

2024 National Elections  
**Manifesto Series**  
Proposals for Political Parties  
July 2024.



---

## CONTENTS

---

Contents.....	i
Acronyms.....	v
1 Introduction .....	1
1.1 Background.....	1
1.2 Purpose and Objectives.....	1
1.3 Our Intentions .....	2
1.4 Our Expectations .....	2
1.5 Selection Criteria for Thematic Areas .....	2
1.6 Selected Thematic Areas.....	3
2 Management of the Urban Space .....	4
2.1 Introduction.....	4
2.2 Problem Statement.....	5
2.2.1 Urban Development Challenges.....	5
2.2.2 Urban Development Trends.....	7
2.2.3 Some Baseline Information.....	8
2.2.4 The Trajectory of the Challenges.....	10
2.3 Previous Efforts to Resolve the Problem.....	11
2.4 Proposals.....	14
2.4.1 Key Interventions .....	14
2.4.2 Key Factors for Success.....	19
2.4.3 Key Indicators for Measuring Success.....	20
3 Urban Public Transportation.....	25
3.1 Introduction.....	25
3.2 Problem Statement.....	26
3.2.1 Urban Sprawl.....	26
3.2.2 Mode of Transportation.....	26
3.2.3 Institutional Arrangements .....	27
3.2.4 Road Transport Unions.....	28

3.2.5	Access to Jobs.....	29
3.2.6	Pollution and Climate Change .....	29
3.3	Previous Efforts to Resolve the Problem .....	30
3.3.1	National Transport Policy (NTP 2020) .....	30
3.3.2	Urban Transport Project (GUTP, 2007).....	31
3.3.3	NIP Transport Sector Infrastructure Plan (TSIP 2013–2020).....	32
3.3.4	Transportation Master Plan (TMP) – Greater Accra Region .....	32
3.3.5	Ghana Urban Mobility and Accessibility Project.....	33
3.3.6	Kumasi Urban Mobility and Accessibility Project (KUMAP).....	34
3.4	Proposals.....	35
3.4.1	Key Interventions .....	35
3.4.2	Key Factors for Success.....	37
3.4.3	Key Indicators for Monitoring.....	38
4	Artisanal and Small-Scale Mining.....	40
4.1	Introduction.....	40
4.2	Problem Statement.....	41
4.2.1	Views Collated from Academia and Policy Makers .....	42
4.2.2	Impact of Land Tenure System.....	43
4.2.3	Impact of Legislation .....	44
4.3	Impact of ASM (including Galamsey).....	44
4.3.1	Environmental Impacts .....	44
4.3.2	Public health impacts.....	47
4.3.3	Economic impacts .....	48
4.3.4	Social impacts.....	53
4.4	Previous/Current Actions to Address ASM Issues.....	54
4.5	Proposals for Sustainable ASM .....	57
4.5.1	A Multifaceted Approach .....	57
4.5.2	Mineral Exploration Fund (MEF).....	57
4.5.3	Strengthen Regulatory Framework and Law Enforcement.....	59

---

4.5.4	Alternative Livelihoods and Awareness Creation .....	60
4.6	Conclusions .....	60
4.7	References .....	62
5	Sustainable Energy .....	70
5.1	Introduction.....	70
5.1.1	Focus on Sustainable Energy .....	70
5.1.2	Reasons and Considerations for Subject Selection .....	70
5.1.3	Criteria for Selection.....	71
5.2	Problem Statement.....	72
5.2.1	The Problem and Its Impact.....	72
5.2.2	Nature of the Problem .....	74
5.2.3	Baseline Information Highlighting the Issues.....	74
5.2.4	Trajectory of the Issue with Current Data .....	75
5.3	Results and Impact of Previous/Current Actions.....	76
5.4	Proposals.....	77
5.4.1	GhIE's View on the Issues .....	77
5.5	A. Proposals for Renewable Energy (Solar and Wind).....	77
5.5.1	Target Setting.....	77
5.5.2	Investment Incentives.....	78
5.5.3	Local Manufacturing Capacity .....	78
5.5.4	Policy Support.....	78
5.5.5	Public-Private Partnerships (PPPs) .....	79
5.5.6	Technological Advancement.....	79
5.5.7	Key Indicators for Measuring Success:.....	80
5.6	B. Proposals for Electricity Infrastructure .....	81
5.6.1	Grid Modernization .....	81
5.6.2	Generation Capacity .....	81
5.6.3	Job Creation and Industrialization.....	82
5.6.4	Key Factors for Success:.....	82

5.6.5	Key Indicators for Measuring Success:.....	83
5.7	C. Proposals for Nuclear Power (Clean Energy).....	84
5.7.1	Roadmap Development.....	84
5.7.2	Public Engagement.....	84
5.7.3	International Collaboration.....	85
5.7.4	Key Factors for Success.....	85
5.7.5	Key Indicators for Measuring Success:.....	87
5.8	Proposals for Hydrogen Power (Clean Energy).....	88
6	Review, Monitoring and Evaluation.....	89
7	Conclusion.....	90
	Acknowledgement.....	91

## ACRONYMS

<b>AMI</b>	Advanced Metering Infrastructure
<b>ASM</b>	Small-Scale Mining
<b>BRT</b>	Bus Rapid Transit
<b>CBD</b>	Central Business District
<b>DLT</b>	District League Table
<b>DUR</b>	Department of Urban Roads,
<b>ECG</b>	Electricity Company of Ghana
<b>GAMA</b>	Greater Accra Metropolitan Area
<b>GAPTE</b>	Greater Accra Passenger Executive
<b>GDP</b>	gross domestic product
<b>GhIE</b>	Ghana Institution of Engineering
<b>GKMA</b>	Greater Kumasi Metropolitan Area
<b>GPRTU</b>	Ghana Private Road Transport Union
<b>GSD</b>	Geological Survey Department
<b>GUTP</b>	Ghana Urban Transport Project
<b>IAEA</b>	International Atomic Energy Agency
<b>ISSER</b>	Institute of Statistical, Social and Economic Research
<b>ITDP</b>	Institute for Transport and Development Policy
<b>KPIs</b>	Performance Indicators
<b>KUMAP</b>	Kumasi Urban Mobility and Accessibility Project ()
<b>LGCSP</b>	Local Government Capacity Support Project
<b>LUSPA</b>	Land Use and Spatial Planning Authority
<b>M/DCE</b>	Municipal/District Chief Executive
<b>MC</b>	Minerals Commission
<b>MCE</b>	Municipal Chief Executive
<b>MD</b>	Mines Department
<b>MDAs</b>	Ministries, Departments and Agencies ()
<b>MEF</b>	Mineral Exploration Fund
<b>MiDA</b>	Millennium Development Authority

<b>MIIF</b>	Minerals Income Investment Fund
<b>MLGRD</b>	Ministry of Local Government and Rural Development
<b>MMDAs</b>	Metropolitan/Municipal/District Assemblies
<b>MMDs</b>	Metropolises, Municipalities and Districts
<b>MoT</b>	Ministry of Transport
<b>MRH</b>	Ministry of Roads and Highways,
<b>NDPC</b>	National Development Planning Commission
<b>NEDCo</b>	Northern Electricity Distribution Company
<b>NIP</b>	Transport Sector Infrastructure Plan
<b>NMT</b>	Non-Motorized Transport
<b>NRSA</b>	National Road Safety Authority
<b>NTP</b>	National Transport Policy
<b>NUP</b>	National Urban Policy
<b>PMMC</b>	Precious Minerals and Marketing Corporation
<b>PPP</b>	Public Private Partnership
<b>PURC</b>	Public Utilities Regulatory Commission
<b>PWDs</b>	Persons with Disabilities
<b>R&amp;D</b>	Research and Development
<b>SMEs</b>	Small and Medium Enterprises
<b>SSMP</b>	Small-Scale Mining Project
<b>STDs</b>	Sexually Transmitted Diseases
<b>TMP</b>	Transportation Master Plan
<b>UDG</b>	Urban Development Grant
<b>UPTU</b>	Urban Passenger Transport Units



## 1 INTRODUCTION

---

### 1.1 Background

2024 is an election year and the political parties will be preparing manifestos for their campaign. The Ghana Institution of Engineering (GhIE) Manifesto Series aims to outline and advocate for strategic interventions in key sectors affecting the socio-economic development of Ghana and to provide informed and practical recommendations to shape the development of political parties' manifestos with a focus on critical sectors that influence the socio-economic development of the country. By leveraging the expertise of engineering professionals and institutions, the GhIE seeks to ensure that the proposed policies are technically sound, promote sustainability, and capable of driving national progress.

### 1.2 Purpose and Objectives

The primary purpose of the GhIE Manifesto Series is to offer well-researched and practical policy suggestions that political parties can adopt and integrate into their manifestos. The recommendations are therefore aimed at addressing progressive national issues, sustainable development, and an improved quality of life for all Ghanaians. The specific objectives of the series will include:

- i. **Influence Policy Formulation and Sectorial Reforms:** To provide evidence-based recommendations that inform the policy-making process, ensuring that policies are grounded in technical feasibility.
- ii. **Promote Sustainable Development:** To advocate for policies that balance economic growth with environmental stewardship and social equity, aligning with global sustainable development goals.
- iii. **Enhance Public Discourse:** To stimulate informed discussions among policymakers, stakeholders, and the public on critical issues affecting the nation, fostering a collaborative approach to problem-solving.

- iv. **Empower Political Parties:** To equip political parties with the knowledge and tools needed to develop comprehensive and actionable manifestos that address the real needs of the population.

### 1.3 Our Intentions

Our intention is to present this document to all the political parties and individuals with interest in leading a future government in 2025. Thereafter, the GhIE will organize public dialogues with the key political players to state their views, position, and commitment to these proposals.

### 1.4 Our Expectations

Our expectation is to build consensus among the political actors on significant policy interventions for national development and have them included in their manifestos towards the 2024 national elections. Hopefully, when one of them forms a government in 2025, we can hold them accountable to their manifesto promises.

### 1.5 Selection Criteria for Thematic Areas

The GhIE, based on our calling as engineering practitioners, has interest in varied thematic areas where specific policy interventions and actions are required from both current and future governments towards national development and the wellbeing of citizens. We therefore had to agree on a criteria to help us prioritize the interventions to present at this time.

The interventions were prioritized based on criteria agreed and rated by the committee of Engineering Practitioners put together by the Council of GhIE. The criterial for selection included:

- i. Impact on national development;
- ii. Public interest value; and
- iii. Linkage to the National Infrastructure Plan.

## 1.6 Selected Thematic Areas

The thematic areas covered in this document are:

- i. Management of the Urban Space;
- ii. Urban Public Transportation;
- iii. Artisanal and Small-Scale Mining; and
- iv. Sustainable Energy.

## 2 MANAGEMENT OF THE URBAN SPACE

---

### 2.1 Introduction

Managing urban space involves the strategic planning, design, and regulation of land use and infrastructure within cities to optimize the efficiency, functionality, and livability of urban areas. This concerns the arrangement of transportation systems, residential areas, industrial zones and dignified public spaces such as parks, playgrounds, and green areas to create a balanced and sustainable urban environment. Efficient management of our urban space will boost economic productivity by reducing transportation costs and travel times, enhancing access to markets and jobs, and attracting businesses and investments.

Well-planned cities with the essential infrastructure and amenities can stimulate economic growth, create jobs, increase property values as well as enhance the quality of life of citizens. It fosters social equity by making essential services like healthcare, education, and transportation accessible to all. Well-designed urban spaces encourage social interaction, community cohesion, and a sense of belonging, contributing to overall societal well-being.

Cities are built for people, designed to meet their needs, and enhance their quality of life. Urban spaces must balance a variety of functions to create environments where residents can live, work, and play comfortably and efficiently. At the heart of successful urban planning is the understanding that cities thrive when human experience is prioritized. In appreciating urban space and the need to manage it, three key things must be considered. Also referred to as the Three M's, these are Movement, Market and Meet:

- i. **Movement:** Effective movement in an urban space relies on a well-designed transportation network which includes urban rail transit, roads, public transit systems, cycle lanes, and pedestrian infrastructure such as walkways and crosswalks. It is imperative that all aspects of the network are integrated seamlessly to allow smooth transition from one mode of transportation to another. To facilitate movement, an ideal urban space must speak of well-connected roads and walkways, infrastructure that serves different modes of transit

such as rail, bicycles, automobiles, and walking, while ensuring that these features are accessible to all, including Persons with Disabilities (PWDs).

- ii. **Market:** The second, Market, represents the economic wellness of the area. Economic activities and marketplaces are the lifeblood of cities. A diverse economy with various industries and services ensures resilience and provides opportunities for people from diverse backgrounds and skills. The presence of traditional markets, business hubs, shopping centers, factories and warehouses in an urban space boosts the economy of the area, if planning and zoning of the area are well engineered.
- iii. **Meet:** Public spaces that offer opportunities for people to meet, socialize and engage in community activities are neglected in urban planning in Ghana or have been encroached upon. The urban spaces lack greenery or access to nature or leisure parks, trees to provide shade for pedestrians and open spaces for community activities. It is important to provide dignified public spaces for citizens. Green spaces like parks, gardens, and playgrounds, as well as cultural spaces such as museums and theatres provide areas for recreation, relaxation, and social interaction. They are important for the mental and physical well-being of residents. Dignified public spaces also play a role in driving economic benefits. By enhancing social cohesion, accessibility and inclusivity, civic engagement and contributing to environmental sustainability, dignified public spaces are indispensable to the urban fabric.

## 2.2 Problem Statement

### 2.2.1 Urban Development Challenges

Unfortunately, there appears to be an imbalance in the incorporation of the 3M's in Ghana's urban areas. The clear and very visible results are manifested in: the inefficient transportation of goods, passengers and services; frequent and increasingly intensive flooding in most urban areas; poor liquid and solid waste management including the growing menace of plastics; air pollution attributed mainly to traffic congestion and unregulated industrialization; inadequate housing; lack of provision and

preservation of urban spaces for social interaction and future development of infrastructure; poor and inadequate access to water, sanitation and hygiene; and the inability of the local government structures to mobilize much needed revenue for management, operation and maintenance. As urban spaces comprise both commercial and residential areas, they must be designed with context sensitive solutions that address the needs of mobility, trade, and livability.

<sup>1</sup>The urban planning and development trajectory pursued across urban Ghana has fashioned severe chaos on the environment without necessarily raising the welfare and awareness level of the average urbanite. This situation has occurred despite the availability of urban planning and management agencies at the national and sub-national level, and ample urban environmental laws.

<sup>2</sup>Research has demonstrated that urban flooding in Ghana occur due to poor drainage system, poor waste management, removal of urban vegetation and poor urban and structural planning; however, the planning system in Ghana has failed to successfully control urban physical development and this has exacerbated the effects of urban flooding. <sup>3</sup>Unchecked urban development in hazard-prone areas has increased the population exposed to flooding and elevated temperatures exacerbated by climate change.

<sup>4</sup>Additionally, the land ownership system is an impediment to the successful management of wetlands by city authorities. Local chiefs take advantage of government administrative inefficiencies to sell out land designated for urban green, wetlands, riparian lands, and open space. It was observed that wetlands, riparian lands, and urban vegetation are being cleared for built-up purposes.

<sup>5</sup>Rising land prices and an underdeveloped housing finance market that sees home loans issued over three-year repayment periods and mortgages contributing just 0.5% to gross domestic product (GDP),

---

<sup>1</sup> Urban Environmental Problems in Ghana, 2017

<sup>2</sup> Causes, Impacts and coping strategies of floods in Ghana: a systematic review, 2020

<sup>3</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

<sup>4</sup> Causes, Impacts and coping strategies of floods in Ghana: a systematic review, 2020

<sup>5</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

compared with 22% in South Africa and 50% in Europe, further complicate the uptake of land and home ownership. The housing backlog is estimated at two million units, that 90% of urban housing is built without prior local authority approval and that 75% of households in Ghana either rent their housing or live with family.

The plethora of Agencies operating in the urban setting and the lack of coordination to optimize the efficiency, functionality, and livability of urban areas is a major factor in the current undesirable situation. The cost of mediocre quality of the management of the urban areas is being borne by urban dwellers and Government.

<sup>6</sup>The democratic feature of urban governance demonstrates that decision-making processes and responsibilities of urban redevelopment initiatives should be shared among all the actors of urbanism. Moreover, taking into account the rapid increase in the urban population, there should be a paradigm shift from the existing urban management approaches to a more sustainable one that delivers socioeconomic benefits, promotes equity, involves participation, and ensures accountability

### **2.2.2 Urban Development Trends**

Urban space management challenges in Ghana have deep historical roots. Post-independence urban growth was often unplanned and under-resourced, leading to the proliferation of informal settlements and slums. These areas typically lack basic services such as water, sanitation, and electricity. According to current demographic trends, over half of Ghana's people reside in urban regions. Thus, land management has been altered by the demands of urbanization and the rapidly increasing population of cities. The urban space management problem in Ghana is a chronic and persistent issue, though it has also emerged more prominently in recent years.

The infrastructure in many Ghanaian cities have struggled to keep pace with the growing population. Roads are often congested and poorly maintained, drainage systems are inadequate, leading to frequent flooding, and public transportation is insufficient and unreliable. Cities like Accra and Kumasi have struggled with issues

---

<sup>6</sup> Urbanization and Urban Governance in Ghana: Identifying Key Actors and their Roles 2020

such as housing deficit, poor sanitation, frequent flooding, and inefficient public transport for many years. The problem has become more acute in recent years due to accelerated urbanization. As urban areas expand, the demand for better infrastructure, housing, and services has increased. This has exposed flaws in urban planning and management, making the issue more urgent and visible.

### 2.2.3 Some Baseline Information

<sup>7</sup>Urban population increased nationally from 50.9% in 2010 to 56.7% in 2021 with almost half (47.8%) the increase in the urban population being in Greater Accra and Ashanti regions. Efforts to address these problems have included initiatives to improve transportation systems, upgrade informal settlements, and enhance urban planning capacities, but progress has been uneven.

<sup>8</sup>Approximately two out of five (40%) of urban dwellers live in informal settlements or slums, characterized by overcrowded housing, inadequate sanitation, and lack of basic services.

<sup>9</sup>The proportion of urban residents with access to piped water declined in major urban centers in Ghana between 2000 and 2010, with Accra experiencing the most acute decline, from 91% to 69% of all households. It is not clear what the situation is today.

<sup>10</sup>In Ghana, about 12,710 tonnes of solid waste is generated every day, with only 10 percent collected and disposed of properly. Plastic waste constitutes a large proportion of urban waste.

<sup>11</sup>Poor enforcement of physical planning regulations, the uncontrolled sprawling of urban areas and the low investment in drainage and flood protection infrastructure has led to frequent episodes of flooding, especially in urban areas, with large economic, social, and environmental costs. <sup>12</sup>The high-end global mean sea-level rise is now projected to rise by 1.3–1.6 meters in 2100. The implication for flooding in flood hazard areas is obvious. <sup>13</sup>Climate change increases

---

<sup>7</sup> Ghana Statistical Service PHC, 2021

<sup>8</sup> 2020 Sustainable SDGs and the African Union (AU) Agenda 2063, NDPC 2021

<sup>9</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

<sup>10</sup> <https://www.undp.org/blog/ghana-tackles-urban-waste-management>. 2022

<sup>11</sup> Ghana Infrastructure Plan 2018–2047. NDPC 2019

<sup>12</sup> [www.wcrp-climate.org](http://www.wcrp-climate.org)

<sup>13</sup> Causes, Impacts and coping strategies of floods in Ghana: a systematic review, 2020



the likelihood of extreme rainfall, and its intensification creates a higher risk of damaging flood events that threaten both life and the built environment, particularly in urban regions where the existing infrastructure has not been designed to cope with these risks.

Urban sprawl has driven up the cost-of-service delivery and undermined agglomeration effects. The infrastructure that is being delivered is often at odds with spatial planning efforts, and poorly aligned with existing social and economic needs. As a result, it fails to generate the economic multipliers that are required to make their financing sustainable.

Traffic congestion and the associated public health and productivity costs have increased; average commute times exceed 90 minutes during peak hours. This is due to the inadequacy of public transportation and the inability to maximize the opportunities of other modes such as rail to service the mobility needs of citizens. The options for public transportation are very limited, which pushes commuters to use private vehicles, thereby increasing traffic volumes, and the rate of vehicular emissions into the atmosphere.

<sup>14</sup>Despite more than 24,000 additional cars being registered annually between 2000 and 2013 across the country, 60% of commuter trips in Ghana still involve walking, bicycling (12% of trips) and trotros (12% of trips).

<sup>15</sup>The lack of synergies and shared vision persists at the city scale, and many urban functions are duplicated by Ministries and other Agencies. <sup>16</sup>These capacity constraints include incomplete policy implementation; weak political and administrative decentralization structures and systems; complex and centralized fiscal transfer frameworks; poor revenue mobilization; inadequate infrastructure financing mechanisms; structural and technical problems in planning and land-use management; weak operations and maintenance systems; poor contract management and regulation; and high degrees of political interference.

---

<sup>14</sup> Impact of Urban Transport on Poverty, Economic, and Environmental Outcomes in GAMA, 2018.

<sup>15</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

<sup>16</sup> Urban Governance and Services in Ghana, 2017

<sup>17</sup>Recent studies have shown that there is low participation of the private sector in urban decision-making. For example, the studies conducted show that in the development of market spaces in the cities in Ghana, traders are not usually invited to participate in the decision-making process.

These challenges, coupled with the pressures of urbanization in Ghana represent a threat to achieving more inclusive urban economic growth development.

### **2.2.4 The Trajectory of the Challenges**

Ghana's urban population is expected to grow further. <sup>18</sup> Seven regions are urbanized; that is, more than half of the population in those regions live in urban areas. The increase in Ghana's annual urbanization rate from <sup>19</sup>2020 to 2025 is estimated at 3.06%, it is however higher in the major cities where urbanization rate sometimes exceeds 5%. The United Nations projects that by 2050, about 70% of Ghana's population will live in urban areas. This rapid urbanization will place even more pressure on already strained urban infrastructure and services.

The housing deficit is likely to worsen as the urban population grows. Without significant investment in affordable housing, the number of people living in informal settlements is expected to increase, further exacerbating issues related to overcrowding, poor sanitation, and lack of access to basic human needs such as healthcare, water, and electricity.

Environmental issues, including pollution and inadequate waste management, are likely to become more severe. The lack of green spaces and continued encroachment on natural areas will contribute to the urban heat island effect, poorer air quality, and reduced overall environmental health.

The congestion on urban roads will worsen if the road networks are not professionally designed, land use impact on transport infrastructure and mobility are not properly managed and public transportation systems remain as they are. Longer commute times

---

<sup>17</sup> Urbanization and Urban Governance in Ghana: Identifying Key Actors and their Roles 2020

<sup>18</sup> Ghana Statistical Service PHC, 2021

<sup>19</sup> Ghana Urbanization Demographics, 2021

have a significant negative impact on productivity, air quality, and cost of delay and fuel use.

<sup>20</sup>The most pressing need, at this stage of Ghana's development, is to align the work of the many ministries, companies and development partners that operate within cities behind a few strategic imperatives.

### **2.3 Previous Efforts to Resolve the Problem**

Several attempts have been made in previous years to address this situation. There have been the National Urban Policy (NUP) Framework and Action Plan, affordable housing projects, attempts at introducing a Bus Rapid Transit (BRT) System in Accra, the Ghana Green project, waste segregation and recycling projects, additional urban rail transit and many other initiatives focused on addressing the issues of urban Ghana. Though the positive impacts from these initiatives are documented, there still lies even more work to be done.

While policies and frameworks exist, their implementation and enforcement have been inconsistent. Lapses in coordination among government agencies, insufficient funding, and corruption hinder effective policy execution. Urban planning efforts have not been comprehensive enough to address the complex challenges of rapid urbanization.

There is a need for more integrated and long-term planning approaches that consider land use, infrastructure, environmental sustainability, fiscal mobilization, and social equity. Positive outcomes, gaps and limitations of previous projects are summarized Table 1 and Table 2 below.

---

<sup>20</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

**Table 1: Outcomes Emerging from the NUP**

Positive Outcomes	Gaps and Limitations
Street naming accelerated under NUP and has created a system that allows for people to be charged property rates or charged for water and electricity.	The street naming process was top-down and did not draw on the names people were already using. It has not made a significant contribution to revenue collection. Property taxes, like all Internally Generated Funds, continue to follow the political cycle and are always low in an election year.
Average 156% improvement in MMDA Internally Generated Funds over 2012–2017. Slow progress in land value capture or payments for services.	Slow progress in land value capture or payments for services. Revenue collection by MMDAs remains erratic, low, and prone to rent-seeking.
Some public-private partnership (PPP) progress in delivering sanitation infrastructure and infrastructure for public markets.	Limited shift in national budgets to support NUP or PPPs. In some districts, PPPs have not progressed beyond circulation of the document. PPP risk still disproportionately loaded on government.
Some capacity created through Local Government Capacity Support Project (LGCSP) leading to enhanced compliance with the District Development Fund and expansion of community infrastructure in Ga Mashie.	Continued MMDA dependence on external support and consultants.
PSUP has improved flood control in Ga Mashie.	Investment in support to PSUP has been limited and the general process remains costly and slow.  MMDAs action in other areas to limit and improve flood control has not absent.
Biogas plants attached to abattoirs in Tamale and Ho under GUMPP and Bolgatanga under the Urban Development Grant (UDG).	Biogas not yet used in taxis or BRT vehicles and unclear on how much electricity or fuel is being produced by these plants.

Positive Outcomes	Gaps and Limitations
PSUP, with Ghana National Bank, extended micro-loans to Ga Mashie entrepreneurs, including on solid waste management in Ga Mashie and Jamestown.	LUSPA has not yet curtailed sprawl or protected green urban space and has not yet overseen land expropriation in pursuit of the public infrastructure.
UDG has significantly stimulated infrastructure delivery in education, health, roads and transport, public safety and security, water and sanitation and urban social infrastructure. 520 projects had received UDG support by early 2019. Prior to this, UDG created 73 markets, 19 lorry parks, 5 artisan villages, 14 abattoirs and 3 agro processing centers.	UDG remains difficult to anticipate and manage for local officials. Has not led to city-wide upgrades. Crowding-in of private investment has been limited outside of 1D1F.

**Table 2: Outcomes from Other Projects**

Positive Outcomes	Gaps and Limitations
Additional railway network from Tema to Mpakadan traversing Tema and part of the Eastern corridor originally focused on freight	Network can also be effectively utilized as part of the urban transit network Lack of coordination with the road sector to provide inter modal transfers for effective transit and freight services
Periodic Dredging of primary drains has been undertaken by national Agencies.	Localized flooding of roads and other areas are increasing after light rains
Construction of major roads and interchanges in major cities such as Accra (Nungua barrier, Flowerpot, Teshie link extension, Obetsebi-Lampsey), Tamale, Takoradi, Pokuase and Kasoa will improve the congestion at the location	High costs of infrastructure but some will have limited impact on the improvement of traffic flow in the urban network Lack of coordination with the Local Government systems to integrate other local interventions to improve network flow

Ghana Green project	Lack of coordination with comprehensive spatial requirements to provide and preserve urban spaces for social interaction
Bus Rapid Transit	Lack of enforcement of the dedicated bus routes by Local Government Agencies to meet objectives of the transit system implemented by the Road sector

## 2.4 Proposals

### 2.4.1 Key Interventions

- i. Institutional Capacity
  - a. The essential need to increase the numbers of planners, engineers, social workers, environmentalist, and health workers assigned to the MMDAs and improve their capacity is critical for the technical delivery of the key services of the urban areas. Other support staff in administration and finance are equally necessary to deliver on the mandate of the MMDAs. The important requirement is to build relevant capacity and ensure continuous professional development amongst stakeholders.
  - b. The other critical requirement is an accountability framework that holds elected officers and appointees, directors, and staff accountable for the decisions, actions, and inaction within the mandate of their institution.
  - c. The Planning Committees need to be revamped to include other actors such private sector and civil society organizations to promote equity, improve public participation, and ensure accountability.

- ii. <sup>21</sup>Institutional Coordination and Rationalization
  - a. Holistic stakeholder involvement in planning processes and decision-making must be adopted. Zoning plans and regulations must be discussed in an open forum before approval by the Assembly. Changes to the Plans must go through a similar process. Government must be bold in implementing the required engineering and legislative actions in this matter of managing the urban space.
  - b. The plethora of institutions operating in urban spaces must be rationalized to ensure collaborative decision-making to meet common objectives.
  - c. The NDPC must create a seamless platform for national Ministries, Departments and Agencies (MDAs) to consult and collaborate national plans with MMDAs and avoid duplication and overlap of effort and responsibilities.
- iii. Land and Spatial Planning Tools
  - a. Development of a more transparent land cadastral complete with accountable and quicker modes of upgrading tenure and securing title, and capable of managing sprawl, enabling transit-oriented development, providing spatial and geo-referenced development which meets the key objectives of the city.
  - b. Additionally, cities should develop conceptual 4D land use plans to provide effective development including very importantly, dignified public places, preservation of water courses and storm retention areas for flood control and management and development control backed by zoning regulations and bye-laws.
  - c. City revitalization strategies, particularly slum upgrading based on a comprehensive housing scheme, are required.

---

<sup>21</sup> Local Governance Act 2016, Act 936

## iv. Transport Modes

- a. The medium-term solution involves efficient and affordable public transport that reconciles the land and jobs markets in support of economic growth and employment. Cities will require to plan and develop an integrated public transport system for effective movement of goods, people, and services.
- b. Provision and enforcement of the use of pedestrian walkways, cycling lanes and safe non-motorized transport with consideration for PWDs would support social inclusion.
- c. Revitalize the existing railway systems in Accra, Tema, Sekondi, Takoradi, and Kumasi to contribute public transport delivery.
- d. Develop a marine transport system to link coastal cities, taking advantage of the landing sites developed for the fishing industry
- e. Effectively segregate markets from the arterial road corridors and provide adequately for off-street terminals.

## v. Digitalization

- a. Revenue mobilization: Public debt and the risk of debt default can be managed by building local fiscal capacity that will tax the urban boom while simultaneously tackling urban sprawl and aligning investments in public infrastructure. Although the Street Naming exercise has had moderate success, the opportunity to enhance the current data can be exploited further by developing the local plans to cover all other areas of the city and providing linkages to other services such as enhancing property tax and land value capture. Application of existing and well tested ICT applications are available to deliver on this.



- b. Enumeration: <sup>22</sup> Digitalization and geo-referencing will become increasingly important to provide accountability as Ghana's public infrastructure in cities expand. Enumeration – the process of making citizens, their needs, their dwellings, and their livelihood strategies visible to the state has become significantly easier and cheaper with digital technology. Both the process and the outcome of enumeration can validate people's relationships with land, government, and government services, by creating a single set of reciprocal obligations between the state and citizens. Absence of enumeration undermines these relationships and can engender social marginalization and disenfranchisement. Data from national census provides a good base to commence and build upon with other data sets.
  - c. Operational and Service Improvement: Empirical evidence indicates that the operations of the MMDAs are slow, tedious, and costly to their customers. Essential re-engineering of work processes and digitalization of the critical operations are essential to reduce cost to customers and provide the base for revenue mobilization. A case in point; is the digitalization of the permitting process to improve service delivery and revenue generation.
- vi. Private Sector Participation
- a. Private sector participation in the provision of municipal services ensures better efficiency and better quality of service for customers. Implementation of the Public Private Partnership Act 2020 (Act 1039) at the sub-national level can be a vehicle for service delivery in the cities. Functions such as the management of solid and liquid waste, cemeteries have private sector participation.

---

<sup>22</sup> Cities as a Strategic Resource: Guideline for Ghana's National Urban Policy Revision Cities as a driver of sustainable and inclusive economic transformation, 2019

## vii. Housing

- a. Encourage the development of industries such as ceramics, glass, alternative cementitious materials e.g., pozzolana cement to replace over 70% of imported materials in the building industry and reduce the cost of building.
- b. Streamline the acquisition and registration of ownership of land to reduce the time for processing and the lack of transparency.

## viii. Flood Control

- a. Effectively utilize the 4D land use plans to acquire or zone water courses and flood plains and water retention basins for flood control and management.
- b. Commence the provision of underground storm sewers to replace open drain channels and plan for their effective maintenance.
- c. Enforce the regulation in the Ghana Building Code, 2018 on 'Preservation of Natural Resources' and 'Stormwater Management' to reduce erosion, reduce siltation, reduce runoff, and reduce the risks in flood hazard areas.

## ix. Waste Management

- a. On account of the vertical expansion in the urban space, there is the urgent need to consider the revitalization of the central sewerage system for Accra, Tema, and construct same for other major cities to manage liquid waste with private sector participation. Basic sewerage infrastructure exists in Accra and Tema.
- b. Consider the banning of single-use plastic containers and encourage the development of a paper and glass industry to replace the plastics
- c. Expand (more companies can be invited to participate) private sector participation in the collection, transportation, and processing of municipal waste to diesel, fly ash, power, etc.

x. Enforcement and Regulation

---

- a. One of the key shortcomings of the management of the urban space is the lack of political and administrative will to enforce approved plans, zoning regulations and sanction violations of the planning regulations. Publicizing local plans on billboards can make citizens aware and protect land uses such as open spaces.
- b. Landowners can only sell land for use in accordance with the Zoning plans. Change of use of land can only be approved if there is a change in the zoning plan.
- c. Chief Executives and District Coordinating Directors must be clear about their roles as Heads of the MMDAs and provide the technical leadership to deliver on their mandate to serve their customers.
- d. Performance Agreements with clear targets for the leadership (MCE & Coordinating Directors) will provide the level of accountability required by citizens. Adequate legislation and regulations exist for the MMDAs to operate.

#### 2.4.2 Key Factors for Success

Effective management of urban spaces requires a comprehensive approach, considering both physical design and community engagement. The following factors will need to be addressed to create vibrant, sustainable, and people-centric environments:

- i. **Participatory Governance:** Involving residents, local authorities, and stakeholders in decision-making processes ensures that urban spaces meet community needs. Participatory approaches lead to better management and utilization of public areas. Creating the opportunity for stakeholders through periodic town hall meetings (M/DCE and Coordinating Directors in attendance), systems for complaints and feedback which can be logged and monitored on actions taken.
- ii. **Rationalization, Coordination and Collaboration:** The number of state actors should be rationalized, and clear roles and responsibilities defined to avoid duplication and overlaps (MMDAs, Coastal, Northern Development Authorities etc.,

LUSPA, Ministry of Roads & Highways, Works & Housing & Water Resources, Lands and Mineral Resources, Sanitation and ..., other Ministries, NDPC)

- iii. **Accessibility and Walkability:** Ensuring that urban spaces are easily accessible to all residents is crucial through convenient means of transport. Walkable neighborhoods promote physical activity, reduce reliance on cars, and enhance social interactions. Factors like well-designed sidewalks, pedestrian-friendly crossings, and proximity to public transportation including rail play a significant role in creating accessible urban spaces.
- iv. **Comfort and Livability:** Residents' comfort to access social and recreational service in public spaces is essential. This includes aspects such as street lighting, access to education, health, markets facilities and cleanliness in respect of solid and liquid waste management. Comfortable seating areas encourage people to spend time outdoors, fostering community engagement and well-being.
- v. **Safety and Security:** Urban spaces should feel safe for residents and visitors. Factors like visibility, proper lighting, and maintenance of public facilities contribute to perceived safety. Enclosed spaces may provide a sense of security, while open areas can enhance social interactions.
- vi. **Environmental Sustainability:** Greenery and natural elements contribute to the overall quality of urban spaces. Parks, trees, and green infrastructure improve air quality, reduce heat islands, and support biodiversity. Sustainable landscaping practices play a vital role in maintaining these spaces.

### 2.4.3 Key Indicators for Measuring Success

<sup>23</sup>The District League Table (DLT) since its inception in 2014 has served as one of the important tools for measuring the status of development at the subnational level. The tool is in pursuance of the National Development Planning Commission's mandate of monitoring and evaluating development outcomes by highlighting inequalities

---

<sup>23</sup> 2021 District League Table Report, 2022

and disparities in wellbeing across the country. It also provides a multi-sectoral, integrated assessment of how Ghana is developing across all its Metropolises, Municipalities and Districts (MMDs), based on selected sectors and indicators

Evaluation of the performance of the MMDAs was conducted in seven (7) sectors using 22 indicators as follows; Education (7), Health (4), Nutrition (7), Water (1), Sanitation (1), Energy (1) and Governance (1).

Broad guidelines for the inclusion of indicators are provided as follows:

- i. Land Use Planning and Zoning:
  - a. How effectively are land use regulations and zoning laws implemented?
  - b. Are there clear guidelines for residential, commercial, industrial, and recreational areas?
  - c. Is there a balance between different land uses to promote sustainable development?
- ii. Infrastructure and Services:
  - a. Evaluate the availability and quality of infrastructure (roads, bridges, utilities, etc.).
  - b. Consider access to essential services such as water supply, sanitation, electricity, and public transportation.
  - c. Assess the maintenance and efficiency of existing infrastructure.
- iii. Environmental Sustainability:
  - a. How well does the city manage green spaces, parks, and natural habitats?
  - b. Is there an emphasis on sustainable practices (e.g., waste management, green buildings, energy efficiency)?
  - c. Evaluate air and water quality, noise pollution, and overall environmental health.
- iv. Transportation and Mobility:
  - a. Assess the transportation network (roads, public transit, cycling lanes, etc.).

- b. Consider traffic congestion, ease of movement, and accessibility for all residents.
  - c. Evaluate efforts to promote non-motorized transport and reduce reliance on private vehicles.
- v. Housing and Affordable Housing:
  - a. Evaluate housing policies, affordability, and availability.
  - b. Consider housing density, quality, and inclusivity.
  - c. Assess efforts to address homelessness and provide affordable housing options.
- vi. Social Inclusion and Equity:
  - a. How well does the city cater to diverse populations (age, income, ethnicity, etc.)?
  - b. Evaluate access to public spaces, community centers, and recreational facilities.
  - c. Consider efforts to reduce social disparities and promote inclusivity.
- vii. Urban Design and Aesthetics:
  - a. Assess the overall visual appeal of the cityscape.
  - b. Consider architectural design, landscaping, and public art.
  - c. Evaluate efforts to create a pleasant and vibrant urban environment.
- viii. Safety and Security:
  - a. Evaluate crime rates, emergency response systems, and public safety measures.
  - b. Consider lighting, pedestrian safety, and community policing efforts.

Additional specific critical indicators relating to the following sectors can be included as provided in Table 3.

**Table 3: Additional Indicators for Urban Development**

Sector	Indicator	Source
<b>Transport</b>	Average commute time by road (min/km)	Traffic Studies
	Bus Rapid Transit (BRT) ridership (pas/yr.)	BRT Operator
	Urban rail transit ridership (pas/yr.)	Rail operator
	Average commute time by rail (mins)	Rail operator
	Condition of road (% good, fair & poor)	Roads Department
	Expenditure on road maintenance (% of own funds)	Finance Department
	Condition of transport terminals (% good, fair & poor)	Transport Department
	Pedestrian walkways (% of roads with walkways)	Transport Department
	Facilities for PWDs (% increase in facilities)	Transport Department
<b>Land Use Planning and Zoning</b>	Local Plan Updated in Last 10 years (Yes/No)	Planning Department
	Compliance with Building Permit (% of Existing buildings)	Planning Department
	Issue development permit (days after application)	Planning Department
	Size of green area (% of total land)	Planning Department
<b>Infrastructure and Services</b>	Electricity Services (% of households connected & Rating of quality of service)	Service Provider/ National LSS
	Water Services (% of households connected & Rating of quality of service)	Service Provider/ National LSS
	Sewerage Services (% of households connected & Rating of quality of service)	Service Provider/ National LSS
	Reduction in Plastic Waste (% of total waste & households practicing waste segregation)	Service Provider/ National LSS
	Walking Trails (length/hectare of parks)	Works Department
<b>Housing and Affordable Housing</b>	Household living in slums (% of households)	Works Department
	New Housing Units (% annual increase & % using sustainable materials and methods)	Works Department
	House ownership (% of household)	Works Department

Sector	Indicator	Source
<b>Financial</b>	Amount of Revenue mobilized (% increase)	Accounts
	No of households on database (%)	GIS
	Payment of property rate (% of properties & % increase)	GIS/Accounts
	Amount paid for violations (% increase)	Accounts
	Annual Financial Statement published	
	Revenue from Business Operations (% increase)	Accounts
<b>Administrative operations</b>	Issue other permits (days after application)	Administrative Data
	No. of violations of zoning regulations rectified	Administrative Data
	Qualitative improvements in critical urban service delivery	Administrative Data
	No of town hall meetings published and held	
<b>Governance</b>	Dissemination of zoning regulations and zoning plans	Flyers/ other informatics/radio & Talk shows
	Amount of private sector funds invested in provision of services	Contracts
<b>Private sector participation</b>	No. of services delivered with private sector	Contracts
	Volumes of solid waste disposed	Private sector /Administrative data
<b>Sanitation</b>	Volumes of waste recycled	Private sector
	% of space for green areas developed	GIS/Maps
<b>Environmental sustainability</b>	No of trees planted annually	
	% of wetlands in good condition	
	Availability of parks	
	Local employment or work opportunities created	Employers in authority
<b>Employment</b>	No of firms (Business operating permits)	



---

## 3 URBAN PUBLIC TRANSPORTATION

---

### 3.1 Introduction

<sup>24</sup>Urban population increased nationally from 50.9% in 2010 to 56.7% in 2021 with almost half (47.8%) of the increase coming from the Greater Accra and Ashanti regions. <sup>25</sup>Seven regions in Ghana are urbanized, that is, more than half of the population in those regions live in urban areas. <sup>26</sup>The rate of urbanization between 2020 – 2025 was estimated at 3.06% per annum. It is however estimated to exceed 5% in the major cities. The United Nations projects that by 2050, about 70% of Ghana’s population will live in urban areas.

The 3Ms for managing an urban space have been identified as Movement, Market and Meet. Transportation is the main means by which people move and its infrastructure defines the structure of the city. It provides the vital links Markets (to earn an income and/or spend to meet ones needs) and Meet (for business, social, leisure and cultural interaction)

Transportation is multi-modal and any attempt to solve the transport problem of a city must focus on the coordinated use of the available means of transportation for the movement of people and goods.

Most public transport trips made in urban areas in Ghana use roads. Rail transportation, when it is operation provide insignificantly to the number of trips, though there are opportunities to revamp the existing rail routes in Accra, Tema, Takoradi, Sekondi and Kumasi to contribute more in the medium term.

The focus of this thematic area is on a road based public transport system to move up to 80% of all person trips in the major urban areas of Ghana, with an initial focus on the Greater Accra Metropolitan Area (GAMA) and the Greater Kumasi Metropolitan Area (GKMA). Other emerging large cities like Sekondi-Takoradi, Tamale, Sunyani and Techiman will in time require similar interventions and the policy

---

<sup>24</sup> Ghana Statistical Service PHC, 2021

<sup>25</sup> Ghana Statistical Service PHC, 2021

<sup>26</sup> Ghana Urbanization Demographics, 2021

framework and planning must start now to make future intervention less arduous as they will appear to be the case for Accra and Kumasi.

## 3.2 Problem Statement

### 3.2.1 Urban Sprawl

<sup>27</sup>The growth of our urban settlements is characterized by scattered or dispersed development. This is associated with among other ills, low housing density, increasing commuting times and the segregation of socioeconomic groups. The low-income households cannot afford a car-based lifestyle and may choose to live in slumps near the city centers, where there is better access to jobs or commute long distances using transport services largely provided by trotro or okara.

### 3.2.2 Mode of Transportation

Walking and public transport are the main modes of transport in Accra and Kumasi, especially for low-income groups. <sup>28</sup>In Kumasi, 50% of all trips is by walking and 43% by public transport (trotro, taxi, and bus). Only 5% of all trips are made by private car. <sup>29</sup>It was noted, as far back as 2007 that, in Accra, the modal share for informal transport (minibus and collective taxis) is more than 70% with coaches having less than a 5% share. Despite this situation, all road improvement works continue to focus on providing more space and free movement for the private car to the detriment of public transportation. Okada, although increasingly popular, represents an insignificant proportion compared to other motorized modes.

The public transport fleet is dominated by minibuses, most of which are over-aged (over 14 years on average) and of low carrying capacity. Their large numbers on major routes contribute to congestion. Some state-owned companies that operate large buses are unable to sustain the business and provide any meaningful service. <sup>30</sup>According to users surveyed as part of the Urban Transport Project, services are unsafe, unreliable, and uncomfortable. It was also noted that the demand for public transport exceeded the supply

---

<sup>27</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

<sup>28</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

<sup>29</sup> NIP Transport Sector Infrastructure Plan (TSIP 2013 – 2020)

<sup>30</sup> NIP Transport Sector Infrastructure Plan (TSIP 2013 – 2020)

and passengers suffer long waiting time (19 minutes for Accra then). It is likely these situation has deteriorated.

The current traffic volumes have outstripped the carrying capacity of the primary traffic corridors and this is worsened by the large number of private cars that account for less than 5% of all trips. This results in congestion. <sup>31</sup>It was noted in in 2007 that more than 70% of the arterial roads in the major cities in Ghana are congested, and it was projected that, whilst the population in the major cities will double every 15 to 20 years, car population (or car use) was expected increase five folds, further aggravating the situation.

A large section of the road network, especially on the collector road network is in poor condition and is unable to support public transport operation in a sustainable way.

There are no traffic priority measures on the road networks in major urban centers to facilitate enhanced movements of regulated public transport vehicles especially during peak hours. Under the Urban Transport Project, sponsored by the World Bank and AFD, bus priority measures were introduced on Accra CBD to Amasaman route in 2012–2016 with well-constructed bus-only lanes, terminals, and bus stops. Buses were procured and the Greater Accra Passenger Executive (GAPTE) was set up to manage the services. Also, a traffic center for coordinating all the traffic signals along the route was set up. This experiment failed due to lack of enforcement of bus priority on the exclusive bus lanes created.

Traffic management along primary corridors in the cities is still rudimentary. Traffic signals do not operate most of the time due to lack of maintenance and/or power supply. Most signals are not coordinated. Road safety furniture is not replaced when it is damaged.

### **3.2.3 Institutional Arrangements**

The need to improve regulatory framework for urban transportation and empowering MMDAs to fulfill their existing regulatory mandate under Act 462 was recognized as far back as 2007 as part of the

---

<sup>31</sup> NIP Transport Sector Infrastructure Plan (TSIP 2013 – 2020)

Urban Transport Project.<sup>32</sup> But it is still stated on a report leading to a new project in 2022 that, fragmentation between national and local governments and the lack of coordination mechanisms adversely affect urban mobility in Ghana. The public transport sector has been effectively self-regulated and so recognized by the authorities. Several ministries (Ministry of Transport, Ministry of Roads and Highways, Ministry of Local Government, Decentralization and Rural Development), central government institutions (Department of Urban Roads, National Road Safety Authority, Police Services), a Regional Coordinating Council, and multiple Assemblies at the local level have joint responsibility as urban mobility stakeholders. Yet, ambiguity and a lack of coordination detract actors from the performance of their roles.

<sup>33</sup>Land use management and its coordination with transport planning at the local level is weak. Though this is emphasized in the National Urban Policy, it has not been implemented. In addition, the low capacity of physical planning departments at the local levels lack of institutional/sectoral coordination, political interference in planning practices, and a complex land tenure system have hindered integrated planning and development. This lack of coordination at the local level is especially detrimental to GHG emission mitigation actions related to urban transport systems.

### 3.2.4 Road Transport Unions

<sup>34</sup>Unions, in particular the Ghana Private Road Transport Union (GPRTU), are effectively established as gatekeepers. This setup provides an effective framework within which new routes can be formed by the grant of a charter (which is effectively a route-operating license) by the union, not by city authorities. Union enforcement of licenses and operations is highly effective because of their control and authority over terminal operations and management.

The unions have, however, become a stumbling block for change. Though the unions were extensively engaged in crafting bylaws to

---

<sup>32</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

<sup>33</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

<sup>34</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

help the Assemblies regulate public transport operations, they have ensured that their power over the sector is not diluted. They have the most to lose should a mass public transport system be effectively implemented, and they are likely to do anything to retain the status quo and their control over the sector.

### 3.2.5 Access to Jobs

<sup>35</sup>Two-thirds of the population in Kumasi do not have access to half of the city jobs within an hour's reach using public transport (Arroyo, 2020). Mobility constraints such as congestion, lack of a proper transit system, limited road supply, and last-mile connectivity issues constrain people's access to opportunities. Low-income communities tend to be particularly isolated to access jobs by public transport because they live far from jobs and lack last-mile connectivity options. Unpaved roads in neighborhoods do not allow access to minibuses services. The isolation is especially prominent during the rainy season and for women and people with disabilities.

### 3.2.6 Pollution and Climate Change

Rapid urbanization, inadequate urban planning, and increasing congestion are contributing to both an exponential growth of GHG emissions and vulnerability to climate change effects. In Ghana, 80% of air pollution is attributable transportation. Vehicle GHG emissions increase because of inefficient urban planning coupled with rapid urbanization, poor vehicle maintenance, the import of second-hand, over-used cars, and traffic congestion. <sup>36</sup>The average age of a vehicle in Ghana is about 14.2 years, a figure that rises significantly for public transport fleets with amplified GHG emission potential. Moreover, congestion causes an average income loss of 21.9 percent for trotro operators in the GKMA which in turn forces neglect in engine maintenance and completely shuns out all chances for fleet renewal. The same goes for the formal sector which experiences an average loss of 9 percent of productive hours a day and of more than two workdays in a month (Arroyo, 2020).

---

<sup>35</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

<sup>36</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

### 3.3 Previous Efforts to Resolve the Problem

#### 3.3.1 National Transport Policy (NTP 2020)

<sup>37</sup> The latest National Transport Policy (NTP 2020) was published in 2020. This was developed through a consultative process, with reference to Target 11.2 of the SDGs – provide access to safe, affordable, accessible and sustainable transport system for all, the AU Agenda 2063 Goal 1.3 – social security and protection, including persons with disabilities and Goal 1.4 – modern, affordable and livable habitats and quality basic services, and a review of the NTP 2008 and NTP 2010.

NTP 2020 has a vision to be “An integrated, efficient, cost-effective and sustainable transportation system responsive to the needs of society, supporting growth and poverty reduction and capable of establishing and maintaining Ghana as a transportation hub of West Africa.”

Under the NTP 2020 Goal 4.2.1 to Create an accessible, affordable, reliable, sustainable, safe, and secure transport system for all users, Objective 4.2.1.5 states, “Establish Mass Transportation systems in urban areas with intermodal facilities and interchanges.” The following strategies are to be adopted:

- i. Develop a more extensive public transport system to help alleviate congestion in urban area.
- ii. Promote road-based mass transport system, including extending Bus Rapid Transit (BRT) corridors.
- iii. Develop standards for public transport vehicles in line with international best practice.
- iv. Develop integrated light rail or metro-rail transit system in major urban areas to improve public transportation.
- v. Review and strengthen institutional arrangement governing the mass transit system.

---

<sup>37</sup> Republic of Ghana, Ministry of Transport, National Transport Policy, 2020

- vi. Create competent transport authorities equipped to plan and regulate transport services in their locality and operators to provide high quality services to meet user needs.

### 3.3.2 Urban Transport Project (GUTP, 2007)

The Urban Transport Project which started in 2007 was a response to the 2008 NTP and aimed at improving mobility in Accra and Kumasi through a combination of traffic engineering measures, management improvements, regulation of the public transport industry, and implementation of a Bus Rapid Transit (BRT) system. The strategic interventions and status are summarized in Table 4 below.

**Table 4: GUTP 2007 Strategic Interventions and Status**

Strategic Interventions	Action Taken	Current Status
The Introduction of institutional and regulatory measures for passenger transportation in the Assemblies in Accra and Kumasi	Establishment of Urban Transport Departments MMDA bye-laws on public transport operations passed MMDA registration of public transport operations started MMDA operating permits for public transport operations started	There is no visible impact on public transport operations
The Implementation of traffic management measures at selected location in Accra and Kumasi, including an area wide traffic control system in Accra	Area -wide traffic signal control was implemented with a traffic control center and field communication system fully resourced and operational.	This reduced travel time from over 2hrs to about 35 minutes during peak periods at the onset.
Construct infrastructure and operate a pilot BRT system along the Accra CBD – Kasoa Route, including the provision of terminals and tributaries	Later the pilot route was changed to Accra CBD Amasaman using limited bus priority lanes. Terminals and bus stop were constructed. Buses were procured and GAPTE formed started to operate the Aayalolo bus services.	Patronage was limited as the system failed to offer any meaningful advantage because the bus priority lane system could not be enforced.  There were shortcomings with profitability, so they

Strategic Interventions	Action Taken	Current Status
	Electronic ticketing, bus tracking and communication systems were deployed for the Aayalolo bus services	turned to inter-city operations There is currently no visible impact
Introduce measures to coordinate urban transportation and urban development	Not clear	No visible impact

### 3.3.3 NIP Transport Sector Infrastructure Plan (TSIP 2013–2020)

The TSIP 2013–2020 of the National Infrastructure Plan saw the following as opportunities for improving urban transport services in Ghana:

- i. An accepted policy framework for urban transportation adopted by the government in 2007.
- ii. Passage of by-laws by eleven Assemblies and their setting up of Urban Passenger Transport Units (UPTU) to provide the framework for planning and regulating urban passenger transportation.
- iii. The ongoing collaboration of the Assemblies in Accra with the objective of setting up of a Greater Accra Passenger Transport Executive (GAPTE) to plan and regulate cross jurisdictional travel (more than 70% of total trips) in the Accra area.
- iv. A proposed project to modernize and improve the coordination of traffic lights in Accra and Kumasi.
- v. The pilot BRT project that was being piloted along the Accra – Amasaman Route, in Accra.

### 3.3.4 Transportation Master Plan (TMP) – Greater Accra Region

<sup>38</sup>A Ministry of Transport report Transportation Master Plan Greater Accra Region (KOICA, 2016) recommended the development of six priority BRT routes in the Greater Accra Region. The assessment

<sup>38</sup> Ministry of Transportation, Transportation Master Plan Greater Accra Region (KOICA, 2016)



undertaken in the report indicated the order of priority in developing the routes as follows:

- i. Route 2 (Amasaman – CBD) and Route 3 (Adenta – CBD) are the most urgent links that must be developed;
- ii. Route1 (Kasoa – CBD) and Route 5 (Motorway) are the next; and
- iii. Route 4 (Ashaiman – Ring Road) and Route6 (Achimota – La) can then follow.

The TMP team recommends that all BRT routes should be implemented within the medium-term period (2017–2021). It also recommends several arterial bus routes that must be implemented within the same period. The strategy limits the operations of trotro to short distance operations along collector routes as feeders for the arterial bus and BRT routes.

The TMP envisages the need for the railways and subways will arise in the long-term.

### **3.3.5 Ghana Urban Mobility and Accessibility Project**

<sup>39</sup>The Ministry of Local Government (Transitec/Delin, 2017), proposed as follows for GAMA:

- i. Improving the governance structure for urban mobility and accessibility:
  - a. Redirect and reform GAPTE;
  - b. Strengthen DUR as the center of excellence on all traffic matters;
  - c. Re-establish a coordination and guidance committee of senior decision makers;
  - d. Establish a support unit in the Ministry of Transport; and
  - e. Strengthen the urban development planning process and the coordination between urban development and urban mobility.

---

<sup>39</sup> Ministry of Local Government and Rural Development report, Improving the Governance and Financing of Urban Mobility and Accessibility in GAMA – Issues and Options to Move Forward (Transitec/ Delin, 2017)

- ii. Expanding the sources and increasing the level of funding for operations and investment:
  - a. Ensure steady funding for urban mobility operating costs and investments from the MMDAs' and national budgets; and
  - b. Expand existing sources of funding for urban mobility and accessibility and develop new ones.
- iii. Developing institutional capacity: Implement GUMAP.

### **3.3.6 Kumasi Urban Mobility and Accessibility Project (KUMAP)**

<sup>40</sup>The following were noted as part of the studies preceding the commencement of KUMAP:

- i. An urban mobility master plan was completed in 2012, financed by the Japan International Cooperation Agency JICA, that identified critical institutional bottlenecks as well as priority interventions, including mass transit development through Bus Rapid Transit (BRT).
- ii. The government has recently finalized the Public Transport Sector Enhancement in Kumasi: Bus Operation Preparation and BRT Project Feasibility Study, funded by the Agence Française de Développement (AFD), that provides a roadmap to: (i) Enhance of the institutional framework by creating a Kumasi Public Transport Authority; (ii) Implement phased infrastructure improvements, with an emphasis on two BRT pilot corridors; (iii) Enhance urban mobility regulation and operations in selected corridors; and (iv) Enhance Non-Motorized Transport (NMT) operating conditions and associated infrastructure. (ROM Transportation Engineering, 2021)
- iii. Kumasi's Urban Mobility Diagnosis and Readiness Assessment – World Bank, 2022 by the Institute for Transport and Development Policy (ITDP) to conduct a study to strengthen the enabling environment for urban transport management, regulation, and project implementation, to assess the readiness

---

<sup>40</sup> Ghana – Kumasi Urban Mobility and Accessibility Project (KUMAP) Detailed Terms of Reference for Package 1

of the BRT project, and to further advance the preparation of Kumasi's BRT demonstration corridor.

- iv. Institutional framework assessment report: Analyzes the current plans, projects, and institutional framework for urban mobility and makes proposals for the institutional arrangement for the implementation and operation of a BRT system in Greater Kumasi. (Kumasi Bus Rapid Transit: Institutional Plan Report, 2022).
- v. Industry transition strategy report: Analyzes the current transport services and developed strategies for the implementation of bus rapid transit (BRT) system in the city. This report proposes a business model and a practical strategy for the transition from informal paratransit services to regulated service as part of the BRT system in Greater Kumasi.
- vi. A consultant has been selected to commence the consulting services for Feasibility Analysis and Business Model, Detailed Design and Procurement Support, and Construction Supervision for the project.

## 3.4 Proposals

### 3.4.1 Key Interventions

The interventions are proposed to be included the manifestos of the political parties towards the 2024 national elections:

- i. Invest into mass transport systems with the aim of contributing to up to 80% of all person-trips in all urban centers in the country. This should include at least the development and operations of a Bus Rapid Transit (BRT) system:
  - a. Along Two corridors each in the Greater Accra Metropolitan Area (GAMA), and the Greater Kumasi Metropolitan Area (GKMA);
  - b. Provide BRT feeder services, safe walking and cycling to access public transport services along the BRT corridor, terminals, and stations;
  - c. Ensure that road maintenance and traffic management along the BRT corridors are guaranteed;

- d. Develop and implement a decentralized institutional and regulatory framework for urban transportation;
  - e. Consult with transport stakeholders, especially the unions, to obtain their buy-in and cooperation;
  - f. Design and implement an enforcement regime for the effective implementation of the new transport regime;
  - g. Adopt national standard for public transport vehicles including mini, midi, and large buses; and
  - h. Create an environment that will empower the private sector to invest into transport service provision.
- ii. All ongoing development projects on urban arterials in Accra and Kumasi will be reviewed to ensure that they are BRT compliant, in accordance with the development plans for the cities.
- iii. Integrate urban transportation within a strategic urban development framework.
- iv. Devise a viable means of funding the large backlog of urban roads that require construction and rehabilitation.
- v. Ensure that the road agencies and metropolitan, municipal and district road departments prioritize the maintenance of roads in Ghana. In doing this:
  - a. There should be legislation reinforcement to use the Road Fund for only road maintenance, traffic management, and road safety;
  - b. There should be legislation reinforcement to provide for a formula for fund allocation to MMDAs; and
  - c. There should be legislation reinforcement for the automatic adjustment of the road fund levy.

### 3.4.2 Key Factors for Success

These may include:

- i. Governance for urban mobility:
  - a. Measures must be put in place to deal with the fragmentation of responsibility for urban mobility with clear allocation of responsibility and accountability, including the key functions of planning for, and monitoring and evaluation of urban mobility.
  - b. Measures must be put in place for effective coordination among decision makers, especially for forging consensus on priority actions.
  - c. Central government must increase its support to MMDAs, especially in developing human resources, disseminating information, ensuring that experiences are shared among all practitioners, and sustaining a dynamic network of experts.
- ii. Funding for urban mobility:
  - a. MMDAs' must budget adequately for urban mobility, road maintenance and investment in urban transport infrastructure and facilities. Large potential sources of funds like sales tax, property tax, and land value increase tax can contribute significantly to funding urban mobility at the local level.
  - b. Donor funding for urban mobility must be better coordinated by the government, adequately matched by funds from the Consolidated Fund, and directed to support urban mobility goals of the government.
- iii. Institutional Capacity:
  - a. **Data on urban mobility.** Urban mobility data must be routinely collected, analyzed, and disseminated. Responsibility for this must be clearly allocated.
  - b. **Trained and experienced staff.** Although the depth of expertise has increased, the number of trained and experienced staff is still insufficient. Urban mobility is a complex field that requires specialized experts in

adequate numbers for studies, formulation of plans and policies, and implementation.

- c. **Methodologies and standards.** Establish methodologies and standards for key technical and sector management activities like mobility performance monitoring, public transport planning, and traffic management.
- d. **Use of ICT.** The use of ICT to enhance institutional performance must be pursued vigorously.
- e. **Facilities and equipment.** Facilities and equipment for planning, operations, regulation, enforcement, and administration of urban mobility must be provided.

### 3.4.3 Key Indicators for Monitoring

The milestones for implementation of the key interventions are suggested in Table 5. Key Performance Indicators (KPIs) for Urban Public Transportation are provided in Table 6.

**Table 5: Milestones for implementation of Key Interventions**

Activity	Milestone
Policy Statement in 1 <sup>st</sup> State of the Nation Address (SONA) by the President	31 <sup>st</sup> March 2025
Commence Procurement of Consultants for all studies and, Design, procurement assistance and supervision	30 <sup>th</sup> June 2025
Select Consultants	31 <sup>st</sup> December 2025
Complete Studies and Designs	31 <sup>st</sup> December 2026
Start Procurement for Works	30 <sup>th</sup> September 2026
Start procurement for Services	31 <sup>st</sup> May 2027
Pass Legislations required for Institutional Management and Financing	31 <sup>st</sup> March 2027
Complete consultation with Stakeholder for Transition to the BRT regime	31 <sup>st</sup> December 2027
Award Works Contract	30 <sup>th</sup> November 2026
Complete Works	30 <sup>th</sup> November 2028
Engage Service Providers	31 <sup>st</sup> January 2028
Start Operations	31 <sup>st</sup> October 2028
Policy Paper on integrating urban transportation within a strategic urban development framework is adopted	31 <sup>st</sup> December 2025

Activity	Milestone
Legislations arising from the policy on integrating urban transportation within a strategic urban development framework is passed	30 <sup>th</sup> June 2026
Review of development projects on urban arterials in Accra and Kumasi are BRT compliant	30 <sup>th</sup> June 2025
The policy road maintenance is reviewed and prioritized for implementation	30 <sup>th</sup> June 2025
The Road Fund Act is reviewed and amended to: <ul style="list-style-type: none"> <li>To use the Road Fund for only road maintenance, traffic management, and road safety;</li> <li>Provide a formula for allocation to the MMDAs; and</li> <li>Provide for automatic adjustment of the road fund levy</li> </ul>	31 <sup>st</sup> December 2025

**Table 6: Some Key Indicators for Urban Mobility**

Indicator	Source
Average commute time by road (min/km)	Traffic Studies
Bus Rapid Transit (BRT) ridership (pas/yrs.)	BRT Operator
Urban rail transit ridership (pas/yr.)	Rail operator
Average commute time by rail (mins)	Rail operator
Condition of road (% good, fair & poor)	Roads Department
Expenditure on road maintenance (% of own funds)	Finance Department
Condition of transport terminals (% good, fair & poor)	Transport Department
Pedestrian walkways (% of roads with walkways)	Transport Department
Facilities for PWDs (% increase in facilities)	Transport Department

---

## 4 ARTISANAL AND SMALL-SCALE MINING

---

### 4.1 Introduction

Artisanal and small-scale mining (ASM) is a blanket term for an array of low capital-intensive, poorly planned mining operations where simple tools and equipment are mostly employed to exploit mineral deposits. About 20% of the global mineral and metal production comes from ASM (Carstens, 2017), providing a source of employment for more than 44.7 million people (World Bank, 2020) and alleviating poverty and enhancing rural development, especially in the developing countries (Eshun and Okyere, 2017; Hilson, 2016). ASM is a source of livelihood not only for the ASM operators but also provides indirect jobs for several people including transport operators, traders, small businesses, and equipment suppliers. In some cases, the proceeds from ASM activities are used as 'start-up' capital for establishing business ventures, paying medical expenses, and funding education (Siaw et al., 2023). Moreover, the ASM sector has been a lucrative employment avenue for many unemployed graduates who are not absorbed by the formal sector, lessening the unemployment burden on governments (Arthur-Holmes et al., 2022).

ASM and illegal mining (otherwise known as *galamsey*) activities in Ghana date back more than two thousand years, with evidence of gold mining as far back as the seventh and eighth centuries. Ghana is presently the second largest producer of gold in sub-Saharan Africa, only behind South Africa. This enviable position is supported by the returns from small-scale and artisanal mining (including *galamsey*). However, these mining activities have countless negative effects on the environment and society. It is estimated that about 30 % of Ghana's total gold output is through these activities and it directly employs an estimated one million small-scale miners while supporting approximately 4.5 million more (Eduful et al., 2020; McQuilken and Hilson, 2016). Currently, the activity is multifaceted, affecting communities in the Central, Eastern, Western, Western North, Ashanti, Bono, Bono East, Ahafo, Upper West, Upper East, Northeast, and Savannah Regions.

The introduction of sophisticated equipment, the use of dangerous chemicals and the recent influx of foreign illegal mining practitioners



have significantly aggravated the negative effects of small-scale and artisanal mining. As such, the public, media, and academia have raised serious concerns about the negative effects of small-scale and artisanal mining operations and have called for it to be abolished and the subsequent restoration of the many abandoned mining sites across the country. The government in its quest to minimize the impact and streamline the activities of artisanal miners introduced the community mining scheme to guide their operation but the challenges persist; hence, the need to produce more innovative strategies/solutions to address them.

## 4.2 Problem Statement

Countries, for example, Ghana, which have legal and regulation frameworks for small-scale mining now and then face problems with miners trying to classify their activities as small-scale or even artisanal to escape from complying with the stringent enacted laws (Carstens, 2017), making it laborious to oversee their operations. The ASM sector in Ghana, for the past two decades, has improved in terms of sophistication, where high-level machinery, for example, water platforms and suction equipment (for dredging rivers), Changfa (for crushing hard rocks) and trommel (for washing), have replaced the conventional tools (Boafo et al., 2019; Yankson and Gough, 2019). Despite the improvement in the operational methods, the safety, security, social and environmental issues associated with ASM have worsened, for instance, contamination of soil and water resources (Gyamfi et al., 2019; Ofosu et al., 2020; Achina-Obeng and Appah, 2022), deforestation (Bansah et al., 2018; Barenblitt et al., 2021), destruction of cocoa farms (Snapir et al., 2017; Siaw et al., 2023), land disputes and fierce clashes between ASM operators and national security officers (Hilson, 2017; Yankson and Gough, 2019) and abuse of women and children (Yakovleva, 2007; Arthur-Holmes and Abrefa Busia, 2021) even though there exist legislative frameworks, outlining the processes required for obtaining licenses and undertaking safe mining operations (Eshun and Okyere, 2017).

#### 4.2.1 Views Collated from Academia and Policy Makers

With legislative instruments barring illegal ASM in Ghana, the growth of illegal mining activities by local and foreign miners has attracted widespread interest from academia and policymakers, whose views are presented as follows:

- i. First, it is asserted that extreme bureaucracies and costs are involved in license applications (Ampaw et al., 2023). For instance, at the national workshop organized in Accra from 29th to 30th July 2003 by the Centre for Scientific and Industrial Research (CSIR) and the Ministry of the Environment and Science on artisanal mining, the participants argued that the license acquisition process is a key factor discouraging ASM operators from regularizing their activities (Aubynn, 2009). It is worth noting that many ASM operators do not have enough capital and even those who have the financial muscle often face delays in the licensing process, leading to increased social, security, safety, and environmental issues (Hilson, 2016; Eshun and Okyere, 2017; Eduful et al., 2020). However, this assertion has been challenged by Botchwey et al. (2022) who strongly believe that regularizing the ASM sector cannot guarantee safe mining practices and environmental protection.
- ii. Second, some scholars, through their studies, found that ASM operators lack adequate knowledge of mining and environmental laws and regulations, which are key to safe mining and environmental protection (Eshun and Okyere, 2017; Mabe, 2023). Even those who admit that their activities are detrimental to the environment have debated strongly that their source of livelihood surpasses any short or long-term environmental cost (Osei et al., 2022; Siaw et al., 2023).
- iii. Third, the involvement of politicians and traditional leaders has been a major subject of discussions on radio and television across the country, naming powerful politicians and chiefs as key sponsors of ASM operations. This argument is corroborated by a 31-page report published by the Bureau of National Investigations, a state intelligence agency in Ghana (JoyOnline, 2017a). When the illicit ASM operators are apprehended, they are not prosecuted owing to the relationship the ASM

operators, especially the female ones, have with some powerful politicians and security officers at the helm of affairs (JoyOnline, 2017b). Moreover, in the quest to win and retain power, political leaders have relented in their efforts to clamp down on illicit ASM activities, particularly during election years (Teschner, 2012; Bansah et al., 2018; Ofori et al., 2021), which has proven to be a good strategy for winning elections in mining communities.

- iv. Fourth, it is asserted by many critics that technological advancement, where earthmoving machinery has replaced rudimentary tools, cannot be ruled out as far as increased illicit ASM activities and associated environmental destructions are concerned (Bansah et al., 2018; Ampaw et al., 2023).

#### **4.2.2 Impact of Land Tenure System**

The above assertions are imperative in shedding light on increasing illegal ASM operations, however, not much attention has been focused on the interactions between national regulatory bodies (e.g., Ministry of Land and Natural Resources) and customary land institutions. Lands unlawfully acquired from traditional rulers and cocoa farmers in mineralized areas for ASM and how it is driving rising illicit mining activities have not been explored extensively. In Ghana, only 20% of the total land is owned by the State, with the remaining 80% typically regulated by the traditional leaders (Aubynn, 2009). Despite the mineral resources vested in the President on behalf of the people of Ghana, stool lands within mineralized areas are sold to illegal ASM operators by traditional leaders and farmers without involving the appropriate regulatory institutions of the state (Banchirigah, 2008; Nyame and Blocher, 2010). Some cocoa farmers, for example, are of the view that incomes from their farms are not enough to meet their needs considering the rapidly growing inflation in the country, which makes them sell their farmlands to ASM operators for huge sums of money (Siaw et al., 2023). Those who are reluctant to sell despite the financial inducement are later forced to sell considering the closeness of their farms to illegal mining sites and the associated damaging impacts (Siaw et al., 2023). This, according to the authors, creates unemployment for “landless” farmers and the only alternative for them is to join the illegal mining

workforce for livelihoods. The “force to sell” strategy utilized by ASM operators to acquire lands will not only cause Ghana to lose substantial revenues generated from cocoa production but also cause a food shortage in the country following the poisoning of soils and water bodies by illegal mining.

#### 4.2.3 Impact of Legislation

In efforts to derive the optimum economic and environmental benefits, several laws and regulations have been passed since 1989 to regularize and formalize the operations of ASM in Ghana (Aubynn, 2009). Despite the introduction of legal systems, formalization and regularization of the sector have not been fully realized, making it difficult to realize its full economic and safe environmental potential (Hilson et al., 2014). In fact, the prevailing mode of formalization which is characterized by poor coordination can be blamed for this difficulty as prospective small-scale miners are frustrated in securing licenses owing to the rigid bureaucratic processes and high cost of registration. Consequently, the legal framework intended to formalize and streamline the operations of ASM has, rather, led to a rapid surge in illegal ASM operations locally called galamsey. More so, the displacement of local folks from their land for large-scale mining activities, often operated by foreigners, has driven many more people into galamsey operations. Hence, serious discussions are needed to combat the menace.

### 4.3 Impact of ASM (including Galamsey)

#### 4.3.1 Environmental Impacts

In the past few decades, artisanal/small-scale mining alongside galamsey operations has unfolded as a major topical societal issue and has been associated with environmental deterioration such as deforestation, mercury contamination, aquatic life destruction, and water and soil pollution (Aryee et al., 2003; Boadi et al., 2016; Tschakert and Singha, 2007). Locally, the practice causes severe environmental damage to lands, and water bodies.

- i. **Impact on Forests:** Forest remains an essential source of clean air and water and is a habitat for many species, making it a critical resource. To extract minerals such as gold, the ASM operators often clear large areas of forest with earthmoving

equipment, leading to the loss of valuable ecosystems, vegetation cover and farmlands. For example, Snapir et al. (2017), whose study focused on cocoa growing areas, especially in the southern part of Ghana, found that the land used for galamsey tripled between 2011 and 2015, with 603 ha direct encroachment into protected forest reserves. Moreover, over a decade (2007–2017), the data from the land cover analysis revealed that about 47,000 ha of vegetation in southwestern Ghana were changed to mining sites at a mean rate of 2600 ha per year (Barenblitt et al., 2021). Also, a study by Boadi et al. (2016) indicated that 4.4% of the degradation of the Offin Shelterbelt Forest reserve of Ghana within 5 years was due to the activities of illegal mining. The impact is more pronounced by the removal of topsoil and the destruction of soil structure, which renders previous fertile lands incapable of sustaining crop production in the long term (Aryee et al., 2003). Additionally, the destruction of forests exacerbates climate change, as trees play a crucial role in absorbing carbon dioxide and regulating local climate patterns.

- ii. **Impact on Soils:** Unregulated mining practices often lead to soil degradation and erosion, causing losses to agricultural lands. Land degradation, as shown in Figure 1, has caused the removal of topsoil, vegetation, and trees using heavy machines for mining gold deposits. This has run down the soil's nutrients and reduced its fertility for agricultural purposes. Tailings heaped on lands after mining release some heavy metals into the soils (Ngole–Jeme and Fantke, 2017), which can remain there for an extended period because of their poor degradation and immobile nature (Sanga et al., 2023). Their presence damages soil biota by altering important microbial processes and lowering biotic activity in soils. They are also taken up by plants through their roots and accumulate in the food chain (Jaiswal et al., 2018). When these pollutants enter the human body through food, there are risks of neurological disorders and cancer (Wu et al., 2021). Studies by Danyo and Osei-Bonsu (2016) and Nunoo et al. (2023) have indicated a decline in food productivity in illegal mining regions, which is a threat to food security.

- iii. **Impact on Water Resources:** In most rural communities, streams and rivers remain an essential water source for domestic and agricultural purposes. Hence, increasing the water bodies' turbidity and total suspended solids and introducing heavy metals (due to dredging rivers and streams and washing of ore deposits in water bodies, as shown in Figure 2a) deny downstream users access to potable water. Past and recent studies conducted in Ghana, especially the southern part, found arsenic, manganese, iron, cadmium, nitrate, lead, mercury, zinc, turbidity, and pH exceeding the World Health Organization (WHO) permissible guideline values for drinking water (Armah et al., 2010; Obiri et al., 2016; Bansah et al., 2018; Gyamfi et al., 2019). Irrigating farmlands with acidic water emanating from acid mine drainage affects the fertility of agricultural lands and poisons food crops (Lin et al., 2005). These crops, when consumed, put human health at risk. Moreover, the high turbidity levels and discoloration of water bodies increase the cost of water treatment and supply owing to the frequent shutdown of treatment plants for repairs and rising quantities of water treatment chemicals (e.g., alum) (Bansah et al., 2018). For instance, the Daboase water treatment plant, which supplies water to Daboase and Sekondi-Takoradi Metropolis from River Pra, produces less than six million gallons of potable water (which is the designed output) owing to high turbidity levels of River Pra (Fig. 2b) induced by illicit mining activities (Amoah, 2018). In March 2017, the Ghana Water Company Limited (GWCL) warned that water pollution caused by illegal small-scale mining could force the country to import water for consumption in the future. Furthermore, the increased turbidity coupled with the presence of poisonous chemicals (e.g., mercury and cyanide) kills fish and other aquatic organisms, which not only causes food shortages in mining communities but also deprives those who depend heavily on streams and rivers for fishing of their source of income.



*Figure 1: Land degradation by artisanal and small-scale mining (after Bansah et al. 2018)*



*Figure 2: (a) ASM operators mining alluvial gold in River Pra (after Karikari et al., 2021) and (b) water samples taken for treatment (after Amoah, 2018).*

#### 4.3.2 Public health impacts

Mining remains one of the most hazardous occupations in the world, both in terms of short-term injury and loss of life but also due to its long-term impacts such as cancers and respiratory diseases. Illegal mining operations often leave footprints in the form of abandoned

ponds (Figure 1), which subsequently become death traps for vulnerable people (e.g., children) and breeding spaces for mosquitoes. For instance, Quarm et al. (2022) found increased incidences of malaria, skin diseases as well as physical injuries and fatal accidents as the commonest health-related effects of ASM in Amansie West District of Ghana.

The short or long-term exposure to harmful chemicals (e.g., mercury and cyanide) in extracting gold from ore results in heavy metal contamination, which has the potential to cause several health problems such as kidney disease, nervous system damage, intellectual impairment, cardiovascular problems, gastrointestinal difficulties, fracture of the bone, cancer in the lungs, bladder, kidney, liver, and skin and eventual death in humans (Ngole-Jeme and Fantke, 2017).

Kidney diseases are on the rise in Ghana and can be attributed partly to the use of mercury by illegal miners. In a study conducted by the Centre for Environmental Impact Analysis, mercury in the environment was reported to be due to the gold recovery process where the inorganic form of the metal is either washed into rivers or readily vaporized into the atmosphere. For example, in the Upper East Region, Gyamfi et al. (2020) found vapours emanating from 91% of homes doing amalgam burning and 64% of homes not practicing amalgam burning all exceeding the mercury permissible level of 300 ng/m<sup>3</sup>, suggesting that the residents, both adults and children, are inhaling vaporized mercury without knowing.

Also, (Obiri et al., 2016b) used hazard quotients for health risk assessment of ASM/galamsey miners in Prestea Huni Valley District of Ghana and reported that the illegal mining activities put the people at risk of developing cancerous and other non-cancerous diseases due to their exposure to heavy metals such as arsenic (As), mercury (Hg), cadmium (Cd) and lead (Pb) in the water and soils in the area.

#### 4.3.3 Economic impacts

- i. **Loss of Livelihood:** Loss of livelihoods of farmers in communities invaded by illegal small-scale gold miners is an important economic consequence of galamsey. Many farmers in the major galamsey-prone regions of Ghana are settler



farmers. They have no legal right over the lands they cultivate. Whenever the owners of these lands decide to cede them for mining, the settler farmers must move out with or without compensation depending on existing agreements or customary practices governing the use of such lands. This leads to displacement and loss of livelihood. Even where compensations are paid, they are often meagre to pay for relocation and acquisition of new lands for farming. Some of the farmers are illiterates, unable to practice any other trade in a sustainably profitable manner, making a shift in occupation to other employment opportunities very difficult. The shifting of farmlands to mine lands creates local food deficits and food price hikes since the shortfall must be sourced from distant towns at exorbitant prices. The operators sometimes divert streams and river courses, depriving downstream users of their sources of water. Fish and other aquatic organisms' die-off are common, forcing fishermen to abandon their source of livelihood and resulting in less food availability in the communities. The influx of foreign illegal miners such as the Chinese increases the human population in the galamsey areas putting further pressure on food supplies and raising the cost of living.

- ii. **Revenue Losses to the State:** Illegal mining operators often evade taxes, royalties, and other regulatory fees, resulting in substantial revenue losses for the government. This hampers the government's ability to fund development projects and provide essential services. Studies have shown that illegal mining activities in Ghana have led to a significant decline in government revenue from the mining sector. The evasion of taxes and royalties by illegal miners deprives the government of a crucial source of revenue. Formal mining companies operating legally are required to pay corporate taxes, royalties, and other fees to the government based on their production and profits. However, illegal miners operate outside the regulatory framework and do not contribute to the government's revenue stream. This is because illegal miners do not own their facilities and depend on the central government. Moreover, the illegal mining sector's informal nature makes it

challenging for the government to track and collect revenue effectively. This could be addressed if they are registered, monitored, and effectively managed.

- iii. **Poor Operational Standard:** The informal nature of illegal mining allows it to operate with lower production costs, evading environmental regulations and labour standards. This undermines the competitiveness and viability of legally operating mining companies, resulting in reduced growth and employment opportunities in the formal sector. This also gives them a competitive advantage over formal mining companies that adhere to legal requirements and face higher operational costs.
- iv. **Investor Confidence in Mining:** Thus, the presence of widespread illegal mining activities can erode investor confidence in the mining sector and the broader economy. Investors may perceive the lack of effective regulation and enforcement as indicative of an unstable and risky business environment. This loss of confidence can deter both domestic and foreign investments, hampering economic growth and development. Illegal mining activities create an environment of uncertainty and instability in the mining sector, which is a crucial sector for economic growth and attracting investments. The lack of effective regulation and enforcement of mining laws raises concerns about property rights, contract enforcement, and the overall rule of law. Investors, whether domestic or foreign, seek stable and predictable business environments that offer legal protection for their investments. The presence of illegal mining can undermine these expectations and deter potential investors. The illegal nature of these activities suggests a disregard for legal and regulatory frameworks, which can cast doubt on the enforceability of contracts and property rights. Investors may be hesitant to commit capital to a sector where illegal mining is prevalent, as they fear potential disputes, conflicts, and challenges in protecting their investments. Loss of investor confidence in the mining sector has broader implications for the overall economy. Mining projects often require substantial investments in infrastructure, equipment, and technology in exploration,

development, mining, exploitation, processing, and rehabilitation. When investor confidence is low, these investments may be delayed or altogether abandoned, depriving the economy of the potential benefits of increased mining activities.

- v. **Effective Resource Governance:** Illegal mining undermines effective resource governance and management. It bypasses formal regulatory frameworks, leading to a lack of control and oversight over mining operations. This weakens the ability of the government to effectively manage and allocate mineral resources, limiting the potential economic benefits that can be derived from the sector. One of the key challenges posed by illegal mining is the evasion of formal regulatory frameworks and the associated governance structures. Illegal mining operations often operate outside the legal framework established by the government, bypassing necessary permits, licenses, and environmental regulations. This lack of compliance undermines the ability of regulatory bodies to monitor and enforce mining activities effectively. The absence of effective resource governance in illegal mining has several implications:

- a. Firstly, it hampers the government's ability to manage and allocate mineral resources strategically and sustainably. Proper resource governance involves the identification of mineral deposits, their exploration, extraction, and revenue management. However, in the context of illegal mining, the government has limited control over these processes, leading to inefficient and unregulated exploitation of mineral resources.
- b. Secondly, impaired resource governance in illegal mining results in revenue losses for the government. Illegal mining operations evade taxes, royalties, and other regulatory fees, depriving the government of potential revenue streams. This loss of revenue hampers the government's capacity to invest in public infrastructure, social services, and development projects, thereby

limiting the overall economic growth and development of the country.

- c. Furthermore, the lack of effective resource governance in illegal mining can lead to social conflicts and disputes over mining rights and resource allocation. The absence of clear guidelines and mechanisms for resolving conflicts can create tensions among different stakeholders, including local communities, mining companies, and government authorities. These conflicts can further impede the development of the mining sector and hinder economic growth.
- vi. **International Trade Opportunities:** The prevalence of illegal mining in Ghana can have detrimental effects on the country's international trade opportunities. The negative perceptions surrounding illegal mining practices can result in trade restrictions, sanctions, or the loss of access to international markets because some of our exported agricultural products could potentially be tagged as "contaminated." These consequences can significantly limit export opportunities, reduce foreign exchange earnings, and impede the overall economic growth of the country. Illegal mining activities often violate environmental regulations, water resource management regulations, labour standards, and ethical business practices. Such practices tarnish Ghana's reputation in the international community and can lead to increased scrutiny and negative perceptions of its mining sector. This, in turn, can result in trade barriers imposed by other countries concerned about the origin and sustainability of the minerals being exported. Trade restrictions may include import bans or increased tariffs on minerals originating from areas affected by illegal mining. These measures aim to discourage the consumption of illegally sourced minerals and protect the interests of importing countries. Consequently, Ghana may face challenges in accessing international markets, limiting its ability to sell its mineral resources and earn foreign exchange. Furthermore, the reputation of a country as a responsible and reliable trading partner is crucial for attracting foreign investment and fostering trade relationships. The prevalence of illegal mining

practices can erode confidence in Ghana's mining sector and deter potential foreign investors. Negative perceptions of illegal mining can lead to decreased interest from international businesses and investors, who may prefer to engage with countries that uphold higher standards of transparency, legality, and sustainability. The loss of international trade opportunities can have significant economic implications. Reduced export opportunities and foreign exchange earnings can negatively impact Ghana's balance of trade, currency stability, and overall economic growth. It can also limit the country's capacity to finance development projects, invest in infrastructure, and provide essential services to its citizens.

- vii. **Tourism:** Tourism is a major economic sector in many countries that thrives on the conservation of natural landscapes, cultural heritage, and biodiversity (Yeboah and Samuel, 2023). However, environmental degradation through ASM/galamsey activities renders natural water features such as rivers, lakes, and waterfalls landscapes unattractive to tourists for activities such as swimming, fishing and boating thereby reducing productivity and income in the tourism sector (Amankwah and Anim-Sackey, 2021); hence, reducing tourist numbers and revenue from tourism (Yeboah and Samuel, 2023).

#### 4.3.4 Social impacts

Communities that engage in illegal mining often witness an upsurge in drug abuse, teenage pregnancy, sexually transmitted diseases, unsafe abortions, theft cases and other social vices (Mantey et al., 2016; Bansah et al., 2018; Eduful et al., 2020). Also, there is often resistance by illegal miners and local people against security task forces and conflicts over ownership of the local resources, leading to increased violence and human rights abuse (Botchwey et al., 2019; Eduful et al., 2020). In mining communities, children of school-going age do menial jobs at illegal mining sites to sustain their livelihoods despite the high-risk nature of illegal mining. The quick-acquired wealth keeps them in mining activities, leading to a high rate of absenteeism and dropout in schools (Danyo and Osei-Bonsu, 2016). During the rainy season (when most rivers and streams overflow their banks, making it difficult for illegal miners to operate), illegal mining

operators opt to steal for survival, threatening the security of most mining communities in Ghana (Bansah et al., 2018).

In mining areas, women are often harassed sexually by men in their quest to get a job. For instance, male galamsey operators demand sex from women in exchange for job, resulting in most women getting impregnated and infected with sexually transmitted diseases (STDs), for example, HIV/AIDS, owing to the limited sexual and reproductive health-care services or religious resistance to the use of contraceptives (Yakovleva, 2007). The lucrative nature of illegal mining attracts commercial sex workers, explaining the widespread of STDs and the abuse of drugs (e.g., Tramadol, marijuana, cocaine, etc.) in mining communities (Osei-Yeboah et al., 2019).

Also, illegal mining activities cause a serious threat to tradition and culture (Ros-Tonen et al., 2021) since the operations sometimes lead to loss of cultural heritage (Kumah and Adum Nyarko, 2018). Land degradation, including indiscriminate digging for gold in sacred sites such as old burial sites and shrines, is considered disrespectful of African belief and practice (Kumah and Adum Nyarko, 2018; Ros-Tonen et al., 2021).

#### 4.4 Previous/Current Actions to Address ASM Issues

Since the 1980s, there have been efforts, both enabling and deterring, by several governments and institutions to regularize the ASM sector (Bansah et al., 2022; Ofori et al., 2021). The enabling processes include the enactment of laws and regulations, the creation of regulatory bodies to oversee the ASM operations, and the establishment of government committees. Some of the initiatives are discussed:

- i. **Small-Scale Gold Mining Act (PNDC Law 218):** In 1989, for example, small-scale mining was legalized by enacting (Yankson and Gough, 2019). Small-Scale Mining Project (SSMP), comprising the Minerals Commission (MC), Precious Minerals and Marketing Corporation (PMMC), Mines Department (MD) and Geological Survey Department (GSD), was formed to supervise the small-scale mining activities in the country. Here, the regulator, MC was responsible for issuing licenses and implementing pertinent industry policies. PMMC offered

purchasing services for the miners. MD oversaw health and safety problems in the industry whereas GSD was to prospect and delineate mineralized areas for small-scale mining. In 1991, the Small-Scale Mining Department (SSMD) was instituted to handle regulatory issues (Ofei-Aboagye et al., 2004). Micro-credit schemes were established for the miners through the World Bank sponsorship, empowering them to purchase equipment for their operations (Ofori et al., 2021). Between 1995 and 1997, the government supported the sector with foreign equipment. However, all of these were unsustainable in addressing the issues of illegal mining owing to non-payment of loans and poor coordination by the state regulatory institutions. The institutions lacked the required expertise in terms of personnel and knowledge. Moreover, the existing small-scale mining laws were not effectively enforced owing to limited logistics (Bansah et al., 2016; Ofei-Aboagye et al., 2004; Ofori et al., 2021).

- ii. **Operation Flush-Out:** Between 2000 and 2008, a government led by John Agyekum Kuffour resorted to the deterrent (combative) approach by initiating “Operation Flush-Out”. Military personnel raided mining sites, arrested mining operators, and destroyed mining equipment (Ofori et al., 2021).
- iii. **Mills/Mahama Government Initiatives:** A change of government led by the late Evans F. A. Mills went back to the enabling approach, where the ASM sector was resuscitated through technology. Miners were sent to China for capacity building, which subsequently resulted in a significant influx of Chinese immigrants into the country. The invasion of Chinese miners in the ASM sector called for a swift measure where an inter-ministerial taskforce was formed to clamp down on illegal mining activities (Ofori et al., 2021). In an attempt to sanitize the ASM sector, John D. Mahama’s government employed the deterrent approach again in 2013 where the military was used. Mining sites were raided, mining equipment and tools were destroyed, arrests were made, and more than 4500 Chinese miners involved in illegal mining activities were deported (Bansah et al., 2018).

- iv. **Akuffo-Addo Government Initiatives:** In the first quarter of 2017, the use of a deterrent approach to cease illegal mining continued in Nana A. D. Akufo-Addo's government where "Operation Vanguard" and "Operation Galamstop" were launched, following pressure from the media houses to save Ghana's waters (Hilson, 2017). ASM activities were banned for six months and subsequently lifted in December 2018 for only licensed small-scale miners to operate (Bansah, 2019). These operations were staffed by security men called from the Ghana Armed Forces, Ghana Air Force, Ghana Navy, and the Ghana Police Force (Hilson and Maconachie, 2020), which resulted in shootings, fatalities and confiscating and burning of mining equipment (Hilson, 2017). Although these operations improved turbidity levels of some water bodies across the country (Eduful et al., 2020), the fundamental problems emanating from illegal ASM persist, suggesting that using the military is not a long-term solution to the illicit mining menace. Also, the government has recently rolled out a community mining scheme to tackle illegal mining by encouraging locals living in mining communities to undertake responsible, viable, and sustainable small-scale mining under the Minerals and Mining Act, 2006 (ACT 703). The scheme is aimed at encouraging effective local community participation in small-scale mining, improving the working conditions of the operators, and minimizing environmental degradation. However, it has not achieved the desired results due to poor implementation.

A review of the literature reveals that the formalization approaches employed so far, especially the combative approach, failed to address the basic factors that drive people into ASM activities (Eduful et al., 2020; Hilson and Maconachie, 2020; Bansah et al., 2022).

The government interventions to end illicit mining were poorly planned and coordinated (Siaw et al., 2023) and failed to provide logistics for regulatory institutions to work effectively (Citinewsroom, 2024).

The formalization approaches failed to conduct broader, inclusive stakeholder engagement. The government policies prioritized the



growth of the large-scale mining sector that contributes significantly to its revenue mobilization in the form of royalties, permit fees and taxes (Hilson and Maconachie, 2020) and marginalizing the ASM operators. Parcels of land were given to multinational exploration companies for prospecting and highly mineralized lands were leased to large-scale mining companies (Bansah et al., 2018). Conversely, the lands assigned to licensed small-scale operators lacked viable prospecting data, which ensured no long-term mining of ore deposits (Bansah et al., 2018).

The government interventions failed to sanction any ASM operators who are well connected to political and traditional leaders (Ampaw et al., 2023; Eduful et al., 2020).

Also, the government interventions failed to incorporate training and capacity-building workshops for stakeholders, and educational programs on the long-term impacts of ASM on the environment (Osei et al., 2022). Furthermore, the government formalization approaches failed to provide alternative sources of livelihood that could provide incomes matching the revenues obtained from ASM (Bansah et al., 2022).

## **4.5 Proposals for Sustainable ASM**

### **4.5.1 A Multifaceted Approach**

Despite the many interventions by succeeding governments over the years, galamsey (including ASM) has been a long-standing challenge in Ghana, with severe environmental, economic, and social consequences. To combat this issue, a multifaceted approach, involving all stakeholders including but not limited to the government, civil society, and community stakeholders, is necessary and paramount. Some proposed strategies that can be used to effectively promote sustainable ASM practices and protect the environment and local communities in Ghana are proposed below.

### **4.5.2 Mineral Exploration Fund (MEF)**

A mineral exploration fund (MEF) should be set up as a financing framework to provide the much-needed capital for mineral exploration projects. The fund would provide primary financing resources to a state agency like the Ghana Geological Survey Authority (GGSA) to undertake national mineral exploration activities

---

to ascertain the presence, or otherwise, of mineral deposits, delineate economic mineral targets and develop a well-structured frontier of preliminary “mineable concessions” to focus the ASM activities. This will guide the granting of permits for all forms of ASM by limiting it to only the delineated areas, reducing random searches for gold by illegal small-scale miners, and controlling environmental degradation. The most recent example of this approach is the state-led investment into the Saudi Geological Survey for mineral prospecting to delineate economic zones in the Arabian Shield.

The MEF could also fund research into emerging mineral exploration techniques, sustainable mining practices, and environmental remediation to develop and promote innovative technologies and solutions at a cheaper cost while creating a rich intellectual resource base in Ghana’s mineral ecosystem. Like the Imperial Barrel award, a prestigious annual competition organized by the American Association of Petroleum Geologists (AAPG) for geoscience students at universities worldwide, that promotes university competitions in subsurface basin evaluation in the hydrocarbon sector, the funding in research can be implemented via a collaboration between academia, government and the mining industry to ensure the research directly generates innovative solutions and training programs for sustainable mining practices as well as create abundant knowledge repository in Ghana’s mineral ecosystem.

Due to the substantial risk in exploration, the fund management must have a technical justification for investing in any exploration or research project and have plans to recover the investments for additional mineral exploration projects or research. At the very least, the lessons learned from an unsuccessful exploration project would guide subsequent steps by the government or its supervisory agency. In the event of an economically viable exploration, the fund should specify how and to what extent exploration expenditures are recoverable from successful projects.

The sources of funding may be from: (i) Minerals Income Investment Fund (MIIF) to allow a percentage of its annual revenue into technical and legally justifiable mineral exploration projects, (ii) Apportion a percentage of corporate taxes from mining in Ghana (large or small-scale mining) to the fund, (iii) Seek assistance from donor agencies

and local industries that supports safe mining like the World Bank's climate-smart mining facility, which seeks to support the sustainable extraction and processing of minerals and metals used in clean energy technologies, and (iv) revenues that would be generated from successful exploration projects. The act (Act, 978) that sets up MIIF is consistent with the proposal of a mineral exploration fund (MEF); thus, the administration of MEF could be under the domain of MIIF with close working association with GGSA and Minerals Commission.

#### **4.5.3 Strengthen Regulatory Framework and Law Enforcement**

The country has enough regulations and laws on mining and the protection of the environment to ensure sustainable ASM practices and curtail galamsey. However, they are not consistently enforced due to partisan political and socio-economic reasons. Therefore, steps should be taken to strengthen the enforcement of the existing regulations and laws with respect to ASM as follows:

- i. Train and equip law enforcement agencies to effectively monitor, prosecute and expedite illegal mining cases and enforce penalties/sanctions for illegal mining offenses.
- ii. Allow mandated regulatory agencies within the mining ecosystem, including the Minerals Commission, Environmental Protection Agency, Geological Survey Authority and Water Resources Commission to professionally discharge their duties without undue political interference.
- iii. Streamline and decentralize the ASM registration and licensing process to encourage legal mining operations and ensure all permits issued are in an accessible centralized database to increase transparency.
- iv. Demarcate and reserve specific land plots for ASM operations, and especially for local/community miners, in the country to prevent mining in unapproved areas.
- v. Make professional development training of ASM operators on best mining practices mandatory.
- vi. Enforce transparency and management of the MEF and MIIF.

#### 4.5.4 Alternative Livelihoods and Awareness Creation

Despite its negative impacts, illegal mining/galamsey is a source of employment and main source of livelihood for a significant portion of the populace and provides business opportunities for many local industries in the country. Therefore, in enforcing laws and regulations to curtail the practice and move towards sustainable mining practices, the following alternative livelihood and extensive awareness creation measures are needed:

- i. Provide training and support for realistic alternative income-generating activities (e.g., agriculture, entrepreneurship, etc.) in communities where the operations are prevalent.
- ii. Involve local communities and their opinion leaders in awareness creation and education on the negative impacts of illegal mining, and as well encourage participatory decision-making.
- iii. Encourage community-led monitoring and reporting of illegal mining activities including a reward system for persons who assist with information on illegal practices.
- iv. Utilize drones, satellite imaging, and other emerging technologies for monitoring and surveillance.
- v. Facilitate establishment of industries and/or community mines in areas where the operations are prevalent, if feasible, to provide sustainable jobs to the populace.

#### 4.6 Conclusions

In less than a decade, the United Nations Sustainable Development Goals (SDGs) are expected to be realized, especially Goals 1, 3, 6, 13, 13, 14, 15 and 16. Therefore, protecting and restoring water bodies and forests to ensure healthy lives in the quest to end poverty is imperative.

The available information shows that the ASM (including galamsey) sector provides livelihoods for many people in Ghana. However, the impacts on the environment and society have been so damaging over the years and threaten the realization of UN SDGs. Efforts by successive governments and other supporting organizations to ensure the full realization of the economic and environmental

benefits have been abortive since 1989 due to poor planning and coordination of government interventions, weak enforcement of ASM regulations, lack of political will, corruption, and lack of alternative livelihood opportunities with matching incomes for galamseyers.

Therefore, to address the lengthened negative impacts and effectively promote sustainable ASM practices to fully realize its benefits, this paper proposes the following three main solutions.

Firstly, establish a mineral exploration fund (MEF) to support: (i) the Ghana Geological Survey Authority (GGSA) delineate economic mineral targets and develop a well-structured frontier of preliminary “mineable concessions” to focus, track and manage the ASM activities, and (ii) research into emerging mineral exploration methods, sustainable mining practices, and environmental remediation techniques as well as generate innovative technologies and solutions for the mining sector.

Secondly, strengthen the enforcement of the existing legislative instruments by decentralizing the ASM registration and licensing process to encourage legal ASM operations and reserving specific land plots for local/community miners.

Thirdly, provide alternative sustainable income-generating activities in communities where the operations are common and strengthen awareness creation and education on the damaging effects of illegal mining by including local communities and their opinion leaders to encourage participatory decision-making. The proposed solutions herein would help sanitize the ASM sector and enhance the attainment of UN SDGs.

## 4.7 References

- i. Achina-Obeng, R., Appah, S., 2022. Informal artisanal and small-scale gold mining ( ASGM ) in Ghana : Assessing environmental impacts , reasons for engagement , and mitigation strategies. *Resource. Policy* 78, 102907. <https://doi.org/10.1016/j.resourpol.2022.102907>
- ii. Amankwah, R., Anim-Sackey, C., 2021. Illegal mining in Ghana: A review of its impact and implications. *Int. J. Sci. Res. Methodol.* 12 ., 66–79.
- iii. Amoah, J.K., 2018. Assessing the Social and Environmental Impact of Illegal Mining Operation in River Pra: a Case Study of Ghana Water Company Projects in Daboase. Kwame Nkrumah University of Science and Technology.
- iv. Ampaw, E.M., Chai, J., Jiang, Y., Dumor, K., Edem, A.K., 2023. Why is Ghana losing the war against illegal gold mining (Galamsey)? An artificial neural network-based investigations. *Environ. Sci. Pollut. Res.* 30, 73730–73752. <https://doi.org/10.1007/s11356-023-27265-x>
- v. Armah, F.A., Obiri, S., Yawson, D.O., Onumah, E.E., Yengoh, G.T., Afrifa, E.K.A., Odoi, J.O., 2010. Anthropogenic sources and environmentally relevant concentrations of heavy metals in surface water of a mining district in Ghana: A multivariate statistical approach. *J. Environ. Sci. Heal. - Part A Toxic/Hazardous Subst. Environ. Eng.* 45, 1804–1813. <https://doi.org/10.1080/10934529.2010.513296>
- vi. Arthur-Holmes, F., Abrefa Busia, K., 2021. Occupying the Fringes: The Struggles of Women in Artisanal and Small-Scale Gold Mining in Rural Ghana—Evidence from the Prestea–Huni Valley Municipality. *Gender Issues* 38, 156–179. <https://doi.org/10.1007/s12147-020-09261-4>
- vii. Arthur-Holmes, F., Abrefa Busia, K., Vazquez-Brust, D.A., Yakovleva, N., 2022. Graduate unemployment, artisanal and small-scale mining, and rural transformation in Ghana: What does the ‘educated’ youth involvement offer? *J. Rural Stud.* 95, 125–139. <https://doi.org/10.1016/j.jrurstud.2022.08.002>

- viii. Aryee, B.N., Ntibery, B.K., Atorkui, E., 2003. Aryee, B. N., Ntibery, B. K., & Atorkui, E. (2003). Trends in the small-scale mining of precious minerals in Ghana: a perspective on its environmental impact. *Journal of Cleaner production*, 11(2), 131–140. No Title. Trends small-scale Min. precious Miner. Ghana 11, 131–140.
- ix. Aubynn, A., 2009. Sustainable solution or a marriage of inconvenience? The coexistence of large-scale mining and artisanal and small-scale mining on the Abooso Goldfields concession in Western Ghana. *Resour. Policy* 34, 64–70. <https://doi.org/10.1016/j.resourpol.2008.04.002>
- x. Banchirigah, S.M., 2008. Challenges with eradicating illegal mining in Ghana: A perspective from the grassroots. *Resour. Policy* 33, 29–38. <https://doi.org/10.1016/j.resourpol.2007.11.001>
- xi. Bansah, K.J., 2019. From diurnal to nocturnal: Surviving in a chaotic artisanal and small-scale mining sector. *Resour. Policy* 64, 101475. <https://doi.org/10.1016/j.resourpol.2019.101475>
- xii. Bansah, K.J., Acquah, P.J., Assan, E., 2022. Guns and fires: The use of military force to eradicate informal mining. *Extr. Ind. Soc.* 11, 101139. <https://doi.org/10.1016/j.exis.2022.101139>
- xiii. Bansah, K.J., Dumakor-Dupey, N.K., Kansake, B.A., Assan, E., Bekui, P., 2018. Socioeconomic and environmental assessment of informal artisanal and small-scale mining in Ghana. *J. Clean. Prod.* 202, 465–475. <https://doi.org/10.1016/j.jclepro.2018.08.150>
- xiv. Bansah, K.J., Yalley, A.B., Dumakor-Dupey, N., 2016. The hazardous nature of small-scale underground mining in Ghana. *J. Sustain. Min.* 15, 8–25. <https://doi.org/10.1016/j.jsm.2016.04.004>
- xv. Barenblitt, A., Payton, A., Lagomasino, D., Fatoyinbo, L., Asare, K., Aidoo, K., Pigott, H., Som, C.K., Smeets, L., Seidu, O., Wood, D., 2021. The large footprint of small-scale artisanal gold mining in Ghana. *Sci. Total Environ.* 781, 146644. <https://doi.org/10.1016/j.scitotenv.2021.146644>
- xvi. Boadi, S., Nsor, C.A., Antobre, O.O., Acquah, E., 2016. An analysis of illegal mining on the Offin shelterbelt forest reserve, Ghana:

- Implications on community livelihood. *J. Sustain. Min.* 15, 115–119. <https://doi.org/10.1016/j.jsm.2016.12.001>
- xvii. Boafo, J., Paalo, S.A., Dotsey, S., 2019. Illicit Chinese small-scale mining in Ghana: Beyond institutional weakness? *Sustain.* 11, 1–18. <https://doi.org/10.3390/su11215943>
- xviii. Botchwey, G., Crawford, G., Loubere, N., Lu, J., 2019. South-South Irregular Migration: The Impacts of China’s Informal Gold Rush in Ghana. *Int. Migr.* 57, 310–328. <https://doi.org/10.1111/imig.12518>
- xix. Botchwey, G., Nest, M., D’Emidio, R., 2022. Working with legal small-scale miners: Implications for development. *J. Int. Dev.* 35, 1239–1253. <https://doi.org/10.1002/jid.3726>
- xx. Carstens, J., 2017. The artisanal and small-scale mining (ASM) sector and its importance for EU cooperation with resource-rich developing and emerging countries.
- xxi. Citinewsroom, 2024. Inadequate logistics hindering fight against galamsey. <https://citinewsroom.com/2024/06/inadequate-logistics-hindering-fight-against-forest-offences-Gt>. (Accessed 7th June 2024).
- xxii. Danyo, G., Osei-Bonsu, A., 2016. Illegal Small-Scale Gold Mining in Ghana: A Threat to Food Security. *J. Food Secur.* 4, 112–119. <https://doi.org/10.12691/jfs-4-5-2>
- xxiii. Eduful, M., Alsharif, K., Eduful, A., Acheampong, M., Eduful, J., Mazumder, L., 2020. The Illegal Artisanal and Small-scale mining (Galamsey) ‘Menace’ in Ghana: Is Military-Style Approach the Answer? *Resour. Policy* 68, 101732. <https://doi.org/10.1016/j.resourpol.2020.101732>
- xxiv. Eshun, P.A., Okyere, E., 2017. Assessment of the Challenges in Policy Implementation in the Small Scale Gold Mining Sector in Ghana – A Case Study. *Ghana Min. J.* 17, 54–63. <https://doi.org/10.4314/gm.v17i1.6>
- xxv. Gyamfi, E., Appiah-Adjei, E.K., Adjei, K.A., 2019. Potential heavy metal pollution of soil and water resources from artisanal



- mining in Kokoteasua, Ghana. *Groundw. Sustain. Dev.* 8, 450–456. <https://doi.org/10.1016/j.gsd.2019.01.007>
- xxvi. Gyamfi, O., Sorenson, P.B., Darko, G., Ansah, E., Bak, J.L., 2020. Human health risk assessment of exposure to indoor mercury vapour in a Ghanaian artisanal small-scale gold mining community. *Chemosphere* 241, 125014. <https://doi.org/10.1016/j.chemosphere.2019.125014>
- xxvii. Hilson, G., 2017. Shootings and burning excavators: Some rapid reflections on the Government of Ghana's handling of the informal Galamsey mining 'menace.' *Resour. Policy* 54, 109–116. <https://doi.org/10.1016/j.resourpol.2017.09.009>
- xxviii. Hilson, G., 2016. Farming, small-scale mining and rural livelihoods in Sub-Saharan Africa: A critical overview. *Extr. Ind. Soc.* 3, 547–563. <https://doi.org/10.1016/j.exis.2016.02.003>
- xxix. Hilson, G., Hilson, A., Adu-Darko, E., 2014. Chinese participation in Ghana's informal gold mining economy: Drivers, implications and clarifications. *J. Rural Stud.* 34, 292–303. <https://doi.org/10.1016/j.jrurstud.2014.03.001>
- xxx. Hilson, G., Maconachie, R., 2020. For the Environment: An Assessment of Recent Military Intervention in Informal Gold Mining Communities in Ghana. *Land use policy* 96, 104706. <https://doi.org/10.1016/j.landusepol.2020.104706>
- xxxi. Jaiswal, A., Verma, A., Jaiswal, P., 2018. Detrimental Effects of Heavy Metals in Soil, Plants, and Aquatic Ecosystems and in Humans. *J. Environ. Pathol. Toxicol. Oncol.* 37, 183–197. <https://doi.org/10.1615/JEnvironPatholToxicolOncol.2018025348>
- xxxii. JoyOnline, 2017a. Chiefs, politicians, others cited in BNI report on galamsey. <https://www.myjoyonline.com/chiefs-politicians-others-cited-in-bni-report-on-galamsey/> (Accessed 30th May, 2024).
- xxxiii. JoyOnline, 2017b. Female Chinese galamseyers blackmailing powerful men with sex videos. <https://www.myjoyonline.com/female-chinese-galamseyers-blackmailing-powerful-men-with-sex-videos/> (Accessed 30th May, 2024).

- xxxiv. Karikari, A.Y., Duah, A.A., Akurugu, B.A., Darko, H.F., 2021. Assessing the impacts of artisanal mining on the quality of South-western Rivers System in Ghana. *Environ. Monit. Assess.* 193. <https://doi.org/10.1007/s10661-021-09515-y>
- xxxv. Kumah, D., Adum Nyarko, E., 2018. Gold mining and its effects through the lens of an archaeologist: Experiences from the prestea area, South Western Ghana. *West African J. Appl. Ecol.* 26, 133–148.
- xxxvi. Lin, C., Tong, X., Lu, W., Yan, L., Wu, Y., Nie, C., Chu, C., Long, J., 2005. Environmental impacts of surface mining on mined lands, affected streams and agricultural lands in the Dabaoshan Mine region, southern China. *L. Degrad. Dev.* 16, 463–474. <https://doi.org/10.1002/ldr.675>
- xxxvii. Mabe, F.N., 2023. Small-scale mining policies in Ghana: Miners' knowledge, attitudes and practices. *Resour. Policy* 85, 103924. <https://doi.org/10.1016/j.resourpol.2023.103924>
- xxxviii. McQuilken, J., Hilson, G., 2016. Artisanal and small-scale gold mining in Ghana. Evidence to inform an 'action dialogue,' lied.
- xxxix. Ngole-Jeme, V.M., Fantke, P., 2017. Ecological and human health risks associated with abandoned gold mine tailings contaminated soil. *PLoS One* 12, e0172517. <https://doi.org/10.1371/journal.pone.0172517>
- xl. Nunoo, I., Boansi, D., Owusu, V., 2023. Does the use of cocoa farmlands for artisanal small-scale gold mining really increase household food insecurity? Evidence from Ghana. *Resour. Policy* 87, 104329. <https://doi.org/10.1016/j.resourpol.2023.104329>
- xli. Nyame, F.K., Blocher, J., 2010. Influence of land tenure practices on artisanal mining activity in Ghana. *Resour. Policy* 35, 47–53. <https://doi.org/10.1016/j.resourpol.2009.11.001>
- xlii. Obiri, S., Mattah, P., Mattah, M., Armah, F., Osaе, S., Adu-kumi, S., Yeboah, P., 2016a. Assessing the Environmental and Socio-Economic Impacts of Artisanal Gold Mining on the Livelihoods of Communities in the Tarkwa Nsuaem Municipality in Ghana. *Int. J. Environ. Res. Public Health* 13, 160. <https://doi.org/10.3390/ijerph13020160>

- xliii. Obiri, S., Yeboah, P., Osaе, S., Adu-kumi, S., Cobbina, S., Armah, F., Ason, B., Antwi, E., Quansah, R., 2016b. Human Health Risk Assessment of Artisanal Miners Exposed to Toxic Chemicals in Water and Sediments in the PresteaHuni Valley District of Ghana. *Int. J. Environ. Res. Public Health* 13, 139. <https://doi.org/10.3390/ijerph13010139>
- xliv. Ofei –Aboagye, E., Thompson, N.M., Al-Hassan, S., Akabzaа, T., Ayamdoo, C., 2004. Putting Miners First: Understanding the Livelihoods Context of Small-Scale and Artisanal Mining in Ghana Factors involved in Increasing the Contribution of ASM to Poverty Reduction Targets. Wales, UK.
- xlv. Ofori, A.D., Mdee, A., Van Alstine, J., 2021. Politics on display: The realities of artisanal mining formalisation in Ghana. *Extr. Ind. Soc.* 8, 101014. <https://doi.org/10.1016/j.exis.2021.101014>
- xlvi. Ofosu, G., Dittmann, A., Sarpong, D., Botchie, D., 2020. Socio-economic and environmental implications of Artisanal and Small-scale Mining ( ASM ) on agriculture and livelihoods. *Environ. Sci. Policy* 106, 210–220. <https://doi.org/10.1016/j.envsci.2020.02.005>
- xlvii. Osei-Yeboah, R., Adedze, M., Bannor, R., Takyibea Opoku, E., Akweongo, P., 2019. HIV prevalence variations in mining communities in Ghana. *J. HIV. AIDS. Soc. Serv.* 18, 129–145. <https://doi.org/10.1080/15381501.2019.1599748>
- xlviii. Osei, L., Arku, G., Luginaah, I., 2022. “We have done nothing wrong”: Youth miners’ perceptions of the environmental consequences of artisanal and small-scale mining (ASM) in Ghana. *Extr. Ind. Soc.* 12, 101179. <https://doi.org/10.1016/j.exis.2022.101179>
- xlix. Quarm, J.A., Anning, A.K., Fei-Baffoe, B., Siaw, V.F., Amuah, E.E.Y., 2022. Perception of the environmental, socio-economic and health impacts of artisanal gold mining in the Amansie West District, Ghana. *Environ. Challenges* 9, 100653. <https://doi.org/10.1016/j.envc.2022.100653>
- l. Ros–Tonen, M.A.F., Aggrey, J.J., Somuah, D.P., Derkyi, M., 2021. Human insecurities in gold mining: A systematic review of

- evidence from Ghana. *Extr. Ind. Soc.* 8, 100951. <https://doi.org/10.1016/j.exis.2021.100951>
- li. Sanga, V.F., Fabian, C., Kimbokota, F., 2023. Heavy metal pollution in leachates and its impacts on the quality of groundwater resources around Iringa municipal solid waste dumpsite. *Environ. Sci. Pollut. Res.* 30, 8110–8122. <https://doi.org/10.1007/s11356-022-22760-z>
  - lii. Siaw, D., Ofori, G., Sarpong, D., 2023. Cocoa production, farmlands, and the galamsey: Examining current and emerging trends in the ASM-agriculture nexus. *J. Rural Stud.* 101, 103044. <https://doi.org/10.1016/j.jrurstud.2023.103044>
  - liii. Snapir, B., Simms, D.M., Waine, T.W., 2017. Mapping the expansion of galamsey gold mines in the cocoa growing area of Ghana using optical remote sensing. *Int. J. Appl. Earth Obs. Geoinf.* 58, 225–233. <https://doi.org/10.1016/j.jag.2017.02.009>
  - liv. Teschner, B.A., 2012. Small-scale mining in Ghana: The government and the galamsey. *Resour. Policy* 37, 308–314. <https://doi.org/10.1016/j.resourpol.2012.02.001>
  - lv. Tschakert, P., Singha, K., 2007. Contaminated identities: Mercury and marginalization in Ghana's artisanal mining sector. *Geoforum* 38, 1304–1321. <https://doi.org/10.1016/j.geoforum.2007.05.002>
  - lvi. World Bank, 2020. 2020 State of the Artisanal and Small-Scale Mining Sector. Washington D. C.
  - lvii. Wu, J., Bian, J., Wan, H., Sun, X., Li, Y., 2021. Probabilistic human health-risk assessment and influencing factors of aromatic hydrocarbon in groundwater near urban industrial complexes in Northeast China. *Sci. Total Environ.* 800, 149484. <https://doi.org/10.1016/j.scitotenv.2021.149484>
  - lviii. Yakovleva, N., 2007. Perspectives on female participation in artisanal and small-scale mining: A case study of Birim North District of Ghana. *Resour. Policy* 32, 29–41. <https://doi.org/10.1016/j.resourpol.2007.03.002>
  - lix. Yankson, P.W.K., Gough, K. V., 2019. Gold in Ghana: The effects of changes in large-scale mining on artisanal and small-scale

mining (ASM). Extr. Ind. Soc. 6, 120–128.  
<https://doi.org/10.1016/j.exis.2018.09.009>

- Ix. Yeboah, A., Samuel, 2023. Digging Deeper: The Impact of Illegal Mining on Economic Growth and Development in Ghana. Munich Pers. RePEc Arch. 1–44.

## 5 SUSTAINABLE ENERGY

---

### 5.1 Introduction

#### 5.1.1 Focus on Sustainable Energy

In this edition of the GhIE Manifesto Series, the focus is on Sustainable energy, recognizing its vital role in national development. The topics covered include Grid Electricity, Nuclear power, and renewable energy (solar and wind). These areas were selected based on their potential to significantly impact Ghana's electricity (power) landscape, address power shortages, and contribute to a sustainable and resilient energy future.

Additionally, emphasis is laid on how the conventional means of power generation, primarily through natural gas, can be made more efficient by converting all simple cycle plants to combined-cycle systems. This transition will improve the overall efficiency of existing power plants, leading to reduced fuel consumption and lower environmental impacts.

#### 5.1.2 Reasons and Considerations for Subject Selection

The selection of sustainable energy as the focus for this manifesto series is guided by several key considerations:

- i. **Power as a Catalyst for Development:** Power, which is the rate at which energy is consumed, is fundamental to a nation's economic development, progressive industrialization, and improvement in the quality of life. A reliable and affordable energy supply is essential for all sectors of the economy including businesses, healthcare, education, and other critical services.
- ii. **Power Shortages and Reliability:** Ghana has faced recurring power shortages and reliability issues, commonly referred to as "dumsor." These challenges have significant economic and social impacts, highlighting the need for a stable and resilient power system.
- iii. **Environmental Sustainability:** The global shift towards renewable energy sources is driven by the need to mitigate climate change and reduce environmental degradation. Ghana's

commitment to international climate agreements necessitates a focus on cleaner energy solutions.

- iv. **Energy Security:** Diversifying the energy mix to include renewable and nuclear sources enhances energy security by reducing dependence on imported fuels and mitigating the risks associated with volatile global energy markets.
- v. **Economic Opportunities:** The development of nuclear power as a baseload power project with incremental renewable energy in the sector presents significant economic opportunities, for industrialization, integrated effect for job creation, technological innovation, and local manufacturing capabilities.

### 5.1.3 Criteria for Selection

The sub-committee responsible for selecting the subject matter of this manifesto series applied the following criteria:

- i. **Relevance to National Priorities:** The topics selected are aligned with national development goals and priorities, ensuring that the recommendations address pressing and high-impact areas.
- ii. **Feasibility and Sustainability:** The proposed policies are evaluated for their technical feasibility, economic viability, and sustainability, ensuring that they can be realistically implemented and sustained over time.
- iii. **Expertise and Evidence Base:** The selection process leverages the expertise of GhIE members and is grounded in robust research and evidence, ensuring that the recommendations are well-informed and credible.
- iv. **Stakeholder Engagement:** The process involves consultation with key stakeholders, including government agencies, industry players, and civil society organizations, to ensure that the recommendations are inclusive and reflective of diverse perspectives.

By focusing on Sustainable energy, the GhIE Manifesto Series aims to address one of the most critical challenges facing Ghana's power sector today – which is a reliable, affordable, and sustainable energy supply for all. Through these recommendations, the GhIE seeks to

contribute to the future of Ghana where the adequate supply of power will drive economic growth, supports social development, and preserves the environment for future generations.

## 5.2 Problem Statement

### 5.2.1 The Problem and Its Impact

Ghana's power sector faces significant challenges that have profound impacts on the economy and society. The primary problems observed over the years include recurring power shortages, robust infrastructure, regulatory inefficiencies, addition of heavily baseload plants, and the underutilization of renewable energy sources. Additionally, the policy reforms for increase in renewable energy for economic growth are yet to be realized significantly. These issues have resulted in frequent blackouts, increased production costs for businesses, and reduced quality of life for citizens. These have all contributed to the instability of Ghana's economy.

**Power Shortages and Reliability Issues:** The phenomenon of "dumsor" (erratic power supply) has plagued Ghana for many years. This persistent issue has led to substantial economic losses. For instance, in 2015, the Institute of Statistical, Social and Economic Research (ISSER) estimated that Ghana lost about \$2.1 billion due to power outages, representing 6% of the GDP (ISSER, 2015). The instability in power supply disrupts industrial activities, reduces productivity, and discourages foreign investment.

**Inadequate Infrastructure:** The infrastructure for electricity transmission and distribution is partly outdated and insufficient to meet growing demand. The grid's inefficiency leads to high transmission and distribution(technical) losses, which were reported to be around 30% in 2022 (Energy Commission of Ghana, 2023). This is also exacerbating with huge commercial losses as a result of power theft in the country.

Figure 3 is a graph showing the Electricity Transmitted in Ghana and its associated Transmission Losses between 2000 and 2022.



**Figure 3: Electricity Transmission and Losses (Energy Commission of Ghana, 2023)**

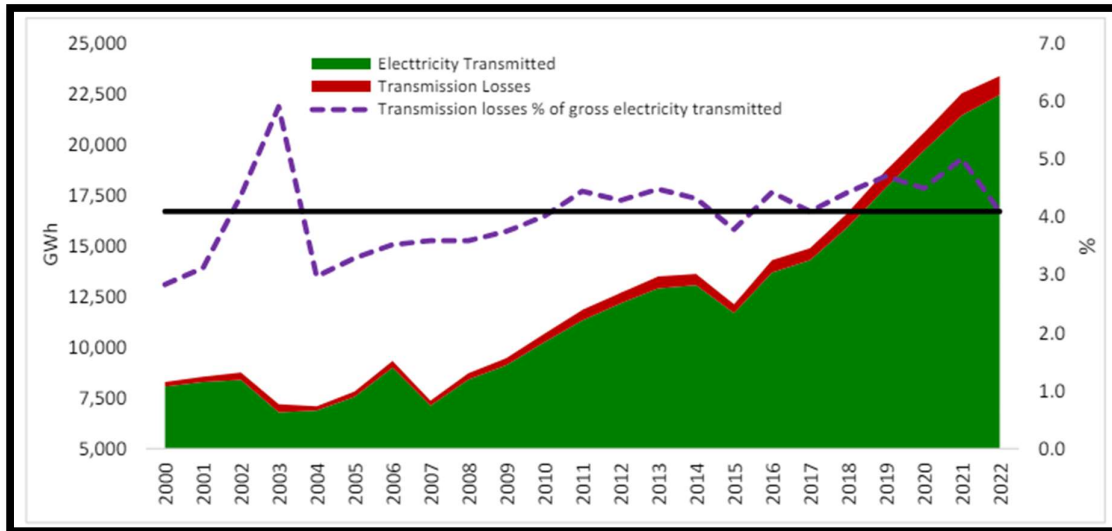
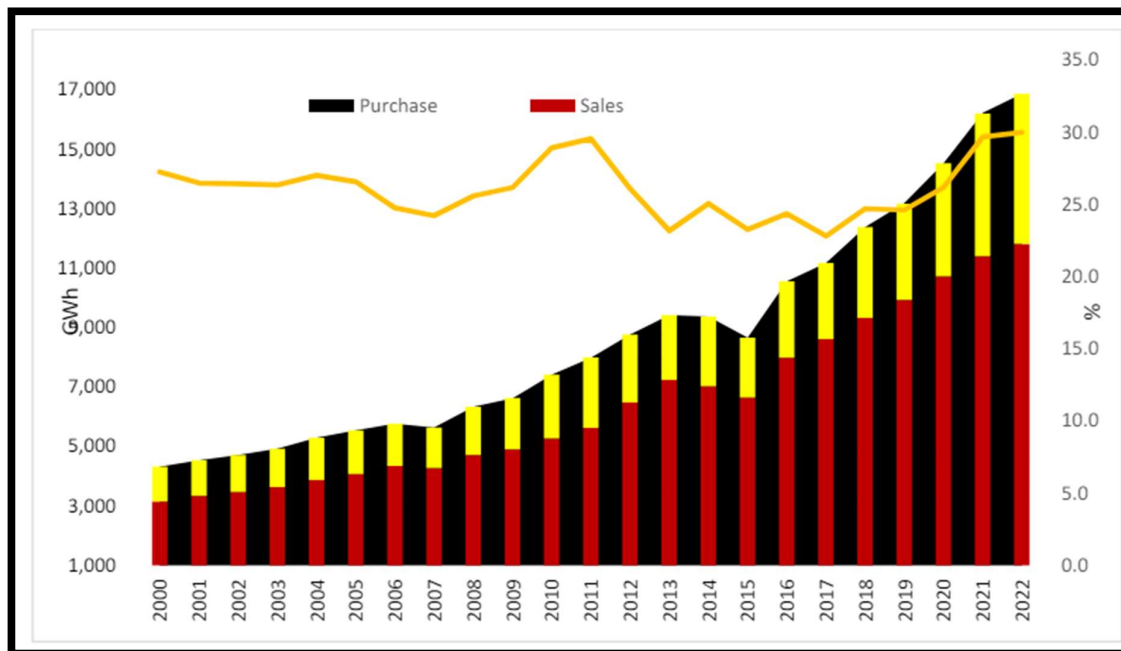


Figure 4 is a graph showing the Distribution Companies in Ghana and their Power Purchases, Sales, and Losses between 2000 and 2022.

**Figure 4: Electricity Distribution Losses (Energy Commission of Ghana, 2023)**

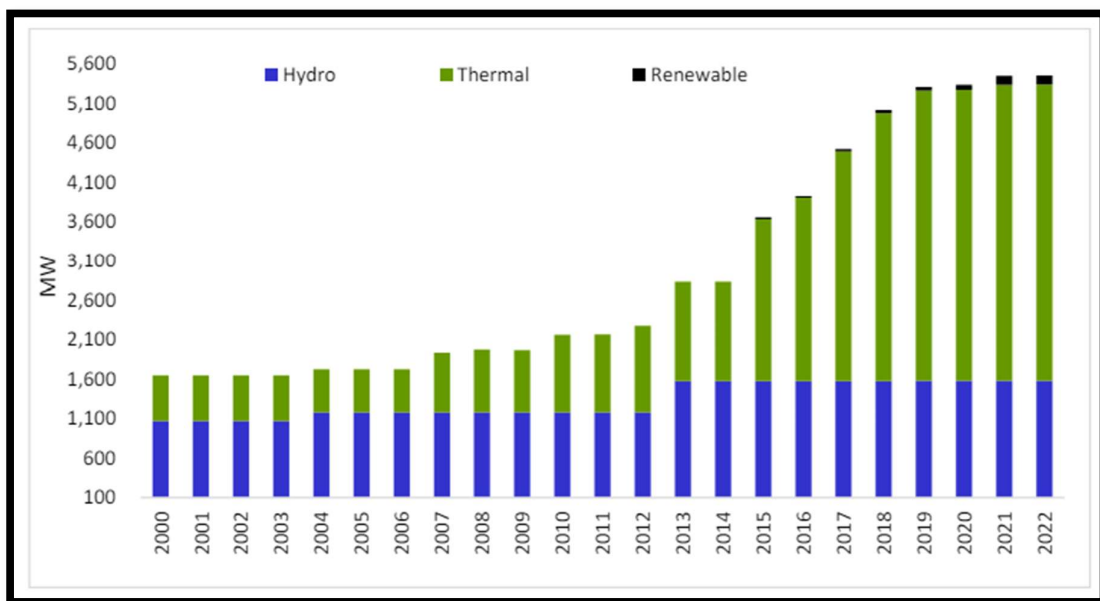


**Regulatory and Institutional Gaps:** The power sector suffers from weak regulatory frameworks that fail to attract and retain investments. There are issues with policy implementation and enforcement, leading to inefficiencies and corruption. The lack of a robust and transparent regulatory environment creates uncertainty for potential investors, stalling progress in the sector (National Development Planning Commission [NDPC], 2018).

**Underutilization of Renewable Energy:** Despite Ghana's significant potential for renewable energy, especially solar and wind, these resources remain untapped. As of 2022, renewable energy (excluding hydro) reached its highest share being 0.70% of the total energy mix (Energy Commission of Ghana, 2023). This underutilization hampers efforts to diversify the energy supply and reduce dependence on fossil fuels.

Figure 5 is a graph showing the Installed Generation Capacity in Ghana between 2000 and 2022.

*Figure 5: Installed Generation Capacity (Energy Commission of Ghana, 2023)*



### 5.2.2 Nature of the Problem

The power issues in Ghana are chronic and persistent, though they have shown some recent improvements. Power shortages and infrastructure deficiencies have been long-standing problems, with significant episodes in the early 2000s and mid-2010s. These issues are compounded by emerging challenges such as increasing energy demand and the global shift towards renewable energy. Fuel security for electricity generation is also increasingly becoming a challenge due to growth in electricity demand.

### 5.2.3 Baseline Information Highlighting the Issues

**Financial Impact:** The economic costs of power supply inefficiencies are substantial. The aforementioned ISSER study highlighted

significant GDP losses. Additionally, the high cost of electricity, averaging around \$0.19 per kWh for industrial users, places a financial burden on businesses and limits economic growth (World Bank, 2019).

**Impact on the Real Economy:** Energy shortages have a ripple effect across various sectors. For instance, the manufacturing sector has reported reduced output and increased operational costs due to unreliable power supply. The agricultural sector also suffers as irrigation and storage systems depend on consistent electricity.

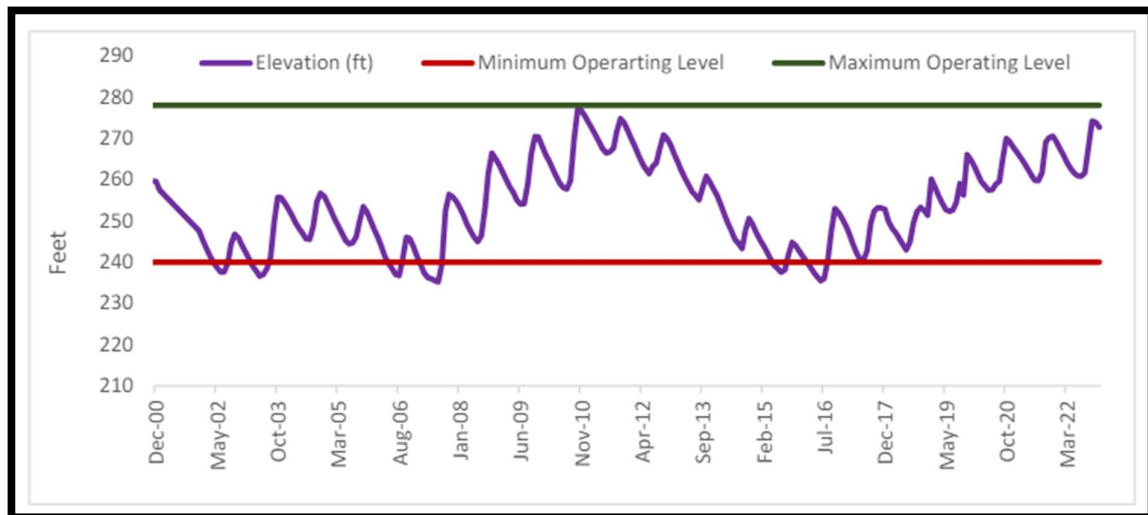
**Impact on Society:** The social impact of energy problems is significant. Frequent power outages affect health services, education, and overall quality of life. Rural areas, in particular, face severe challenges in accessing reliable power, leading to disparities in development and living standards.

#### 5.2.4 Trajectory of the Issue with Current Data

Over the past decade, Ghana's energy situation has shown both improvements and setbacks. The Akosombo Dam, a key hydroelectric source, has experienced fluctuating water levels, affecting power generation.

Figure 6 is a graph showing the Trend in Akosombo Headwater Levels Between December 2000 and March 2022.

*Figure 6: Trends in Akosombo Headwater (Energy Commission of Ghana, 2023)*



Additionally, the reliance on thermal power plants, which are dependent on imported fuel, has exposed the country to global price volatility.

**Worsening Conditions:** In recent years, despite efforts to stabilize the power supply, the issues persist. Data from the Energy Commission indicates that while installed capacity has increased, the actual generation has not kept pace with demand. This discrepancy is due to operational inefficiencies and maintenance challenges (Energy Commission of Ghana, 2020).

**Potential to Get Worse:** If current trends continue, the situation could deteriorate further. The growing population and expanding industrial activities will increase demand, potentially leading to more severe shortages unless significant investments are made in developing potential baseload plants (nuclear power plants), infrastructure improvement and renewable energy.

### 5.3 Results and Impact of Previous/Current Actions

**Previous Actions:** The government has undertaken various initiatives, such as the Millennium Development Authority (MiDA) Compact II, which aims to improve the power sector through infrastructure upgrades and regulatory reforms. However, these efforts have had mixed results. While there have been improvements in some areas, the overall impact has been limited by implementation delays and funding challenges.

**Current Actions:** The National Energy Policy outlines strategies to enhance energy security, promote renewable energy, and improve efficiency. However, gaps remain in policy enforcement and investment mobilization. For instance, despite policies promoting renewable energy, the uptake has been slow due to inadequate incentives and support structures.

**Gaps in Actions Taken:** Key gaps include the lack of a comprehensive strategy for integrating renewable energy into the national grid, insufficient focus on demand-side management, and inadequate financing mechanisms for infrastructure development. These gaps hinder the realization of the full potential of the energy sector.

Ghana's power sector faces chronic issues that require sustained and strategic interventions. The economic and social impacts of

---

these problems are significant, and without effective measures, the situation could worsen. Political parties must adopt robust and forward-thinking energy policies in their manifestos to address these challenges comprehensively.

## 5.4 Proposals

### 5.4.1 GhIE's View on the Issues

The Ghana Institution of Engineering (GhIE) recognizes the critical challenges facing the power sector and acknowledges the urgent need for a comprehensive approach to ensure a sustainable and reliable energy supply. The persistent power shortages, inadequate infrastructure, regulatory inefficiencies, lack of heavy baseload plants, and the underutilization of renewable energy sources are major obstacles that must be addressed. To tackle these issues, the GhIE proposes a multifaceted strategy that includes both new initiatives and enhancements to existing policies.

## 5.5 A. Proposals for Renewable Energy (Solar and Wind)

### 5.5.1 Target Setting

**Clear Targets:** Develop a national renewable energy plan with specific, measurable targets. aim to have at least 20% of the energy mix from renewable sources by 2030. This plan should outline annual milestones and be integrated into the national energy policy. The government should also commit to international agreements like the Paris Climate Accord, which will help in maintaining accountability.

**Policy Alignment:** Ensure that all related policies across sectors (energy, environment, industry) are aligned to support this target. Regularly update the targets based on progress assessments and technological advancements.

**Reporting and Transparency:** Establish a transparent system for monitoring and reporting progress towards these targets. Regular updates should be shared with the public to build trust and accountability.

### 5.5.2 Investment Incentives

**Financial Incentives:** Offer a range of financial incentives to attract private sector investment. This can include tax breaks on the importation of renewable energy equipment, grants for research and development, and subsidies for installing solar and wind energy systems.

**Green Bonds and Financing:** Promote green bonds to finance renewable energy projects. Partner with financial institutions to create low-interest loan programs for small and medium enterprises (SMEs) investing in renewable energy.

### 5.5.3 Local Manufacturing Capacity

**Develop Local Manufacturing:** Establish manufacturing plants to produce solar panels to reduce import dependency. This will also stimulate the local economy and create jobs. Provide incentives for companies that establish such facilities, including tax holidays and grants.

**Training Programs:** Collaborate with educational institutions to develop specialized training programs for renewable energy technologies. This should include technical training for installation and maintenance, as well as engineering and research programs to foster innovation.

**Certification and Standards:** Create certification programs to ensure that training meets international standards. Establish partnerships with international organizations to provide certifications that are recognized globally.

### 5.5.4 Policy Support

**Regulatory Frameworks:** Develop and enforce regulatory frameworks that are conducive to the growth of the renewable energy sector. This includes streamlined procedures for project approvals, clear guidelines on land use, and environmental impact assessments.

**Stable Policy Environment:** Ensure that policies remain stable over time to build investor confidence. Avoid frequent policy changes that could create uncertainty and deter investment.

**Government Commitment:** Demonstrate strong government commitment through consistent funding and political support for renewable energy initiatives.

### 5.5.5 Public-Private Partnerships (PPPs)

**Leverage Expertise:** Foster partnerships between the public sector and private companies to leverage the expertise and efficiency of the private sector. Create joint ventures for large-scale renewable energy projects.

**Risk Sharing:** Develop mechanisms to share risks between public and private partners, such as government-backed guarantees and insurance schemes to protect investments.

**Community Involvement:** Engage local communities in PPP projects to ensure that they benefit from renewable energy developments. This can include community-owned energy projects and local employment opportunities.

### 5.5.6 Technological Advancement

**Research and Development (R&D):** Invest in R&D to improve renewable energy technologies. This can include funding for university research projects, partnerships with international research institutions, and support for startups in the renewable energy sector.

**Innovation Hubs:** Establish innovation hubs and incubators to support modern technologies and business models in renewable energy. Provide seed funding, mentorship, and resources for entrepreneurs.

**Technology Transfer:** Facilitate technology transfer from developed countries to Ghana. Establish agreements with international partners to bring advanced renewable energy technologies and practices to the country.

### 5.5.7 Key Indicators for Measuring Success:

- i. Renewable Energy Capacity
  - a. Installed Capacity: Monitor the increase in installed capacity of solar energy and wind energy (when available). This should be tracked annually to ensure progress towards the 2030 target.
  - b. Grid Integration: Measure the proportion of renewable energy integrated into the national grid. Assess the capacity of the grid to handle renewable energy inputs and identify areas for improvement.
- ii. Investment Levels
  - a. Private Sector Investment: Track the amount of private sector investment in renewable energy projects. This includes both domestic and foreign investments. Set annual targets for investment growth.
  - b. Public Funding: Monitor the allocation and utilization of public funds dedicated to renewable energy development. Ensure that funding is being used efficiently and effectively.
- iii. Employment
  - a. Job Creation: Measure the number of jobs created in the renewable energy sector, including manufacturing, installation, maintenance, and research positions. Assess the impact of training programs on employment rates.
  - b. Skill Development: Track the number of individuals trained and certified in renewable energy technologies. Evaluate the effectiveness of training programs in meeting industry needs.



## 5.6 B. Proposals for Electricity Infrastructure

### 5.6.1 Grid Modernization

**Upgrade the National Grid:** Invest in upgrading the current national grid infrastructure to reduce technical losses and improve overall reliability. This includes replacing outdated equipment, enhancing transmission lines, and optimizing distribution networks.

**Implement Smart Grid Infrastructure:** Introduce smart grid technologies to enhance grid management and efficiency. This involves deploying advanced metering infrastructure (AMI), real-time monitoring systems, and automated control systems to better manage electricity flows, detect faults, and optimize energy distribution. There is a need to strengthen the distribution companies (ECG and NEDCo) to be efficient in their operations and debt collection to improve cashflow in the sector.

**Cybersecurity Measures:** Incorporate robust cybersecurity measures to protect the grid from potential cyber threats. This includes implementing security protocols, regular system audits, and training for personnel to oversee cybersecurity incidents.

### 5.6.2 Generation Capacity

**Efficiency Improvements:** Increase the efficiency of existing power plants by upgrading technology and implementing best practices in operation and maintenance. This includes retrofitting older plants with more efficient equipment and optimizing fuel usage.

**Invest in New Technologies:** Invest in cleaner generation technologies such as nuclear(base loading) hydroelectric power, and renewable energy sources. Encourage the development of combined cycle gas plants and other high-efficiency, low-emission generation methods.

**Diversification of Energy Mix:** Diversify the energy mix to include a proportion of renewable energy sources, reducing dependence on fossil fuels and enhancing energy security.

### 5.6.3 Job Creation and Industrialization

**Local Manufacturing:** Promote local manufacturing of grid components, smart meters, and renewable energy technologies. This will create jobs and build local capacity.

**Skill Development:** Implement training programs to develop a skilled workforce capable of supporting the modernization and expansion of the electricity infrastructure.

**Industrial Zones:** Develop more industrial parks(zones) with reliable electricity supply to attract investments and support the growth of manufacturing industries.

### 5.6.4 Key Factors for Success:

- i. Institutional Capacity and Efficiency
  - a. **Strengthen Institutional Capacities:** Enhance the capacities of institutions responsible for electricity distribution in the country, namely ECG & NEDCO, to improve their operations and develop an effective approach to reducing commercial losses. Provide the sector regulators such as the Energy Commission, Public Utilities Regulatory Commission (PURC), and grid operators adequate training, resources, and support to ensure effective coordination and management.
  - b. **Clear Roles and Responsibilities:** Define clear roles and responsibilities for all stakeholders involved in the electricity sector. Ensure effective communication and coordination among government agencies, regulatory bodies, utility companies, and the private sector.
- ii. Financing Mechanisms
  - a. **Mobilize Financial Resources:** Secure funding through international donors, development banks, and private sector investments. Establish public-private partnerships (PPPs) to leverage additional capital and expertise.
  - b. **Innovative Financing Solutions:** Explore innovative financing solutions, such as green bonds, climate funds, and energy performance contracting, to support infrastructure investments.

iii. Regulatory Environment

- a. **Stable and Transparent Regulations:** Create a stable and transparent regulatory environment to attract long-term investments. Ensure that regulations are clear, consistent, and enforced fairly.
- b. **Incentive Structures:** Develop incentive structures to encourage investment in grid modernization, generation capacity, and energy storage. This can include performance-based incentives, tax relief, and streamlined permitting processes.

### 5.6.5 Key Indicators for Measuring Success:

i. Grid Reliability

- a. **Power Outages:** Track the frequency and duration of power outages to measure improvements in grid reliability. Aim for a significant reduction in unplanned outages and improved response times to faults.
- b. **Customer Satisfaction:** Measure customer satisfaction levels regarding the reliability and quality of electricity supply. Use surveys and feedback mechanisms to gather insights and address concerns.

ii. Energy Losses

- a. **Transmission and Distribution Losses:** Monitor and reduce technical and non-technical losses in the transmission and distribution networks. Set annual targets for loss reduction and implement strategies to achieve these targets.
- b. **System Efficiency:** Evaluate the overall efficiency of the electricity system, including generation, transmission, and distribution. Identify areas for improvement and implement measures to enhance efficiency.

iii. Energy Access

- a. **Household Electrification:** Increase the number of households with reliable electricity access. Track progress towards universal electrification and prioritize underserved and rural areas.

- b. **Business Electrification:** Expand electricity access to businesses and industrial areas to support economic growth. Monitor the impact of improved electricity access on business operations and productivity.
- iv. Job Creation and Industrialization
  - a. **Employment in Energy Sector:** Track the number of jobs created through grid modernization and new generation projects.
  - b. **Industrial Growth:** Measure the growth in industrial output and investments in industrial zones with improved electricity infrastructure.

## 5.7 C. Proposals for Nuclear Power (Clean Energy)

### 5.7.1 Roadmap Development

**Comprehensive Roadmap:** Develop a detailed and phased roadmap for the introduction and expansion of nuclear energy in Ghana. This roadmap should outline clear timelines for each phase of development, from feasibility studies to plant construction and commissioning. It should also identify funding mechanisms, such as government budget allocations, international grants, and private-sector investments.

**Regulatory Frameworks:** Establish and continuously update regulatory frameworks to govern the safe development and operation of nuclear power plants. This includes setting safety standards, environmental protection guidelines, and emergency response plans. The framework should comply with international best practices and standards set by organizations such as the International Atomic Energy Agency (IAEA).

**Risk Assessment:** Conduct comprehensive risk assessments at each stage of the roadmap to identify and mitigate potential challenges. This includes geological surveys, environmental impact assessments, and socio-economic analyses.

### 5.7.2 Public Engagement

**Public Education Campaigns:** Implement extensive public education campaigns to build awareness, understanding, and acceptance of nuclear energy. These campaigns should address common

misconceptions and fears about nuclear power, highlighting its benefits such as reliability, low greenhouse gas emissions, and potential economic advantages.

**Stakeholder Involvement:** Engage a broad range of stakeholders, including community leaders, civil society organizations, educational institutions, and the media, in the dialogue about nuclear energy. This will help in gaining diverse perspectives and fostering a sense of ownership and trust.

**Transparency and Communication:** Ensure transparency in all stages of nuclear power development by regularly communicating progress, challenges, and safety measures to the public. Use various communication channels, including public forums, social media, and official reports, to keep the public informed.

### 5.7.3 International Collaboration

**Technical Assistance:** Partner with countries that have advanced nuclear programs to gain technical assistance and expertise. This can include joint research projects, technology transfer agreements, and consultancy services from international experts.

**Capacity Building:** Engage in capacity-building initiatives with international nuclear agencies such as the IAEA to train Ghanaian scientists, engineers, and regulatory personnel in nuclear technology and safety protocols.

**Best Practices and Benchmarking:** Learn from the experiences of other countries by adopting best practices and benchmarking Ghana's nuclear development against global standards. This includes regular peer reviews and audits by international nuclear bodies.

### 5.7.4 Key Factors for Success

- i. Safety Standards
  - a. **Stringent Safety Standards:** Implement stringent safety standards to ensure the highest level of protection for the public and the environment. This includes regular safety audits, rigorous testing of nuclear systems, and adherence to international safety protocols.
  - b. **Robust Regulatory Body:** Establish a strong and independent regulatory body to oversee the development

and operation of nuclear power plants. This body should have the authority to enforce regulations, conduct inspections, and respond to any safety concerns.

- c. **Emergency Preparedness:** Develop comprehensive emergency preparedness and response plans to address potential nuclear incidents. This includes training emergency response teams, conducting regular drills, and establishing communication protocols with local communities.

- ii. Human Capital Development

- a. **Specialized Training Programs:** Invest in specialized training programs to develop a skilled workforce for the nuclear sector. Collaborate with universities and technical institutes to offer courses in nuclear engineering, safety, and management.
- b. **International Training:** Send Ghanaian professionals to train with international nuclear agencies and institutions to gain firsthand experience and expertise.
- c. **Knowledge Retention:** Implement strategies to retain trained personnel within the country, such as offering competitive salaries, career development opportunities, and a supportive working environment.

- iii. Funding and Investment

- a. **Government Allocations:** Secure consistent government funding for nuclear energy development to ensure long-term commitment and stability.
- b. **International Grants:** Seek grants and financial support from international organizations such as the World Bank, the African Development Bank, and other development agencies.
- c. **Private Sector Participation:** Encourage private sector investment through public-private partnerships, offering incentives such as tax breaks, subsidies, and risk-sharing mechanisms.

### 5.7.5 Key Indicators for Measuring Success:

- i. Nuclear Capacity
  - a. **Development Progress:** Monitor the progress in the development and commissioning of nuclear power plants. This includes tracking key milestones such as site selection, construction progress, and the start of operations. Nuclear baseload power will provide an integrated strategic solution for industrialization for the country.
  - b. **Installed Capacity:** Measure the installed nuclear capacity and its contribution to the overall energy mix. Set targets for capacity growth and track progress towards achieving these targets.
- ii. Public Support
  - a. **Public Opinion Surveys:** Conduct regular surveys to gauge public support and acceptance of nuclear energy. Use the survey results to identify areas of concern and address them through targeted communication and engagement strategies.
  - b. **Community Engagement:** Measure the level of community involvement and participation in nuclear energy projects. Track the number of public forums, educational campaigns, and stakeholder meetings held.
- iii. Safety Records
  - a. **Compliance with Regulations:** Monitor compliance with national and international safety regulations. Track the number of safety inspections, audits, and compliance reports.
  - b. **Incident Reports:** Maintain a record of any safety incidents or near-misses. Analyze these incidents to identify trends, root causes, and implement corrective actions to prevent future occurrences.

## 5.8 Proposals for Hydrogen Power (Clean Energy)

Ghana needs to develop a comprehensive national framework for accelerating the production, processing, delivery and use of clean hydrogen, as part of its energy mix and to facilitate the drive towards the nations decarbonization goals. The actions required toward s this goal include:

- i. **Roadmap Development:** Establish a clear roadmap for Hydrogen fuel development with consideration for local research and development, policy formulation and regulatory frameworks
- ii. **Public Engagement:** Promote acceptance through educational campaigns and knowledge sharing on the clean energy of the future, Hydrogen.
- iii. **International Collaboration:** Leverage on work that has been done by other nations on the processing and use of Hydrogen, to enable Ghana to accelerate the move towards a wider application of hydrogen in the industrial, transportation and energy sectors.
- iv. **Industrial Applications:** Target strategic, high impact uses of hydrogen to catalyze industrial growth and create green jobs for the youth.



## 6 REVIEW, MONITORING AND EVALUATION

---

GhIE's role extends beyond this proposal. We envision an ongoing partnership where GhIE continues to play a pivotal role in shaping government policy, programs, and projects, and monitoring and evaluating government performance in these thematic areas. We propose as follows:

- i. **Policy Review Forum:** That within the first six months of 2025 the government engages the GhIE and other stakeholders to review its policy direction in these thematic areas and agree on a set of Key Performance Indicators for continued monitoring and evaluation of its policies, programs, and projects.
- ii. **Annual Review Forum:** The GhIE will organize, with the assistance of the government, an annual forum to assess progress on these thematic areas, based on the KPIs agreed above. Other stakeholders, including the NDPC, will be invited to participate in this accountability fora. The GhIE will issue a position paper after each fora to evaluate government performance.
- iii. **Technical Discussions:** The Technical Divisions and Branches of the GhIE will be encouraged to organize periodic technical events on any aspect of the thematic areas and, where necessary, issue advisory notes to the government on any specific issue.

## 7 CONCLUSION

---

The GhIE has prepared these proposals to influence policy formulation and sectorial reforms; promote sustainable development; enhance public discourse; and empower political parties to develop comprehensive and actionable manifestos that address the real needs of the population.

We will organize public fora with the participation of the political parties to discuss these development themes together with all recognizable stakeholder to promote a better appreciation and understanding.

Our expectation is to build consensus among the political actors on significant policy interventions for national development and have them included in their manifestos towards the 2024 national elections.

The thematic areas we have covered are Management of the Urban Space; Urban Public Transportation; Artisanal and Small-Scale Mining; and Sustainable Energy.

GhIE recognizes the importance of partnership and collaboration in achieving these goals. As a trusted advisor and partner, GhIE is prepared to provide ongoing guidance and support to the government, industry stakeholders, and the public. Our expertise in engineering and technology positions us uniquely to contribute valuable insights and recommendations.

By embracing these recommendations and fostering strong partnerships, Ghana can address some its challenges effectively, ensuring a prosperous and sustainable future for all its citizens. The GhIE stands ready to support and guide this transformative journey, leveraging its expertise for the good of society.

God bless our homeland Ghana!

---

## ACKNOWLEDGEMENT

---

The President and Council of the Ghana Institution of Engineering (GhIE) is grateful to the following persons who played various rolls to produce this document:

### Members of the Manifesto Series Ad hoc Committee:

- Ing. Ludwig Hesse, F-GhIE, President-Elect – Convenor
- Ing. Darlington Ahuble, F-GhIE – Member
- Ing. Prof. Emmanuel Appiah-Adjei, PE-GhIE – Member
- Ing. Ebenezer Ato Roberts, F-GhIE – Member
- Ing. Michael Obeng Konadu, F-GhIE – Member
- Ing. Godwin Brocke, F-GhIE – Member
- Ing. Prof. Nana Yaw Asiedu, SPE-GhIE – Member
- Ing. Pomaa Karikari, SPE-GhIE – Member
- Ing. Samuel Nasumong PE-GhIE – Member
- Helena Pokuaa Amponsah – Secretary

Members and friends of GhIE who contributed material and or reviewed the initial draft for each thematic area.

### Management of the Urban Space:

- Ing. Godwin Brocke, F-GhIE – Team Lead
- Ing. Magnus Quarshie, F-GhIE, PP – Content Provider
- Planner Doris Tetteh – Content Provider
- Planner Kofi Kekeli Amedzro – Content Provider
- Ing. Steve A. Amoaning-Yankson, FGhIE, PP – Reviewer
- Ing. Kwabena Bempong, FGhIE, President – Reviewer
- Planner Mohamed Alhassan – Reviewer

**Urban Public Transportation:**

- Ing. Michael Obeng Konadu, F-GhIE - Team Lead
- Ing. Ludwig Hesse, F-GhIE, President-Elect - Co-Lead
- Ing. Godwin Brocke, FGhIE - Content Provider
- Ing. Amoo- Gottfried, SPEGhIE - Content Provider
- Ing. Regina Van-der Palen, SPE-GhIE - Content Provider
- Ing. Samuel Boamah Danquah, SPE-GhIE - Content Provider
- Ing. Magnus Lincoln Quarshie, F-GhIE, PP - Reviewer
- Ing. Dr. Andrews Kwablah, F-GhIE - Reviewer

**Artisanal and Small-Scale Mining:**

- Ing. Prof. Emmanuel Appiah-Adjei, PE-GhIE - Team Lead
- Geological Engineering Department, KNUST - Content Provider  
With contribution from:
  - Dr. Daniel O. B. Nuamah;
  - Dr. Albert K. Kwaw;
  - Dr. Bernard K. Amoah; and
  - Dr. Daniel Otoo.
- Ing. Prof (Em.) Francis Yao Momade, SPE-GhIE - Reviewer
- Ing. Augustine Appiah Boakye, F-GhIE - Reviewer

**Sustainable Energy:**

- Ing. Ebenezer Ato Roberts, F-GhIE - Team Lead
- Ing. Darlington Ahuble, F-GhIE - Co-Lead
- Ing. Emmanuel Kofi Dankwa Osafo, SPE-GhIE- Reviewer