462,706.10	997,420.87
Power :self generated (kwh)	Ghana	1,210,838.00	-	668,024.76	668,024.76
Power : national grid (kwh)	Ghana	275,093,691.90	3,395,387.19	47,558,677.59	50,954,064.78
Sodium Carbonate: Soda Ash (t)	Ghana, Belgium	12.85	4,628.40	3,283.08	7,911.48
Sodium Cyanide (t)	Belgium, Australia, United Kingdom, Australia, Germany	4,704.66	11,795,613.53	-	11,795,613.53
Steel Balls (t)	South Africa, Ghana, China,	7,209.49	7,719,312.53	1,870,682.97	9,589,995.50
Telecommunication	Ghana	-	206,500.20	194,834.99	401,335.19
Water : national grid (gal)	Ghana	24,169.18	-	49,823.59	49,823.59
Water : self generated (gal)	Ghana	318,015.04	217,003.93	293,997.56	511,001.49
		Total	110,701,767.97	80,559,332.06	191,261,100.03

As seen in Table 2, the mining sector employed 18,717 staff for the year 2008 which is an economic benefit for the country. This sector thus generates employment in the supply chain.

The labour employed in the mining sector over the past five years points out that a greater percentage of total labour can be found in the junior staff category. The availability of cheap unskilled labour in and around the environs of the mining companies might have accounted for its greater number over the past five years. In 2005 there was a slight decrease in the number of junior staff employed in the sector whiles 2006 and 2007 experienced an increase, followed by another fall in 2008. Ghanaian senior staff saw an increase in 2005 and 2006 then a fall in 2007. The number employed increased by 557 in 2008 as compared to the previous year.

4.3 Consumables

Activated carbon, cement, explosives, floculant, fuel, hydrochloric acid, lime, steel balls water and power are some consumables employed in the mining sector. The Table 3 gives a summary of the consumable and utility consumption for the second quarter of the year 2009. Other consumables including some of those mentioned above are imported to complement those already available in the country.

The consumables needed for the sector generated both foreign and local components amounting to US$ 191,261,100.03 all contributing to the Gross Domestic Product (GDP) of the nation. The local component forms forty two percent (42%) of the total amount.

It may be noted that the use of chemicals presents high risk because of accidental spillages. Most chemicals are also harmful to the environment.

5.0 The Demand Side of Consumption Patterns of the Sector

The major minerals are gold, diamond bauxite and manganese. Clam shells and lime (oyster shells) and other industrial minerals like mica, limestone, kaolin, salt and many more minerals are also exploited in the country. The industrial minerals are mainly for local consumption and gold, diamond, bauxite and manganese are predominantly for the international market. Some of the uses of the various minerals mined in Ghana are listed below.

5.1 Gold

There is continuous exploration of the mineral due to its high demand in:

- Dentistry and medicine
- Jewelry and arts
- Medallions and coins
- Ingots as a store of value
- Scientific and electronic instruments
- As electrolyte in the electro-plating industry

5.2 Diamond

The mineral is essential to jewelry industry

5.3 Bauxite

The mineral is exported for the production of aluminum.

5.4 Manganese

The mineral is essential to iron and steel production.

5.5 Industrial Minerals

Silica Sand and Quartz *is used for:*

- Construction products (sandblasting sand, sand lime brick, portland cement and aggregate)
- Manufacture of glass, ceramics, abrasives, and cement clinker
- Refractory use (silica brick)
- Metallurgical use as foundry molds and cores
- Smelter flux for base and precious metal ores
- Alloy in the production of cast-iron, steel
- Hydraulic fracturing to enhance oil, gas and water recovery from reservoirs
- Electronic industry (in semiconductor and solar cell manufacture)
- In optics
- Collectible semiprecious gemstones
- Glassmaking
- Used for pressure gauges, oscillators, resonators, and wave stabilizers

Brown clay *is used for:*

- Tile
- Brick
- Pipe

Quartzit*e is used for*

- Flagstone
- Veneer facing stone

- Decorative stones
- Electric furnace production of silicon metal

Jasper *is used for:*

- Abrasive
- Decorative objects and ornaments
- Building stone

Aggregate and Dimension Stone

Local demand is considered the driving force for its exploration, and it is used for:

- Concrete
- Terrazzo
- Pavement tiles
- Surface roads
- Road and railroad construction
- Building industry

Salt and Brine *is used for:*

- An additive in chemical feedstock, in fertilizer and insecticides
- Manufacture of chlorine and caustic soda (chlorallialine)
- Production of synthetic soda ash used in plastic, glass, solvent, paper, detergent and ceramics manufacture
- Water purification
- Antiseptic, rehydration and dental care
- Local consumption
- Exportation

Kaolin *is used for:*

- Additives to ceramics
- Additives to drilling mud
- Rubber products
- Tile and brick
- Hazardous and radioactive waste barriers
- Production of sanitary articles
- Paint
- Adhesives
- Ink pigment
- Rubber reinforcing, extending and filling agent
- Paper filling and coating
- Drugs
- Cosmetics base

- Primary ingredient in porcelain
- Primary ingredient in dinnerware and tiles and enamel manufacture.
- Catalyst base for petroleum cracking
- In auto exhaust emission catalytic control devices
- Additive in digestive coating remedies
- Fiberglass

Limestone *is used for:*

- Cement and lime manufacture
- Building Stone
- Aggregate
- Railroad ballast
- Fluxes
- Refractories
- Fillers
- Reactive filler
- Reactive agents in carbon dioxide
- Glassmaking process
- Steel
- Carpets
- Abrasives
- Soil conditioners
- Manufacture of paper filters
- Plastics
- Paint
- Processing of food and household items
- Water treatment and purification plant

Mica

- Export
- Electronic insulators
- Paint
- Joint cement
- Well-drilling muds
- Plastics
- Roofing
- Rubber
- Welding rods

5.6 Clam Shells and Lime (Oyster Shell)

These are used for:

- Ingredient in the manufacture of cement
- Highway stabilization
- Water treatment
- Coagulation of suspended solids
- pH control
- Filtration
- Removal of heavy metals and radionuclide from drinking water
- Flue gas desulphurization and neutralization of acids
- Ornaments

6.0 The Direct and Indirect Impacts of Mining on the Environment

Mining has both direct and indirect impacts.

6.1 Direct Impact

The direct impacts of mining may be positive or negative

6.1.1 Direct Positive Impacts

- Revenue generation from royalties and taxes
- Employment generation
- Infrastructural development in mining communities.

6.1.2 Direct Negative Impacts

Environmental Impacts

- Destruction of natural habitat at the mining site and at waste disposal sites
- Destruction of adjacent habitats as a result of emissions and discharges
- Changes in river regime and ecology due to siltation and flow modification
- Alteration in water-table
- Change in landform
- Land degradation due to inadequate rehabilitation after closure
- Land instability
- Danger from failure of structures and dams
- Abandoned equipment, plant and buildings

Pollution Impacts

- Drainage from mining sites, incl. acid mine
- Drainage and pumped mine water
- Sediment run-off from mining sites
- Pollution from mining operations in riverbeds
- Effluent from minerals processing operations
- Sewage effluent from the site

- Oil and fuel spills
- Soil contamination from treatment residues and spillage of chemicals
- Leaching of pollutants from tailings and disposal areas and contaminated soils
- Air emissions from minerals processing operations and internal combustion equipment
- Dust emissions from sites close to living areas or habitats

Occupational Health Impacts

- Handling of chemicals, residues and products
- Dust inhalation
- Fugitive emissions within the plant
- Air emissions in confined spaces from transport, blasting, combustion
- Exposure to cyanide, mercury or other toxic materials used on site
- Exposure to heat, noise, vibration
- Physical risks at the plant or at the site
- Unsanitary living conditions
- Radioactivity risk impact

Socio-economic impacts

- Influx of miners and resettlements resulting in alteration of cultural and socio-economic set-ups.
- Land use conflicts and its effect on project affected persons

6.2 Indirect impacts

The indirect impacts may be either positive or negative.

6.2.1 Indirect Positive Impacts

- Employment and revenue generation for mining sector support services such as transportation, catering
- Better standard of living for community with advent of infrastructural development

6.2.2 Indirect Negative Impacts

- Generation of electronic waste and its associated problems
- Increase in crime rate and social vices
- Land take and reduction in food security due to use of farm lands for mining projects and increase of population in mining communities
- High cost of living in mining communities

7.0 Policy Objectives, Targets and Activities Required to Achieve Targets for Sustainable Development

The basic principles of sustainable development are:

- Human needs/ satisfaction of basic human needs
- Integration of environment and development
- Inter-generational equity and justice
- Intra-generational equity and justice

Environmental sustainable development principles include:

- Non-exhaustion of natural resources
- Minimize the depletion of non-renewable resources
- The precautionary principle
- The polluter-Pays principle
- Eco-efficiency
- Full-costing
- Environmental impact assessment and management
- Map out ecologically sensitive areas and forest reserves and protect them from mining activities
- Recycling and reuse of resources

Socio-political sustainable development principles include:

- Public participation in governance cooperation
- Multi-stakeholder approach partnership
- Communication and education
- Consensus building process
- Increased regulation
- Institutional capacity
- Democratic self-determination
- Sovereignty over resources
- Invest mining resources in non-mining ventures to reduce dependence on land for mining
- Effect better deterrent penalties and regulatory principles since the current penalty is not deterrent enough
- Use of penalty points
- Clear-cut policies for addressing closure and post-closure of mines for sustainable development
- Alternative livelihood for people who have lost surface rights

The objectives for sustainable development in mining include:

- To improve sound environmental management

- To develop environmental guidelines for mining operations
- To review the state of science with respect to the social, economic, environmental and geophysical aspect of extraction in karst and to determine whether the existing science is adequate to support sustainable resource management
- To discuss cross-sectoral social, economic and environmental issues related to the sustainable development
- To develop national-scale, consensus set of indicators of sustainability for energy and mineral material systems
- To develop consensus set of indicators of sustainability for minerals
- To manage the environmental and social effects of mineral development for the better
- To identify how mining and minerals can best contribute to the global transition to sustainable development
- To improve mining policies and practices to ensure that mining activity contributes to the achievement of sustainable development in the hemisphere

The matrix in Table 4 gives policy areas and activities required to achieve the targets for sustainable development in Ghana within the next 5 years.

The Environmental Protection Agency and the Minerals Commission are agencies competent enough for the execution of the policies. However for the enhancement of their operations, the existing structures and systems need to be strengthened. The various District Assemblies should be empowered to monitor more closely to ensure regulations and standards within their area of jurisdiction are kept.

AGRICULTURE

1.0 BACKGROUND

1.1 State of Agriculture in Ghana

Ghana has a population of some 23.4 million people, with a population growth rate of 1.93% per annum (2008 Estimates). About 11.29 Million of the population make up the labour force. It is also estimated that agriculture employs the largest of the labour force (56%) followed by service (29%) and industry (15%).

The Gross Domestic Product (GDP) growth rate average 6 percent over the last few years. The agriculture sector in 2007 grew at 4.0 percent. The contribution of agriculture to GDP in 2007 was 36% {Ghana Statistical Service}. The fisheries, livestock and crops' were 5%, 7% 66% respectively. Cocoa on the other hand contributed 13% to agricultural GDP (2006).

1.1.1 Land use and Crop production

Agricultural land in Ghana represents about 57.1% of the total land area, out of which 30.4 % is under cultivation with only 0.14% irrigated. The major crops include industrial **(c**ocoa, oil palm, coconut, coffee, cotton, kola, and rubber), starchy staples (cassava, cocoyam, yam, maize, rice, millet, sorghum, plantain), and fruits and vegetables (pineapple, citrus, banana, cashew, pawpaw, mangoes, tomato, pepper, okro, egg plant, onion, asian vegetables).

Table 1 Land Use (Specific to Agriculture)

Type of Land Use	Hectares	%
Total Land Area (T.L.A.)	23,853,900	100.0
Agric. Land Area (A.L.A.)	13,628,179	57.1
Area under cultivation (2007)	7,248,000	30.4
Total area under irrigation (2007)	33,778	0.14
Area under inland waters	1,100,000	4.6
Others (forest reserves, savannah woodland, etc)	9,125,721	38.3

Sources: *The Ghana Survey Dep't and MOFA, Accra* ***Note:*** *Percentages will not add up to 100, because area under cultivation is part of agric. land area, while area under irrigation is part of area under cultivation.*

1.1.2 Land area and production patterns

Considering Tables 2b and 2d, the growth rate of selected crop indicates that the land area for cultivation is increasing but the corresponding decline in food production. This could be associated with decline in soil fertility, poor extension services and impropriate management systems.

Table 2a Area Planted to Selected Food Crops ('000 ha.)

Crop	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Maize	697	697	695	713	940	792	733	740	793	790
Millet	181	186	208	193	198	207	182	185	200	163
Rice	130	105	115	135	123	118	119	120	125	109
Sorghum	332	312	289	329	337	346	298	305	320	208
Cassava	630	640	660	726	794	807	784	750	790	801
Cocoyam	218	372	247	262	282	277	270	255	260	258

Plantain	246	253	244	265	277	286	281	290	299	305
Yam	211	243	261	287	300	321	311	300	325	324
Total	**2,645**	**2,808**	**2,719**	**2,910**	**3,251**	**3,154**	**2,978**	**2,945**	**3,112**	**2,958**

Source: Statistics, Research and Information Directorate (SRID), MoFA.

Table 2b Mean Annual Growth Rates for Area Planted to Selected Food Crops

CROP	Average Area ('000 ha)		Growth Rate (%)*	Average Area ('000 ha)		Growth Rate (%)*
	1996 - 1998	1999 - 2001		2002 - 2004	2005 - 2007	
Roots & Tubers						
Cassava	643.3	675.3	1.62	795.0	780.3	-0.62
Cocoyam	279.0	293.7	1.71	276.3	257.7	-2.32
Yam	238.3	254.0	2.13	302.7	281.3	-2.44
Plantain	247.7	254.0	0.84	281.3	285.7	0.52
Cereals						
Maize	696.3	701.7	0.26	815.0	821.7	0.27
Millet	191.7	190.0	-0.30	193.7	195.7	0.34
Sorghum	311.0	310.0	-0.11	337.3	327.0	-1.03
Rice	116.7	118.3	0.45	125.3	120.0	-1.44

*Source: Based on Table 4.1.2 *The average of 2002 to 2004 compared with average of 2005 to 2007 and average of 1996 to 1998 compared with average of 1999 to 2001.*

Table 2c Production of Selected Food Crops ('000 Mt)

Crop	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Maize	1,015	1,015	1,013	938	1,400	1,289	1,158	1,171	1,189	1,220
Millet	162	160	169	134	159	176	144	185	165	113
Rice (paddy)	281	210	215	253	280	239	242	237	250	185
Rice (milled)	169	126	129	152	168	143	145	142	150	111
Sorghum	355	302	280	280	316	338	287	305	315	155
Cassava	7,172	7,845	8,107	8,966	9,731	10,239	9,739	9,567	9,638	10,218
Cocoyam	1,577	1,707	1,625	1,688	1,860	1,805	1,716	1,686	1,660	1,690
Plantain	1,913	2,046	1,932	2,074	2,279	2,329	2,381	2,792	2,900	3,234
Yam	2,703	3,249	3,363	3,547	3,900	3,813	3,892	3,923	4,288	4,376
Total	**15,347**	**16,660**	**16,833**	**18,032**	**20,093**	**20,371**	**19,704**	**20,008**	**20,555**	**21,302**

***Source**: SRID **Note:** Milled rice is estimated to be 60% of paddy*

Table 2d Mean Annual Production Growth Rates of Selected Crops

CROP	Average Production ('000 Mt)		Growth Rate (%)*	Average Production ('000 Mt)		Growth Rate (%)*
	1996 - 1998	1999 - 2001	1996 - 2001	2002 - 2004	2005 - 2007	2002 - 2007
Roots & Tubers						
Cassava	7,708	8,306	2.49	9,903	9,808	-0.32
Cocoyam	1,636	1,673	0.75	1,794	1,679	-2.21
Yam	3,105	3,386	2.89	3,868	4,196	2.71
Plantain		2,017	0.89	2,330	2,501	2.36

	1,964					
Cereals						
Maize	1,014	989	-0.83	1,209	1,282	1.95
Millet	164	154	-2.10	156	160	0.84
Sorghum	312	287	-2.78	311	314	0.32
Rice	141	136	-1.20	154	152	-0.44

Source: Based on table 4.1.5

**The average of 2002 to 2004 compared with average of 2005 to 2007 and average of 1996 to 1998 compared with average of 1999 to 2001.*

TABLE 3*:* Estimated Levels of Per Capita Consumption of Selected Food Crops.

	Kg/head/year*					
Commodity	**1980**	**1985**	**1990**	**1995**	**2000**	**2005**
1. **Roots & Tubers**						
Cassava	145.2	146.3	148.0	149.7	151.4	152.9
Yam	44.2	43.8	43.3	42.8	42.3	41.9
Cocoyam	-	-	54.0	55.0	56.0	57.1
2. Plantain	82.2	82.5	83.0	83.5	84.0	84.8
3. **Cereals**						
Maize	38.4	39.2	40.3	41.4	42.5	43.8
Rice (milled)	12.4	12.7	13.3	13.9	14.5	15.1
Millet	8.5	9.4	5.1	12.6	9.0	6.4

Sorghum	13.0	14.4	9.3	21.7	14.8	10.1
Wheat	-	-	-	-	8.0	8.0
4. **Fish**	-	-	23.6	24.2	27.0	30.2
5. **Meat**	-	-	8.0	6.3	6.7	7.1

In the absence of a household consumption survey, these estimates have been based on food available for human consumption from both domestic and import sources. For fish, imports amounting to 100,000 Mt were considered .For meat, bush meat consumption of 40,000 Mt and import amounting to 20,000 Mt has been considered. Dashes indicate cells for which information was not available.

1.1.3 Production and supply pattern of Food Crops

In Ghana, there are a number of gaps along the value chain that reflect in the production and supply patterns of food crops. The information available as indicated in Table 4 reveals that some selected food crops such as maize which is an important staple crop in the country had a total production 1,220MT in the year 2007 and the human was 853MT, however the country had a deficit of 118 MT. The short fall in the overall consumption may be associated with a number of factors. This may be due to the fact that some were made available for livestock and post harvest losses etc.The production supply pattern is also affected by importation of food crops.

Table 4 Domestic Food Supply and Demand Position (2007)

Crop	Total Domestic Production ('000 Mt)	Production Available for Human Consumption* ('000Mt)	Per Capita Consumption (kg/Annum)	Estimated National Consumption ('000Mt)	Deficit/Surplus ('000 Mt)
Maize	1,220	853	43.8	971	-118
Rice (Milled)**	111	89	15.1	335	-246
Millet	113	79	6.4	142	-63
Sorghum	155	109	10.1	224	-116

Cassava	10,218	7153	152.9	3391	3,761
Yam	4,376	3501	41.9	929	2,571
Plantain	3,234	2749	84.8	1881	868
Cocoyam	1,690	1352	57.1	1266	86
Groundnut	302	257	12	266	-9
Cowpea	119	101	5	111	-10
Total	**21,537**	**16,242**		**9,517**	**6,724**

Source: SRID ***Notes****: Estimated Population for 2007, based on 2000 census figure (18.9 m) and a growth rate of 2.7 % = 22.18 m. * 70% of Domestic production for maize, millet, sorghum and cassava; 80% for rice, yam, cocoyam; 85% for plantain, groundnuts and cowpea. Livestock feed, wastage and seed account for the discount. ** 60% of paddy rice which stood at 185,000 MT for 2007.*

Table 5 *Quantity and Value of Cereal Imports (1999 – 2007)*

Year	Wheat	Rice	Maize	Sorghum
1999 Quantity (Mt)	181,645	241,610	201.21	-
Value $ million	102.7	95	0.07	-
2000 Quantity (Mt)	196,700	187,256	5,050	819
Value $ million	72.03	65.03	0.73	1.18
2001 Quantity (Mt)	168,816	311,513	10,589	4,040
Value $ million	64.25	72.46	1.52	2.75
2002 Quantity (Mt)	182,681	296,953	10,470	5,135
Value $ million	78.59	68.85	2.08	2.25
2003 Quantity (Mt)	147,779	797,705*	163	193
Value $ million	50.7	124.66	0.07	0.002
2004[a] Quantity (Mt)	247,991	253,905	140	2.6
Value $ million	84.32	119.15	0.086	0.77

2005[a] Quantity (Mt)	369,733	484,513	54,965	n.a.
Value $ million	99.69	138.94	12.31	n.a.
2006[a] Quantity (Mt)	254,052	389,660	6,572	0.58
Value $ million	46.37	159.47	1.43	n.a.
2007[a] Quantity (Mt)	332,299	442,073	596	n.a.
Value $ million	111.38	157.86	0.21	n.a.

*Source: Ministry of Trade & Industry, Accra. [a] Figures from GSS. *Part of this amount may have been trans-shipment to neighbouring countries. However, this could not be ascertained from the MOTI, PSI.*

1.1.4 **Production and supply pattern of Industrial crops**

Table 6 Production of Industrial Crops (Mt.)

Year	Cocoa[1]	Coffee[1]	Sheanut[1]	Seed Cotton[2]	Tobacco[3]	Oil Palm[4]
1997	322,490	2,880	21,504	24,953	2,020	55,505
1998	409,360	8,370	34,886	33,803	2,390	1,022,010
1999	397,675	3,965	17,465	38,127	2,556	1,031,919
2000	436,634	1,956	30,771	35,503	2,457	1,066,426
2001	389,591	1,379	19,882	17,506	1,233	1,586,500
2002	340,562	1,464	27,160	22,851	2,155	1,612,700

2003	496,846	338*	n.a.	16,822	2,150	1,640,100
2004	736,975	477*	n.a.	20,155	2,359	1,686,800
2005	599,318	270*	30,000	21,000	1,350	1,712,600
2006	740,458	164*	n.a.	n.a.	n.a.	1,737,900
2007	614,532	304*	n.a.	n.a.	n.a.	1,684,500

Sources: *1. COCOBOD, 2. Agricultural Development Bank. 3. British American Tobacco Co. 4. Oil Palm Companies (GOPDC, TOPP, BOPP, NOPL) and Individual Plantations. *Values updated with more current and complete information. n.a.: Not Available*

1.1.5 Livestock Sub-sector

Livestock production in Ghana has a number of challenges. The concentration had been in the production of poultry which is done on commercial basis. Cattle are normally on free range system, they are challenged with issues such as unavailability of water sources and fodder or silage during the dry seasons. The cattle production areas have not been able to establish fodder banks to feed the animals, therefore the need to explore in that area. Cattle rearing is dominantly confined in the north of the country and are kept as wealth. Other dominate livestock available are sheep, goat, cattle, and pigs. The importation of chicken parts, pig feet and turkey tails into the country may have impacted on the production pattern of livestock, since these parts are very affordable and consumed by the public. Even though there is no guinea fowl and ducks in the information given, there is the opportunity to promote their production and consumption in the country. Rabbits and grasscutter production are limited to the urban and peri-urban areas.

From the analysis below, with the exception of poultry, the other livestock production has not been significant.

Table 7 Livestock Population ('000)

Type of Livestock	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Cattle	1,260	1,273	1,288	1,302	1,315	1,330	1,344	1,359	1,373	1,392	1,407
Sheep	2,496	2,576	2,658	2,743	2,771	2,922	3,015	3,112	3,211	3,314	3,420
Goats	2,659	2,792	2,931	3,077	3,199	3,230	3,560	3,925	3,923	3,997	4,196
Pigs	347	339	332	324	312	310	303	297	290	477	491
Poultry	15,888	17,302	18,810	20,472	22,032	24,251	26,395	28,727	28,386	34,030	37,038

Source: Veterinary Services Directorate, MoFA, Accra

Table 8 Meat Production

	Domestic Meat Production (Metric Tons)									
	1997	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Cattle	17,160	18,029	18,570	19,053	18,288	18,486	18,686	18,874	19,140	19,346
Sheep	10,886	11,940	12,298	12,780	13,149	13,568	14,004	14,450	14,913	15,390
Goats	9,879	11,216	11,552	12,037	12,597	13,884	15,308	15,300	15,588	16,364
Pigs	11,360	11,173	10,056	9,653	10,416	10,181	9,979	9,744	16,027	16,498
Poultry	11,104	14,534	13,807	14,580	19,401	21,116	22,982	22,709	27,224	29,630
Total	**60,389**	**66,892**	**66,283**	**68,103**	**73,851**	**77,235**	**80,959**	**76,582**	**92,893**	**97,229**

Source: Estimated from Table 4.2.1 based on information and criteria in Appendix 7

TABLE 9 IMPORTS OF LIVESTOCK AND POULTRY PRODUCTS

CATEGORY	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
BOVINE:								
BEEF	631.6	73.2	901.3	1,112.4	2,586.8	6,331.7	10,585.5	16,250.4
BUFFALO	237.9	81.0	162.2	249.6	1,169.2	2,257.1	4,717.3	8,109.0
SUB-TOTAL	**869.5**	**154.2**	**1,063.5**	**1,362.1**	**3,756.0**	**8,588.8**	**15,302.8**	**24,359.4**
POULTRY:								
CHICKEN	9,160.0	6,731.5	19,986.0	32,939.0	39,088.6	40,591.0	44,757.7	63,276.3
TURKEY	385.9	74.1	766.3	1,164.5	1,268.7	1,697.2	3,030.3	3,514.7
DUCK	2.1	2.0	0.0	4.1	0.0	0.0	6.1	0.0
SUB-TOTAL	**9,548.0**	**6,807.6**	**20,752.3**	**34,107.6**	**40,357.3**	**42,288.2**	**47,794.1**	**66,791.0**
OTHER:	74.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0

CHEVON								
MUTTON	237.4	478.2	1,285.0	2,122.3	2,053.4	3,640.8	4,839.2	6,887.1
PORK	358.1	1,166.1	7,737.5	9,882.3	7,756.4	10,286.8	13,290.5	10,551.5
PROCESSED MEAT	106.8	80.4	133.9	0.0	256.2	270.4	0.0	0.0
SUB-TOTAL	**872.7**	**3,273.2**	**10,021.9**	**12,353.9**	**10,269.3**	**15,753.1**	**18,129.7**	**17,438.6**
MILK	96.0	1,548.5	865.5	349.4	203.3	1,555.1	1,044.2	2,659.9
GRAND TOTAL	**11,290.2**	**10,235.0**	**31,837.7**	**47,823.5**	**54,382.6**	**66,630.1**	**82,270.8**	**111,248.9**

Source: veterinary Services Directorate

1.1.6 Soils as supply component of the production pattern

The soils are predominantly light textured and sandy loams. The loamy soils are common. Many soils contain abundant coarse material either gravel and stone, or concretionary materials which affect their physical properties, particularly their water holding capacity. The rate of erosion in the country is very significant, causing the country about 2% of it GDP. The main source of soil nutrition is through the application of inorganic fertilizers. The application of organic fertilizers is not intensified. The regular burning of vegetation on farmlands also affects the status of nutrition and soil health. Improper drainage on irrigated fields has resulted in extensive soil salinity problems.

1.1.7 The Fisheries Supply and Production Pattern

The main types of fish production for the country is **capture fisheries (**industrial, semi-industrial, artisanal/canoe fisheries), and **Aquaculture (**intensive, semi-intensive, and extensive).

Aquaculture potential however is not fully explored. The breeding sites for fish stock are not well identified and protected, affecting natural restocking. The potential to improve breeding stock especially for inland waters have not been adequately explored. The inappropriate harvesting methods (e.g. unapproved nets, chemicals, powerful lights) impact on the fish stock. Inadequate landing and storage facilities affect the operations of fishermen.

Table 10 Annual Fish Production by Source (Mt.)

Source	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007

Marine	396,000	376,000	333,000	380,000	366,000	290,000	331,412	352,405	322,790	315,530	293,398
Inland	72,000	76,000	89,000	88,000	88,000	88,000	75,450	79,000	82,654	83,168	84,757
Total	**468,000**	**452,900**	**422,000**	**468,000**	**454,000**	**378,000**	**406,862**	**431,405**	**405,444**	**398,698**	**378,155**

Source: Ministry of Fisheries.

1.1.9 Irrigation development

In Ghana, an irrigation type may be classified as "Formal" or "Informal" (Traditional). The type of irrigation systems being practiced in the country include: surface irrigation, overhead irrigation and flood recession. Table 11, below indicates the total land area under irrigation is 33,778ha representing only 0.14% of the total agricultural land area, which is due to high cost of irrigation infrastructure development. There is also no irrigation master plan to guide irrigation development for the country. Most of the irrigation systems are operated by pumps which consume a lot of energy. The management of the irrigation systems are not efficient, resulting in serious deterioration of structures and causing land degradation. The construction of dams has contributed to various environmental and health related issues. The crops mostly irrigated are food crops (vegetables, lowland rice).

Table 11

Scheme/Project	**Area (ha)**
Formal Irrigation	
Existing Irrigation Schemes	16,800
Additional Area after Rehabilitation	500
Small Scale Irrigation Development Project	118
Small Farms Irrigation Project	586
Sub-Total	**18,004**
Informal Irrigation	
Area Under Cultivation	15,774
Grand Total	**33,778**

Source: Ghana Irrigation Development Authority (2008)

1.1.10 Farm Inputs

The table below shows that the prevailing prices have increased consistently over the years and has impacted on supply and production. Fertilizer and other agro-chemical imports have increased over the years. Presently, Government intervention in agricultural input support is directed towards fertilizer subsidies. However, there are challenges associated with the subsidy programme.

Table 12 National Average Input Prices (GH ¢)

Input	Unit	2003	2004	2005	2006	2007	Change% 2004-05	Change% 2005-06	Change% 2006-07
15-15-15	50kg	14.95	18.87	20.22	20.44	21.72	7.2	1.1	6.3
Sulphate of Ammonia	50kg	10.99	14.22	15.80	17.54	18.10	11.1	11	3.2
Urea	50kg	14.22	18.94	22.94	24.56	25.82	21.1	7.1	5.1
Round Up	1 litre	6.07	7.06	6.73	6.60	6.24	-4.7	-1.9	-5.5
Karate	1 litre	7.88	7.91	6.92	6.94	7.10	-12.5	0.3	2.3
Actellic	1 litre	10.79	15.00	14.88	12.83	12.82	-0.8	-13.8	-0.1
Hoe	Single	1.12	1.24	2.38	1.73	2.03	92.2	-27.4	17.5
Cutlass	Single	2.56	2.71	3.37	3.37	4.08	24.3	-0.1	21.2
Jute Sac	Single	0.80	0.75	0.82	0.89	0.86	8.4	9.2	-3.6

Source: SRID, MOFA

Table 13 Agro-**chemical Imports (Mt)**

	Year								
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Insecticide	1,203	1,195	907	1,090	5,829	610	5,982	6,921	9,979
Fungicide	718	673	618	1,345	1,673	770	1,713	2,148	2,575
Herbicide	195	224	598	582	2,472	1,096	5,340	8,780	8,932
Rodenticide	22	257	384	563	159	n.a.	13	78	123

Total	**2,138**	**2,349**	**2,507**	**3,580**	**10,133**	**2,476**	**13,048**	**17,927**	**21,609**

Source: GSS, Accra n.a. Figures not available.

Table 14 Fertilizer Imports, 1997-2007 (Mt)

Year	15-15-15 (NPK)	Other NPK	Urea	M. of Potash	SOA*	SSP & TSP*	Nitrate*	Pot. Sulphate	Cocoa Fert.	Others	Total
1997	19,230	17,850	1,850	5,450	10,700	0	n.a.	n.a.	n.a.	1,083	56,163
1998	13,058	8,800	500	3,095	13,265	500	n.a.	n.a.	n.a.	3,097	42,315
1999	3,202	400	n.a.	8,066	4,800	3,500	n.a.	n.a.	n.a.	2,025	21,993
2000	14,127	775	141	4,510	23,165	600	n.a.	n.a.	n.a.	180	43,498
2001	31,787	17,500	2,500	4,147	22,628	700	n.a.	n.a.	n.a.	1,586	80,848
2002	n.a.	800	n.a.	18,484	20,047	1,656	n.a.	n.a.	n.a.	901	41,888
2003	16,930	1,960	500	23,440	25,715	n.a.	7.35	n.a.	19,500	4,027	92,807
2004	17,118	1,105	250	822	7,688	1,850	95,312	72,000	25,000	2,588	223,733
2005	26,100	12,878	4,540	1,000	15,000	1,000	157	135	12,000	18,496	91,306
2006[a]	84,907		9,072	19	19,090	99	52,601	103	n.a.	23,988	189,879
2007[a]	87,388		4,962	109	17,458	504	52,823	321	n.a.	26,029	189,594

Source: *1. Ministry of Food and Agriculture, Crops Services Directorate, Accra 2. GSS, Accra(2004-2007). *SSP & TSP are Single and Triple Super Phosphate respectively. SOA is Sulphate of Ammonia. Nitrate fertilizer includes Potassium and Calcium Nitrate. [a] NPK value includes both 15-15-15 and other put together. n.a. Figures not available.*

1.1.11 Performance of the Agricultural Sectors

The Cocoa sub-sector is the fastest growing; contributing 13% agricultural GDP .The other sector therefore needs the necessary attention to boost production.

Table 15 Growth Rates in Agricultural Sub-Sectors (%)

Year	Sub-sector				National
	Crops/Livestock	Cocoa	Fisheries	Forestry	
1997	4.5	4.0	1.0		4.3
1998	4.4	11.0	1.8		5.1
1999	4.7	-0.5	1.0		3.9
2000	1.1	6.2	1.6	11.1	2.1
2001	4.6	-1.0	2.0	4.8	4.0
2002	5.2	-0.5	2.8	5.0	4.4
2003	5.3	16.4	3.0	6.1	6.1
2004	5.4	29.9	3.5	5.8	7.5
2005	3.3	13.2	-1.2	5.6	4.1
2006	3.5	2.0	15.0	2.6	4.5
2007*	4.0	6.5	5.0	2.5	4.3

*Source: Budget Statement and Economic Policy of the Government of Ghana (2008 Annual Series) * Provisional*

CHALLENGES OF THE AGRICULTURAL SECTOR

The major challenges include inappropriate farming systems, non-sustainable land management, inadequate irrigation, high price of agriculture inputs, high production cost, poor post harvest management and packaging, pest and diseases less value addition, land use competition and land grabbing, uncontrolled bushfires, uncontrolled grazing, poor information gathering and dissemination, uncontrolled fishing, inadequate catch fish landing sites and storage facilities and climate change impacts. These challenges have impacted on the sustainability of agricultural production and consumption patterns. A major growth component of the Ghanaian consumer market is the food service

industry. The rapidly rising personal incomes are creating demand for varied diets and these are leading to changing food consumption patterns.

The issues leading to changing food consumption patterns are foreign influences (importation and changing food habits), rapid growth of the food industry (restaurants, food vendors etc) and dwindling local production of non-traditional food crops such as orphan crops (e.g. *Colocasia ,Sorghum, traditional yam etc.),* variability of food items, increase advertisement of food products especially foreign items and easily processed foods .

1.2 Overview of existing Sectoral Polices, Plans and Programmes

1.2.1 The Food and Agriculture Sector Policy (FASDEP II)

The Food and Agriculture Sector Policy FASDEP II has been adopted as the policy framework for food and agriculture sector development in Ghana spanning the period 2009-2015. The policy framework has six objectives for sustainable food production and agriculture development namely:

1. Food security and emergency preparedness
2. Improved growth in incomes
3. Increased competitiveness and enhanced integration into domestic and international markets
4. Sustainable management of land and environment
5. Science and technology applied in food and agriculture development
6. Improved institutional coordination

Efficient implementation of the policy objectives will ensure sustainability in development.The FASDEP II has set the following performance targets for the agriculture sector, based on achievements between 2001 and 2006:

- Agricultural growth rate of 6-8% per annum over the next 4 years
- Crops and livestock leading the growth at an average annual growth rate of 6%
- Forestry and logging, and fisheries, each growing at 5% per annum.
- Cocoa will remain robust in support of other sectors.

Sub-sector wide policies and strategies have also been highlighted for ensuring the achievement of the policy vision of FASDEP II. They include the following:

Crop Development Policy

The goals of the crop sub-sector development are to:

- Enhance an integrated approach to food, horticultural and industrial crop development;
- Enhance the competitiveness and profitability of crops through access to improved technological packages for increased productivity;
- Ensure sustainable management of environment in crop production systems.

The guiding principle is to ensure an integrated and sustainable exploitation and use of natural resources for increased production and productivity of the crop sub-sector using public-private partnerships

Strategies

- Support production of certified seeds/planting materials and increased farmer usage through intensification of awareness campaigns.
- Intensify dissemination of updated crop production technological packages.
- Facilitate the development of high-yielding, disease and pest-resistant varieties and increase supply of certified planting material.
- Ensure that operators of urban agriculture are reached with the needed information technology and inputs.

Industrial Crops

The major industrial crops such as cashew, citrus, cotton, coconut, oil palm, and rubber, share similar constraints, which include unavailability of high-yielding planting material, poor agronomic practices, and cultivation of smallholdings. These have been adequately addressed.

Cocoa Strategy

Cocoa remains the largest single export commodity and remains the driving force of agricultural growth in Ghana. The key strategy for the development of the cocoa has been the promotion of high technology package of improved hybrid seed, a set of fertilizer, pesticide and fungicide recommendations and improved husbandry practices. Although yields have been enhanced, the sustainability of these interventions is to reach the target of 1 million tonnes per annum is threatened by climate change impacts. Land degradation in the cocoa fields is another factor increasingly threatening the viability, hence the sustainability of cocoa farming and related industry. Indeed, a study by CRIG predicts the collapse of the cocoa industry by 2050 due to impacts of climate change.

Strategies

A policy of comprehensive development of the cocoa value chain is in place and special incentives are available for local and foreign entrepreneurs willing to invest in the processing of cocoa. The objective is to increase the proportion of cocoa processed locally from 20% in 2002 to 40%, and revised to 50% in the 2007 budget statement. Specific strategies currently being applied in the cocoa sub-sector are:

- Promotion of commercialization of research on the utilization of substandard cocoa and cocoa wastes to enhance value addition.
- Improvement in internal and external marketing of cocoa through competition and equal access to COCOBOD's warehousing and crop financing facilities.
- Rehabilitation of roads in cocoa-growing areas to facilitate the evacuation of the crop.
- Maintaining the quality control responsibility within the public institution.

The expected impact of the above policies and strategies on the socio-economic life of the people in cocoa producing areas are improvement in household incomes and improved livelihoods and living standards

Livestock Development Policy

The goals of the livestock policy are increasing the supply of meat, animal and dairy products from domestic production at the current aggregate level of 30% to 80% by the year 2015; and contributing to the reduction of the incidence of poverty among farmers (who are also livestock keepers) from 59% to 30% by the year 2015.

Strategies

Livestock development policy (2003) outlined a set of strategies for the development of the sub-sector. These strategies are consistent with the objectives of FASDEP II because they address issues of breed improvement, production management, and health, processing, and marketing.

Some of the key strategies are:

- Focus on improving animal health (using community animal health workers).
- Improve access to quality feed and water.
- Enhance performance of indigenous breeds through a programme of selection.
- Develop commercial poultry as the priority for improving meat supply in the short term, while measures are implemented to transform smallholder production into profitable enterprises.

- Improve access of operators to technology and appropriate financial instruments to enhance their Competitiveness with imports.
- Advocate fair trade.
- Interventions will be designed to address processing and marketing of livestock, and increase the Awareness on food safety and public health.
- Advocate an enabling environment for intensive urban and peri-urban livestock farming.
- Create awareness among livestock farmers, traders and processors on the Road Traffic Regulations, 2006 (Reg. 122 (6)) on the transportation of livestock.
- Facilitate the development of a livestock statistics and monitoring system.

Fisheries Policy

An inland fisheries policy has been developed with a specific strategic framework for aquaculture development. The inland fisheries policy has the objectives to increase fish production, increase incomes and employment, protect the fisheries resource and environment and build capacity of relevant institutions.

Some of the specific strategies are to:

- Improve management of declining fish resources.
- Develop under-exploited fisheries resources.
- Improve product utilization and marketing.
- Improve socio-economic infrastructure and opportunities.
- Promote an integrated development of artisanal fisheries.
- Promote inter-sectoral cooperation

The aquaculture strategy covers issues on inputs, institutions and production systems. Inputs are to be delivered as a private sector activity. The institutional strategies also cover greater engagement of the private sector, training, extension and formalization of links among public sector institutions for aquaculture development. MoFA will collaborate with the Ministry of Fisheries to appropriately integrate fish farming in cropping systems.

Irrigation Development Strategies

The policy objective for irrigation development in Ghana is to enhance production potential of existing schemes by raising productivity of irrigation water from 30% to 80% in the next 10 years.

The policy thrusts are to:

- Realize the productive capacity of existing assets and respond to new demands for irrigated production through a mix of well coordinated public and private initiatives.
- Remove constraints to a balanced socio-economic engagement with land and water resources.
- Raise the environmental performance of all types of irrigation and related agricultural practice.
- Extend cost-effective, demand-driven irrigation services to public and private irrigators.

Strategies

Principles of sustainability in operation and maintenance of public irrigation facilities, and use of natural resources, equitable access of men and women to benefits of irrigation, and rights to participate in irrigation Management. However, only partial capital cost-recovery may be achieved, especially for services to the rural poor. Finally, the principle of subsidiary will be followed in the management of infrastructure but with public sector participation in decision making at all levels.

Plant Protection Strategies

The goal of the national plant protection strategies is to achieve an efficient system that ensures that crop losses caused by biological, environmental and ecological factors are contained in a sustainable and economical manner. MoFA aims to reduce crop losses caused by crop pests from 30-50% to 10-15%.

Strategies

- Promote integrated crop pest management.
- Strengthen plant pests and disease surveillance, including pest risk analysis, and improve plant quarantine systems at entry points.
- Strengthen the collaboration among PPRSD, CEPS and Ghana Immigration Service at all entry points.
- Strengthen the regulatory and protection services and field surveillance of pesticides sales
- Update all laws on plant protection to international standard and enforce them.
- The promotion of certified planting materials and pesticides, good agricultural practice, particularly in the use of pesticides proposed under the market access objectives of FASDEP II will complement these Plant Protection strategies.

Agricultural Mechanization

The objective is to facilitate access of farmers and agro-processors to mechanized services at affordable cost.

Strategies

- Collaboration with the private sector to build capacity of individuals and companies to produce and or assemble appropriate agricultural machinery, tools, and other equipment locally.
- Promote small-scale multi-purpose machinery along the value chain, including farm level storage facilities; appropriate agro-processing machinery/equipment and Intermediate Means of Transport (IMTs).
- Intensify use of animal traction through establishment of AT centers.
- Facilitate the establishment of mechanization services provision centers, and machinery hire purchase and lease schemes that also have adequate backup of spare parts for all machinery and equipment.
- Promote local assembly of tractors and encourage adaptation and local fabrication of processing equipment.
- Develop human capacity in agricultural machinery management, operation and maintenance within the public and private sectors.

1.2.3 Environment Policy (EPA Act 490, 1994, LI 1652, 1999)

Environmental Assessment on Agriculture Sector Policy

The mandate is to undertake an environmental assessment to ensure all agricultural activities is in harmony with the environment. This can be obtained by undertaking strategic environmental assessment (SEA) for all agricultural policies, plans and programmes, environmental impact assessment (EIA) for all agricultural projects and undertaking environmental management plans for all existing projects and projects thus have obtained environmental permits. These interventions are ensuring that agricultural activities do not impact negatively on the natural resources.

2.0 SUPPLY SIDE PRODUCTION PROCESS (ECONOMIC, SOCIAL AND ENVIRONMENTAL IMPACTS)

The agricultural land area of over 13.5 million hectares constitutes about 57% of the total land area in Ghana. It is also estimated that about 64 per cent of the national wealth is held in croplands (CEA, WB 2005). As at 2006, about 6,904,000 hectares were under cultivation. This means more than half of the agricultural land of Ghana is yet to be put under cultivation. Ghanaian agriculture is generally rainfall dependent. The country is well drained with numerous rivers and streams. The potential area – including inland valleys – that could be developed for irrigation is estimated at 500,000 ha and yet only 0.148% of the irrigable area is under cultivation. As at 1999 an estimated 6,000 farm enterprises nation-wide were using some means of irrigation. In 2002, the total area under formal irrigation was around 11,000 hectares.

The Ghana Irrigation Development Authority (GIDA) in 2000 identified 32,000 hectares of under-developed inland valleys throughout the country that could benefit from moisture improvement technologies for food production but this is not sufficient to avert our food security problems. There is therefore the need for significant investment in irrigation, especially in areas with erratic rainfall distribution.

Ghana produces 51% of its cereal needs, 60% of fish requirements, 50% of meat and less than 30% of the raw materials needed for agro-based industries. Production and availability of roots, tubers (cassava, yams sweet potatoes etc.) and vegetables such as tomatoes and onions, which are important staple food crops is highly dependent on the vagaries of the weather .In recent times climate change impacts e.g. flooding, variations in rainfall patterns, severe storms, high temperatures have serious impacted on agricultural production .There is therefore the need to promote high resistant varieties (e.g. orphan crops) that can withstand climate change impacts.

Agriculture is predominantly practised as smallholder with about 90% of farm holdings less than 2 hectares. Most farms are operated using family labour and rudimentary technology to produce about 80% of Ghana's total agricultural output. It is estimated that about 2.74 million households operate a farm or keep livestock. According to the 2000 Census, 50.6% of the labour force, or 4.2 million people, are directly engaged in agriculture. The small holder farms are the major producers of the country's staple food crops (e.g. grains and legumes, cereals, roots and tubers and horticultural crops). Yet they face challenges such as poor rural road infrastructure, inadequate extension services, inappropriate

land management practices, lack of storage and processing facilities, inadequate credit facilities, poor harvesting techniques, market availability, weak systems for disaster prevention and management, insecurity of land tenure, inadequate supply of farm inputs, inaccessibility of irrigation water and pest and diseases.

These factors affect the supply side along the agricultural value chain which has implications on the economic, social and environmental impacts as shown in Table 16 below.

Table 16 Impacts of supply side of production process

Challenges	Economic Impacts	Social impacts	Environmental Impacts
Poor rural road infrastructure,	Post harvest loses , High cost of transportation and farm produce, Low incomes, less investment.	Low Standard of living, Poor health condition, poor access to markets, inadequate extension services	Increased agricultural waste. Less noise, Enhance biodiversity,
Inadequate extension services	Low Productivity ,	Poor access to Information ,	land and water resource degradation,
Inappropriate land management practices	Low yields, less fodder for livestock	Poor Health conditions (pollution of water sources),	land and water resource degradation, pollution
Lack of storage	Post harvest losses, low incomes	Low standard of living,	Increased agricultural waste,
processing facilities	Less foreign exchange,	Low standard of living,	Increased agricultural waste,
inadequate credit facilities	Less production,	Idleness and low standard of living	Pressure on natural resource base,
poor harvesting techniques,	Low income, low foreign exchange ,post	Low standard of living,	Pest and disease infestation. ,depletion

Challenges	Economic Impacts	Social impacts	Environmental Impacts
	harvest loses		of fish stock
insecurity of land tenure	Less investment,	Social conflicts, unemployment,	Land degradation,
Unavailability market	Low investment, less production	Poverty, school drop outs,	
weak systems for disaster prevention and management	Food shortage ,	Destruction of properties,mobidity and death, poverty, health issues,	Flooding ,bushfires
inadequate supply of farm inputs	Low productivity and yields.	Low standard of living	degradation
Inaccessibility of irrigation water.	Low productivity,	Idleness during dry season,	
Pests and disease infestation	Reduce yields, less growth in incomes, reduces value of products.	Low standard of living, health impacts,	The use of chemicals leading to air and water pollution.

The medium to large scale farms and plantations mainly produce oil palm, rubber and coconut and to a lesser extent, maize, rice and pineapples. In Ghana, the dominant plantation crops are Cocoa, Oil palm, Rubber, Mango and Cashew. Their activities have large economic, social and environmental impacts.

Large scale farms create employment opportunities and contribute significantly to the total production and Gross Domestic Product (GDP) in the country. However, it requires vast lands, more inputs and high technologies to execute their activities. These large scale farming systems negatively impact on land and water quantity and quality, biodiversity and micro-climate.

The challenges encountered in agricultural production and supply systems impacts on food security in the country. To ensure food security, measures should be adopted to improve post harvest management activities, improve crop and livestock varieties and genetic resource conservation, add value to commodities , improve nutrition, research, information gathering and dissemination, and

markets, intensify and diversify agriculture, promote sustainable land and water management, promote consumption of orphan crops and adopt climate change adaptation and mitigation measures .

3.0 Demand side of consumption patterns in the agricultural sector

Agriculture production involves investments, projects, products and services which consume land, water, energy, transportation and input resources such as labour, fertilizers and agro chemicals, packaging materials and information for its activities.

Agricultural produce in Ghana consist of carbohydrates (maize, cassava) protein (fowl, guinea fowl, beef, mutton, chevrons, beans, fish) oils and fats (oil palm, groundnut oil, kernel oil, coconut oil, sheabutter) vegetable and fruits (tomato, onions, okro, pepper, garden eggs, green leaves, mangos, oranges avocado, bananas), and local spices (ginger, dawadawa, prekese, white and black pepper, cinnamon seeds). Other common consumables include plantain, cocoyam, and yams. Meat consumption is on special occasions or during celebrations. Some taboos, cultural and religious believe, norms and practices restricted the consumption of some agricultural commodities.

It has been shown that meat and milk intake in Ghana is one of the lowest in the world. The FAO estimates that Ghana's annual per capita intake of meat over the years has varied between 4-10 kg. This falls short of FAO's recommendation of about 180 kg. Similarly, milk consumption in Ghana is low with annual per capita intake of about 25 percent of the recommended intake for healthy growth. Egg consumption is generally considered to be low. The table shows that Ghana is deficient in meat production.

Table 17 Food situation in Ghana (in metric tonnes)

Food item	*Domestic production*	*Imports*	*Total available*	*Requirement*	*Total deficit*
Meat	**97,229**	108,589	205,818	285,430	79,512
Milk	**31106**	17441	48548		
Egg	**18249**	-4506	13743		
Rice (Paddy)	**216336**	231800	448136		

Source: Milk, eggs and rice data from FAO stats (average for 1993-2003), meat data from Country (Ghana) data, MoFA – Ghana.

In recent times the consumer preference has been directed towards exotic foods and diets (e.g. foreign rice, spaghetti, bread, apples, and grapes). These have been associated with the importation of foreign products, and the fact people are now conscious of their health, improper preservation and packaging of local produce, impoved processing of products, local consumption now outstripping local production, changing life styles, profuse advertisement of non local products, low import tariffs, proliferation of fast food vendors, price index, non availability of some indigenous farm produce (e.g. orphan crops).

In addressing these impacts, there should judicious use of land and water resources, vigorous promotion of local dishes, value addition to local products, encourage school and back yard farming, government should increase import tax on meat and meat products, sensitisation and education on food safety and nutrition, improve storage and processing facilities and promote organic farming.

4.0 Direct and indirect impact on the environment of Actions, Investments, Projects, Products and Services

4.1 Actions

Ghanaian agricultural systems continue to be extensive in nature with low levels of productivity leading to high rate of conversion of forest for agriculture purposes. The extensive systems increase rate of degradation resulting in decrease in environmental resilience. Climate change effects tend to further exacerbate the current situation and may have serious implications for human development, especially rural communities that depend on natural resources for their livelihood.

Other actions impacting on sustainable production and consumption include; Land fragmentation, land litigation, farming along river banks, farming on critical slopes and areas, uncontrolled grazing, profuse pesticide applications, improper processing and storage of meat and meat products, improper fishing, profuse and vulgar advertisements, improper procurement, non-maintenance of structures (irrigation), improper irrigation and drainage, ploughing across contours, burning of stubble etc.

4.2 Investments

At present a lot of investments are being made to develop the agriculture sector in Ghana. Most of the investments lay emphasis on increasing productivity, achieving food security and reducing poverty. Whilst these are laudable and could result in observable indicators of development, the investments

have some implications for the natural environment which might have the potential of off-setting gains made in the economic and social sectors.

4.3 Projects

Majority of projects being implemented within the agricultural sector lays heavy emphasis on development of commodities (crops, animals and fisheries). This approach leads to development of improved species of animals and crops which put pressure on the natural resources in terms of their growth demands. In addition, the introduction of these improved species has serious implication for sustainability of local spp. It may result in loss of local varieties and species –biodiversity loss (genetic erosion). Introduction of GMOs for example has the potential of introducing species that could become invasive and difficult to handle. Even though irrigation projects have contributed to ensuring food security, its attendant impacts on the environment include biodiversity loss, high incidence of water borne and water related diseases, high pest proliferation, high energy consumption, land and forest degradation, air and water pollution and migration.

Projects that have made impact on sustainable consumption and production systems are:

1. Land and Water Management project undertaking by MoFA trained farmers on good land management practices
2. Agro- forestry projects have improved vegetative cover and soil nutrient levels.
3. Organic farming projects
4. The National Agricultural Research Project (NARP)
5. Inland Valleys Projects
6. Ghana Environmental Resource Management Project (GERMP).

4.4 Products

In Ghana packaging of agricultural products is a major challenge resulting in high levels of post harvest losses. The high post harvest losses results in decrease in net production therefore the need to put more land area under production (incursion into forest lands). This state of affairs has implication for environmental conservation

4.5 Services

Ghana has an effective research-extension – farmer linkage system that provides information to support farmer level activities. However majority of services provided tend to be skewed towards product development with little emphasis on addressing the linkages between production and environmental management. In addition a number of technologies have been developed to enhance farmer level processing activities, most of these technologies tend to produce high levels of waste products which management are not normally factored into the design of the equipment; thereby creating condition for the pollution of water bodies etc. There is an urgent need to improve communication and collaboration between research, extension and farmers to provide local solutions to local problems.

5.0 EXITING LEGISLATIONS AND POLICIES RELATED TO SUSTAINABLE CONSUMPTION/PRODUCTION PATTERNS.

5.1 Review of Policies and Legislation on Sustainable Consumption

The food and agricultural sector in Ghana consists of crops and livestock, fisheries and cocoa.

- FASDEP II has incorporated sustainable land management and environment as one of its policy objectives to ensure that every agricultural project activities are environmentally compliant.
- Fisheries Act 625, 2002: the sections 69 to 96 outlines strategies and administrative procedures for fishing licence, activities and conservation methods to ensure sustainable fishing in the country
- The Water Resources Commission (WRC) Act (Act 522 of 1996) and Legislative Instrument (LI 1692 of 2001) regulates the management of water resources in Ghana. The Act controls the use of water resources, through granting of water rights and water use permits
- Land Planning and Soil Conservation Ordinance No. 32 of 1953, amended in 1957, contains a number of provisions to control and abate land degradation and manage soil conservation

6.0.1 PROPOSED FRAMEWORKS FOR SUSTAINABLE CONSUMPTION AND PRODUCTION

The following strategic actions would be pursued to achieve sustainable production and consumption in the agricultural sector:

a) Farming and Natural Resources

1. Manage sustainably competing uses of water and land resources (water, wildlife, soil, energy, air).

b) Plant, Animal and Fish Production Practices

2. Enhance productivity of major food crops
3. Promote and encourage fish culture to argument protein consumption
4. Encourage and promote improved livestock production systems
5. Promote and support viable horticulture industry
6. Identify and address constraints to cash crop industry
7. Promote and encourage peri-urban agriculture

c) Information, Markets,

8. Establish and support efficient distribution and marketing systems
9. Promote research and extension services

10. Agriculture information gathering, storage and dissemination

d) Economic, Social and Political Context

11. Identify and promote domestic value addition activities
12. Encourage and support agricultural diversification
13. Establish and support regulations to improve quality of foods.
14. Develop efficient pilot value chains selected commodities in each ecological zone.

The strategies are grouped according to four separate, though related areas of concern: Farming and Natural Resources; Plant, Animal and Fish Production Practices; Information and Markets and the Economic, Social and Political Context.

a) Farming and Natural Resources

Water (ground and surface)

The production of food and industrial crops, animals and fish cultures degrade the natural resource base, the ability of future generations to produce and flourish decreases. Water is the principal resource that has helped agriculture and society to prosper, and it has been a major limiting factor when mismanaged.

Water supply and use In Ghana, farming along the river banks allowed crop production to continue during the dry season. During the dry seasons, when there is a limited surface water supply, groundwater is used by some farmers. An approach to store water during the rainy season would be to improve water conservation and storage measures. Irrigation water use is not well coordinated resulting in over use and attendant drainage and soil salinity problems.

Water quality The most important issues related to water quality involve salinization and contamination of ground and surface waters by pesticides and fertilizers. In Ghana salinity has become a problem wherever water of even relatively low salt content is used on shallow soils in dryland areas especially in the northern sector, and areas where the water table is near the root zone of crops. Pesticide and nitrate contamination of water can be reduced by adopting good farming practices.

Wildlife

Agriculture practices affect water resources by the destruction of riparian habitats within watersheds for example in Ada in the Greater Accra Region. The conversion of wild habitat to agricultural land reduces fish and wildlife through erosion and sedimentation, the effects of pesticides, removal of riparian plants, and the diversion of water.

Energy

Modern agriculture is heavily dependent on non-renewable energy sources, especially petroleum. The continued use of these energy sources for fishing, irrigation land preparation and agro processing cannot be sustained indefinitely, yet to abruptly abandon our reliance on them would be economically catastrophic. However, a sudden cutoff in energy supply would be equally disruptive as observed in the Dawhenya irrigation project.

For sustainable agricultural systems, there is need to reduce reliance on non-renewable energy sources and a substitute it with renewable sources or labour e.g. donkey cart, bullock ploughs to the extent that is economically feasible.

Air

Many agricultural activities affect air quality. These include smoke from agricultural burning; dust from tillage, traffic and harvest; pesticide drift from spraying; and nitrous oxide emissions from the use of nitrogen fertilizer. Measures to improve air quality include incorporating crop residue into the soil, using appropriate levels of tillage, and planting wind breaks, cover crops or strips of native perennial grasses to reduce dust.

Soil

Soil erosion continues to be a serious threat to our continued ability to produce adequate food. Numerous practices have been developed to keep soil in place, which include zero tillage, contour plough, bunding, strip cropping, managing irrigation to reduce runoff, and keeping the soil covered with plants or mulch.

b) Plant, Animal and Fish Production Practices

Strategies to ensure sustainable production practices must take into account topography, soil characteristics, climate, pests, local availability of inputs and the individual grower's goals. The following practices could be adopted to ensure good management practices:

- Selection of species and varieties that are well suited to the site and to conditions on the farm;
- Diversification of crops (including livestock and fish culture) and cultural practices to enhance the biological and economic stability of the farm;
- Management of the soil to enhance and protect soil quality
- Efficient and humane use of inputs
- Integrated pest management and
- Consideration of farmers' goals and lifestyle choices

Selection of site, species and variety

Early adoption of preventive strategies could reduce inputs and help establish sustained production systems. Pest-resistant crops that are tolerant to existing soil and site conditions must be selected. In selecting sites for farming factors such as soil type and depth, soil nutrition, previous crop history, and location (e.g. climate, topography, and accessibility) should be considered.

Diversity

Diversified farms are usually more economically and ecologically resilient. While monoculture farming has advantages in terms of efficiency and ease of management, the loss of the crop in any community could put a farm out of business and/or seriously disrupt the stability of a community dependent on that crop. The adoption of diversified farming systems reduces economic risk and radical price fluctuations associated with changes in supply and demand.

Diversification can also buffer a farm in a biological sense. For example, in annual cropping systems, crop rotation can be used to suppress weeds, pathogens and insect pests. Also, cover crops can have stabilizing effects on the agro-ecosystem by holding soil and nutrients in place, conserving soil moisture with mowed or standing dead mulches, and by increasing the water infiltration rate and soil water holding capacity.

Cover crops in plantations buffer the system against pest infestations, reduce the need for chemical inputs, reduce erosion and enhance infiltration.

Soil management

Healthy soils produce healthy crop plants with optimum vigor and less susceptible to pests. Proper soil, water and nutrient management helps to prevent some pest problems due to crop stress or nutrient imbalance.

To protect and enhance the productivity of the soil, the use of cover crops, compost and/or manures, and efficient water application should be encouraged

Efficient use of inputs

Sustainable approaches are those that are the least toxic and least energy intensive, and yet maintain productivity and profitability. Preventive strategies and other alternatives should be employed before using chemical inputs from any source. Effective supervision of input application is necessary to ensure efficient input application.

Consideration of farmer goals and lifestyle choices

Farm decisions should reflect not only environmental and broad social considerations, but also individual goals and lifestyle choices. For example, the adoption of some technologies or practices that promise profitability may also require such intensive management that one's lifestyle actually deteriorates. Technologies that are being promoted to the farmers should promote the community and the individual living standard.

Animal Production Practices

Management Planning

Adequate planning in livestock farming system takes advantage of mobility of the stock, daily feeding, health concerns, breeding operations, seasonal feed and forage sources, and marketing. A successful ranch plan should include enterprise calendars of operations, stock flows, forage flows, labor needs, herd production records and land use plans.

Animal Selection

The selection of animal breeds should consider breeds that are hardier, have better growth and production potential and better adapted to less favorable environments with sparse or highly seasonal forage growth.

Animal nutrition

Livestock feed is mainly from grazing of pasture. Fodder development is not given the necessary attention. While most of the feed may come from other enterprises like feed processors, some fodder are purchased. The establishment of fodder banks should be promoted.

Grazing Management

Uncontrolled grazing has resulted in adverse environmental, economic and social impacts that can be prevented or mitigated with proper grazing management. The number of stock per unit area (stocking rate) must be correct for the landscape and the forage sources. Fencing will reduce overgrazing and prevent damage to other crop fields.

Confined Livestock Production

Animal health and waste management are key issues in confined livestock operations. Waste management facilities are now a necessary cost of confined production systems. Waste is a problem of almost all operations and must be managed with respect to both the environment and the quality of life in nearby communities.

d) The Economic, Social & Political Context

Public policies, economic institutions, and social values and strategies must aim at preserving natural resources and changing production practices. Strategies for change must take into account the complex, reciprocal and ever-changing relationship between agricultural production and the broader society.

Land use

Conversion of agricultural land to urban uses is a particular concern in Ghana, as rapid growth and escalating land values threaten farming on prime soils. Existing land tenure systems often discourage farmers from adopting sustainable practices.

In the urban areas, the close proximity of newly developed residential areas to farms is increasing the public demand for environmentally safe farming practices. Comprehensive new policies to protect prime soils and regulate development are needed, particularly in the cities. Agricultural land can be preserved if farmers adopt practices that reduce chemical use and conserve scarce resources, through research and education

Labour

Labour is an important constituent of agricultural production must be acknowledged and supported by government policies. Labour pricing on small holder farms should be harmonized to attract the labour force.

Rural Community Development

The rural communities in Ghana are challenged by economic, social and environmental deterioration. The reasons for the decline are complex, but changes in farm structure e.g. land fragmentation, have played a significant role.

Economic development policies are needed that encourage more diversified agricultural production on community/block farms as a foundation for healthy economies in rural communities. In combination with other strategies, sustainable agriculture practices and policies can help foster community institutions that meet employment, educational, health, cultural and spiritual needs.

The strategic objectives, targets, actions to achieve the set objectives and targets, indicators for monitoring performance, implementing and affiliate agencies are shown in Appendix 1.

7.0 CROSS CUTTING ISSUES IDENTIFIED FOR THE SECTOR

Health

The construction of dams and irrigation canals and drains as well as dugouts for agricultural water result in increased incidence of water borne and water related diseases. The indiscriminate use of agro chemicals and disposal of residual chemicals and containers, affect the health of farmer, consumers and the ecosystem (fauna and flora, water and air quality). Accidents through farming operations are serious occupational health and safety issues. The improper use of animal and human waste to improve soil nutrition has health implications.

Human settlement

Uncontrolled bushfires during land preparation and poaching affect human settlement by destroying houses and property. Increasing population and the quest for agricultural land is limiting land for

settlement expansion. The absence of land use plans has resulted in land use conflict. The organic waste from settlements is used on farmlands.

Water and sanitation

Agricultural water use conflicts with other water uses eg industries, domestic, tourism, transport and energy. The insanitary disposal of agricultural waste into water bodies (point and non–point source) causes water pollution, and affects aquatic life and industrial and domestic water use.

Transport:

Poor rural road infrastructure hampers the transportation of food products into the available markets, causing food shortage. This also results in gluts and wastes of produce at the farm gate. Poor transportation increases travel time, causes stress and impacts on food price index.

Waste management

Agriculture wastes include:

- Biological waste (carcass, biomass, manure),
- Liquid waste (urine, wastewater from washing agriculture produce, liquid waste from cocoa pods)
- Chemical waste (expired agro chemicals and veterinary drugs , waste lubricants)
- Industrial waste (effluent, biogas ,solid wastes)
- Material waste(packaging materials, harvesting materials, storage materials, production materials, protection materials)
- Equipment wastes (tractors, pumps, ploughs, planters, harvesters, irrigation equipment, sprayers, fishing boats, veterinary equipment and vessels)

Chemicals:

Agriculture produces raw materials for the production of chemicals, such as food additives cosmetic products, biodiesel and medicines. However the indiscriminate use of chemicals and their residues have enormous health implications.

Energy:

Agriculture supplies raw materials for energy consumption e.g. fuel wood, biofuels , in addition agricultural wastes is used to generate biogas. However the competing use of land for food and energy production impacts on agriculture production.

Tourism:

Some agricultural practices impact negatively on potential tourist sites such as sacred groves and wildlife sanctuaries. Agriculture also produces the base for diversified local foods, which is a potential tourist attraction.

Industry and Manufacturing:

Agriculture is the primary source of raw materials for industries and the manufacturing sector. The industries and the manufacturing sector also produce agricultural inputs for production.

Research and Education:

Agriculture depends on research and information for improved inputs and practices, markets, capacity building. Deficiencies and threats in agricultural production systems trigger research and development of new products.

Economic instruments:

Levies, taxes, and tariffs on agricultural exports and imports improve the balance of payment. Conversely, low import tariff on agricultural inputs encourages consumption of foreign products and discourages local production. In addition taxes on local agricultural products inflate prices and reduce demand. Low taxes on local agricultural products boost consumption and improve farmers' incomes, but impacts negatively on the local economy.

Mining:

Mining competes with agriculture for land and water. It degrades agriculture land and water, pollutes air, depletes biodiversity, and reduces agricultural production and incomes. It competes with agriculture for labour.

Consumer behavior:

Consumers play a critical role in creating a sustainable food system. Through their purchases, they send strong messages to producers, retailers and others in the system about what they think are important. Food cost and nutritional quality have always influenced consumer choices. There should be strategies to broaden consumer perspectives in making choices based on environmental quality, resource use, and social equity.

New policies and institutions must be created to enable producers using sustainable practices to market their goods to a wider public. Coalitions organized around improving the food system are one specific method of creating a dialogue among consumers, retailers, producers and others. These coalitions or other public forums should be important vehicles for clarifying issues, suggesting new policies, increasing mutual trust, and encouraging a long-term view of food production, distribution and consumption.

The unattractive packaging of agricultural products (value addition) in Ghana does not encourage consumer demand. Improved packaging of agricultural produce has the potential to influence consumer preference and acceptability. Regular advertizing through print and electronic media of agricultural products also impacts consumer choices.

8.0 ACTIVITIES TO GUIDE CONSUMER CHOICES AND LIFESTYLES IN THE AREAS OF COMMUNICATION, MARKETING AND ADVERTISING, EDUCATION AND TRAINING, SOCIAL AND CULTURAL INITIATIVES.

<u>Communication</u>

- Gather enough information on a product before purchasing
- Hearing and understanding of language and actions
- Travelling and touring
- Email, mobile phone texting,
- Preaching

Marketing and advertising

- Regular examination of manufacturing and expiry dates of products, source and nutritional content
- Avoid products in damaged packages, avoid buying products with unreadable language, un-recommended language
- Purchase products that are well stored
- Fashion shows
- Installation of billboards
- labeling

Education and training

- Workshops and seminars
- Schooling programmes

Social and cultural initiatives

- Celebrations, bazaars, festivals, trade fairs/shows,
- Picnics and dancing
- drumming

10.0 PROPOSED DEMONSTRATION /PILOT PROJECTS.

11.1 Afforestation for lake front area protection project

11.2 Orphan crop development project

11.3 Remote sensing and GIS based agricultural data capture and management project

11.4 Global Navigation Satellite System reference station network Demonstration project for land use (irrigation and agricultural fields, cadastral etc.) survey

11.5 Food and agricultural trade show.

Proposed Project	Objective	Target	Activities	Budget (GHc)	Time frame	Implementing Agencies	Funding sources
Afforestation for Lake front area protection	-Control erosion, pollution and siltation of reservoir. - Enhance incomes of farmers.	5000ha of lake front areas afforested by year 5.	- Stakeholder sensitization. - Procurement of inputs -Establish pilot nursery - Training - Seedling production - Field planting - Monitoring and reporting	1million	5yrs	MoFA, IDA, WRC,EPA and district assemblies	GOG,DPs NGO's,

Remote sensing and GIS based agricultural Data capture and management	-Development of agricultural GIS spatial data. -Develop Remote Sensing and GIS protocol for Agricultural monitoring. -Capacity Building in GIS for agricultural data management.	- Gather baseline agricultural GIS data for the country by year 5. - Develop spatial agricultural information system. Train 40 agricultural officers in Remote sensing/GIS.	- Identify areas for pilot projects - Procure Remote sensing data and GIS equipment. - Conduct field surveys for the data. -Training in remote sensing data and GIS. Develop spatial data base for agriculture. Develop strategies for expansion	6Million	5yrs	SRID-MOFA, Research institutions.	GOG,DP
Global Navigation Satellite System (GNSS)	- Install GNSS reference stations in agricultural	- Set up 4 reference stations in demonstr	-Identify demonstration sites. Procure	0.6 million	1 yr.	IDA/MOFA,UN, Leica Geo-Systems .	GOG, , Leica Geo-Systems,

reference station network Demonstration project for land use plans.	areas - Demonstrate the use of the system for surveying and mapping - Build capacity for modern surveying technology	ation sites. -Establish a control center to distribute GNSS data. - Installation of system applications and coordinate transformations. -Training of officers in system application and field data collection and management.	GNSS equipments. -Install reference station equipment. - --- -Operate the equipment. -Monitoring of system				

Item	Priority areas/Strategies		Specific objectives		Action Details	Target	Indicators	Laws and Regulations	Host agency	Affiliated Agencies
1 .	Enhance productivity of major food crops		Increase per capita protein consumption Establish and implement an effective targeted input subsidy to support food crop production.		- Introduce and promote improved varieties (high yielding, short duration, disease, pest and drought tolerant) and nutrient-fortified -promote good agricultural practices within crop production systems. -Encourage and support the development of lesser known traditional food crops (orphan). Preserve genetic diversity of orphan crops Identify,	X number of improved high yielding crops, livestock and fish varieties introduced by year 'Z'. X percentage of farms adopting good agricultural practices by year 'Z'. X number of orphan crops promoted. X number of orphan crops preserved X number of local crop varieties developed by year 'Z'	New varieties adopted by farmers Adopted production practices on X number of farms. Increased Quantity and variety of orphan crops appearing on market. Increased planting stock maintained by farmers. % increase in number of orphan crops on the market.	FASDEP II GPRS II	MoFA	CRI,IDA,EPA, ARI,FRI, PPRSD Grains dev board.

					support and develop local crop varieties. -Expand infrastructure for seed/planting materials production, processing, storage and marketing to facilitate private sector involvement.	X number of infrastructure identified and expanded by year 'Z'	% increased local crop varieties within the farming community. % increase in number, size and capacity of storage facilities % increase in number, size and capacity of agro-processing plants. % increase in number, size and capacity seed markets available to farmers			
2	Promote and encourage fish culture to argument protein consumpti		Develop inland fishing production systems and improve		- Disseminate existing culture fisheries technologic al packages in all	X number of fishermen adopting new technologi cal packages	% increas e adoptio n rate of culture fisherie	Fisheri es Act	Fish erie s com miss ion MOF A	GIDA, NGOs and Other private compani es

	on.		open sea fishing information systems Promote expansion of inland fisheries development Support research		potential parts of the country. -establish open sea fishing information system - Train farmers on how to manage disease problems in fish production. - Use mass communication systems and electronic media for culture fish extension delivery -establish FBO to support	by year 'Z' X number of information database established by year 'Z'. X number of farmers trained in fish disease management by 'Z'. X number of culture fish farmers informed X number of active FBO's formed to support	s production technologies. X number sea fishing information database developed. - Number of fish farmers trained. -% increase in fish harvest. Increased survival rate of fish, Number of farmers that have adopted the technology Increased frequency of			

			in inland fisheries dev (especially, lesser known species)		extension delivery -Establish inland fisheries research fund -Build capacity for research -establish demonstration sites	extension delivery by year 'Z' -Research fund established by year 'Z' -X number of researchers trained by year 'Z' X number of demonstration sites established by year 'Z'	electronic extension programmes in the airwaves. -Increased number of active FBOs -research fund in place -training reports and manual in place -Number of active demonstration sites established -reports on demonstration sites availabl			

							e			
3	Encourage and promote improved livestock production systems.		Intensify research and development into livestock and poultry breeds Encourage research and development for improved production systems for local poultry Encourage development of improved pastures Demarcation and development of improved rangelands Develop		-Identify, update and disseminate existing livestock technological packages. -Undertake genetic characterisation and improvement of local livestock species -Introduce improved livestock and poultry breeds. -Use mass communication systems and electronic media for livestock extension delivery that responds to practical gender		Increased adoption of livestock production technologies within the community Increased number of improved livestock breeds Increased adoption of new breeds. Increased frequency of electronic extension programmes in the	FASDEP II Livestock policy	Animal Production Directorate (MOFA)	ARI-CSIR EPA GIDA District Assemblies

			and improve lesser known livestock species (grasscutters, snails, rabbits)		needs (radio programmes, information vans) - Disseminate extension information through FBOs. -Train community livestock workers to act as service agents		airwaves. Increased number of active FBOs Increase number of trained service agents.			
4	Establish and support efficient distribution and marketing systems.		To make food available and accessible all year round and at affordable prices.		Establish and manage an effective and efficient food distribution system Establish a guaranteed pricing mechanism to motivate production of targeted food crops (cereals, grains and legumes). Support the		Number of distribution and marketing systems established Number and length of roads linking production centres developed	FASDEP II	SRID (MOFA)	NGOs PRIVATE SECTOR

					developme nt of food storage infrastruct ure across country Support improveme nt and developme nt of road infrastruct ure. -Identify NGOs in microfinan ce to promote and sustain community based savings and credit schemes. -Introduce targeted grants and subsidies on inputs to poor farmers to improve farm level production and marketing activities					
5	Promote and encourage		Enhance income level of		-Liaise with Metropolit		Number of Zoned	Local govern ment	MoF A Metr	GAWU, EPA WRI

	Urban and Peri-urban agriculture		urban dwellers involved in agricultu re		an, Municipal and District authorities to zone areas within urban and peri-urban areas for agricultura l activities. -Train peri-urban producers in good agricultura l practices.		areas for peri-urban agricult ure Increas ed area of land for peri-urban agricult ure. Increas ed number of trained peri-urban farmers on good farming method s	by-laws	opol itan asse mbli es	SRI SARI ARI Affiliated tertiary institutes . TCPD
6	Manage sustainable competing uses of water and land resources		Promote efficient use of water resource s.		-Implement efficient water resources development -Develop management schemes to improve irrigation efficiencies. -Manage on-farm water activities to overcome water shortages and		Increas ed number of water use efficient systems . Increas ed irrigatio n efficien cy.	Land Policy Water policy Irrigati on Policy	MOF A/GI DA	WRC WRI GWCL Land Commiss ion

					enhance food security.		Increased cropping intensity Increased production			
7	Promote and support viable horticulture industry.		To provide appropriate inputs for enhanced production To reduce post harvest losses		-Acquisition of appropriate planting materials (green procurement) -Establish cold chain handling of commodities -Promote appropriate handling containers for produce, especially tomato. -Train and resource extension staff in post-harvest handling technologies -Train producers, processors and marketers in post-harvest handling.		Number/types of appropriate materials being used Percentage reduction in post harvest losses	-FASDEPII -plant variety bill	-PPRSD, horticultural unit, MOFA	tertiary institution Private sector

					-Improve storage facilities along the value chain. -Promote appropriate transportation systems. -Provide regular market information (deficit/ surplus areas) to improve distribution of food stuffs					
8	Identify and address constraints to cash crop industry		Promote and enhance appropriate inputs for production develop and establish effective quality control systems		-Build capacity of nursery operators in all tree crop growing areas. -Support nursery operators (certify and assist to obtain resources) to expand and improve quality of tree crop seedlings. -Build capacity of certified seed growers and support		-% of growers using appropriated inputs -Number of quality control systems developed and established -	Cocoa Policy FASDEP II	CRIG OPRI Cotton dev Board MOFA	Research institutes EPA

					them (to obtain resources) to expand and improve quality of seed. -Strengthen the capacity of PPRSD for monitoring and certification of seed and seedlings. -Use ICT methods (e.g. DVDs) to extend improved production technologies -Build capacity of cash crop farmers to improve productivity and produce quality. -Link cash crop farmers to credit sources (rural banks, NGOs, outgrower schemes etc.) -Facilitate contractual arrangements between					

					cash crop producers and marketers/industry.					
9	Identify and promote domestic value addition activities		Research into and Develop new products		-Source funds for research into new product development. -Develop products that break bulk, have long shelf life, are safe and convenient to use. -Institute competitive grant scheme for research into new products. -Identify existing value addition		Number of new products developed	FASDEPII	MOFA CSIR	GAEC GSB EPA FDB

					technologies and promote to the private sector. -Assess demand for value addition technologies					
10	Encourage and support agricultural diversification		Promote the development of alternative livelihoods		-Promote the production of “orphan” crops -promote the rearing of small stocks -promote the production of non tree forest products (NTFPs) eg. mushroom, snail, etc		-% Increase in the production of orphan crops -Number of farmers adopting small stocks and NTFPs	FASDEPII	MOFA	NBSSI CSIR
11	Establish and support regulations to improve quality of foods.		-Improve quality and market value of foods		-Commission studies into food regulations. -Develop standard into food quality		-Number of studies commissioned and made available - number of food quality standards developed	FASDEPII	MOFA	MOAP-GTZ

12	Develop efficient pilot value chains selected commodities in each ecological zone.		Mainstream value chain in all productive processes		-Establish and resource regional core teams for value chain development backstopping. -Upscale training in value chain analysis for MOFA and MDA staff. -Identify and build capacity of actors in value chain concept and processes. -Undertake market feasibility studies to determine available and potential demand for the selected commodities. -Facilitate the linkage to markets for the selected commodities. -Build capacity of actors along the value chain on GAPs, GMPs and HACCPs.		-regional core teams established -number of trainings conducted - number of people trained -Number of feasibility studies conducted Number of linkages established	FASDEPII	MOFA	Development partners

i.	Manage sustainable competing uses of land resources		-promote efficient land use systems		-develop a national land use plan -Research into efficient use of marginal lands for cultivating plants for bio fuels generation - develop production practices to check desertification		-availability of national land use plan Reports on findings on efficient use of marginal lands for cultivating plants for bio fuels generation	FASDEPII AgSLM Strategy and Action Plan	MOFA Min. Lands and natural resources	-Development partners -EPA -CSIR -Lands Commission -Forestry Commission
ii.	Promote the use of improved		Improve soil health		-Promote appropriate farming		-Number of appropri	FASDEPII SLM	MOFA	-SRI -Tertiary -

	soil conservation techniques, especially to restore degraded land.				systems -Encourage crop livestock integration -Control soil erosion through Soil conservation practices - update soil information		ate farming systems in use -soil conservation practices adopted -reports on soil information available	Plan		institutions -CERGIS -ARI
Iii	Encourage adoption of ecosystem-based farming practices		Promote organic agriculture		-promote conservation agriculture -promote organic agriculture;		Availability of organic products from local sources	-FASDEPII	-MOFA	-CSIR -EPA -WRC -District assemblies
i.	Strengthen adoption of improved technologies by farmers.		-Promote use of efficient technologies in production -build capacity of field officers and farmers		-Conduct participatory research work informed by needs of new technology users along the value chain -Build the capacity of field officers and farmers in use of new technologies. -Conduct on-farm research into low cost appropriate technologies		-Number of participatory research commissioned -Number of field officers trained -number of on-farm research conducted -number of private sector	FASDEPII	-MOFA	-CSIR -private sector

					and deliver them as packages. -Support development of private sector input distribution network. -Intensify field demonstrations/field days/study tours to enhance adoption of improved technologies.		input distribution points. -number of demonstration farms established - % increase in yield of farmers.			
ii.	Increased Agricultural research funding.		Avail adequate funding for research		-Dialogue with Development partners and Ministry of Finance to increase funding for agric research. -Dialogue with private sector to fund agricultural research. -Advocate for the establishment of Agricultural Research fund.		- Quantum of funds devoted to agricultural research	FASDEPII	MOFA MOFEP	Development partners

					-Revise the Science and Technology policy in line with current agriculture policy framework.					
i.	Develop Capacity for planning, policy analysis and M&E at all levels.		Improve inter-sectoral collaboration		-Strengthen plan implementation and monitoring at all levels. -Build M&E capacity at all levels. -Implement programme for participatory M&E and impact assessment. - Establish a clearing house for accepted reports.		-Approved sector plans for monitoring and implementation -Number of M&E capacity built. -number of programmes implemented. -Clearing house for accepting reports established	FASDEPII	MOFA MOFEP	
ii.	Develop a national communication strategy to link all stakeholders		Promote access to ICT at all levels		-Improve access to ICT. -Develop and implement		-ICT equipment available for use. -Established ICT	FASDEPII MoFA ICT policy	MOFA	Min. Of Com CERSGIS

					an intra communications strategy. -Establish a framework for disseminating agricultural information. - strengthen human resource Capacity in ICT. -Establish ICT based agricultural statistic and information database.		networks - established framework for disseminating information -number of staff trained in ICT Established ICT database.			

MANUFACTURING SECTOR

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List of Abbreviations

AGI Association of Ghana Industries
AP Action Plan
ARSCP Africa Roundtable on Sustainable Consumption and Production
BOD Biochemical Oxygen Demand
COD Chemical Oxygen Demand
CP Cleaner Production
EF Energy Foundation
EMPs Environmental Management Plans
EPA Environmental Protection Agency
EPRD AKOBEN Environmental Performance Rating and Public Disclosure
FID **Factory Inspectorate Department**
GCPC Ghana Cleaner Production Center
GDP Growth Domestic Product
GHG **Green House Gas(es)**
GIPC Ghana Investment Promotion Center
GPRS Growth Poverty Reduction Strategy
GWCL Ghana water Company Limited
MDAs Ministries, Departments and Agencies
MEST Ministry of Environment, Science & Technology
MMDAs Metropolitan, Municipal & District Assemblies
MoE Ministry of Energy
MoLGRD Ministry of Local Government & Rural Development
MOTI Ministry of Trade and Industry
MoWRWH Ministry of Water Resources, Works & Housing
NCPC National Cleaner Production Center
NDPC National Development Planning Commission
NEAP National Environmental Action Plan
NEP National Environmental Policy
NGOs Non-Governmental Organisations
NRSCP National Roundtable on Sustainable Consumption and Production
PB Pay Back Period
SCP Sustainable Consumption and Production
SMEs Small and Medium Enterprises
TSS Total Suspended Solids
UNEP United Nations Environment Programme
UNIDO United Nations Industrial Development Organisation
WRC Water Resources Commission

1.0 Structure of Manufacturing Industrial Sector

Ghana's industrial sector is made up of four main sectors namely: Manufacturing, Mining, Electricity and water, and construction. The manufacturing sub-sector accounts for over 36% of the total industrial output and has a contribution of 9% to gross domestic product (Medium Term Development plan - NDPC, 2009).

Ghana has a relatively broad and diverse industrial base, covering a wide range of sectors. Nonetheless, the contribution of the manufacturing sector to GDP remains modest. In 2003, the year of the most recent industrial census, there were some 23,800 manufacturing companies in Ghana, with nearly 117,000 employees.

After mining, manufacturing is the main target sector for foreign investors in Ghana. Accumulated foreign investment in manufacturing amounted to US$2.3 billion between 2001 and 2006, generating some 16,400 jobs (GIPC, 2007). Nearly 90% of foreign investment projects in manufacturing are located in the Greater Accra area. Specific difficulties encountered by the manufacturing sector include power cuts, and access to and conditions of financing (AGI, 2007). The manufacturing sub-sector is broadly classified into Textiles, Food and beverages, Paints and Chemicals, Pharmaceuticals, Pulp and Paper, Wood and wood processing, Metals, Glass, Cement, ceramics and tiles, Thermal power plant and Oil and Gas Refinery. Aluminium smelting, sawmills, agro processing, cement and breweries are the major activities in the manufacturing sub-sector.

The manufacturing industry sector of Ghana has over the years implemented a number of sustainable consumption and production initiative. Among the initiatives implemented include current development of the Trade policy, the implementation of pollution prevention measures that include the implementation of cleaner production measures in the manufacturing sector. The Environmental Protection Agency (EPA) is in the final stages of the establishing a clearner production centre in Ghana.

The GPRS I & II and the long term development plan all outline strategies to ensure the growth of the sector in a sustainable manner. Both the Energy and Water policies are aimed at ensuring efficient use of energy and water respectively in the various sectors including the manufacturing sector. This will require the implementation of various strategies to ensure the efficient use of energy and water in the manufacturing sector to ensure sustainability.

Over the years, the focus of the manufacturing sub-sector has been:

- Processing of raw material for export
- Use of raw material for local production
- Import of raw materials for manufactured exports

2.0 Industrial Sector Objectives

Ghana is an open economy with a population of about 20 million and per capita income of about $450 (Medium Term Development plan-NDPC, 2009). Consequently, any industrial policy devised for the country must be aligned with global opportunities and domestic capacity. Ghana's industrial policy is being developed and the entire policy has four main clusters that covers regulation and incentive programme, technology and innovation, production and distribution and issues on environment, health, gender mainstreaming industrial information and some cross-cutting issues. For the period 2007 to 2015, the industrial sector objectives include:

- Accelerating industrial growth from 7.3% in 2006 to about 12%
- Increasing industry's share of GDP from 25% in 2006 to about 50%
- Increasing manufacturing growth rate from 4.2% in 2006 to about 9%
- Increasing manufacturing share of industrial GDP from 36% in 2006 to about 60% (Medium Term Development plan-NDPC, 2009)

3.0 Activities Implemented under Sustainable Consumption and Production

In her quest to ensure environmentally sustainable industrial development, Ghana has implemented a number of cleaner production programmes. These include

3.1 CP Demonstration Project

Between September 2001-September 2002 a Cleaner Production Demonstration Project was sponsored by the Government of Norway and implemented by UNIDO and EPA-Ghana, with IVAM Environmental Research of Holland as the External Consultants. The objectives of the project included:

- Demonstrating the applicability of CP in Ghanaian industry
- Building capacity in CP assessment at the enterprise and consultants level
- Reducing industrial waste-water discharged into Korle and Chemu II Lagoons of Accra and Tema respectively.

The fifteen (15) industries selected for the pilot project demonstrated both economic and environmental advantages of cleaner production through process efficiency, raw material utilization to enable industries manufacture products with minimal waste generation. Some local consultants were recruited and trained to facilitate the programme implementation. At the end of the project two hundred and ninety-seven (297) CP options were identified. This is made up of the following: Input change- 2%, Product change- 11%, Management -22%, Process optimisation -17%, Equipment modification -4%, Technology change-12%, Waste reuse/recycling -13% and Training/instruction -19%. The CP options per cost level identified were (a) Zero or low cost -48%, (b) Medium cost -29% and (c) High cost- 23%. The payback (PB) periods of 48 options requiring investments (excluding zero and low cost options) are PB < 1 year 51%, 1 < PB < 3 year 40% and PB > 3 years 9%.

The preliminary results indicated the following:

- 200,000 USD total investment were committed as at September 2002
- 830,000 USD annual savings generated
- Considerable reduction in Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Suspended Solids (TSS), etc
- A total of forty five (45) people comprising eight (8) local consultants, thirty (30) company staff and about seven (7) EPA staff had been trained in CP assessment.

- Prior to the beginning of the pilot programme, the fifteen (15) companies together generated approximately 2.7 million m^3 of industrial wastewater per annum in 2000. Upon completion of the programme industrial wastewater generation among the fifteen (15) companies had reduced considerably to 0.8 million m^3 per annum
- Reduction of solid waste as well as efficient use of raw material and utilities within the fifteen (15) companies was also achieved.

The demonstration project was successful and found to be feasible. To sustain the project, it was recommended to establish a cleaner production center with a network of stakeholders to propagate the CP concept in the country.

3.2 National Roundtable on Sustainable Consumption and Production and Institutionalization of National Cleaner Production Centre

In February 2005, the first National Roundtable on Sustainable Consumption and Production (NRSCP) under the theme "Institutionalization of Ghana Cleaner Production Center (GCPC) for Promotion of SCP in West African Sub-region" was organized by the Environmental Protection Agency, Ghana in collaboration with the United Nations Environment Programme (UNEP) and in consultation with Africa Roundtable on Sustainable Consumption and Production (ARSCP). The Roundtable participants were drawn from industry, ministries, departments and agencies (MDAs), research institutions, financial institutions, media houses, multilateral institutions (UNIDO, UNEP), and other African NCPCs namely Uganda Cleaner Production Center and Cleaner Production Center-Tanzania. A number of presentations were made including:

- **SCP awareness creation and dissemination of African Countries Experience (Uganda, Tanzania, Ghana)**
- **Awareness creation on the concept of SCP as a programme for sustainable development**
- **Application of CP Strategies and Beneficial Outcomes: Regional and National Experience on Application of Cleaner Production**

The Roundtable learned lessons from the experiences of established African NCPCs, namely Uganda and Tanzania regarding the need of demand-driven programme delivery to industry for sustainability of the

Center and the nature of cooperation between principal stakeholders and NCPCs to ensure sustainable financing and operation of National Cleaner Production Centre was also made clear to industry participants.

The Roundtable also achieved a major milestone by reaching consensus on the nature of institutional arrangement of the Ghana Cleaner Production Center. The EPA was selected as the Host Institution. Some institutions representing governmental agencies and departments, non-governmental organisations, civil society groups, research institutions, and universities were proposed to serve on the Advisory Board of GCPC. Some institutions were also proposed to serve on the Executive Board of the Center.

The Roundtable welcomed the establishment of National Cleaner Production Centre for Ghana as a legally constituted autonomous institution. They noted that the GCPC would play a significant role in promoting SCP in Ghana and the sub-region.

In addition, potential national and sub-regional SCP projects were identified for development and implementation towards ensuring energy, water and food security, and waste minimization for breaking poverty cycles towards sustainable national development. The potential projects for SCP discussed include:

- Biogas generation technology transfer
- Bio-diesel and organic fertilizer production as a potential regional SCP project for energy, food security and poverty alleviation
- Technology transfer for conversion of plastic waste recycling products to biodegradable plastic packaging to minimize the environmental hazards and health-related impacts associated with plastic waste in Africa.

3.3 Akoben Environmental Performance Rating and Public Disclosure (EPRD)

A pilot Environmental Performance Rating and Public Disclosure (one of the programs to facilitate the uptake of CP in Ghana) with the support of the World Bank has been undertaken to increase compliance with environmental regulations and to create incentives for companies to take voluntary incentives for pollution prevention. Eighteen (18) mining industries and thirty-two (32) manufacturing industries participated in the Pilot Phase I of the EPRD in 2005 for the award of EPA's Annual Continual Environmental Improvement Award. Based on lessons learnt from Pilot Phase I, the Akoben EPRD (which is an improvement of Pilot Phase I) was initiated in 2009 and covered fifty (50) companies throughout the country. The Akoben EPRD has been institutionalized into the day to day programmes of the Agency. To this end the existing environmental laws and regulations are being critically examined in terms of their adequacy to support the Akoben EPRD concept.

3.4 Capacity Building

Two hundred and fifty (250) participants have been introduced to CP in five zonal workshops organised by the EPA (EPA, Annual Report, 2006), particularly the benefits of integrating CP in enterprise management and mandatory Environmental Management Plans (EMPs). Sixty (60) SMEs have participated in National CP Workshops and National Roundtable on Sustainable Consumption and Production (NRSCP) and have endorsed the establishment of Ghana's NCPC and pledged their patronage of the Center when established. Of this number, twenty-six (26) have participated in CP demonstration projects.

Workshops are also organized by Environmental Protection Agency for National Consultants in environmental management.

4.0 Legal and Legislative Framework

At present policies for environmental management in the manufacturing sector are contained in various documents. These policies and legistrations are all aimed at enhancing sustainable comsumption and production in the manufacturing sector. These include among others:

4.1 National Policies

4.1.1 Adoption of Agenda 21

As a party to the Rio Conference on Sustainable Development, the Country also adopted the principles of Agenda 21 as a blue print for environmental management in Ghana. The EPA thus encourages industries to put in place appropriate preventive, minimisation and mitigation measures to ensure sustainable industrial development and operations in Ghana.

4.1.2 The National Environmental Policy

The current Ghanaian environmental policy at national level is mainly based on:

- The Environmental Action Plan, Vol. 1 and 2 (EPA, 1991 - 1994),
- The Environmental Sanitation Policy paper (MLGRD, 1999 - 2001). As the preparation phase of the "Environmental Action Plan" lies back more than one decade and social, industrial and economic development of the Ghanaian society has partly overtaken the Action Plan's visions, expectations and recommendations, the "Environmental Sanitation Policy" paper can be recognised as current status of the society's understanding of environmental management.

The "Environmental Sanitation Policy" identifies waste management as key factor in urban and industrial development and outlines specifications for the management of solid, liquid and industrial waste. The policy, however, can only be a basis regarding the necessary regulations to be developed as well as for the enforcement of respective laws and regulations.

The National Environmental Action Plans sets out clearly the National Environmental Policy of Ghana. The key guiding principle of this policy statement is that:

"Environmental Protection in Ghana should be guided by the **PREVENTIVE APPROACH**; that is with the recognition that socio economic developments must be undertaken in such a way as to avoid the creation of environmental problems".

Specifically, the policy seeks to:

- Ensure sound management of natural resources and the environment;
- Maintain ecosystem and ecological processes essential for the functioning of the biosphere;
- Adequately protect humans, animals and plants, their biological communities and habitats against harmful impacts and destructive practices, and preserve biological diversity;
- **Guide development in accordance with quality requirements to prevent, reduce, and s far as possible, eliminate pollution and nuisances;**
- **Integrate environmental considerations in sectoral structural and socio-economic planning at the national regional, district and grassroot levels;**
- **Seek common solutions to environmental problems in West Africa, Africa and the world at large**

4.1.3 Industrial Policy

Ghana's industrial policy is being developed and the entire policy has four main clusters. These are:

- Regulation and incentive programme
  - Incentive framework for industrial development
  - Industrial legislation and regulations
  - Labour and industrial relations
  - Spatial distribution, decentralization and cluster development
  - Strategic interventions in industrial development
  - Privatisation and public-private partnerships for industrial development

- Technology and innovation
  - Technology for industry
  - Innovation, research and development
  - ICT for industrial development
  - Intellectual property rights in industrial development

- Production and distribution
  - Manpower development and training for industrial development
  - Raw materials and inputs supply

- Financing for industrial development
- Industrial lands, infrastructure, energy and utilities for industrial development
- Industrial sub-contracting
- Marketing and distribution of industrial products
- Standards

- Cross-cutting issues
  - Gender mainstreaming in industry
  - Quality health in industrial development
  - Environmentally sustainable industrial development
  - Industrial data and information

For the period 2007 to 2015, the industrial sector objectives include:

- Accelerating industrial growth from 7.3% in 2006 to about 12%
- Increasing industry's share of GDP from 25% in 2006 to about 50%
- Increasing manufacturing growth rate from 4.2% in 2006 to about 9%
- Increasing manufacturing share of industrial GDP from 36% in 2006 to about 60%

4.1.4 Water Policy,

A draft National Water Policy, which provides a framework for the development of Ghana's water resources, was prepared by the Water Resources Commission (WRC) in 2002. The draft document has being consolidated to include policies, concerning urban water supply and community water and sanitation services. The policy aims at achieving an efficient and effective management system for the sustainable development of water resources in Ghana to assure full socio-economic benefits for present and future generations. It is targeted at all water users, namely water managers and practitioners, decision makers, policy makers, industry, NGOs and international organizations. The Guiding Principles comprises among othes:

- Recognising water as a finite and vulnerable resource given its multiple uses.
- Integrating water resources management and development with environmental management in order to ensure the sustainability of water resources in both quantity and quality.

4.1.5 Trade Policy

The new Ghana Trade Policy which was launched in February 2005 is the country's first coherent document that seeks to provide clear and transparent guidelines for the implementation of the Government's domestic and international trade agenda. The key objective is to ensure a consistent and stable policy environment within which the private sector and consumers can operate effectively and with certainty. The fundamental principle underlying the Trade Policy is that the private sector is the engine of growth, with Government providing a trade enabling environment to actively stimulate private sector initiatives. The policy prescriptions emanate from seven (7) thematic areas that form the basis of the document. The thematic areas and the issues they cover are as follows:

- International Trade
- Import-Export Regime
- Trade Facilitation
- Enhancing Production Capacity
- Domestic Trade and Distribution
- Consumer Protection and Fair Trade and
- Intellectual Property Rights

The Trade Sector Support Programme (TSSP) is also being implemented as a five-year (2006-2010) Strategic Plan designed to implement the policy prescriptions in the Ghana National Trade Policy. The objectives of the TSSP are to increase Ghana's competitiveness in international and domestic markets and improve the legal and regulatory environment for business and consumers. The TSSP consists of 27 projects which were couched from the thematic areas of the Trade Policy with some of the key objectives that seeks to achieve are to:

- Create a fair and transparent import-export regime;
- Enhance production capacity for domestic and export markets;
- Increase domestic trade and improve distribution;
- Strengthen standards Institutions to ensure the protection of health and safety of consumers and also promote the quality of exports;
- Promote consumer protection and fair trade;

4.2 Legislations

At present, there is no specific legislation for the manufacturing sector on industrial or hazardous waste management at national level. However, some environmental laws and regulations deal with general issues of waste management. The key environmental, health and safety legislation relevant for the management of waste is provided within the following acts, legal instruments and regulations:

- Environmental Protection Agency Act 1994 (Act 490),
- Environmental Assessment Regulations 1999 (LI 1652),
- Chemical Hazards Control Act 1996 (Act 528),
- Factories, Offices and Shops Act 1970,(Act 328),
- Food and Drugs Board Law (PNDC Law ....),
- The Ghana National Fire Service Act, 1997 (537),
- National Environmental Quality Guidelines, 2000

A few of these legislations within the scope of this work are briefly introduced below:

Environmental Protection Agency Act, 1994 (Act 490)

This Act is the major framework law which establishes the Environmental Protection Agency and specifies its functions (in Article 2). .

Environmental Assessment Regulations, 1999 (LI 1652)

The process of environmental permitting is based on the Environmental Assessment Regulations 1999 (LI 1652). The aim of the environmental assessment process is to ensure that all potential environmental and social impacts of any undertaking are fully investigated and appropriately managed.

National Environmental Quality Guidelines Regulations, 2000,

The draft National Environmental Quality Guidelines were prepared with reference to section 28 of the Environmental Protection Agency Act 1994. These guidelines are the basis for the draft regulations namely the National Environmental Quality Standards Regulations. The draft regulations comprise standards for the following environmental media

- Ambient air quality,
- Ambient noise level,

- Industrial effluent discharge quality,

The Guidelines also prescribe limits for industrial effluent discharge quality for specific industrial sectors including food and beverage, textile, paint and chemicals, metals and others. Whilst the Agency is waiting for Parliament to pass the National Environmental Quality Guidelines into law (regulations), industries are required to ensure that wastewater discharges from their operations meet the permissible limits of the EPA Environmental Quality Guidelines.

5.0 Major Environmental Impacts of the Manufacturing Sector

The major issues of environmental concern in the manufacturing sector may be direct or indirect. Major impact sources include production, plant operations, products, raw material, energy and, water use. The major direct impacts include air pollution from steel mills, cement, oil refineries, wood processing, industrial boilers and aluminum plants. Conversly, the impacts of solid waste generation is from oil palm processing, breweries, textiles, fish processing, wood processing and fruit processing anong others, while liquid waste is largely generated from breweries, soft drink bottling plants, fish processing, textiles, oil palm mills etc. The indirect impacts are however linked to climate change from the use of fossil fuels, ozone layer depletion from the use of ozone depletion substances.

5.1 Impact of materials

The main manufacturing sectors are listed in section 1.0 above. The major raw materials for the manufacturing sector are sourced from both foreign and local sources. The imported materials include among others concentrates, alcohols, grey baft, dyes, chemicals, aluminum ingots, alumina, clinker, limestone, crude oil etc. The materials from local sources are scrap metal, tuna fish, lumber, cotton, cocoa, oil palm etc.

There are various impacts associated with the sourcing of the raw materials from local sources. These may be positive or negative. They include job creation, development of communities, earning of foreign exchange through export, development of local expertise. Some of the negative impacts include climate

change, depletion of natural resources, air pollution, land degradation, desertification, waste generation among others.

Generally, the production pattern depends on the trends in consumption patterns. Quite a number of companies depend on market surveys, research and development and hence the companies ability to market. The consumers choices are thus greatly influence by the purchasing power and advertisement. In Ghana consumer choices are influenced more by the purchasing power than by any consideration for the environment. These may be due to the general lack of awareness on issues relating to eco-labelling, environmental issues. Thus the EPAs implementation of EPRD and Cleaner Production programmes could be used by the manufacturing sector to influence consumer choices.

The major impacts associated with this is the discHarge of large volumes of solid and liquid wastes, aerial emissions etc. Other impacts include urbanisation as a result of rural-urban drift. It should however, be mentioned that the solid and liquid waste hold a great potential for sustainable resource use.

6.0 Strategies to Guide Consumer Choices

In Ghana quite a number of companies in the manufacturing sector are ISO 9001 certified and a few others are ISO 14001 certified. However, to fully influence consumer choices will require a combination of strategies including eco-design and labeling, awareness creation, Environmental Performance Rating and Public Disclosure among others. Eco-design and labeling will ensure that the life cycle approach is adopted in the choice of product and services to enhance the efficient utilisation of resources. There is however, the need to create awareness so that consumers are well informed of the range of choices available. The EPRD will increase compliance with environmental regulations and to create incentives for companies to take voluntary incentives for resource use efficiency and thus pollution prevention.

7.0 Pilot Projects for the Manufacturing Sector

The SCP programme consists of specific strategic project components in the manufacturing sector. To facilitate the uptake of sustainable consumption and production by the manufacturing sector, a number of projects have been identified. These projects are detailed in the Table 1 below. The project areas are

water use efficiency, energy use efficiency, waste management, sustainable and renewable energy generation capacity building and awareness creation, eco-design and labeling etc. The projects have been selected on the basis of their cost-effectiveness and for opportunities of synergy and replicability.

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Table 1 Pilot Projects for the Manufacturing Sector

Project	Implementation Agency(ies)	Measurable Outputs	Priority Urgent : 0-1 yr High : 0-3 yrs Medium > 3 yrs	Output
Reduction of water consumption in Breweries	EPA, Breweries, MOTI, AGI,	Reduction in hectoliters of water use per litre of product Reduction in volumes and load of wastewater discharged	High	Water consumption reduced Wastewater volume and load reduced
Reduction of water consumption in Soft Drinks Bottling Plant	EPA, Drink Bottling Plants, MOTI, AGI, Soft	Reduction in m^3 of water use per m^3 of product	High	Water consumption reduced Wastewater volume and load reduced
Reduction in energy consumption from the national grid through the use of biomass for firing boilers/furnaces in the wood processing sector	EPA, MOE, Wood processing companies	No. of wood processing companies using wood off cuts and saw dust for firing boilers Saved Energy from National grid made available for other users	Medium	Consumption of renewable energy sources increased GHGs emission and other air pollutants reduced Dependence on conventional energy reduced
Energy use efficiency improvement	EPA, MOE, EF, Steel Plants, Aluminium plants, AGI, Oil Palm Processing Plants, Industrial Boilers, Cement production etc	No. of industries participating Total amount of energy saved High energy demand areas and alternatives for reduction/change over identified Amount of GHGs and	Medium	High energy demand areas and alternatives for reduction/change identified and implemented Best available technologies identified and transferred GHGs emissions reduced

		other air pollutants reduced		
Renewable energy use from biomass for generation of electricity in the Oil Palm Processing Industry	EPA, MOE, Energy Foundation, Oil Palm Processing Industries	No. of oil palm processing companies using biomass to generate electricity Saved Energy from National grid made available for other users	Medium	Consumption of renewable energy sources increased GHGs emission and other air pollutants reduced Dependance on fossil fuels for energy generation reduced
Reduction in fish waste generated by fish processing companies	EPA, AGI, Fish processing companies	Quantity of fish waste sold to third parties Reduction in pollution load of effluent	Medium	Effluent load from fish processing companies reduced Reduction in solid waste generated
Use of renewable energy sources for industrial boilers	EPA, industries, oil palm processors, AGI	Number of industries using renewable energy sources e.g. biomass for firing boilers	Medium	Consumption of fossil fuel reduced GHGs emission and other air pollutants reduced
Capacity building on SCP in the manufacturing sector	EPA, industries, MOTI, MEST, AGI	Number of industries and industrial workers aware of SCP benefits	High	Awareness of SCP created SCP implemented in manufacturing sector
Mandatory water efficiency audits for high water consuming manufacturing users.	EPA, GWCL, Industries, AGI	No. of big manufacturing consumers conducting Water Audits Water Consumption reduction among big	Medium	Water audit conducted Water consumption reduced

		manufacturing water users		
Mandatory energy efficiency audits for high energy consuming manufacturing industries.	EPA, MoE, Energy Foundation, Energy Commission, NGOs	No. of big consumers conducting Water Audits Water Consumption reduction among big water users	Medium	Energy audit conducted Energy consumption reduced
Sustain a national awareness campaign on water savings	EPA, MoWRWH, GWCL, NGOs	Public Attitude towards water savings through surveys % Reduction in Average industry and employee water consumption	High	Attitude of public on water savings changed Average industry and employee water consumption reduced
Sustain a national awareness campaign on energy savings	EPA, MoE , Energy Foundation, Energy Commission, NGOs	Public Attitude towards energy savings through surveys % Reduction in Average household and employee energy consumption	High	Attitude of public on energy savings changed Average industry and employee energy consumption reduced
Development of a national eco-design and labeling framework with a focus on manufacturing sector	EPA, MEST, MOTI, AGI, Consumer Associations, NGOs	Development of national guidelines for eco-design and label of manufactured products Number of manufacturing industries implementing eco-design and label guidelines Consumer demand for eco-designed and labeled products	High	Guidelines for eco-design and labeling developed Eco-design and label guidelines for manufacturers implemented Demand for eco-designed and labeled products increased

Establishment of industrial enclave in all major cities in Ghana	MOTI, EPA, MoLGRD, MMDAs, MEST, AGI, NGOs		Medium	Impacts of manufacturing industries localised

TRANSPORTATION

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List of Abbreviations

BRT	Bulk Road Transport
BRV	Bulk Road Vehicles
CNG	Compressed Natural Gas
DFR	Department of Feeder Roads
DUR	Department of Urban Roads
DVLA	Driver, Vehicle Licensing Authority
EC	Energy Commission
EPA	Environmental Protection Agency
GCAA	Ghana Civil Aviation Authority
GHA	Ghana Highway Authority
GDP	Gross Domestic Products
GPHA	Ghana Ports and Harbours Authority
GPRS	Ghana Poverty Reduction Strategy
GPRTU	Ghana Private Road Transport Union
GRF	Ghana Road Fund
GRTCC	Ghana Road Transport Coordinating Council
ICAO	International Civil Aviation Organization
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MDG	Millennium Development Goal
MLGRDE	Ministry of local Government and Rural Development
MOE	Ministry of Energy
MRH	Ministry of Roads and Highways
MRH	Ministry of Transport
MTTU	Motor Traffic and Transport Unit
NPA	National Petroleum Authority
NRSC	National Road Safety Committee
SEA	Strategic Environmental Assessment
TCPD	Town and Country Planning Department
TOR	Tema Oil Refinery
VLTC	Volta Lake Transport Company

1.0 Background

Sustainable development is defined as the "*development that meets the needs of the present without compromising the ability of future generations to meet their own needs."* (Bruntland Commission Report – Our Common Future1987)

In recent years serious concerns have been raised about the continued deterioration of the global as well as national environmental conditions. This situation is attributed mainly to the unsustainable pattern of consumption and production, particularly in industrialized countries as concluded by the United Nations Conference on Environment and Development in Rio de Janeiro in 1992." (Agenda 21, para 4.3).

The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 singled out "changing unsustainable patterns of production and consumption" as one of the key elements of sustainable development. There was a call for fundamental changes to the ways in which societies produce and consume goods and services in order to achieve sustainable development.

Countries were called upon to promote sustainable consumption and production patterns, with the developed countries taking the lead. The 2002 Johannesburg Summit called for a ten-year framework of programmes in support of national and regional initiatives to accelerate the shift towards sustainable consumption and production.

1.1 Definition, Purpose and Benefits of Sustainable Consumption and Production

Sustainable production and consumption (SCP) is generally defined as *"The production and use of goods and services that respond to basic needs and bring a better quality of life, while minimizing the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardize the needs of future generations." (*United Nations Commission on Sustainable Development (UNCSD) Symposium on Sustainable Consumption, Oslo, 1994.2)

SCP can also be broadly defined as a holistic approach to minimizing negative environmental impacts from production and consumption in society. It can be considered as a practical implementation of strategies to achieve sustainable development and can be viewed as the two legs on which sustainable development stands.

The above definition of *sustainable consumption focuses on*

- addressing needs,
- quality of life,
- equity,
- resource efficiency,
- waste,
- (environmentally-improved) goods and services.

It also emphasizes changes in patterns of consumption both in terms of the levels of utilization of goods and services *and* the way those goods and services are produced and delivered. Consumption of goods and services is not an end in itself; patterns of consumption reflect the existence of markets for goods and services – 'systems of production meeting the expressed needs of consumers'. The 'expression of needs' is a complex issue. Even needs which could be considered as universal (nourishment, health, shelter, mobility, etc) are obviously expressed (and met) in different ways in different contexts. Even in a given context, the way those needs are expressed (and met) changes over time.

The call for sustainable consumption and production is justified by the conclusions of studies showing that two-thirds of the Earth's ecosystem services are in decline. Nature provides essential resources to the system of production and consumption, including provisioning services, or products, such as timber and fish, and regulation services, such as climate control, pollination, irrigation and flood regulation. According to the Millennium Ecosystem Assessment (MA), 60% are being degraded or used unsustainably, including 70% of provisioning and regulating ecosystem services.

Again the ecological impact of activities in various sectors is significant to warrant some critical attention. For instance WWF states that each US$ 1 million spent by consumers on food has an ecological footprint of approximately 1,500 hectares. Food and drink are reported to have the highest footprint per dollar spent, followed by household equipment and housing. In terms of absolute consumption impacts, food, transport and housing are seen as the most significant. (*One Planet Business* report).

1.2 Key Sustainable Development Principles

The following principles of sustainable development must be integrated into national development agenda

- Collective Stewardship, Partnerships and Shared Responsibility
  This implies:
  - Collective responsibility to pass on to the next generation a world that is at least in the same state as it was when we inherited it.
  - Use of the environment and natural resources in such a way that they benefit the community as a whole and within the limits of their capacity for renewal.
  - Ensure that economic development is adapted to long-term management of the environment and natural resources.
  - Everyone can contribute to sustainable development. Coordinated and effective participation by the business sector, the voluntary sector, central and local authorities and individual people requires a common understanding of the challenges we are facing and opportunities for different groups and people to contribute to sustainable development.

- The Precautionary Principle

The precautionary principle states that "where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation."

- The Ecosystem Approach

Management should be based on

- all types of information, including scientific, traditional and local knowledge, to maintain ecosystem functioning and ensure that human activity takes place within the tolerance limits of the natural environment.
- evaluated on a continuum from intensive use to strict protection.
- management should be planned so that it is adapted to temporal ecological variations and effects on neighbouring ecosystems.
- management should be decentralized to the lowest appropriate level.

- The Polluter-Pays Principle

The principle puts a price on the environment and on pollution of the environment. Polluters are charged for pollution they cause according to common rules. By relating the costs imposed on polluters to the pollution they cause and not only requiring reductions in emissions, we can give polluters incentives to develop and use environmentally-friendly technology. This improves efficiency in the long term. The use of policy instruments based on the polluter-pays principle can reap double dividends: environmental pressure is reduced and society uses other resources more efficiently. The

- Inter-sectoral Coordination

Efforts to promote sustainable development require an integrated approach to economic, social and environmental aspects. To achieve this, we must develop cross-sectoral policies, integrate policy between different decision-making levels, integrate the various considerations within each sector and find policy instruments that can promote all these developments in a cost-effective way.

1.3 Transport and Sustainable Development

Transport is considered important to economic growth and experience has shown that it is difficult to "decouple" from sustainable economic growth. Transport therefore impacts our lives in a variety of ways and the challenge for us is to balance transport's role in promoting development whilst reducing its carbon emissions, maintaining safe and secure networks that also promote health, equality of transport opportunity, quality of life and the natural environment.

It has been established that the transport sector places particular stresses in our quest for sustainable development through increasing dependence on oil, which exposes us to potential energy price shocks or shortages due to supply constraints or political instability; increasing emissions of greenhouse gases (especially CO2) and local pollutants (NOx, SO2, PM); and the increasing costs of congestion, loss of "social capital" – "social networks and interactions that inspire trust and reciprocity among citizens" – which is degraded in a car-dependent society,

increasing number of transport accidents etc. This situation indicates that transport systems in most countries are not on sustainable paths. It does not meet all our current needs and in its current form will most certainly not meet the needs of future generations.

The OECD Environmentally Sustainable Transport (EST) project has proposed that:

"an environmentally sustainable transport system is one where transportation does not endanger public health or ecosystems and meets needs for access consistent with (a) use of renewable resources below their rates of regeneration, and (b) use of non-renewable resources below the rates of development of renewable substitutes." (Wierenkehr 2004, 14)

In Ghana transport is one of the key challenging areas for achieving sustainable national development. The growth in the transport sector is accompanied by increasing problems like congestion, local air pollution, greenhouse gas emissions, land degradation, noise pollution, rising transport related energy demand and uncontrolled urban sprawl..

The development and implementation of a sustainable transport action plan could have enormous beneficial impact on the economy through reduced pollution, reduced time, and an increase in quality of life. Important goals to be target could base on the following environmental, social and economic factors:

i) Improved integration of transport with land use planning and development.
ii) Reduced environmental emissions (CO2, NOx, VOCs, PM, noise)
iii) Reduced transport congestion and accidents
iv) Increased share of efficient and less used modes of transport such as mass transit, rail
vi) Promotion of more efficient fuel use.

A number of strategies focusing on changing people's/drivers behaviour, technological solutions, improving regulatory and institutional systems, and planning and infrastructure provision could be employed to achieve the above goals.

Priorities for sustainable transport action planning may be focused on incentives, integration with planning, infrastructure development, institutional strengthening and information dissemination. Any concept of sustainable transport must be grounded in the broader concept of sustainable development and must aim at:

- preserving the natural environment by minimizing emissions of pollutants, reducing and managing transport waste and by careful land use planning to address the impact of transport infrastructure
- reducing environmental impacts and contribute to economic prosperity and development by maximizing transport efficiency
- enhancing social well-being by providing access and mobility to urban and rural populations
- maintaining high standards of safety and security and
- avoiding noise nuisance.

This requires the development and implementation of a sustainable transport action plan which recognizes the important direct link with many other development priorities, such as economic growth and competitiveness, job creation, environmental protection, water and energy security; poverty alleviation; health and education. The main benefit of the plan is that it enables resource efficiency and helps in meeting basic transport needs in a sustainable manner.

2.0 Overview of the Transport Sector in Ghana

Ghana's transport sector has evolved to satisfy a wide range of often competing requirements. Socio-political and economic conditions as well as technological know-how and capacity change over time resulting in the need for adaptation and review to ensure optimum institutional arrangements are applied. Sometimes these changes take place on an ad-hoc basis while, at other times they are the results of strategic planning aimed at bringing about specific improvements or realizing new opportunities.

Currently, the impact of external events is creating opportunities and demands on the sector which could inspire reform and improvement yet barriers, to previously identified improvements, remain in place. Ghana's planning and decision making in the transport sector continues to focus almost exclusively on improving individual modes, with very little attention paid to how improvements in one mode affected others.

The establishment of an intermodal framework where road, rail, inland water and pipeline transport and logistics services coexist and complement each other will provide a broader range of options to all transporters.

2.1 Description of the Transport Sector in Ghana

The transport sector comprises a wide range of institutions such as Ministries, Departments and Agencies as well as private and state owned enterprises. Institutional activities are guided by policy objectives and influenced by the systems, rules and behaviour that reflect the culture of the organizations involved. The main modes of transportation in Ghana comprise road, rail, maritime and aviation. The responsibility for providing transport infrastructure is shared by the Ministry of Roads and Highways (MRH) and the Ministry of Transport (MOT). The MRH has oversight responsibility for the development and maintenance of roads whiles the MOT has oversight responsibility for the development and maintenance of ports and harbours, inland-water, railway infrastructure and airport facilities.

2.1.1 The Road Transport Sector

Road transport is by far the dominant carrier of freight and passengers in Ghana's transport system. It carries over 95% of all passenger and freight traffic and reaches most communities, including the rural poor.

Ghana's road network is about 62,954 kilometers as at the end of 2007. Improvements in improving road conditions have been gradual. As at 2007, the road condition nation wide is 43.4 percent good, 26.9 percent fair, and 29.6 percent poor as compared to the desired condition of 70 percent good,

20 percent fair, and not more than 10 percent poor. The road condition mix for the trunk road network constitutes 57% good 17% fair and 26% poor. In 1997 it was projected that by 2002 the roads could be improved to 70% good, 20% fair and less than 10% poor. However this target was not been achieved as at 2006 due to inadequate funding, unplanned expansion and local construction capacity and skills.

The feeder road network has a road condition mix of 34% good, 51% fair and 28% poor. Urban areas need special attention. Roads are heavily congested yet there is the need to create greater carrying capacity. For example cars and taxis take up 55% road space and carry 26% passengers. Trotros and buses take up 32% of road space and carry 68% of passengers.

2.1.2 Maritime and Inland Water Transport Sector

Ghana's maritime and inland water transport sector is made of the following providers: Ghana Ports and Harbors Authority in charge of the two sea ports at Takoradi and Tema. The development and maintenance of ports infrastructure is the responsibility of Ghana Ports and Harbours Authority as well as regulation and licensing of operators associated with ports in Ghana. The Volta Lake Transport Company Ltd is responsible for water transport on the Volta River, whiles the Ghana Maritime Authority is responsible for regulating the operations and safety in marine and inland water ways, the Ghana Shippers Council is responsible for the welfare of shippers. Maritime transport constitutes about 80% of the country's total international trade.

The Volta Lake transport system spans about 450 kilometers from the south to the north with ports at Akosombo, Buipe and Yapei and major ferry crossings at Yeji, Keta Krachi, Dambai and Kpandu.

This important inland waterway transports petroleum products, cement, and agricultural commodities. It also provides many passenger services, mostly for the rural population living along the lake. Operations started off well many years ago, but to be successful a number of challenges need to be overcome. Periodic drops in the level of the lake inhibit longitudinal movement and expose Debre shoal, making it difficult to reach Buipe. Cross-lake services are also affected as a result of inability to access properly constructed landing stations. Other challenges include aging equipment, underwater obstructions to safe navigation, lack of navigational aids, and lack of regulation for canoe construction, use, and operations. Improving lake transport will complement land transport and offers certain economic advantages to users. Barge transport has distinct advantages over other modes. Greater use of lake transport will also divert some truck movements from our transport corridors, reducing overloading on roads, traffic congestion and road maintenance costs.

Whilst inland water transport does not constitute a significant part of Ghana's transport system, some routes are critical to small communities. Small boats and canoes operate on Ankobra, Pra, Oti, Black Volta, White Volta, Volta south of Akosombo and Lake Bosumtwi. Private small owners operate in these areas moving foodstuffs with virtually no control or regulation.

New infrastructure facilities are being provided for the Inland Port of Boankra, 50 kilometres from Kumasi. So far the infrastructure provision consists of land and preparation works to enable full scale

development by private sector interests. Responsibility for this development currently falls within the MOT.

2.1.3 The Railway Transport Sector

Ghana's railway network is 947 kilometers of mostly single track rail of 1.067m (3′ 6") gauge located in the southern part of the country. In 1965, it carried 2.3 million tons of freight and 8 million passengers. From then the performance of the Company has continued to decline and by the year 2007 with only the western line partially operational for freight, traffic fell to 121,437 tones. Currently with only the suburban trains located in Accra operating, passenger traffic has also declined to 26,000 as at 2007. With lower revenues and increasing labor costs, the rail operation could not support modernization and sustain its maintenance program. The worsening financial situation of the railway resulted in the usual vicious cycle faced by many railroads: default on loan payments → poor maintenance → drop of service quality → loss of customers → more drops in revenues.

The rail system has the potential to become a vital part of Ghana's transport system, carrying a larger portion of travelers and freight on the busiest transport corridors. As the economy grows, there will be increasing demand on the transport system, and rail can become a viable alternative to road transport, provided costs are kept under control, efficiency and reliability are improved, and ongoing investments are secured for development and maintenance of the system.

The Government of Ghana is actively considering private sector participation as a means of supporting rail sector development with the establishment of the Ghana Railway Development Authority.

2.1.4 The Aviation Sector

Ghana's aviation sector is managed by the Ghana Civil Aviation Authority whose functions comprise: policy formulation, technical (safety) and economic regulation and air space management and the Ghana Airport Company which is responsible for the infrastructural development, operations, maintenance and management of airports and aerodromes.

There is only one international airport located in Accra with regional airports in Kumasi, Takoradi, and Sunyani and Tamale with paved runways. Apart from Wa, which is a paved airfield, there are other airstrips with short unpaved runways at Yendi, Paga, Obuasi, Ho, Tarkwa, Ketekrachi, Bimbilla, Saboba, Mole Game Reserve and Salaga which provide for medical and other emergency services.

Kotoka Airport handles about 800,000 passengers and 50,000 tons of freight annually. Passenger traffic has generally increased in recent years, growing at an average of 7 percent annually over the past five years.

The recent growth in passenger and airline traffic is a reflection of Ghana's economic growth in recent years. Compared to other West African countries, Nigeria shows greater increases in traffic growth considering passengers between the United Kingdom and the three West African countries as shown in Figure 1.

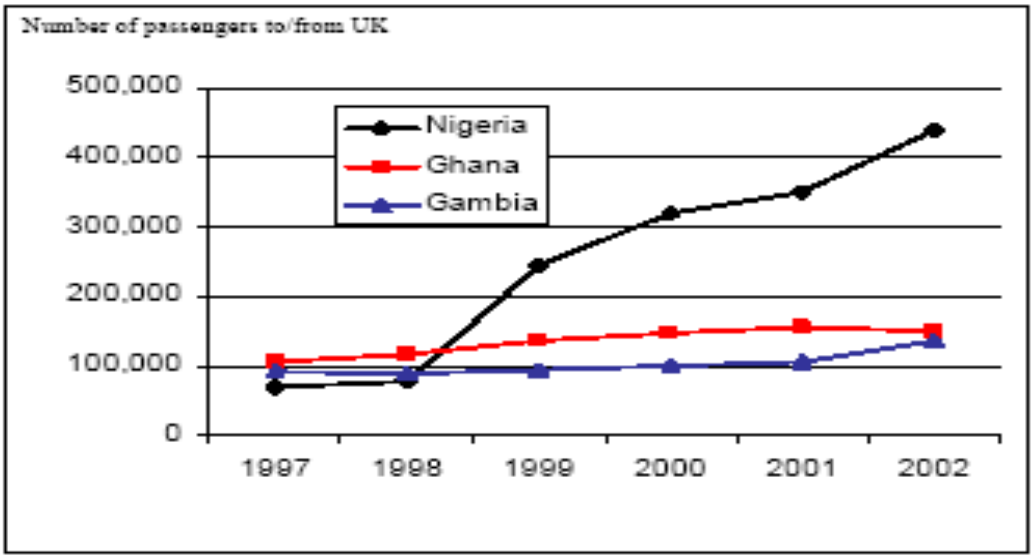

Figure 1: Passenger Traffic from UK to West Africa

The airport is being renovated as part of a phased rehabilitation program funded by internal and external sources. The program includes extending the runway and installing modern navigation and communication equipment. Boarding lounges will be renovated in the next phase. The other airports, however, need investment for improving infrastructure and navigation equipment. Ghana controls the entire Accra Flight Information Region (FIR), which includes the upper airspace of Ghana, Togo, and Benin. The Government has adopted a liberalized skies policy that allows for competition and cross-border investments and lifts restrictions on ownership and control while still keeping some limits on flight frequency. Compared to international airfares in other parts of the world, air fares for both passengers and airfreight to and from Ghana are high and in some cases seat availability and air cargo space are limited. This discourages business travel, tourism, and foreign investment.

3.0 Unsustainable Consumption and Production Patterns and Issues in the Transport Sector in Ghana

In Ghana issues of concern for developing a sustainable transport system must take into account the following:

- Transport related atmospheric emissions/pollution
- Noise nuisance
- Transport energy demand
- Transport safety and security
- Integrated transport system
- Land use planning and transport integration
- Poor transport infrastructure and services

3.1 Transport related Atmospheric Emissions/Pollution

The transport sector is a dominant source of local and global air pollutants (PM, SOx, NOx, CO, CO_2, VOCs, O_3) that are responsible for adverse health impacts and contribution to global climate change. In Ghana total emission levels increased linearly from 32,222.78t in 2000 to 52,666.17t in 2005. The rise is estimated to be about 16.67% per annum depending especially on the commensurate increase in fleet numbers and fuel consumption. There is a direct link between vehicular emissions, fuel consumption and fleet population as demonstrated in figure 2. below. It is projected that fleet population will rise at 6.9% and even more in the coming years, and road transport activities intensified, total v9ehicular emission is likely to build-up from the current 52,666.17t to 71,652.78t in five years, 111,652,.58t in ten years, and 151,65.38t in 20 years respectively .

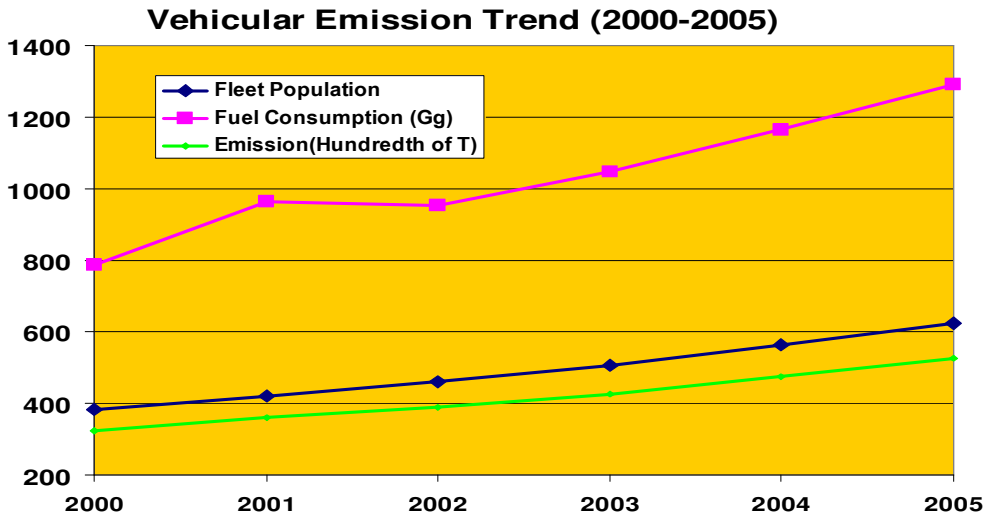

Figure 2: Total Vehicular Emission Trends (2000-2005)

Vehicular emission from urban roads accounted for an average of 71 percent between 2000 and 2005. Urban source emissions increased marginally by 6.6% between the study periods. The

remaining 29 percent was distributed 20.28 percent and 8.72 percent accordingly among rural and highway road classes.

The average distribution of total emission is influenced largely by the high fleet population density especially in the urban areas where traffic movement is relatively around slow and fuel consumption high. The dominance of low capacity buses, mainly second-hand imported van conversions and minibuses and use of old commercial vehicles for passenger transport results in adverse environmental impact due to frequent break downs and poor engine maintenance.

Passenger vehicles account for about average 69.7 percent (430495) of total fleet stock in the country between 2000 and 2005. Forty-eight percent of these were manufactured before 1993 (Conventional), thirty-seven percent manufactured after 1992 and before 1996 (Euro 1), totaling 85 percent. Eight percent were produced after 1996 but before year 2000 and six percent manufactured after 2000 and 2005. Table 1 below shows the distribution of emissions and passenger fleet numbers for the various years.

Table 1: Passenger Vehicle Emission by Year of Production

Emissions From Passenger Vehicles							
% of total Emissions	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**% Emission**
	70.10	70.61	70.04	70.02	70.04	70.04	
Conventional	17875.21	19624.90	21544.51	23621.03	26293.19	29189.62	78.78
Euro I	3753.40	4122.96	4526.16	4957.42	5516.68	6134.05	16.54
Euro II	681.65	1433.76	821.54	900.09	1001.88	1113.31	3.45
Euro III	277.12	304.28	334.02	365.89	407.27	452.66	1.22

Source: SEA of National Transport Policy Report (2006)

Emissions from passenger vehicles account for 70 percent of total emissions in the country. (SEA of Transport 2006). Passenger vehicles are therefore a major emission category source among the sub-classes. The remaining 30 percent are from to light duty, heavy duty and others etc. In terms of emissions, mopeds and motorcycles contributed 0.001 and 2.5 percent of the total vehicular emissions.

It was estimated in 2006 that total greenhouse gases from the road transport increased by 24.5 percent from 2547.11Gg in 2000 to 4201.73Gg in 2005. CO_2 constituted average of 96.2 percent of the total greenhouse gases between 2000 and 2005. The remaining 3.36 and 0.42 percents were accounted for by CO_2 equivalent of the non-CO_2, namely, CH_4 and N_2O respectively. The amount of CO_2 is largely dependent on initial carbon content of the fuel stock and fuel consumption level. This factor greatly influenced the level of greenhouse emission since CO_2 concentrations forms a major part of the whole GHGs. Therefore the dip in the chart in 2000 in fuel consumption in the country had a consequential impact on the amount CO_2. This anomaly in the reflected in the Total

Greenhouses level in 2002. The figure 3 below shows the trend of GHGs between 2000 and 2005. The transport sector is responsible for over 60% of non-biomass carbon dioxide and over 50% of nitrogen oxide emissions.

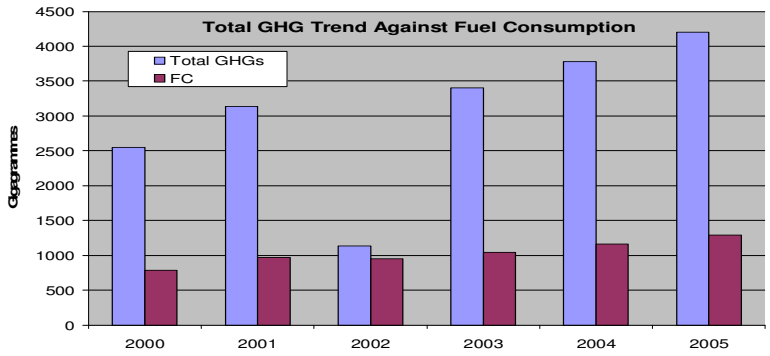

Figure 3: GHGs and Fuel Consumption

3.2 Increasing Transport Energy Demand

Ghana has been experiencing increasing fuel consumption levels since 2000. There was a steady increase from 787.02Gg in 2000 to 1292.15Gg in 2005. (see table 2 below).

Table 2: Fuel Consumption Trend

Year	Fuel Consumption (Gg)
2000	787.02
2001	964.52
2002	953.43
2003	1047.74
2004	1164.21
2005	1292.15

Source: SEA of National Transport Policy Report (2006)

The transport sector alone accounts for 99.7% of gasoline consumption in the economy and almost all of that fuel is consumed by road transport. Fuel consumption in urban areas was relatively high (55%) as compared to rural (22%) and highways (23%) respectively. The implication of these increases for the national economy as well as the country's environment is enormous.

The country's fuel import bill is increasing and attempts to get sustainable supply of fuel are becoming difficult in view foreign exchange challenges. It is important that transport energy demand is controlled for economic as well as environmental reasons. In addition to the increasing fuel consumption the quality of transport fuels must also be improved in order to improve air quality.

Improvements in fuel quality can contribute to better air quality if they are closely coordinated with improvements in vehicle technology. After the phase out of leaded gasoline in Ghana, the next step is to shift from the use of methyl cyclopentendiayl manganese tricarbonyl (MMT) to non metallic additives in the production of gasoline.

At the same time, it is important to address other fuel parameters that may have adverse health impacts. There is the need for the Tema Oil Refinery and oil marketing companies(OMCs) in collaboration with Ministry of Energy, Ministry of Transportation, Environmental Protection Agency and other stakeholders to put in measures to reduce the sulphur content of diesel from the current levels of between 5000 – 10000 ppm to below 500 ppm for locally produced and imported diesel. The reduction of sulphur content in diesel and the use of non metallic additives in gasoline should receive highest priority in the development of medium- and long term strategies for fuel standards.

There is the urgent need to consider the use of alternative transport fuels such as compressed natural gas (CNG), liquefied natural gas (LNG) and liquefied petroleum gas (LPG). For the long term, the use of other fuel alternatives such as bio-diesel, methanol, ethanol, vegetable oils; synthetic liquid fuels derived from coal and various fuel blends, such as gasohol; electricity; and hydrogen should be considered

3.3 Transport Noise

Over the years, public concern about noise nuisance along major road corridors especially in Accra has increased. Road traffic noise is generated from vehicle engines, tyre friction from contact with the roadway surface, tooting of horns, blowing of sirens, road construction as well as commercial activities like hawking and trading along road routes. The national transport policy to make Ghana a gateway to West Africa would transform the Kotoka International Airport into a hub for international travel in the sub region, therefore increasing air traffic and associated noise. With the increasing growth rate of communities surrounding the airport, residential areas along the flight path of visiting aircrafts are subjected to aircraft noise nuisance.

A noise assessment carried out in 2006 along eight major road routes and at the Kotoka international Airport and the surrounding communities recorded ambient noise levels ranging between 53.6 – 76.8 dB (A). Areas that recorded levels above 70 dB (A) were described as hot spots and many of such hot spots were found along all the road routes except Mallam to Tetteh Quarshie and the Ministries road routes. All the hotspots are associated with road intercessions, which tend to slow down vehicular movements. The resultant traffic jam created, attract roadside hawkers whose activities in addition to hooting of horns by impatient drivers result in the high noise levels. Vehicle counts per hour along the road routes monitored ranged from 898 to 2947(Derlin Consult, 2000). 40% of the locations monitored along the road routes had vehicle count above 1000 per hour and 54.28% had counts of 2000 and above per hour. The observations of the study have serious implications for land use planning and health of the people residing or operating commercial concerns along road corridors.

3.4 Transport Safety and security

Ghana loses over $165million annually, representing 1.6% of the country's Gross Domestic Product

(GDP) to road accidents. This can be attributed to driver's competence, poor conditions of roads and transport service. In 2004 the World Health Organization declared road safety a public health issue and charged various governments to invest resources to reverse the trend otherwise risk the danger of the phenomenon becoming the third cause of death after heart disease and unipolar depression.

Various programmes aimed at institutional and attitudinal changes have been initiated by the Government of Ghana to deal with the problem. The National Road Safety Commission's efforts have led to a decline in fatality rate from a high of 36 deaths in 10000 vehicles to 21 deaths per 10,000 vehicles over the last ten years. The national target however is to make Ghana the country with the safest road transportation system in Africa. To achieve this target the country needs to record a single digit fatality rate or less than that per 1000 death per year by the year 2015. In addition lead agencies should be resourced to implement proven systemic reforms, intensify advocacy for global best practices as well as enforcing existing laws. Most countries in the world with very good road safety records have road safety financing plan which targets spending between 3-5% of the total annual road expenditure on road safety programmes and activities. The average allocation from the road fund in Ghana to the National Road Safety Commission has been below about 0.7%.

3.5 Inter Modal Transport System

Transportation policy has traditionally focused on single elements; automobiles, trains, trucks, ships, airplanes. The transport environment in Ghana particularly in urban areas is characterized by heavy dependence on road transport leading to congestion particularly during the peak periods, low vehicle utilization, heavy dependence on informal private bus services, weak implementation of traffic management measures, inadequate facilities for pedestrians and bicyclists, poor road safety arrangements and high accident rates.

In Accra for instance almost 70% of motorized person trips in the city depend on some form of bus transport, which is the dominant mode and uses less than a third of the road space. In contrast, private cars and taxis provide only a quarter of the person trips but occupy over half of the road space. Motorization is high by African standards at 90 vehicles/1000 population, as compared to 20-30 for Nairobi, Dar es Salaam and Addis Ababa, which partly reflects the high number of taxis.

No reliable estimates are available for walk trips, although surveys suggest that about 15% of the total trips are by walking. The share of non-motorized transport (NMT) i.e. bicycle, is negligible because of cultural reasons and an absence of infrastructure facilities (bike paths, bike stands). The result of this structure is a highly congested primary road networks due to a lack of road capacity and inefficient use of the existing road space, poor road maintenance, and indiscriminate parking and street trading;

The intention to develop a national intermodal transportation system that is economically efficient and environmentally sound provides the foundation for the nation to compete in the global economy and will move people and goods in an energy efficient manner. Inter-model transportation system connects all the various modes in a seamless system that is efficient safe, flexible, and environmentally sound, and meets the needs of the nation's travellers and shippers. Inter-modalism describes an approach to planning, building, and operating the transportation system that emphasizes optimal utilization of transportation resources and connections between modes. From

the perspective of the user the traveller or shipper of goods-the mode is irrelevant; what matters are the quality, cost, timeliness, and safety of the trip. The benefits of a National Intermodal Transportation System are enormous and include the following:

- Lowering overall transportation costs by allowing each mode to be used for the portion of the trip to which it is best suited;
- Increasing economic productivity and efficiency, thereby enhancing the nation's global competitiveness
- Reducing congestion and the burden on overstressed infrastructure components;
- Generating higher returns from public and private infrastructure investments;
- Improving mobility for the elderly, disabled, isolated, and economically disadvantaged. and
- Reducing energy consumption and contributing to improved quality and

3.6 Integrated Development and Transport planning

There is a lack of integrated development and transport planning which has led to: low density development; spatially dislocated settlement and urban sprawl. This in turn leads to inordinately long commuting distances and times; low occupancy levels; congestion; high transport cost and poor cost recovery by operators. The relationship between land use and transport is critical for sustainability. In Ghana this critical linkage was demonstrated in the noise survey conducted during the SEA of the Transport Policy in 2006 which revealed that the major noise hot spots are located along the major transport corridors. The implication is that noise sensitive activities such as schools, hospitals, etc must be located away from major road corridors.

3.7 Poor Transport Infrastructure and Services

Poor transport infrastructure and services due to limited technical skills needed for infrastructure constructions and maintenance in both private and public sectors, inefficient maintenance of transport infrastructure. Inadequate research aimed at improving the delivery of transport infrastructure and services and seldom application of research findings. Equipment for timing, signaling, tracking, controlling and monitoring infrastructure is either obsolete or nonexistent. There is duplication and redundancy in transport network and services. There are gaps in the functionality of institutions for integration and coordination. The sector is dominated by road transport with very little or no investments in the other subsectors. As a result all journeys are generated by roads and ends by road. There is very little intermodal interaction in transport services.

Table 3 below gives a good indication of government's investment in the transport sector for all modes. About 99% of total investment made in the transport sector is dedicated to the road sub-sector.

Table 3: Public Sector Investments in the Transport Sector

Year	Road	Aviation	Rail & Maritime	Total National Budget
2006	3.665	N/A	0.043	29.484

2007	3.853	0.015	0.029	38.698
2008	4.748	0.316	0.229	61.687

Figures are in Trillion Cedis

Even though the rail and maritime subsectors have enormous potential for promoting sustainable consumption and production patterns in the transport sector, investments in these sectors have been very low. This reflects government's priority in transport and to achieve the objectives of sustainable development requires a shift in investment patterns.

4.0 Sustainable Transport Action Plan

In order to address the above issues and challenges the following priority areas were selected for short to medium term strategic actions to be taken:

- Reducing vehicular and aircraft emissions
- Transport Safety
- Reducing Road Traffic Congestion and Travel Time
- Reducing Transport Noise
- Intermodal Transport
- Integration of Transport and Land use Planning

The matrices in the appendices present a summary of the various actions outlined below.

4.1 Strategy 1 - Reduce Vehicular/Aircraft Emissions

The transport related emission particularly vehicular emission is likely to build-up from the current 52,666.17t to 71,652.78t in five years, 111,652,.58t in ten years, and 151,65.38t in 20 years respectively. There is therefore the need to reduce emissions from transport sources.

4.1.1 Objectives of the Strategy

The overall objective is to reduce transport related emissions particularly CO_2

4.1.2 Specific Activities

- Establish national emission control programmme
- Development of emission standards and regulations
- Build capacity of relevant institutions to enforce regulations and standards
- Undertake public awareness programmes
- Institute quality control programme for certification of fuels
- Improve traffic control management system
- Build national capacity to measure aircraft/marine/vehicular emissions
- Institute economic instruments to control emissions
- Increase refinery capacity and find alternatively cheaper fuel and use, e.g. compress natural gas.
- Regular examination of vehicle worthiness and enforce traffic regulations.

4.1.3 Expected Outcomes

- Improvement of local health status
- Reduction in green house gas emissions
- Improvement in air traffic management technology. e.g. The introduction of Reduced Vertical Separation Minima (RVSM) in Ghana airspace recently.
- Clean air

4.1.4 Target Groups/Implementing Agencies

- Ministry of Transport
- Min of Environment, Science and Technology

- Min of Energy
- DVLA, EPA, EC, NPA, TOR/GNPC

4.1.5 Critical Steps for Implementation

- Definition and clarification of institutional responsibility for implementing enforcing emission control policies

4.1.6 Monitoring Indicators

- Octane level of fuel
- No of vehicles with catalytic convertors or phase out
- No of vehicles that meet national emission standards
- Aircraft smoke levels
- Increase in the volume of renewable alternatives
- % of alternative energy sources
- Type of vehicles and fuel efficiency
- Level of greenhouse gas emissions

4.2 Strategy 2: Transport Safety

Develop comprehensive safety measures in the transport sector to enhance the well being of operators and the avoidance of the use of sub standard transport infrastructure in relation to effective regulations, policy guidance, monitoring and implementation. Sustainable transport safety is critical to the well being of the citizens of Ghana considering the high accident fatality rates on our roads. It is estimated that average fatality rates are about 21 deaths per 10,000 vehicles over the last ten years.

4.2.1 Objectives of the Strategy

- To provide safe and reliable transport services
- To maintain transport safety standards

4.2.2 Specific Activities

- Carry out public education and driver training programmes
- Build capacity of relevant institutions to enforce transport safety regulations
- Develop and implement a road safety financing plan which targets spending between 3-5% of the total annual road expenditure on road safety programmes and activities.
- Institute non- punitive reporting system
- Improve traffic management system such as Vessel/vehicle Tracking Monitoring Information Systems
- Introduce a certification system for safety compliance
- Improvement in transport infrastructure
- Implement driver education programmes
- Install speed and traffic control and management systems

- Delineate navigational fare ways and remove tree stumps and other water plants only in this path.
- Develop and enforce safety standards in transportation services including unauthorized modifications of vehicles, vehicle emissions and speeding
- Mainstream road safety education in the curricula of schools from pre-school to the tertiary level.
- Develop a comprehensive educational programme for road users using the print and electronic media radio, television, posters and pamphlets to create awareness. and inform the benefits of better road us
- Improve coordination between emergency services in both public and private sectors to enhance emergency response.

4.2.3 Expected Outcomes

- Reduction in transport accidents, fatality rates and associated cost to national economy
- Improved compliance with transport safety regulations

4.2.4 Target Implementing Agencies

- Ministry of Transport
- Ministry of Roads and Highways
- Ghana Maritime Authority
- Volta Lake Transport Company Ltd
- Driver and vehicle Licensing Authority
- National Road Safety Commission
- Metropolitan, Municipal and District Assemblies
- Vehicle operators
- Mariners
- Aircraft operators
- Transport service providers
- Aerodrome operators
- Port facility operators
- Driving School Operators

4.2.5 Critical Steps for Implementation

The Ministries of Roads and Highways and Transport should increase budgetary allocation for transport safety.

4.2.6 Monitoring Indicators

- The number of accidents/ incidents per annum
- Transport accidents fatality rates per annum
- The number of safety surveys carried out per annum
- The number of competent personnel trained from recognized training schools
- Road conditions mix within the period

- Periodic mandatory safety inspection carried out
- Level of budgetary allocation for transport safety activities

4.3 Strategy 3-Reduction in Road Traffic Congestion and Travel Time

The heavy dependence on road transport, coupled with poor linkages between transport planning and land use development has resulted in highly congested primary road networks particularly in urban areas and long travel times. This is compounded by the lack of road capacity and inefficient use of the existing road space, poor road maintenance, and indiscriminate parking and street trading, negligible share of non-motorized transport (NMT).

4.3.1 Objectives of Strategy

i) To create awareness and encourage the public on the usage of public transport

ii) To introduce mass transport systems to facilitate the movement of people, goods and services at a least cost possible.

iii) To achieve high density development and discourage spatial settlement thereby reducing travel time,

iv) To achieve integrated modal planning and modal interchange systems to reduce travel times and decongestion.

v) Improve road design concept with advance traffic management systems to facilitate uninterrupted movement of vehicles to reduce travel time and congestion.

4.3.2 Activities

- Educate and sensitize the public on the need to patronize public transport and adopt the pool and park and ride concepts.
- Promote the development of sub urban integrated modern light rail and inter city railway systems with modern railway terminal and platforms in a more affordable, accessible and efficient manner and to make it attractive to the public
- Integrate land use planning, control and management with transport infrastructure development, planning and services.
- Improve road designs taking into account local condition to facilitate and allow for multiple unidirectional movement and efficient control and management of traffic
- Introduce the use of advance technology in traffic management and planning with grade separation that will be situationally sensitive and user friendly.
- Provide an integrated network of rail and road transport systems to the ports with the development of inland cargo and freight transit ports.

4.3.3 Expected Outcomes

- Reduced travel time and congestion

- Reduction in GHG emissions
- Reduced pressure on health system
- Reduction in accidents

4.3.4 Target Group/Implementing Agencies

- Public and private toad transport services providers.
- Road design, construction and maintenance institutions and agencies.
- Consulting and research institutions
- Rail road agencies, companies and institutions
- Ministry of Transport and \the Ministry of Roads and Highways
- The general public.

4.3.5 Monitoring Indicators

- Total number of vehicle registered per annum.
- Total number of vehicle in the country.
- Increase usage of mass transport system.
- Total length of road network in the country.
- Proportion of road type mix in the country.
- Change in number of passengers using public transport
- Change in number of passengers and freight going by rail.

4.3.6 Critical Steps for Implementation

The Ministry of Transport, the Ministry of Roads and Highways in collaboration with the Ministry of Environment Science and Technology set up an implementation team comprising representatives from MOT, MRH, MTTU, all transport operators, MMDAs. The implanting team shall perform following task;

- Research into existing sustainable transport vision and mission from international best practices in transport infrastructural development and management with the objective of reducing travel time and congestion.
- The team should research into the policies and visions of all stakeholders in the transport sector with the aim of integrating traffic management and reducing congestion and travel time.
- The team should conduct workshops to finalize a common vision statement for all transport agencies in traffic management and decongestion.

4.3.7 Target Groups/Implementation Agencies

The following institutions are required to collaborate in implementing the various strategies

- Ministry of Transport
- Ministry of Roads and Highways,
- Ghana Highway Authority,
- Department of Urban Roads,
- Department of Feeder Roads,
- DVLA, MTTU, MMDA, GRCL, and

- All transport organizations

4.4 Strategy 4 - Transport Noise Control

Perhaps the one most significant environmental impact associated with transport is that of the noise that emanates from the movements of the various transport modes to and from their destination. For instance, citizens living around airports often complain that airport-related noise is annoying. Noise disturbs sleep, interferes with conversation, and generally detracts from the enjoyable use of property. There is increasing evidence that high exposure to noise has adverse psychological and physiological effects and that people repeatedly exposed to loud noises might exhibit high stress levels, nervous tension, and inability to concentrate.

4.4.1 Objectives of the Strategy

- Institute a transport noise measurement programme
- Enforce noise regulations and standards
- Undertake public education and awareness creation programme
- Introduce a transport operators noise certification scheme

4.4.2 Activities

- Institute a transport noise measurement programme
- Procure necessary noise meters and train relevant stakeholders
- Enforce noise regulations and standards
- Undertake public education and awareness creation programme
- Introduce a transport operators certification scheme
- Implement/ establish a system for reporting in the Transportation Ministry on noise emissions abatement measures

4.4.3 Expected Outcomes of the Strategy

- Reduction in hearing impairment, noise related stress and nuisance
- Reduced social conflicts/tension related to noise pollution
- Reduced aviation noise in the air space
- Reduction of community exposure to noise pollution

4.4.4 Target Group/Implementing Agencies

- Ministry of Environment, Science and Technology
- Ministry of Transport and Ministry of Roads and Highways
- Ghana Civil Aviation Authority,
- Environmental Protection Agency
- Road Agencies
- DVLA, MTTU, MMDA, GRCL, and
- All transport organizations
- Planning Authorities
- Transport service providers and Regulators

4.4.5 Monitoring Indicators

- Level of roadside noise at hotspots
- Level of aircraft noise
- Age/type of aircrafts using national airspace
- Level of vibration of aircrafts
- Level of air traffic density

4.5 Strategy 5 – Development of Intermodal Transport System

There is over reliance on a single transport mode leading to limited choices, congestion, increased travel times, and associated productivity losses.

4.5.1 Objectives of the Strategy

- Integrate the various transport modes to provide integrated transport infrastructure development and efficiency in its use.

4.5.2 Activities

- Implement Ghana Urban Transport Project (GUTP) including the Bus Rapid Transit BRT and school bus system
- Develop rail-based mass transport system in Accra-Tema and Kumasi-Ejisu and Accra-Nsawam as part of an integrated transport plan
- Incorporate NMT infrastructure in all road developments.
- Develop regulatory framework for NMT

4.5.3 Expected Outcomes of the Strategy

- Efficient use of transport infrastructure
- Eased congestion
- Reduced atmospheric emissions
- Reduced travel times

4.5.4 Target Group/Implementing Agencies

- Ministry of Transport
- Ministry of Roads and Highways,
- Ghana Highway Authority,
- Department of Urban Roads,
- Department of Feeder Roads,
- DVLA, MTTU, MMDA, GRCL, and
- All transport organizations

4.5.5 Monitoring Indicators

- Level of atmospheric emissions
- Level of private vehicular traffic

- No of mass transport passengers
- Shift in passengers from private to mass transport mode
- Improvement in rail and in land transport systems

4.6 Strategy 6 – Integration of Transport and Land Use Planning

There is a disconnect between transport planning and land-use development leading to congestion and inefficient and costly travel patterns.

4.6.1 Objectives of the Strategy

- Reduce inefficient travel patterns
- Improve transport and land use efficiency

4.6.2 Activities

- Establish mass transport system
- Development of transport infrastructure and services;
- Establishment of the proposed Urban Transport Advisory Committee (UTAC) to offer urban transport sector stakeholders a platform for effective coordination in the areas of:
    - Integrating land use and transport planning;
    - Decentralized Management, Financing and Maintenance
- Production of practical guidelines for development and transport planners to facilitate effective integration
- Proper acquisition and protection of land for transport infrastructure development
- Incorporation into master plans of cities, provision of inter-modal and intra-modal "break-bulk" facilities to improve the transfer of goods and passengers from one mode to another.
- Increase collaboration with MMDAs to ensure the provision of independently managed lorry parks and other transport interchange facilities to encourage competition and improve customer services
- Consistent application of the "Road Utility Manual" by passing appropriate legislation.

4.6.3 Expected Outcomes of the Strategy

- Eased congestion
- Reduced atmospheric emissions
- Reduced travel times
- Savings in the cost of transport infrastructure development particularly in terms of the cost of land acquisition, compensation and protection of right of way (ROW).
- Improved mobility, accessibility and productivity

4.6.4 Target Group/Implementing Agencies

- Ministry of Transport
- Ministry of Roads and Highways,
- Ghana Highway Authority,
- Department of Urban Roads,

- Department of Feeder Roads,
- DVLA, MTTU, MMDA, GRCL, and
- All transport organizations

4.6.5 Monitoring Indicators

- Travel times and patterns
- Reduction in the number of compensation related disputes
- Extent to which transport infrastructure is mainstreamed into land use planning and vice versa
- Reduced travel time and distance

4.7 Timelines

The above actions are expected to be undertaken within a timeframe of five years (2010-2015

5.0 Demonstration Project – Eco-driving

It is proposed that in the short term a demonstration project on Ecodriving should be undertaken with the objective to:

- reduce transport related emissions and
- promote safe driving to reduce transport accidents and fatalities

Eco-driving principally aims at changing drivers' driving style to reduce the amount of fuel consumed and is a low cost policy measure to reduce CO2 emissions from transport. The impact of eco-driving on fuel economy can be considerable and may range between 5-15 percent CO2 emissions reduction in cars, buses, and trucks, with the best drivers achieving up to 50 percent reduction. It covers driving and other related information such as gear shifting, maintenance a steady speed, using the highest gear possible, deceleration techniques, tyre pressure checks, use of in-car devices such as revolution counter, onboard computer, cruise control, shift indicator, tyre pressure monitor, etc., deduction or elimination of idling etc. Eco-driving can be a central part of CO2 emissions reduction strategy.

5.1 Proposed Activities

- Development of guidelines and manuals for eco driving
- Create awareness on ecodiving and its benefits
- Engage key stakeholders such as transport unions, driving schools associations etc
- Integrate eco-driving training into learner driver training, driving instructor training, and test criteria for commercial and general driver licenses.
- Provide support in the form of fiscal incentives for starting eco-driving training and installation of in-car instruments and 8th gear technology in cars in both private and commercial drivers.
- Institute an annual national, regional and district award schemes for the best eco-driver
- Monitor the success of the programme,

5.2 Expected Outcomes of the Strategy

- Reduced atmospheric emissions
- Reduced fuel consumption and accidents

5.3 Target Group/Implementing Agencies

- Ministry of Transport
- Ministry of Roads and Highways,
- Ghana Highway Authority,
- Department of Urban Roads,
- Department of Feeder Roads,
- DVLA, MTTU, MMDA, GRCL, and
- All transport organizations
- Drivers

5.4 Monitoring Indicators

- CO2 emissions

5.5 Budget

An estimated amount of GH¢100,000 is required to cover the cost of the activities outlines above particularly development of manuals, public education and awareness programmes, support for installation of in-car instruments and 8th gear technology in cars and awards scheme

6.0 Cross Secotral Issues

There are critical sectoral issues in view of the linkages between transport and other sectors such as health, energy, tourism, etc which must be considered. These issues include health and safety, gender, energy consumption and climate change issues and land use planning.

Improving the sustainability of transport will require the cooperation of many government departments and agencies, economic sectors and individuals. The Ministry of Transport should play a critical role in promoting institutional collaboration and coordination. Institutional arrangements are required to deliver policy on time and within budget. The development of passenger and freight transport alternatives to road transport need to be undertaken in order to provide citizens with real choices. This is critical for achieving sustainable consumption and production within the transport sector.

7.0 Conclusions

There are a number of unsustainable consumption and production practices within the transport sector which have been identified. These include overreliance on a single mode leading to rising congestion on roads that makes journey times ever longer, wastes time, generates stress, diminishes family and community life, fosters obesity, and adds to pollution and costs at many levels among others, unsustainable energy consumption and associated emissions, lack of integration between transport and land use planning etc.

The key to making transport in Ghana more sustainable is to promote integration of the modes and increase investments in less used and more sustainable modes such as rail and non-motorized transport systems, control transport emissions and integrate transport and planning systems. A change in drivers and people's behaviour and some government intervention in the form of increased investments, planning and infrastructure provision are needed to achieve sustainable transport in Ghana

References

1. Comhar Sustainable Development Council 2006, Sustainable Travel and Transport Action Plan Response to Public Consultation

2. Dinesh Mohan and Geetam Tiwari 2006, Sustainable Transport Systems: Linkages Between Environmental Issues, Public Transport, Non-Motorized Transport and Safety, Transportation Research and Injury Prevention Programme Indian Institute of Technology, Delhi, India

3. EPA 2006, SEA of National transport policy Report

4. EPA 2009 Draft Urban Transport SEA Report

5. Government of Ghana 2006, National Transport Policy

6. Government of Ghana 2006: The Growth and Poverty Reduction Strategy (GPRS II) – Simplified Version

7. Government of Norway (2004) Norway's Action Plan for Sustainable Development Management,

8. Mc Donagh, J (2006) "Transport Policy Instruments and Transport-related Social Exclusion in rural Republic of Ireland", *Journal of Transport Geography* 14 p. 355-366

9. NDPC 2006, Ghana Millennium Development Goals 2006 Report

10. OECD (2007) Presentation by P. Crist at Comhar SDC Workshop on Transport Demand

11. University of California, Institute of Urban and Regional Development, Working Paper 2001-03 : Sustainable development and Sustainable Transport Strategies for Economic Prosperity,

12. www.dft.gov.uk/about/howthedftworks/sda/

Appendix 1: Project Concept Note - Eco Driving

1. General Background

In Ghana transport related atmospheric emission/pollution is of great concern and should be given due attention in promoting sustainable consumption and production in the transport sector. The transport sector is a dominant source of local and global air pollutants (PM, SOx, NOx, CO, CO_2, VOCs, O_3) that are responsible for adverse health impacts and contribution to global climate change. In Ghana total emission levels increased linearly from 32,222.78t in 2000 to 52,666.17t in 2005. The rise is estimated to be about 16.67% per annum depending especially on the commensurate increase in fleet numbers and fuel consumption.

The average distribution of total emission is influenced largely by the high fleet population density especially in the urban areas where traffic movement is relatively around slow and fuel consumption high. The dominance of low capacity buses, mainly second-hand imported van conversions and minibuses and use of old commercial vehicles for passenger transport results in adverse environmental impacts. In addition unsustainable driver behaviour and skills are contributory factors to the high emission levels.

It is has been established that mainstreaming sustainable consumption and production practices into driver training and driving styles has the potential to reduce CO2 emissions from transport. Hence Eco driving has been chosen as a short term project to demonstrate sustainable consumption and production practices at least cost.

Eco-driving principally aims at changing drivers' driving style to reduce the amount of fuel consumed and is a low cost policy measure to reduce CO2 emissions from transport. The impact of eco-driving on fuel economy can be considerable and may range between 5-15 percent CO2 emissions reduction in cars, buses, and trucks, with the best drivers achieving up to 50 percent reduction. It covers driving and other related information such as gear shifting, maintenance a steady speed, using the highest gear possible, deceleration techniques, tyre pressure checks, use of in-car devices such as revolution counter, onboard computer, cruise control, shift indicator, tyre pressure monitor, etc., deduction or elimination of idling etc. Eco-driving can be a central part of CO2 emissions reduction strategy.

The Project background

The World Summit on Sustainable Development (WSSD) in Johannesburg in 2002 singled out "changing unsustainable patterns of production and consumption" as one of the key elements of sustainable development. There was a call for fundamental changes to the ways in which societies produce and consume goods and services in order to achieve sustainable development.

Countries were called upon to promote sustainable consumption and production patterns, with the developed countries taking the lead. Consequently Ghana embarked on a process of developing sustainable development action plans for 14 key areas or sectors. The transport sector was considered one of the key priority areas that efforts should be made to accelerate the shift towards sustainable consumption and production.

The preparation of the SDAP for the transport sector showed the need to develop a demonstration project that would show case simple cost effective strategies to reduce transport related emissions.

The Objectives

The overall objective of this project is to integrate ecological principles into driving styles and training. Specifically the objectives of the project include:

- reducing transport related emissions and
- promoting safe driving to reduce transport accidents and fatalities

Results

- The principles and concepts of sustainable consumption and production shall be integrated in driving training curricula and behaviour.
- A comprehensive strategy shall be developed for the promotion of eco-driving principles within the transport sector
- The required training capacities in eco-driving shall be developed.
- Incentives schemes for promoting ecodriving would be instituted
- Achievement of fuel economy between 5-15 percent
- CO2 emissions reduction in cars, buses, and trucks (up to 50 percent reduction for best ecodrivers).
- Eco-driving made a central part of Ghana's CO_2 emissions reduction strategy.
-

Outputs

- Guidelines and Training manuals for integrating eco driving principles into driving school curriculum developed
- Awareness on eco-diving and its benefits created
- Programme to engage key stakeholders such as transport unions, driving schools associations to adopt a strategy for mainstreaming Eco-Driving would be developed
- Eco-driving training integrated into learner driver training, driving instructor training, and test criteria for commercial and general driver licenses.
- Support scheme in the form of fiscal incentives for starting eco-driving training and installation of in-car instruments and 8th gear technology in cars in both private and commercial drivers developed.
- Annual national, regional and district award schemes for the best eco-driver instituted
- Programme to monitor the impact of the project developed and implemented,

Activities

- Organize national seminars and forums aimed at creating the basic awareness about ecodriving and its potential among key stakeholders
- Undertake comprehensive consultation both at the national and local level in order to identify key activities and to further develop the implementation of the concept..

- Review existing driver curricula and test criteria for driver licences to determine gaps and opportunities for mainstreaming
- Review existing driver training manuals and resource tool-kits
- Organize workshops for training of driving instructors and testing officers as well as transport organizations
- Set up the criteria for the best eco-driver at various levels and develop a funding mechanism for the award scheme.

Project implementation

The project is proposed to be implemented by the Ministry of Transport in collaboration with the The following institutions:

- Ministry of Roads and Highways,
- Ghana Highway Authority,
- Department of Urban Roads,
- Department of Feeder Roads,
- Environmental Protection Agency
- DVLA, MTTU, MMDA, GRCL, and
- All transport organizations
- Drivers

An estimated amount of GH¢500,000 is required to cover the cost of the activities outlined above particularly development of manuals, public education and awareness programmes, support for installation of in-car instruments and 8th gear technology in cars and awards scheme. However detailed work plan and budget shall be prepared as per the outlined activities

Appendix 2: Policy/Pilot Activities Matrix				
No.	**Policy/pilot Activities**	**Implementing Institutions**	**Verifiable Indicators**	**Possible Sources of Funding**
1	Reduce vehicular/Aircraft Emissions	Ministry of Transport Min of Environment, Science and Technology Min of Energy DVLA, EPA, EC, NPA, TOR/GNPC	Octane level of fuel No of vehicles with catalytic convertors or phase out No of vehicles that meet national emission standards Aircraft smoke levels	Local/national Bilateral/DPs
2.	Aircraft Noise Reduction	Ministry of Transport Min of Environment, Science and Technology GCAA EPA	Level of aircraft noise Age/type of aircrafts using national airspace Level of vibration of aircrafts Level of air traffic density	Local/national Bilateral/DPs
3	Reduction in road traffic and travel times	Ministry of Transport Min of Roads and Highway GHA, DUR, DFR, DVLA, MMDA, MTTU, GRCL Transport organizations	Total no of vehicles registered annually Total no of vehicles in the country Increased use of mass transport system	Local/national Bilateral/DPs

Appendix 2: Policy/Pilot Activities Matrix				
No.	**Policy/pilot Activities**	**Implementing Institutions**	**Verifiable Indicators**	**Possible Sources of Funding**
			Travel time	
4	Improved transport safety	Ministry of Transport Min of Roads and Highways GMA, DVLA, VLTC, MMDA, GRCL, GRDA, NAVY, GPHA, NRSC, GCAA,	No of accidents/incidents No of safety surveys carried out per annum Periodic mandatory safety inspections carried out No of competent personnel trained from recognized training schools Road condition mix	Local/national Bilateral/DPs

Appendix 3: SDAP Matrix

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
1	Reducing vehicular and Aircraft Smoke Emissions	To improve health standards locally To reduce green house gas emissions	Establish national emission control programmme Development of emission standards and regulations Build capacity of relevant institutions to enforce regulations and standards Undertake public awareness programmes Institute quality control programme for certification of fuels Improve traffic control management system	Clean air Improvement in health status leading to increased productivity Reduction in greenhouse gas emissions	Vehicular operators Regulatory Institutions, training institutions Policy making institutions

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
			Build national capacity to measure aircraft/marine/vehicular emissions Institute economic instruments to control emissions		
2	Transport Safety	To provide safe and reliable transport services To maintain transport safety standards	Carry out public education and training programmes Build capacity of relevant institutions to enforce transport safety regulations institute non-punitive reporting system improve traffic management system e.g., VTMIS Introduce a certification system for safety compliance	Reduction in transport accidents and associated cost to national economy Improved compliance with transport safety regulations	Vehicle operators Mariners Aircraft operators Transport service providers Regulatory and training institutions Aerodrome operators Port facility

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
			Improvement in transport infrastructure		operators
3	Reduction in road traffic and travel times	To facilitate the fast movement of people, goods and services To promote efficient use of transport	Introduce mass transport system Improve land use planning, control and management	Enhance efficiency and increased productivity Reduction in GHG emissions Reduced pressure on health system Reduction in accidents	Road users Transport service operators Land-use planning and development control organizations
4	Transport noise control	To reduce transport related noise pollution To conform to relevant national and international noise	Institute a transport noise measurement programme Enforce noise regulations and standards Undertake public education and awareness creation programme	Reduction in hearing impairment, noise related stress and nuisance Reduced social conflicts/tension	Transport service providers Regulators

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
		standards	Introduce a transport operators certification scheme	related to noise pollution	
5	Inter-modal transport	To integrate the various modes of transport	Implement Ghana Urban Transport Project (GUTP) including the Bus Rapid Transit BRT and school bus system Develop rail-based mass transport system in Accra-Tema and Kumasi-Ejisu and Accra-Nsawam as part of an integrated transport plan Incorporate NMT infrastructure in all road developments. Develop regulatory framework for NMT	Eased congestion Less emissions Reduction in travel time Increased productivity	Transport service providers/users Regulators Policy makers Planners/Engineers
6	Integration of transport and land-use planning	Reduced travel demand	Establish mass transport system Development of transport infrastructure and services; Establishment of the proposed Urban Transport Advisory	Eased congestion Reduced atmospheric emissions Reduced travel times Savings in the cost of transport	

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
			Committee (UTAC) to offer urban transport sector stakeholders a platform for effective coordination in the areas of: • Integrating land use and transport planning; • Decentralized Management, Financing and Maintenance • Production of practical guidelines for development and transport planners to facilitate effective integration • Proper acquisition and protection of land for transport infrastructure development • Incorporation into master plans of cities, provision of inter-modal and intra-modal “break-bulk” facilities to improve the transfer of goods and	infrastructure development particularly in terms of the cost of land acquisition, compensation and protection of right of way (ROW). Improved mobility, accessibility and productivity	

No	Policy/Pilot Activity	Objectives	Activities	Results/Outcomes	Target Groups/Sectors
			passengers from one mode to another. • Increase collaboration with MMDAs to ensure the provision of independently managed lorry parks and other transport interchange facilities to encourage competition and improve customer services • Consistent application of the "Road Utility Manual" by passing appropriate legislation.		