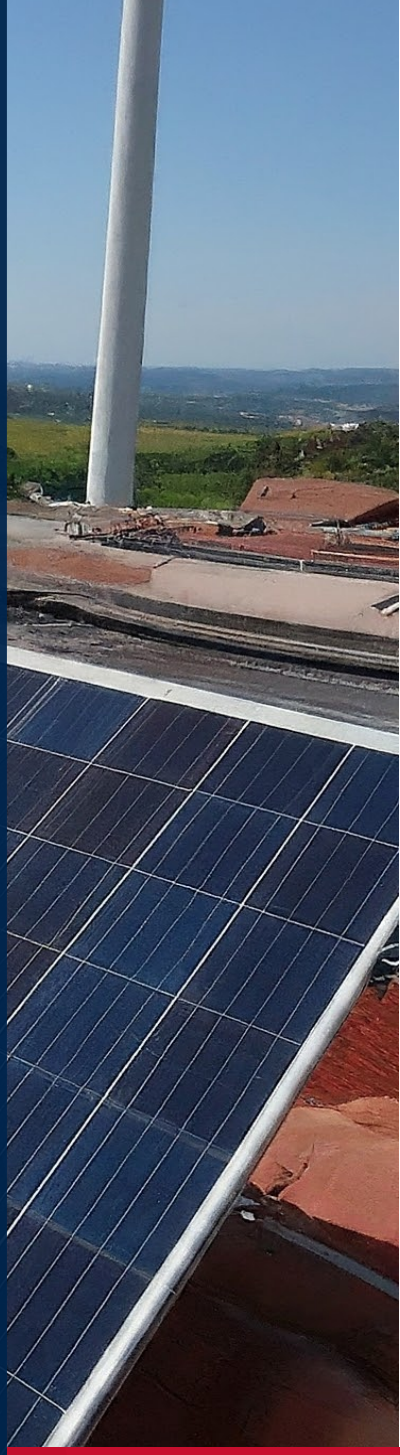
31 August 2024

Financing Ghana's Energy Transition: National and International Public-Private Sources



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Abbreviations

AfDB	African Development Bank
CDM	Clean Development Mechanism
CIF	Climate Investment Fund
CIT	Corporate Income Tax
CPESD	Coordinated Programme for Economic and Social Development
CPP	Climate Prosperity Plan
ESRP	Energy Sector Recovery Programme
ETM	Energy Transition Model
FIT	Feed-in Tariff
GCF	Green Climate Fund
GEF	Global Environment Facility
GH-ETIP	Ghana Energy Transition and Investment Plan
GH-NETF	Ghana National Energy Transition Framework
GIIF	Ghana Infrastructure Investment Fund
IFC	International Finance Corporation
MoE	Ministry of Energy
MOF	Ministry of Finance
MTFF	Medium-Term Fiscal Framework
NDCs	Nationally Determined Contributions
PBB	Programme Based Budgeting
PFM	Public Financial Management
POA	Programmes of Action
REMP	Renewable Energy Master Plan
SDGs	Sustainable Development Goals
SOEs	State Owned Enterprises

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Executive Summary

Objective of the study

Ghana's government has committed to cutting 15-45% of greenhouse gas (GHG) emissions by 2030 and reaching net zero by 2070. To implement this transition, the country estimates total investment needs of about US$562 billion, which is US$11.95 billion annually. This study analyses feasible approaches for accelerating finance for Ghana's energy transition.

Five key objectives guided this study:

Review Ghana's two (2) Energy Transition Plans (ETPs) to understand the synergies and points of divergence.

Understand how Ghana has financed its climate change commitments and energy transition journey so far.

Identify key funding sources likely to be most effective in supporting Ghana's energy transition.

Examine Ghana's major challenges or bottlenecks in securing financing for its energy transition.

Recommend policy reforms to unlock public and private— domestic and international— finance to support Ghana's energy transition. That is, innovative financing structures or strategies to minimise debt vulnerabilities while maximising energy transition finance flows.

Key findings

- **Ghana is implementing its national energy transition plans through three primary administrative documents**: the Ghana National Energy Transition Framework (GH-NETF, 2022-2070), the Ghana Energy Transition and Investment Plan (GH-ETIP, 2023-2060), and the Nationally Determined Contributions (NDCs).

- **The Ghana National Energy Transition Framework (2022-2070), developed by the Ministry of Energy, envisions that emissions will peak in the mid-2050s and Ghana will become net-zero by 2070**. On the other hand, the Ghana Energy Transition and Investment Plan (2023-2060), developed by the Ministry of Environment, Science and Technology, seeks more rapid decarbonisation: emissions peak by 2035 and begin a rapid decline after that, with net-zero reached by 2060. in both instances, the transportation sector will be the main source of emissions because of the increased demand for vehicles and other mobility services such as rail services.

- **Ghana's energy transition plans are anchored in several key low-carbon technologies:** electrification and renewables, carbon capture and storage, low-carbon hydrogen, battery electric technologies, clean cooking technologies, and negative emissions technologies. However, there are major differences in terms of technology choices and timing of emissions between the GH-NETF and the GH-ETIP. This has the potential to create policy uncertainty and confusion as to which transition plan Ghana will implement. It reflects the different policy priorities of the two main ministries. Which of the two plans will become dominant is yet to be ascertained.

- **Ghana needs more international public financing and private sector capital as well as de-risking instruments to finance the country's energy transition, given limited national public financing.** Domestically, Ghana could unlock additional domestic financing through ongoing public financial management (PFM) reforms under the IMF programme, but we are unsure of the quantum of additional funding this could yield. Nevertheless, newly created domestic public financing bodies such as the Development Bank Ghana (DBG) could prioritise some of their portfolio allocation to fund the energy transition through catalytic co-investments (blended finance) with other multilateral agencies and private sector financing bodies. This could support highly prospective early-stage energy ventures (including low-carbon ones) that need low-interest patient capital and technical assistance to derisk their investments.

- **There is an avenue to tap into external sovereign wealth funds (SWFs), including those from the Gulf States, who want to diversify their portfolios into Africa**. Gulf-based SWFs such as Masdar (also known as the Abu Dhabi Future Energy Company), Qatar Investment Authority (QIA) and the Saudi Public Invest Fund (PIF), which have historically invested in North Africa, are looking at expanding into Sub-Saharan Africa in search of low-carbon opportunities. However, translating these pledges into low-carbon investment projects requires innovative government guarantee mechanisms and scalability of projects to make investments attractive to them.

- **Broader energy sector liquidity issues will affect the investments required for the energy transition.** The energy sector is saddled with high indebtedness between state-owned enterprises (SOEs) such as the Electricity Company of Ghana (ECG) and the independent power producers (IPPs) mainly because of unreflective cost-recovery tariffs, high technical and commercial losses, and low collection rates. These financial challenges in the power sector threaten the viability of the SOEs and the IPPs to increase investments to meet the growing demand. Critical reforms are needed to improve the revenue shortfalls, commercial and technical losses, and debt management in the sector.

Key differences between the Ghana National Energy Transition Framework (2022-2070) and the Ghana Energy Transition and Investment Plan (2023-2060)

Parameter	Ghana National Energy Transition Framework (2022-2070)	Ghana Energy Transition and Investment Plan (2023-2060)
Peak emissions	• 2050	• 2035 - Both industry and transport sector emissions peak between 2035 and 2040
Net zero	• 2070	2060—emissions are close to zero in all sectors, with negative emissions in power • offsetting a small volume of residual emissions in industry.
Top 3 sectors with the most CO2 emissions potential	• Transport • Agriculture • Industry	• Transport • Industry • Power
Focus technologies	• Electrification and Renewables—Upscaling nuclear power in the electricity generation mix; 20 percent of electricity generation capaci • ty is renewable energy. • Carbon Capture and Storage (CCUS)- electricity generation, Oil & Gas and Industries • Battery Electric Technologies (transport electrification drives around 40% of abatement) • Clean Cooking Technologies - rural households use LPG for cooking.	• Electrification and Renewables • Carbon Capture and Storage (CCUS) • Low-Carbon Hydrogen • Battery Electric Technologies (transport electrification drives around 40% of abatement) • Clean Cooking Technologies • Negative Emissions Technologies
Assumptions	1. 2% average annual population growth 2. 5% average annual per capita GDP growth 3. 99.8% (universal electricity access by 2030) from current 88%	1. Population expected to grow 1.7x, at 1.5% compounded annual growth rate (CAGR) by 2060 2. GDP per capita expected to grow 4.4x, at 4% CAGR
Main anchor technology	• Nuclear energy	Battery Electric Technologies (transport electrification drives around 40% of abatement)
Cost	• US$562 billion from 2020 to 2070	• US$24 billion near-term investment opportunities in clean energy infrastructure, • US$550 billion of overall investment opportunities from 2025 to 2060; power (21%) and transport (69%) accounting for around 90% of this total

Recommendations

- **Clarify which of the two energy transition plans Ghana implements:** The Ghana National Energy Transition Framework (2022-2070) envisions emissions peaking in the mid-2050s and Ghana attaining net zero by 2070. On the other hand, the Ghana Energy Transition and Investment Plan (2023-2060) seeks more rapid decarbonisation: emissions peak by 2035 and begin a rapid decline after that, with net zero being reached by 2060. There are major differences in terms of technology choices and timing of emissions depending on the plan, creating policy uncertainty and confusion among investors.

- **Solicit for more international public financing, private sector capital, and de-risking instruments: There is an avenue to tap into external sovereign wealth funds (SWFs), including from the Gulf States, which** are looking at diversifying their portfolios into Africa in search of low-carbon opportunities. Also, innovative government guarantee mechanisms and the scalability of projects make investments attractive.

- **Build investor confidence by fixing macro-imbalances and energy sector debt issues:** It is urgent to address the high indebtedness between the SOEs and the independent power producers (IPPs) through reflective cost-recovery tariffs, reduction in technical and commercial losses and improvement to collection rates. Structural reforms under Ghana's current IMF programme (2023-2026) seek to partly address some of these issues.

- **Improve project viability through the launch of the portal with pre-assessed/investment-ready projects across the climate and energy lifecycle:** This portal will help reduce the information and project asymmetry gap between project developers and financiers by showing pre-assessed or partially derisked investment-ready projects across the energy and climate lifecycle. Such a portal would allow locally-based companies to access green finance opportunities from different agencies, including DFIs and private sector funds. It has the potential to catalyse new low-carbon investments in renewables, hydrogen, circular economy, nature-based solutions and sustainable materials, energy storage and clean heat.





1.0

Introduction

1.1 Background

Ghana has embraced the imperative of transitioning to a more sustainable energy future, necessitated by the global push to reduce greenhouse gas (GHG), especially carbon dioxide (CO2) emissions, to help address climate change. The impacts of climate change can already be felt, with evidence of unpredictable precipitation and warming temperatures over the past two decades.[1] This vulnerability to climate change has implications for both economic and human development. For instance, the World Bank estimates that average annual losses due to drought were about US$95 million[2] in 2020, equivalent to about 72% of total government expenditure to support gender, children, and social protection in the same year[3]Addressing these challenges requires a long-term decarbonisation strategy that leverages existing green growth potential and minimises the country's exposure to climate change impacts.

While emissions from single countries like Ghana (0.1%[4] of global CO2 emissions), and more so, the whole of Africa (3.8% of global CO2 emissions), is minimal compared to many advanced countries, local and regional actions can help manage physical and transition risks and create significant opportunities.[5] Between 1990 and 2019, the country's greenhouse gas (GHG) emissions grew by about 139%[6] with the Agriculture, Forestry and Other Land Use (AFOLU) sector as the major contributor, followed by the energy sector (Figure 1). However, **since 2019, energy sector emissions have been the country's leading source of GHG emissions, accounting for 46% of total national emissions,** followed by AFOLU (45%).

CO2 is the largest GHG source in Ghana, accounting for 70% of the total national emissions in 2019. This is followed by Nitrous Oxide (14%), methane (13%) and fluorinated gases (PFCs and HFCs) accounting for the rest.[7]

Also**, most (63%) of the CO2 emissions come from the energy sector when one includes Land Use, Land-Use Change, and Forestry (LULUCF).** This increases to 96% without LULUCF. Thus, most of the country's transition efforts target reducing energy sector emissions focused on energy, oil and gas production, manufacturing, construction, and transport (Figure 2).

Ghana has demonstrated a significant commitment to reducing emissions and transitioning to a lower or net zero carbon economy closely aligned with development priorities. **The government has committed to cutting 15-45% of emissions by 2030 as per its Nationally Determined Contributions**. In terms of absolute emissions, plans in the updated Nationally Determined Contributions[8] (NDCs) are to generate absolute greenhouse gas emission reductions of 64 million tonnes of carbon dioxide equivalent (MtCO2e) by 2030.[9]

Notable measures include increasing the share of renewable energy in the energy mix from 1% to 10% by 2030.

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1 Boadi, S. A., & Owusu, K. (2019). Impact of climate change and variability on hydropower in Ghana. *African Geographical Review*, *38*(1), 19–31. https://doi.org/10.1080/19376812.2017.1284598; Addaney, M., Asibey, M. O., Cobbinah, P. B., & Akudugu, J. A. (2021). Climate change in rural Ghana: perceptions and adaptive responses. Local Environment, 26(12), 1461–1479. https://doi.org/10.1080/13549839.2021.1978411

2 World Bank. (2022). Country Climate and Development Report. https://openknowledge.worldbank.org/server/api/core/bitstreams/9c9764c1-076d-5dcc-8339-6e4f0de2b610/content

3 Ministry of Gender, Children and Social Protect. (2021). Programme Based Budgeting. https://mofep.gov.gh/sites/default/files/pbb-estimates/2021/2021-PBB-MOGCSP.pdf

4 https://www.iea.org/countries/ghana/emissions

5 World Bank, 2022).

6 EPA. (2021). Ghana Fifth National Greenhouse Gas Inventory. https://unfccc.int/sites/default/files/resource/gh_nir5_15052022_final.pdf

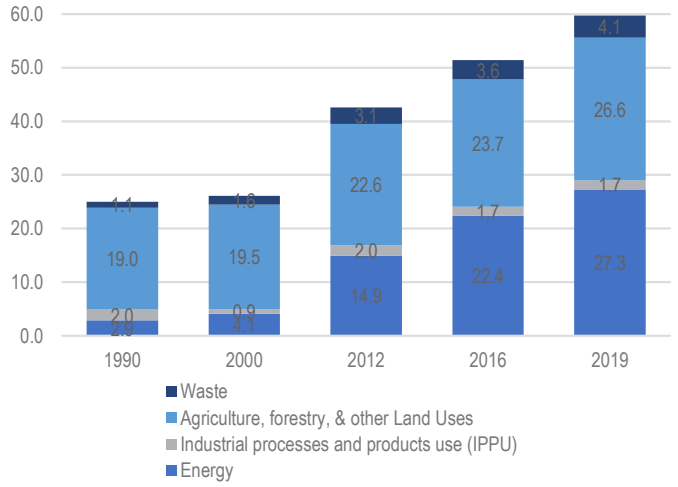
7 Ibid.

8 Ibid.

9 See Ghana's Updated National Determined Contributions (2022-2030). https://unfccc.int/sites/default/files/NDC/2022-06/Ghana%27s%20Updated%20Nationally%20Determined%20Contribution%20to%20the%20UNFCCC_2021.pdf

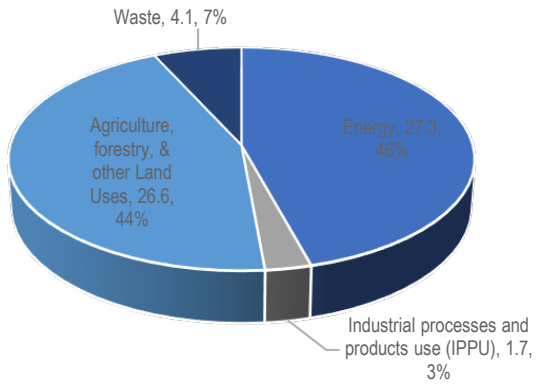
Figure 1 Ghana's total GHG emissions by sector

Ghana's total GHG emissions from 1990-2019 by sector (MtCO2e)



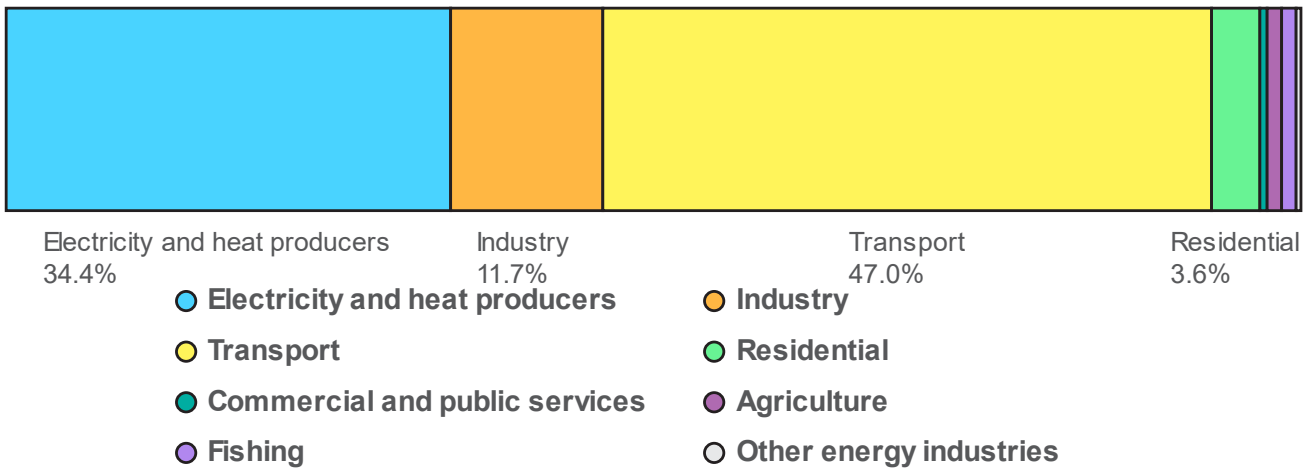
Data Source: Ghana Fifth National Greenhouse Gas Inventory.

Distribution of GHG emissions by sectors in 2019 (MtCO2e and%)



Data Source: Ghana Fifth National Greenhouse Gas Inventory.

Figure 2 CO2 emissions by sector, Ghana, 2021



Source: International Energy Agency. Licence: CC BY 4.0

To give further context to the aspirations under the NDCs and also attract needed low-carbon and other investments, the government in 2022 and 2023 produced two documents, namely, **The Ghana National Energy Transition Framework (GH-NETF: 2022-2070)**[10] **and the Ghana Energy Transition and Investment Plan (GH-ETIP: 2023-2060)**[11] **—** Figure 3. The first document (**GH-NETF**) was locally led and produced by The Ministry of Energy and envisages that the bulk of the country's emissions reduction to meet net-zero goals by 2070 will be in decarbonising the power sector, given the sector's significant contribution to GHG emissions.

In contrast, **GH-ETIP** was produced by external consultants Sustainable Energy for All (SEforALL) under the auspices of the Ministry for Environment, Science, Technology & Innovation (MESTI). It envisages more emissions reduction in the transportation sector as the key for Ghana meeting net zero goals by 2060. Both documents provide a comprehensive account of the planned pathways to transition to carbon neutrality, **although the sector focus and, by extension, the investment requirements differ**.[12]

However, the investments required for such a transition are substantial, posing a challenge given the country's current fiscal constraints and limited broader climate finance flows. The financing for the transition is estimated at US$562 billion as per the GH-NETF and US$550 billion as per GH-ETIP, with most of this expected to come from private and external sources. Since December 2022, Ghana has been debt distressed and renegotiating its debt with creditors. The current macroeconomic environment, evidenced by high inflation and cost of capital, means that the central government and Ghanaian private sector have limited capacity to finance the energy transition. Also, tracked climate finance flows indicate about US$1.3 billion (US$163 million yearly) was raised between 2011 and 2019, with bilateral and multilateral development finance institutions (DFIs) being the dominant financing sources (about 85%[13]) during the period. This, however, contrasts with an annual climate finance need of about US$1.94 billion up to 2030— Ghana needs between US$9.3 billion and US$15.5 billion to implement all the mitigation and adaptation measures in the NDCs by 2030.



10 https://www.energymin.gov.gh/sites/default/files/2023-09/FINAL%20GHANA%27S%20NATIONAL%20ENERGY%20TRANSITION%20FRAMEWORK_2023_compressed%20%281%29_compressed%20%282%29.pdf

11 https://www.seforall.org/system/files/2023-09/report-ghana-etip_WEB.pdf

12 See Section 3 for more discussion of this.

13 Ghana's Fourth National Communication to the United Nations Framework Convention on Climate Change. Ghana's Fourth National Communication to the United Nations Framework Convention on Climate Change (unfccc.int)

Figure 3 The Ghana National Energy Transition Framework (2022-2070) and the Ghana Energy Transition and Investment Plan (2023-2060)



Locally led by Ministry of Energy (Foreword by the President; Preface by Hon Minister for Energy)



Led by Environment Ministry & Supported by SEforALL (Foreword by the President; Preface by Minister for Environment, Science, Technology & Innovation)

Source: Government of Ghana | Ministry of Energy, and Ministry of Environment, Science, Technology & Innovation (MESTI)

1.2 Key framing issues and research questions

While there is an urgent need to address the climate crisis by scaling up financing, the sources and types of financing Ghana needs to reach its net zero goals and reduce its debt vulnerabilities are not clearly mapped out.

Within this context, this report analyses feasible approaches for accelerating finance for Ghana's energy transition by providing answers to the following questions:

1. **What** are the synergies and points of divergence in Ghana's two (2) Energy Transition Plans (ETPs), namely the GH-NETF and GH-ETIP.
2. **How** has Ghana financed its climate change commitments, and how does it intend to finance the energy transition?
3. **Which** key funding sources are likely to be most effective in supporting Ghana's energy transition?
4. **What** are Ghana's major challenges or bottlenecks in securing financing for its energy transition?
5. **What** policy reforms need to be undertaken to unlock public and private—domestic and international—finance to support Ghana's energy transition? That is, what innovative financing structures or strategies could Ghana adopt to minimise debt vulnerabilities while maximising energy transition finance flows?

1.3 Methodology

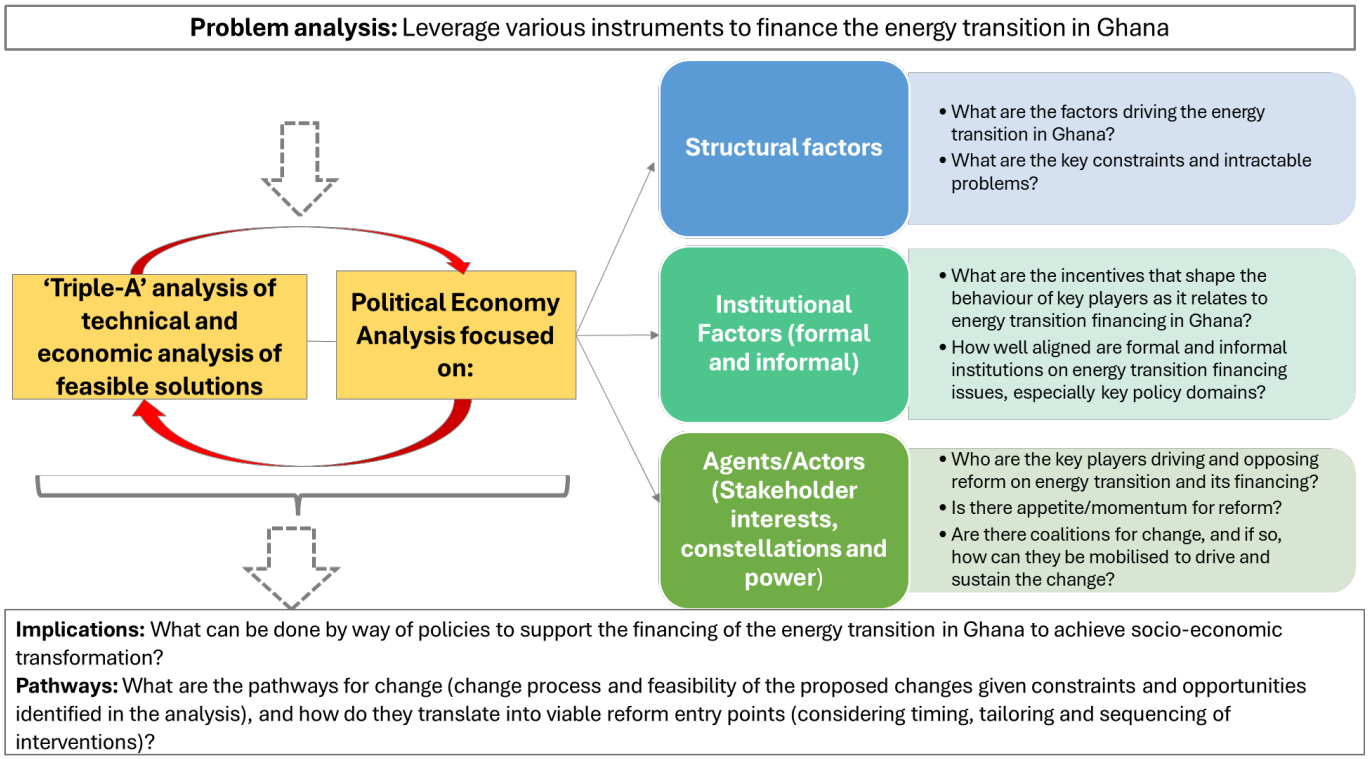
This research adopts a qualitative approach to investigate climate financing in Ghana, utilising in-depth interviews and political economy analysis (PEA) as the primary methodologies. Figure 4 highlights the essential blocks of the PEA approach.

Desk literature review: We conducted literature reviews covering relevant documents across the energy and climate financing space. This included policy and legislative documents, academic papers, reports, and official publications. This helped us obtain a clear understanding of the main stakeholders, political economy context, objectives and challenges, and align them with the expected outputs and outcomes of the project.

Stakeholder interviews: Multiple semi-structured interviews were administered with identified organisations and industry bodies engaged in the national policy debate on energy transition financing. We also held a stakeholder event to bring all relevant bodies around the table to discuss the issues of energy transition plans and financing. The in-depth interviews are conducted with key stakeholders, including government officials, representatives from non-governmental organisations (NGOs), financial institutions, and community leaders. This method allowed for collecting detailed and nuanced information directly from those involved in or affected by energy transition financing policies and initiatives. The semi-structured interviews provide a flexible framework to explore respondents' perspectives, experiences, and insights while ensuring the coverage of critical topics relevant to the study. This approach is justified as it enables the capture of rich, contextual data often inaccessible through quantitative methods, offering a deeper understanding of the complexities and challenges in energy transition financing within the Ghanaian context. The interview data were transcribed and thematically analysed to identify recurring patterns, themes, and insights. The list of stakeholders consulted is provided in the Appendix.

Political economy analysis (PEA): The findings from the literature review and interviews were fed into PEA and then synthesised to provide policy recommendations. PEA provides a framework to understand how political, economic, and social dynamics shape the decisions and actions of various stakeholders involved in climate finance. It involves analysing power relations, governance structures, and the roles of different actors within the policy environment. The use of PEA is justified as it helps to uncover underlying power imbalances, institutional constraints, and incentives that affect the effectiveness and equity of climate finance mechanisms. The analysis will involve mapping out the key actors, their interests, and interactions and assessing how these influence climate financing policies and outcomes. By integrating PEA with the thematic analysis of interview data, the research gains a comprehensive view of both the micro-level experiences of stakeholders and the macro-level institutional dynamics, thereby providing a holistic understanding of energy transition financing in Ghana.

Figure 4 Political economy analysis approach



Source: Authors' construct

1.4 Structure of the report

The rest of the report is structured as follows:

- **Section 2** presents Ghana's institutional and legal framework for energy transition governance and financing.
- **Section 3** reviews Ghana's two national energy transition frameworks. It also assesses key sectoral issues and the linkages between the framework and the nationally determined contributions (NDCs).
- **Section 4** reviews Ghana's national energy transition financing strategy, including detailed financing analysis by sector and source and financing risk analysis.
- **Section 5** provides the conclusions and policy recommendations from the study.

2.0

Institutional and Legal Framework for Energy Transition Governance and Financing in Ghana



Institutional and Legal Framework for Energy Transition Governance and Financing in Ghana

This section highlights the legal framework and institutional governance structures for the energy transition e in Ghana.

2.1 Protocols, policies, plans and strategies

2.1.1. Kyoto Protocol

Ghana ratified the United Nations Framework Convention on Climate Change in 1995 and agreed to the Kyoto Protocol in 2002. Under the Kyoto Protocol, flexible market mechanisms, including joint implementation, the clean development mechanism (CDM), and international emissions trading, were introduced.[14] A country subject to a Kyoto Protocol emission reduction or limitation through the CDM may carry out an emission-reduction project. The Environmental Protection Agency serves as the Kyoto Protocol's Designated National Authority.[15]

2.1.2. AU Agenda 2063 and the Sustainable Development Goals (SDGs)

The national and regional priority areas of the Africa Union (AU) Agenda 2063 include sustainable and inclusive economic growth, human capital development, agriculture/value addition, and agro-business development. Others include employment generation, especially the youth and females; social protection; gender/women development and youth empowerment; good governance including capable institutions; infrastructural development; science, technology, innovation; manufacturing-based industrialisation; peace and security; culture, arts and sport.[16] The AU believes that energy is a vital resource that propels the economy and the advancement of every initiative. Therefore, it is critical to ensure that energy sector issues are adequately resolved to develop the continent's economy.[17]

Similarly, Ghana has committed to the following under SDG Goal 7 Action (on Affordable and Clean Energy) by 2030:

- Ensure universal access to affordable, reliable and modern energy services by 2030.
- Increase substantially the share of renewable energy in the global energy mix.
- Double the global rate of improvement in energy efficiency.

Enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency and advanced and cleaner fossil-fuel technology and

Promote investment in energy infrastructure and clean energy technology.

Expand infrastructure and upgrade technology to supply modern and sustainable energy services to all developing countries, in particular least developed countries, small island developing states, and land-locked developing countries, in accordance with their respective support programmes.

Concerning Goal 13 Action (on Climate Action), Ghana has committed to integrating climate change measures into national policies, strategies and planning.[18] These commitments reflect the country's attention to energy transition.

2.1.3. Ghana's Updated Nationally Determined Contributions

The nationally determined contributions (NDCs) detail Ghana's contributions to meeting the Paris Agreement goals. Ghana has developed nineteen (19) policy initiatives aimed at lowering greenhouse gas emissions and enhancing the resilience of communities and vulnerable groups to the consequences of climate change by 2030.[19] These nineteen (19) policy efforts yield thirteen (13) adaptation measures and thirty-four (34) mitigating actions. The policy initiatives address the main high-emission economic sectors, including energy, forestry, transportation, waste management, and agriculture (Table 1). Implementing the mitigation and adaptation measures would cost substantial amounts of money. For the government to successfully carry out the necessary measures and meet the NDCs'

14 https://unfccc.int/kyoto_protocol
15 https://unfccc.int/sites/default/files/resource/Gh_NC4.pdf
16 https://au-afrec.org/agenda-2063-agenda-2063-sdgs-energy
17 ibid
18 https://ghana.un.org/en/sdgs
19 https://unfccc.int/sites/default/files/NDC/2022-06/Ghana%27sUNFCCC_2021.pdf

targets by 2030, over US$15.5 billion will be required.[20] Consequently, to get funding and gather the necessary technologies to carry out the initiatives outlined in the NDCs, the government requires the assistance of both the domestic and international commercial sectors.[21]

Table 1 NDC policy actions from 2020-2030

Policy Actions	Area	Funding (US$ million)	Funding (%)
Scale-up renewable energy penetration by 10% by 2030	Mitigation	2,296.9	24.81%
Expansion of inter-and-intra-city transportation modes.	Mitigation	1,890.5	20.42%
Build resilience and promote livelihood opportunities for the youth and women in climate-vulnerable agriculture landscapes and food systems	Adaptation	1,855.0	20.03%
City-wide resilient infrastructure planning.	Adaptation	827.0	8.93%
Promotion of energy efficiency in homes, industry and commerce	Mitigation	786.9	8.50%
Promote gender-responsive sustainable forest management	Adaptation/Mitigation	392.5	4.24%
Expand the adoption of market-based cleaner cooking solutions.	Mitigation	386.4	4.17%
Promote sustainable charcoal production, including youth and women entrepreneurs.	Mitigation	292.1	3.15%
Low carbon electricity generation	Mitigation	141.4	1.53%
Manage climate-induced and gender-related health risks.	Adaptation	117.0	1.26%
Integrated water resources management	Adaptation	108.0	1.17%
Adopt alternative urban solid waste management	Mitigation	60.4	0.65%
Promote clean rural household lighting.	Mitigation	35.7	0.39%
Decarbonisation of oil and gas production	Mitigation	31.5	0.34%
Early warning and disaster risk management.	Adaptation	15.0	0.16%

20 ibid

21 https://www.adaptation-undp.org/private-sector-engagement-climate-plans

Enhance climate services for efficient weather information management.	Adaptation	10.0	0.11%
Sustainable production in Industry	Mitigation	7.4	0.08%
Refrigeration and Air Conditioning (RAC)	Mitigation	3.2	0.03%
Enhance climate resilience of women and the vulnerable.	Adaptation	2.2	0.02%
Total		**9,259.1**	**100.00%**

Source: Author's construct based on Ghana's Updated NDC (2021) submitted to the UNFCCC.

The NDCs categorise the programmes of action (POAs) into conditional and unconditional targets. The unconditional POAs are activities that the government of Ghana can implement with or without support from the international community. These unconditional targets and POAs must be translated into government policies fed into the Coordinated Programme for Economic and Social Development (CPESD). This main strategic constitutional document influences fiscal policy and the medium-term fiscal framework (MTFF). The MTFF is the government's resource envelope and links the CPESD and the immediate spending, revenue, and financing activities in the national budget.

2.1.4 National Energy Policy, 2021

The national energy policy outlines the goals, objectives, challenges, and policy directions for the energy sector.[22] The following areas are covered in the policy: power generation, transmission and distribution; renewable energy; nuclear power; petroleum (upstream and downstream); energy transition; energy efficiency and conservation; cross-cutting areas (health, safety, security and environment; gender; local content and local participation, and research and development. The policy notes that Ghana has abundant gas and oil resources, which need to be considered when shifting to a low-carbon economy. Since it is a component of other frameworks that aim to transparently and efficiently utilise oil and gas resources, finding a balance is necessary when addressing the energy transition from a national standpoint.

2.1.5. National Energy Transition Framework

The National Energy Transition Committee developed Ghana's National Energy Transition (NET) Framework, introduced by the President in November 2022. The framework aims to achieve net-zero emissions by 2070, promote socioeconomic growth, and utilise natural resources while addressing increased demand. This framework is anticipated to supplement current initiatives with fresh approaches, like expanding renewable energy, converting thermal plants to natural gas, and incorporating nuclear power into the energy mix. The government formed the National Energy Transition Coordinating Office to oversee the Framework's implementation and the National Energy Transition Implementation Committee. Important state institutions involved in this process include the Ministry of Science, Technology, and Innovation, the Ministry of Energy, the Ministry of Transportation, and the Ministry of Environment.[23]

The Renewable Energy Master Plan and the Energy Efficiency Regulations are two relevant policy texts the NET utilises. The Energy Transition Model (ETM) for the NET is predicated on three key assumptions to achieve a net zero target in 2070: The first presumption is related to the economy: that the Gross Domestic Product would rise with an annual growth of 5% from US$79.08 billion to US$863.69 billion. The second presumption relates to demographics: Ghana's population would grow from 30.8 million to 72.2 million at a 2% yearly growth rate. The third premise

22 https://www.energymin.gov.gh/sites/default/files/2023-09/2021%20ENERGY%20POLICY.pdf
23 Ghana's National Energy Transition Framework (2022–2070), p.1.

is industrial equity, which states that at a 1% annual growth rate, the urban-rural share of industrialisation will increase from 56% to 85%. [24]

Ghana's Nuclear Regulatory Authority announced in August 2022 that it has officially started Phase 2 of its nuclear power programme.[25] Cabinet authorised one of four possible sites for constructing the first nuclear power plant as part of continuing Phase 2 efforts.[26] Nuclear Power Ghana engages stakeholders to secure a preferred site for its first nuclear plant and shortlist vendors to identify cost-effective and resilient technology.[27] Natural gas is also gaining increasing attention as a lower-carbon transition fuel for the production of power, industrial heating, and transportation, as a result of the energy transition agenda and Ghana's NDC obligations.

2.1.6. Ghana Renewable Energy Master Plan, 2019

The goals, aims, regulations, and steps required to support Ghana's development and use of renewable energy resources are outlined in the Renewable Energy Master Plan.[28] The nation's renewable energy potential from all sources—including solar, wind, hydro, biomass, and geothermal—is evaluated in the master plan. It quantifies the capacity for deployment and finds appropriate sites for renewable energy projects.[29]

The plan sets aggressive targets for the percentage of renewable energy in Ghana's energy mix. It creates a framework of policies, including market processes, investment promotion initiatives, and regulatory incentives, to help achieve these goals.[30] The master plan includes comprehensive resource mapping and technical study of renewable energy sources, including information on solar radiation, wind speed, hydrological potential, biomass availability, and geothermal resources.[31] This data informs project planning, site selection, and technology deployment methods. The plan delineates tactics to foster market expansion and draw capital towards renewable energy initiatives. It pinpoints funding sources, development incentives for renewable energy, and chances for public-private partnerships to raise funds and quicken implementation.[32] The plan also focuses on Grid Integration and Infrastructure Development, Institutional Strengthening and Capacity Building, Community Engagement and Socio-Economic Benefits, and Monitoring, Evaluation, and Reporting.

2.1.7. National Climate Change Policy and National Climate Change Adaptation Strategy

Ghana's approach to climate change is guided by overarching aims and principles outlined in the Climate Change Policy.[33] These goals usually involve reducing greenhouse gas emissions, preparing for the effects of climate change, and encouraging the development of low-carbon and climate-resilient development strategies. The policy establishes a framework for integrating climate change issues into sectoral policies, national development planning, and decision-making processes. The significance of incorporating climate change issues into many sectors, such as energy, agriculture, forestry, water resources, and urban planning, is emphasised. In the face of the effects of climate change, Ghana's National Climate Change Adaptation Strategy[34] provides a thorough framework for increasing climate resilience, decreasing vulnerability, and advancing sustainable development.

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24 Ghana's National Energy Transition Framework: Domestic aspirations and mistrust in international relations complicate 'justice and equity'

25 Ghana's Nuclear Power Programme (Nuclear Regulatory Authority), https://nra.gov.gh/nuclear-power.php

26 2023 Budget Statement and Economic Policy, para.653.

27 2023 Mid-Year Policy Review, para.488.

28 https://www.energycom.gov.gh/files/Renewable-Energy-Masterplan-February-2019.pdf

29 Ibid

30 Ibid

31 Ibid

32 Ibid

33 https://www.pef.org.gh/documents/climate-change/national-climate-change-policy.pdf

34 https://www.adaptation-undp.org/sites/default/files/resources/ghana_national_climate_change_adaptation_strategy_nccas.pdf

2.1.8. Ghana Climate Prosperity Plan

This strategy aims to create a pathway to low-carbon economic growth that provides sustainable livelihoods by bringing together public bodies, private sector participants, and civil society organisations (CSOs). The Climate Prosperity Plan (CPP)[35] is a development strategy supporting the government's financial goals. There is a chance to make sure green fiscal policies are incorporated into public spending and that the CPP emphasises the needs of green enterprises.

2.1.9. Ghana Energy Transition and Investment Plan (GH-ETIP)

GH-ETIP[36] offers long-term strategies for cutting carbon emissions, a list of priority industries, and pertinent anchor technologies to help achieve the decarbonisation objectives. ETIP emphasises the transport and energy sectors as the anchors for long-term decarbonisation in Ghana.

2.2 Legal Framework Governing Energy Transition in Ghana

- The legal framework encompasses the following:
- The Renewable Energy Act, 2011 (Act 832).
- The Energy Commission Act 1997 (Act 541) .
- Public Financial Management Act, 2016 (Act 921).
- Public Private Partnership Act, 2020 (Act 1039).
- Ghana Investments Promotion Centre Act, 2013 (Act 865).
- Ghana Exemptions Act, 2022 (Act 1083).
- Environmental Protection Agency Act, 1994 (490
- Public Procurement Act, 2003 (Act 663).
- Other Legislations and Regulations

2.2.1. The Renewable Energy Act, 2011 (Act 832)

Act 832 provides for the development, management and utilisation of renewable energy[37] sources for producing heat and power efficiently and environmentally sustainably, and a framework to support developing and utilising renewable energy sources. The Act seeks to provide an enabling environment to attract investment in renewable energy sources, promote the use of renewable energy, diversify supplies to safeguard energy security, improve access to electricity through the use of renewable energy sources, build domestic capacity in technology for renewable energy sources; public education on renewable energy production and utilisation; and the regulation of the production and supply of wood fuel and biofuel.[38]

35 https://drive.google.com/file/d/1YFx-Jue-OxFJewgIm2MGKnk4AawMSLQW/view

36 https://www.seforall.org/system/files/2023-09/report-ghana-etip_WEB.pdf

37 Energy from non-depleting sources, such as wind, solar, hydro, biomass, biofuel, landfill gas, sewage gas, geothermal energy, ocean energy, and any other source officially designated in writing by the Minister of Energy, is referred to as renewable energy under the Renewable Energy Act of Ghana 2011 (Act 832).

38 Act 832 1(1-2)

Act 832 provides detailed responsibilities for the relevant institutions as follows:

Institution	Function concerning renewable energy
The Energy Commission	Advise the Minister on renewable energy matters; Create a platform for collaboration between government, the private sector, and civil society for the promotion of renewable energy sources; Recommend and advise relevant stakeholders on the educational curriculum on efficient use of renewable energy sources and evolve programmes for its mainstreaming on the educational curriculum of educational institutions; Recommend for exemption from customs, levies and other duties, equipment and machinery necessary for the development, production and utilisation of renewable energy sources; In consultation with the Public Utilities Regulatory Commission, recommend financial incentives necessary for the development, production and utilisation of renewable energy sources; Promote the local manufacture of components to facilitate the rapid growth of renewable energy sources; Promote plans for training and supporting local experts in the field of renewable energy; Promote the benefits of renewable energy to facilitate its utilisation; In consultation with relevant stakeholders, set targets for the development and utilisation of renewable energy sources; Implement the provisions of the Act; In developing regulations and guidelines for the provision of electricity, the Energy Commission is expected to consider the particular nature of the electricity generated from renewable energy sources to ensure that relevant renewable energy projects are integrated into Ghana's power system.[39]
Public Utilities Regulatory Commission (PURC)	Provide chargeable rates for the purchase of electricity from renewable energy sources by public utilities; Provide chargeable rates for grid connection; Provide chargeable rates for wheeling of electricity from renewable energy sources. The PURC is expected to consider the particular nature of the electricity generated from renewable energy sources- in developing regulations and guidelines for providing electricity- to ensure that relevant renewable energy projects are integrated into Ghana's power system.[40]
The National Petroleum Authority(NPA)	In developing guidelines for the provision of petroleum products, Act 832 enjoins the NPA to consider the particular nature of the fuel produced from renewable energy sources to ensure that relevant renewable energy projects are integrated into the fuel supply system of Ghana.

39 Act 832 (46)
40 ibid

2.2.2. The Energy Commission Act 1997 (Act 541)

The Energy Commission Act 1997 (Act 541) governs Ghana's transmission, sale, distribution and wholesale supply of electricity. Act 541 sets out the development and utilisation of energy resources (mainly concentrating on electricity and natural gas) as part of the functions of the Energy Commission. The Commission is charged with the duty to recommend national policies for the development and utilisation of indigenous energy resources[41] which suggests that from its inception, there was little anticipation of the issues requiring attention regarding energy transition. Arguably, the Renewable Energy Act, 2011 (Act 832) subsequently sought to complement the existing responsibilities given to the Energy Commission with key actions required for renewable energy considerations and tackle energy transition issues- as the narrative on Act 832 above highlights. As part of its functions, the Commission receives and assesses applications and grants licenses under this Act to public utilities for the transmission, wholesale supply distribution, and sale of electricity and natural gas.[42]

2.2.3. Public Financial Management Act, 2016 (Act 921)

Fiscal policies are a useful tool for accomplishing climate goals. The Public Financial Management Act, 2016 (Act 921) stipulates in Section 14 that the government may consider alternative fiscal policy goals as long as they align with the principles of fiscal policy outlined in Section 13. This implies that the government can incorporate climate change as a major goal of fiscal policy by passing an amendment to the PFM statute. Every five years, Act 921 gives the Minister the leeway to update the fiscal policy indicators in accordance with Section 16. This serves as a starting point for the government to incorporate budgetary targets that are sensitive to the energy transition, ensuring that public entities' spending meets the nation's climate needs in general, with those relevant to the energy sector being provided with the opportunity to make considerations in line with adapting to the energy transition. To guarantee that climate-sensitive budgeting is not an ad-hoc endeavour and is protected from changes in government and economic reforms, the PFM Act must provide a legal foundation for incorporating climate targets in general and consider Ghana's energy transition agenda.

The public financial management system (PFM) has built a framework of laws, organisations, and procedures that govern the operation of fiscal policies. **This implies that in order to address concerns connected to climate change and energy transition, the PFM law needs to be modified.** This would guarantee that the medium-term expenditure and fiscal policy frameworks are created to meet the PFM Act's climate change and energy transition objectives. Although climate change was not explicitly taken into account when designing Ghana's PFM Act, the law does contain provisions that allow the government to prioritise environmental goals and climate change mitigation as important fiscal policy objectives and, in effect, be of benefit to Ghana's energy transition plans for the future. For example, **sub-section (h) of Section 20(2) allows the Minister to set the selection criteria for investment projects. These are potential entry points for the Ministry of Finance to influence public expenditure to reflect energy transition opportunities**.

Moreover, **the budget can be used to ensure that public investment projects respond to the energy transition needs of the government.** In addition, the transition from Activity Based Budgeting (ABB) to Programme Based Budgeting (PBB), which focuses on results, sub-programmes, and projects, presents an opportunity for the government to include the NDCs in the PBB of MDA/MMDAs. The budget preparation is an opportunity for the Ministry and the MDA/MMDAs to align their short and medium-development plan (SMDTP) to the MTFF. Thus, if the MTFF reflects fiscal and environmentally sustainable pathways, the Ministry can align the SDMTP of public entities to achieve climate change and energy transition goals. When the budget reaches the execution stage, green fiscal policies and energy transition needs will be captured in public expenditure.

41 Act 541 (2)(2)(a)
42 Act 541 (2)(2)(e)

2.2.4. Public Private Partnership Act, 2020 (Act 1039)

Public-private partnerships (PPPs) are governed by laws and regulations in Ghana, with the Public-Private Partnership Act 2020 (Act 1039) being the anchor. These rules and regulations enable the government and private sector firms to work together on financing, creating, and running renewable energy infrastructure. PPP agreements can assist in bringing in private funding and experience for projects involving the energy transition.

Act 1039 aims to regulate public-private partnership arrangements and promote the use of private sector resources for the provision of infrastructure and services through such partnerships.[43] The Act requires contracting authorities to ensure that partnership arrangements of that contracting authority contain measures designed to safeguard the interest of the general public, interested persons and employees affected by the project and that public-private partnership activities conform to the environmental laws of the country and the highest standards of environmental, climate and social safeguards.[44]

2.2.5. Ghana Investments Promotion Centre Act, 2013 (Act 865)

Ghana's investment laws and regulations offer rewards and assurances to entice local and foreign investors to fund renewable energy projects. These regulations seek to reduce investment risks and foster an environment favourable to investment. The current legal framework of Ghana provides some level of cushioning for investors interested in energy transition activities in the country. The Ghana Investments Promotion Center Act, 2013 (Act 865) is one such legislation. Exemptions, credits, and deductions for investments in renewable energy, equipment imports, and project development expenses are examples of tax rules and incentives (Figure 5). The purpose of these tax breaks is to encourage investment in the renewable energy industry and lessen the financial strain on developers.

Figure 5 Tax Benefits and Incentives under the Ghana Investments Promotion Centre Act



43 Act 1039 (1)(1)
44 Act 1039 (4)

2.2.6. Ghana Exemptions Act, 2022 (Act 1083)

Act 1083 provides under General tax incentives- the leeway for the Minister of Finance, on the recommendation of the relevant sector Minister and with the approval of Cabinet, by legislative instrument, to make regulations to grant an industry-specific or programme-specific tax concession for an industry or investment programme.[45] The Act also provides for special tax incentives for strategic investments where the State may, in addition to granting a general tax incentive to a sector in accordance with an enactment, grant a specially-negotiated tax exemption for strategic investment where the State takes a commensurate equity stake in the investment project.[46]

Act 1083 also makes provision for equipment, replacement parts and kits for production trials imported by a manufacturer or assembler of plants and machinery, including an automobile which is (a) registered by the Ministry responsible for trade and industry; (b) recommended by the Minister responsible for trade and industry; and (c) approved by the Minister- to be made exempt from customs duties and customs taxes.[47] The Act also specifies the granting of exemption from the payment of customs duties and customs taxes for certain treaties, agreements or conventions executed by or under the authority of the President after ratification by Parliament.[48]

2.2.7. Other Legislations and Regulations Beneficial to Energy Transition in Ghana

In Ghana, capital markets, banks, and other financial institutions are governed by laws and regulations pertaining to financial services. These laws provide the legislative framework for funding renewable energy projects with loans, stock investments, bonds, and other financial instruments. Project financing laws and regulations govern the legal framework for financing renewable energy projects through debt, equity, and project finance structures. For renewable energy projects to be financially viable, these rules cover risk allocation, project agreements, and security interests.

Other relevant regulations include the Local Content and Local Participation (Electricity Supply Industry) Regulations 2018 (LI 2354), the Renewable Energy Sub-Code for the National Interconnected Transmission System, the Renewable Energy Sub-Code for Distribution Networks and Net Metering Sub-Code for Connecting Renewable Energy Generating Systems to the Distribution Network in Ghana.

In addition to the Public Financial Management Act, 2016 (Act 921), the following Acts and Regulations contain no specific references to energy transition: Environmental Protection Agency Act, 1994 (490); the Environmental Assessment Regulations, 1999 (Li 1652) and the Public Procurement Act, 2003 (Act 663). Furthermore, Ghana's Public Procurement Act, 2003 (Act 663) does not yet completely legislate green public procurement practices or anything specific to energy transition.

45 Act 1038 (14)
46 Act 1038 (15)
47 Act 1038 (19)
48 Act 1038 (20)

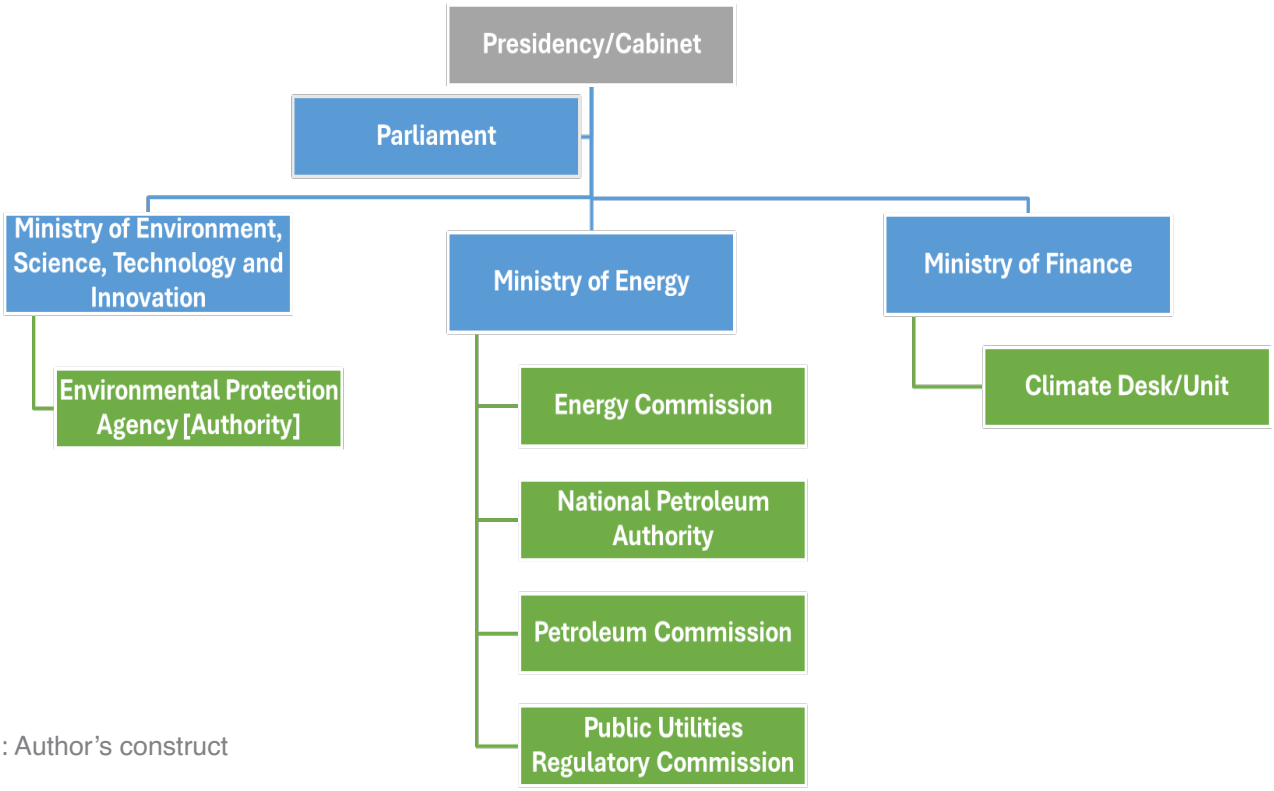
Photocredite:https://www.freepik.com/free-photo/photovoltaics-solar-power-station-energy-from-natural_10896368.htm#-from_view=detail_alsolike

2.3. Institutional Framework Governing Energy Transition in Ghana

Figure 6 shows Ghana's institutional framework for energy transition governance and financing.

- **Ministry of Environment, Science, Technology and Innovation:** The Ministry currently holds the leading role in climate-related matters in the country. Through scientific research, technical innovation, and information sharing, the Ministry of Environment, Science, Technology and Innovation in Ghana contributes significantly to the energy transition process by advancing the creation and application of clean energy solutions.
- **Ministry of Energy:** The MoE is responsible for formulating energy policies, strategies, and plans, including those related to renewable energy and energy efficiency. It oversees the implementation of energy projects and coordinates with other ministries, agencies, and stakeholders involved in energy transition governance and financing. The Ministry does so through policy development and implementation, renewable energy promotion, regulatory oversight, infrastructure development, capacity building and technical assistance, public awareness and education, international cooperation and partnerships, and monitoring and evaluation mechanisms.
- **Ministry of Finance:** The Ministry of Finance plays a central role in budgeting, fiscal planning, and resource allocation for energy transition projects. It coordinates with other ministries and agencies to prioritise funding for renewable energy and sustainability programs. The Ministry of Finance is placed to assist Ghana's energy transition in the following ways: budget distribution, public finance management, reform of subsidies, public-private partnerships (PPPs), financial access, green bonds and climate finance, and integration and coordination of policies. In detail, it mobilises funding from the public and commercial sectors to spur and solidify investments in renewable energy. Form public-private partnerships to provide co-financing for the building, development, and implementation of transitional infrastructure, such as nuclear power plants, solar photovoltaics, wind, hydro, mini-grids, and compressed natural gas (CNG) stations.
- **Environmental Protection Agency**: The EPA ensures that energy projects comply with environmental regulations and standards. It conducts environmental impact assessments and monitors environmental performance.
- **Public Utilities Regulatory Commission** oversee the energy sector, including pricing, tariffs, and quality standards for renewable energy. They ensure regulatory certainty and investor confidence in energy transition projects. In addition, the Public Utilities Regulatory Commission regulates utility services in the electricity and water sectors.
- **National Petroleum Authority:** NPA regulates the downstream petroleum sector and may oversee aspects related to biofuels and other renewable fuels.

Figure 6 Institutional framework for energy transition governance and financing in Ghana



Source: Author's construct

2.4 Stakeholder Engagement

Stakeholder engagement is essential for effective energy transition governance and financing. Civil society organisations, local communities, and the private sector contribute to policy dialogue, project development, and monitoring of energy transition initiatives. Private sector companies, both domestic and international, invest in renewable energy projects such as solar, wind, hydro, and biomass. They develop, finance, and operate renewable energy infrastructure. Universities and research institutions conduct research, provide technical expertise, and offer training programs related to renewable energy and energy transition. They contribute to innovation and capacity building in the sector. Similarly, CSOs advocate for policies that promote sustainable energy development, environmental protection, and social equity. They engage in public awareness campaigns, policy dialogue, and community outreach. Energy consumers and local communities play a role in energy transition by adopting energy-efficient practices, supporting renewable energy projects, and participating in decision-making processes.

2.5 Summary

This section highlighted that various laws, such as the Renewable Energy Act, Energy Commission Act, and Public Private Partnership Act, are well placed to drive efforts at achieving energy transitioning in Ghana. However, their provisions remain scattered and are yet to be streamlined. Ghana has been adapting its energy transition plans to international protocols and national policies, such as the Kyoto Protocol, AU Agenda 2063, the SDGs and the National Energy Transition

Framework. With the plethora of roles assigned to several institutions and agencies for similar tasks- there is bound to be the chronic challenge of the lack of institutional coordination and misalignment with the overall agenda concerning energy transition, as experienced with past national programmes. Funding has also yet to be made available to make gains from all commitments to energy transition.

Despite a clear intention outlined in the aforementioned legislations, some Acts and Regulations reviewed, such as the Environmental Protection Agency Act and Public Procurement Act, do not explicitly mention energy transition and may need to be adapted to the current framework and outlook of results expected in this sector in the near future. The Energy Commission Act of 1997 does not specifically focus on energy transition. However, the Energy Fund, under its ambit, provides an opportunity for the Energy Commission to apply funds to promote projects for the development and utilisation of renewable energy resources, including solar energy. Together with funds available from Ghana's development partners and other climate finance mechanisms, the country is poised to implement key goals contained in its Energy Transition Framework.





3.0

Review of Ghana's National Energy Transition Frameworks

3.1 Key highlights of Ghana's energy transition frameworks

3.1.1. Broad Objectives and Targets under The Ghana National Energy Transition Framework (GH-NETF: 2022-2070)

The GH-NETF is intended to reduce emissions by about 200 $MtCo_2e$ by 2070 and achieve transition emissions of 14 $MtCo_2e$ by 2070; emissions will peak in the mid-2050s. The GH-NETF is driven by the need to improve energy security, minimise the impact of low fossil fuel financing on the petroleum sector and broader implications on the economy, and harness the green growth potential of Ghana to address the economic and environmental risk of climate change.[49] Furthermore, the framework recognises that without significant interventions, Ghana's emissions could reach about 140 MtCo2e by 2050 and 200 MtCo2e by 2070, with most of the emissions coming from the energy sector, specifically the transportation sub-sector (Figures 7 and 8).

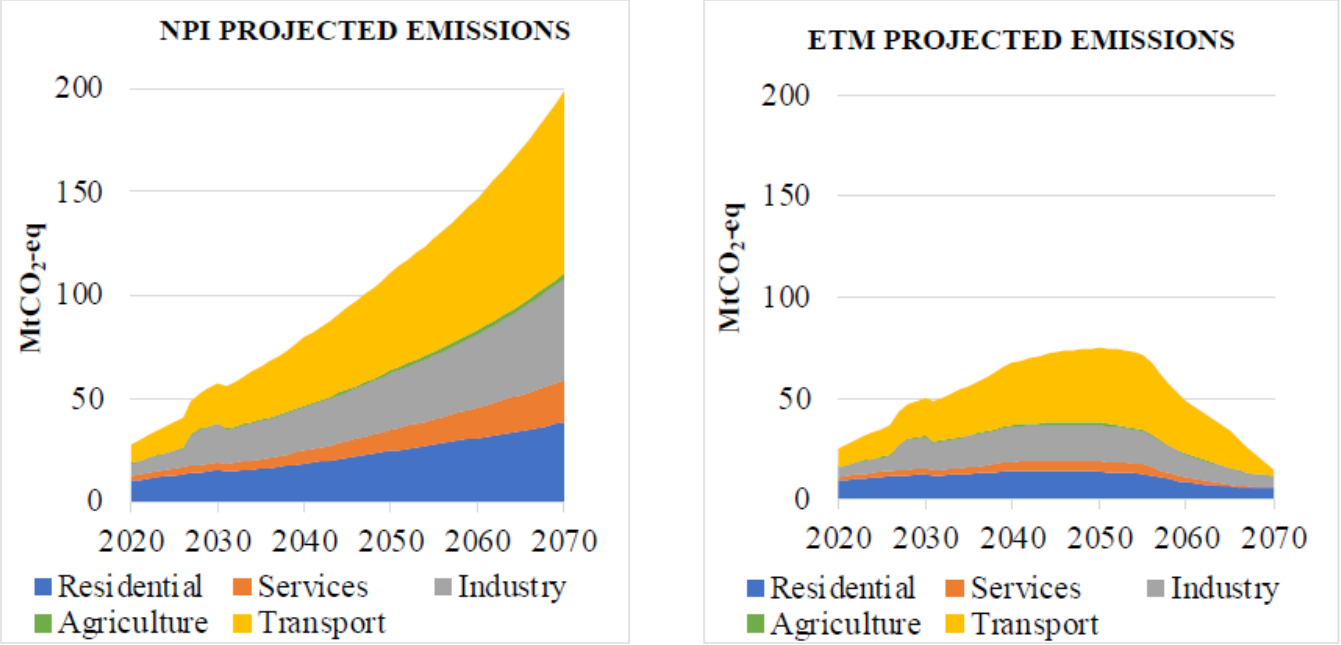
As a result, it is designed to accelerate the adoption of anchor technologies that effectively minimise emissions in the power and transportation sectors and carbon-intensive industries. Also, it demonstrates the country's low carbon priorities for decarbonising the energy sector (including transportation), which is the primary driver of greenhouse gas emissions. The GH-NETF recognises that expanding the economy and increasing population growth can potentially stress the existing primary energy supply sources. As a result, the GH-NETF is designed to explore a diverse and sustainable fuel mix for powering the economy. For instance, the GH-NETF estimates that energy demand is likely to double between now and 2030[50].



49 https://www.energymin.gov.gh/sites/default/files/2023-09/FINAL%20GHANA%27S%20NATIONAL%20ENERGY%20TRANSITION%20FRAMEWORK_2023_compressed%20%281%29_compressed%20%282%29.pdf

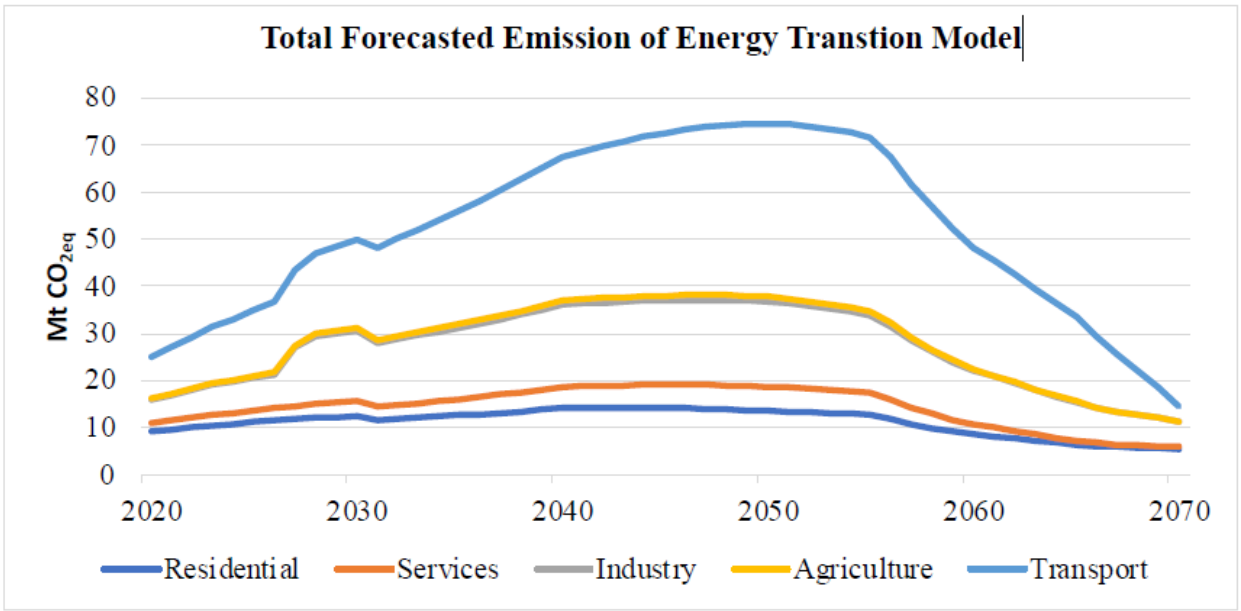
50 Ibid.

Figure 7 Projected emissions without policy intervention (NPI) versus with transition interventions



Source: Ministry of Energy

Figure 8 Total forecasted emission of energy transition model for all sectors



Source: Ministry of Energy

The net-zero targets of the GH-NETF are spread over fifty years, with major milestones beginning in 2030 (Figure 9). The targets for 2030 include scaling up renewable energy to 10% in the generation mix, reaching about 95% of households with electricity, introducing compressed natural gas fuel in internal combustion engines, and with cooling and household appliances[51]. Also, the GH-NETF targets upscaling nuclear energy resources and utilising carbon capture, utilisation, and storage (CCUS) technologies by 2040[52]By 2050, the policy targets about 50% of households to use solar-powered heating systems and 70% of transportation using hydrogen fuels. By 2070, the GH-NETF envisages about 70% of rural households using LPG for cooking where LPG replaces coal or biomass as cooking fuel, this also has shown to bring sizeable health benefits (mitigate health care costs; all road and rail transportation vehicles being electrified and hydrogen-fuelled; and 20% of electricity being sourced from renewable energy resources.[53]

Natural gas will be the key anchor fuel throughout the transition up to mid-2050 and decline due to the scaling up of nuclear energy resources. For instance, Ghana expects the delivery of Liquified Natural Gas (LNG) by the end of 2024 to utilise the floating, storage and regasification terminal constructed and complement the domestic natural gas supply.[54] This facility would become a key aspect of the natural gas supply infrastructure and minimise potential future supply risks.

Specific sectoral policies and other cross-cutting programmes are required to create incentives for adopting key clean energy technologies. The GH-NETF makes several policy options for accelerating the adoption of relevant clean energy technologies. The policy options are categorised into four: ***decarbonisation, energy access and security, energy efficiency, and broader cross-cutting solutions***[55]***.*** The decarbonisation policy options focus on solutions that effectively increase businesses and households' and households' adoption of clean energy technologies. For instance, increasing green energy adoption, afforestation solutions, and carbon capture and storage technologies are mainly for industries. Also, the decarbonisation policy options will create the requisite policy support to attract investment for high-cost technologies such as nuclear power generation and e-mobility solutions. The energy access and security policy options are intended to leverage existing fossil fuel resources to mobilise the needed financing to support clean energy technologies. Key actions include creating a supportive system to accelerate the development of critical minerals for creating clean energy technology value chains in Ghana. Also, the policy options focus on strengthening existing infrastructure to enhance energy security and access.

51 https://www.energymin.gov.gh/sites/default/files/2023-09/FINAL%20GHANA%27S%20NATIONAL%20ENERGY%20TRANSITION%20FRAMEWORK_2023_compressed%20%281%29_compressed%20%282%29.pdf
52 ibid
53 ibid
54 https://www.bloomberg.com/news/articles/2024-02-20/ghana-s-lng-project-on-target-for-year-end-completion-regulator
55 ibid

Figure 9 Critical Targets in the Energy Transition Framework

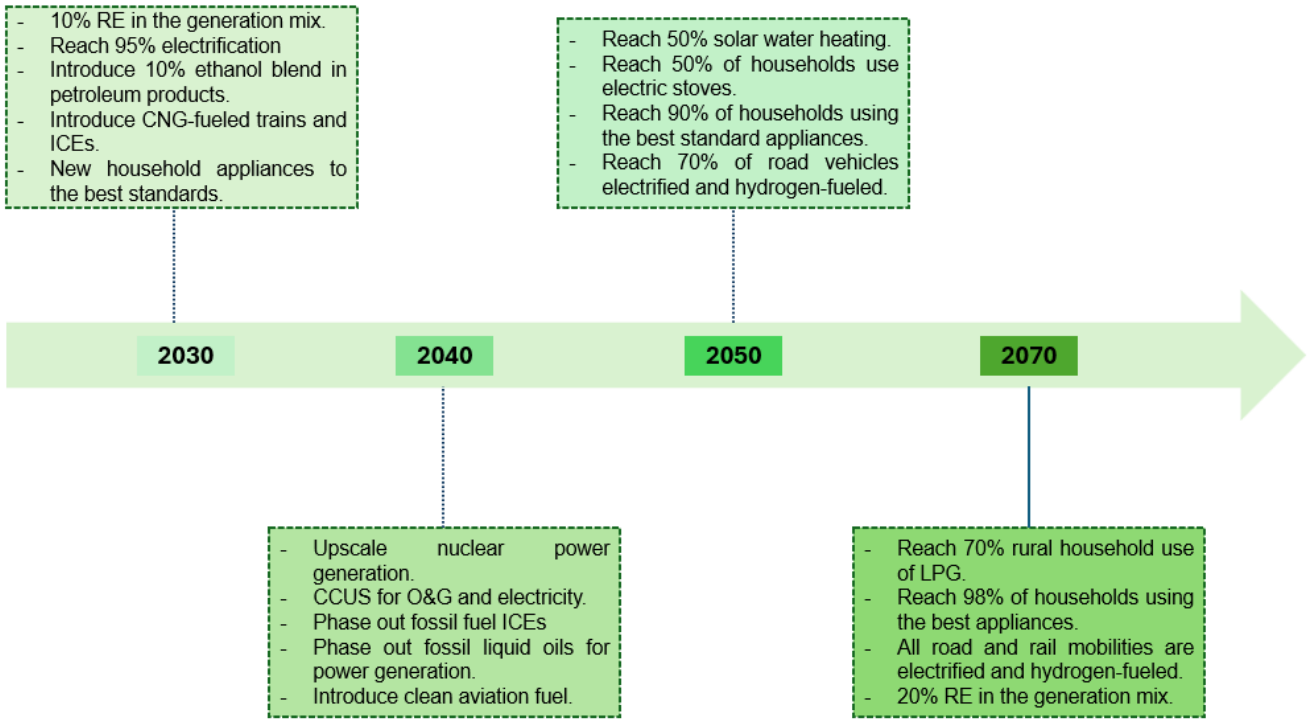


Chart: IMANI CPE I Source: Ministry of Energy

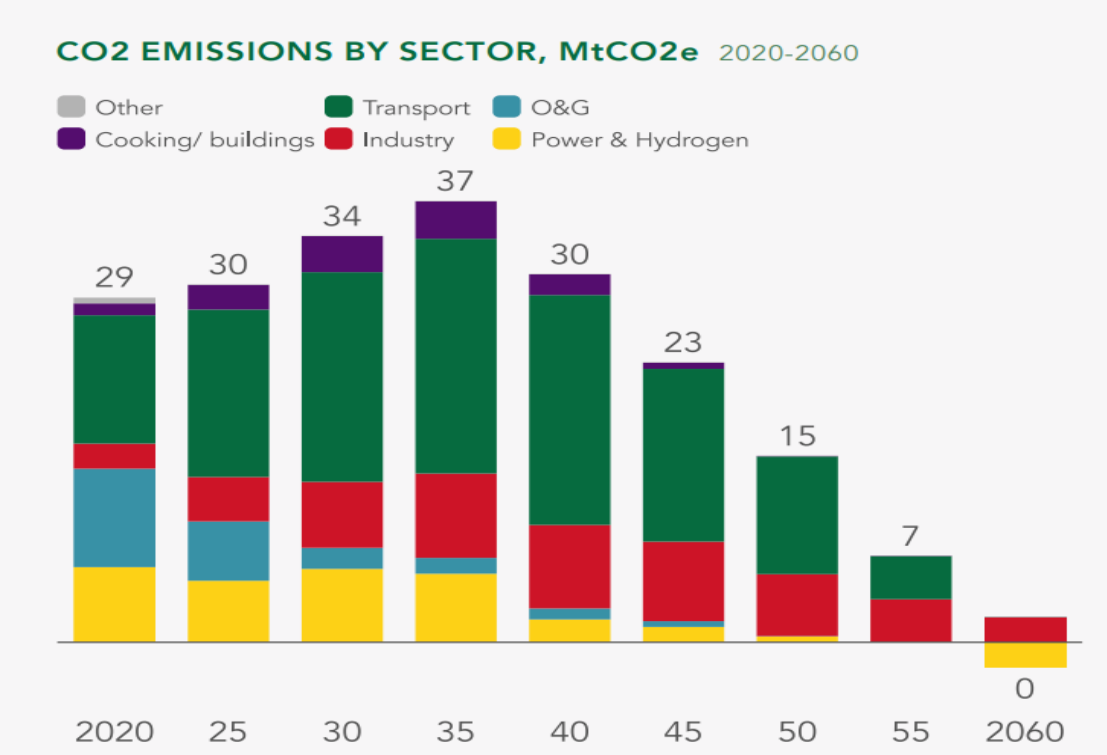
The energy efficiency policy options are intended to increase the adoption of energy efficiency solutions and technologies that ensure the effective use of energy for households and businesses. At the household level, the policy option focuses on increasing the utilisation of energy-efficient appliances and clean cooking stoves. At the business level, the policy seeks to increase the adoption of energy-efficiency solutions in SMEs and encourage the construction of energy-efficient buildings. Beyond the specific sectoral or technology-related policies, there are cross-cutting policies whose implementation may straddle several ministries and agencies. For example, mainstreaming gender issues in the transition would have to be considered by all ministries and agencies during policy planning and implementation. The key cross-cutting issues may also include integrating the energy transition into academic curricula, decentralising the implementation of the energy transition policies and programmes, and the local content and participation issues that may arise.

3.1.2 Broad Objectives and Targets under The Ghana Energy Transition and Investment Plan (GH-ETIP 2023-2060)

Unlike the GH-NETF, the Ghana Energy Transition and Investment Plan (GH-ETIP 2023-2060) envisages a more rapid transition, with Ghana's emissions peaking by 2035 begin a rapid decline after that— that is, an almost 15-year gap in the timing of peak emissions. However, in both instances, the **transportation sector will be the primary source of emissions** because of the increased demand for vehicles and other mobility services, such as rail services. Emissions are projected to consistently grow until they peak by 2035 and 2040 due to the increased utilisation of clean energy fuels (Figure 10). The growth in emissions will be driven by increased population and economic expansion through industrialisation. However, the rapid deployment of clean fuel technologies such as electric vehicles and hydrogen fuels results in a decline around mid-2040.

Also, the industrial sector will experience a growth in emissions because of economic expansion. **GH-ETIP projects that an orderly transition and policy consistency could lead to net zero by the end of 2060 and negative emissions in the power sector, offsetting the reduced emissions from the industry and transportation sector**. Improving energy efficiency and introducing carbon capture and storage is the strategy for decarbonising industrial sectors such as steel, cement, and other chemical industries.

Figure 10 Key Sectors of Ghana's Net Zero Pathway



Source: Ghana Energy Transition Plan I SEforALL analysis

Furthermore, the energy transition plan is anchored on six key low-carbon technologies—Electrification and Renewables, Carbon Capture and Storage, Low-Carbon Hydrogen, Battery Electric Technologies, Clean Cooking Technologies, and Negative Emissions Technologies[56]**—**to achieve net zero by 2060 (Figures 11 and 12). The electrification and renewables technologies will be leveraged to replace all fossil fuels with electricity mainly produced from solar, onshore wind and geothermal technologies, and combined with energy storage technologies. Carbon capture technologies would support industrial decarbonisation and high-temperature heat processing activities by capturing the CO_2 emissions linked to industrial processes. Low-carbon hydrogen technologies will be needed to generate blue and green hydrogen as alternative heating fuel or feedstock for industrial processes. Battery electric technologies will be promoted as a replacement for combustion engines, particularly for passenger vehicles, two- to three-wheelers, and light trucks. Clean cooking technologies will be needed to replace traditional

56 https://www.seforall.org/system/files/2023-09/report-ghana-etip_WEB.pdf

biomass cooking stoves and liquified petroleum gas (LPG) with improved biomass technologies and electricity. Negative emissions technologies relate to mechanisms that remove additional greenhouse gas emissions from the atmosphere. Activities such as reforestation, afforestation, and bioenergy with carbon capture. They are complementary mechanisms to reducing greenhouse gases and achieving net zero.

Battery electric vehicles replacing internal combustion engines (ICEs) is the main anchor technology of Ghana's energy transition because it is expected to contribute about 40% of the potential carbon abatement over the transition period[57]. This is followed by electrification and renewables, which will be useful in phasing out fossil fuels. It is expected to contribute about 26% of the potential carbon abatements. Hydrogen fuels and clean cooking solutions like LPG and cookstoves would contribute about 12% and 16%, respectively, to the carbon abatement under the energy transition framework. Carbon capture technologies and negative emissions solutions such as afforestation would contribute up to 5% and 2%, respectively, to the carbon abatement targets in the transition framework. This suggests that the government's policy priorities must focus on creating a supportive investment environment for developing and utilising electric and hydrogen-fuelled mobility and scaling up renewable energy because they are critical to the net zero pathways of Ghana.

Figure 11 Key anchor technologies for the energy transition

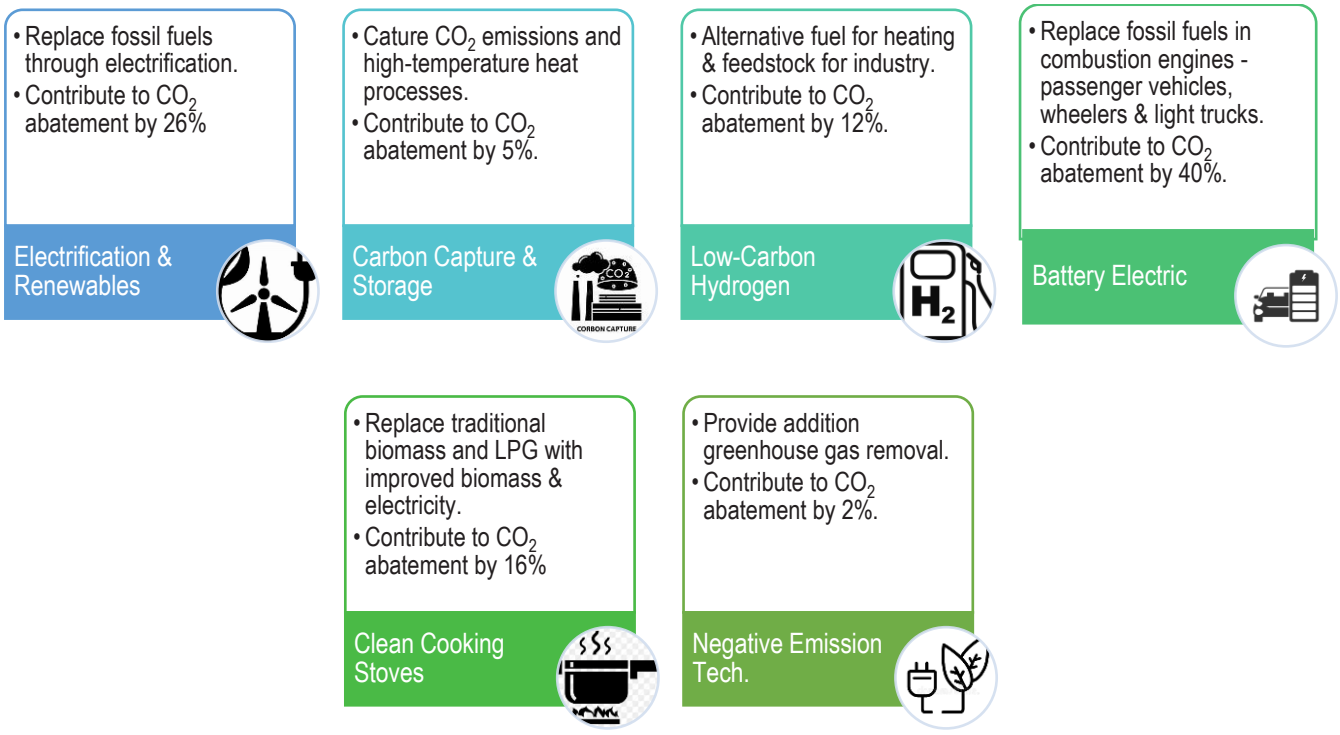


Chart IMANI CPE I Source: Ghana Energy Transition Plan

57 ibid

Table 2 below shows the key differences between the Ghana National Energy Transition Framework (2022-2070) and the Ghana Energy Transition and Investment Plan (2023-2060). As can be seen, while the objectives of the transition are broadly shared, **there are significant differences in technology choices and timing of emissions, among others**.

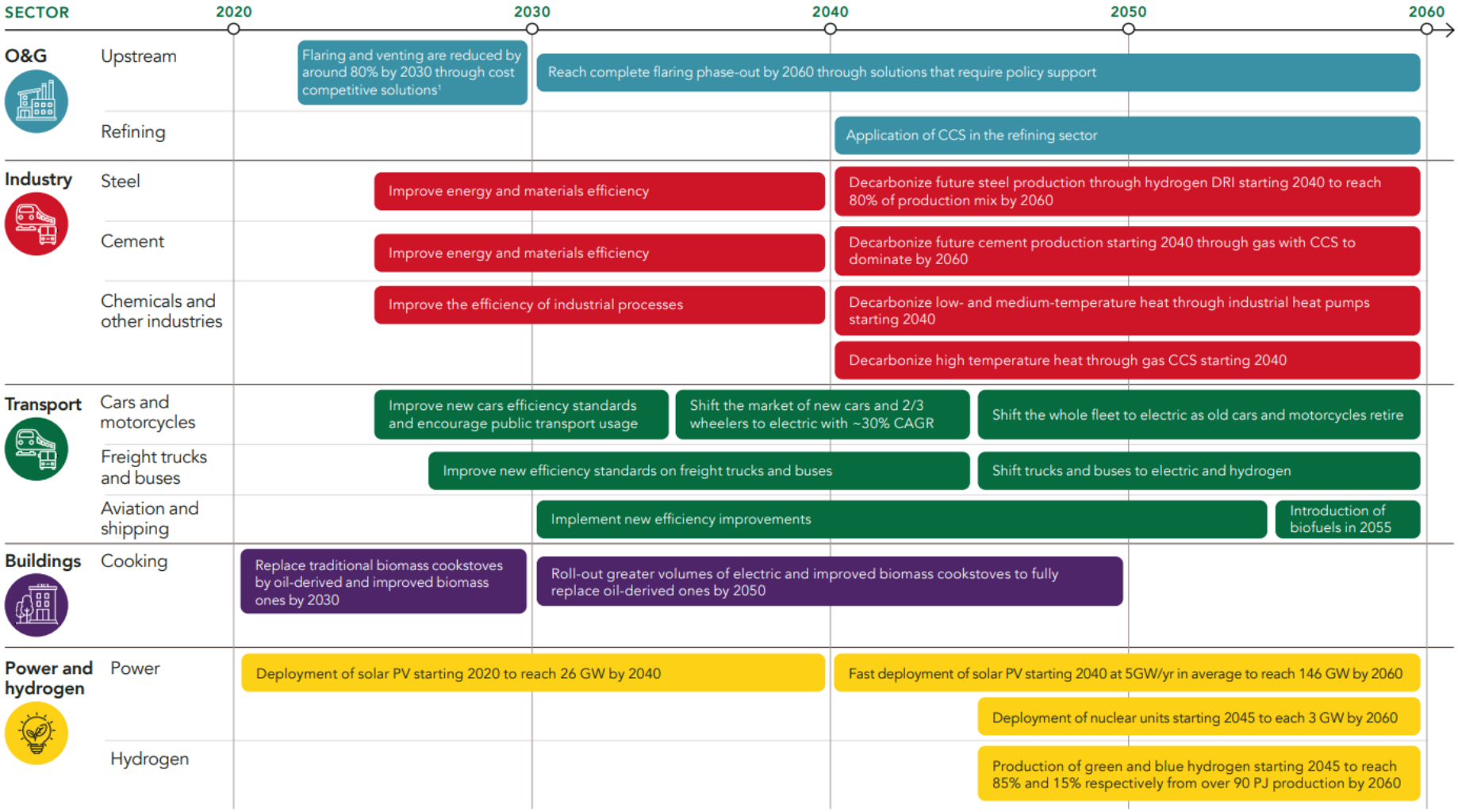
This has the **potential to create policy uncertainty and confusion as to which transition plan Ghana will implement**. It, perhaps, also reflects the different policy priorities of the two main ministries (energy and environment), with the latter opting for a more rapid transition than the former. Which of the two plans will become dominant is yet to be ascertained

Table 2 Key differences between the Ghana National Energy Transition Framework (2022-2070) and the Ghana Energy Transition and Investment Plan (2023-2060

Parameter	Ghana National Energy Transition Framework (2022-2070)	Ghana Energy Transition and Investment Plan (2023-2060)
Peak emissions	• 2050	• 2035 - Both industry and transport sector emissions • peak between 2035 and 2040
Net zero	• 2070	• 2060—emissions are close to zero in all sectors, with negative emissions in power • offsetting a small volume of residual industrial emissions.
Top 3 sectors with the most CO2 emissions potential	• Transport • Agriculture • Industry	• Transport • Industry • Power
Focus technologies	• Electrification and Renewables—Upscaling nuclear power in the electricity generation mix; 20% of electricity generation capacity is renewable energy. • Carbon Capture and Storage (CCUS)-electricity generation, Oil & Gas and Industries • Battery Electric Technologies (transport electrification drives around 40% of abatement) • Clean Cooking Technologies - rural households use LPG for cooking.	• Electrification and Renewables • Carbon Capture and Storage (CCUS) • Low-Carbon Hydrogen • Battery Electric Technologies (transport electrification drives around 40% of abatement) • Clean Cooking Technologies • Negative Emissions Technologies
Assumptions	• 2% average annual population growth • 5% average annual per capita GDP growth • 99.8% (universal electricity access by 2030) from current 88%	• Population expected to grow 1.7x, at 1.5% compounded annual growth rate (CAGR) by 2060 • GDP per capita expected to grow 4.4x, at 4% CAGR
Main anchor technology	• Nuclear energy	Battery Electric Technologies (transport electrification drives around 40% of abatement)
Cost	• US$562 billion from 2020 to 2070	• US$24 billion near-term investment opportunities in clean energy infrastructure, • US$550 billion of overall investment opportunities from 2025 to 2060; power (21%) and transport (69%) accounting for around 90% of this total

Source: Authors' construct

Figure 12 Ghana's net-zero pathway with anchor technologies



Source: Ghana Energy Transition Plan

3.2 Key Sectoral Issues and Analysis

3.2.1. Petroleum Sector

The domestic oil and gas sector will play a key role in the energy transition because the power sector relies heavily on domestic natural gas. Natural gas will be a critical transition fuel for Ghana because thermal power generation will remain the major source of electricity supply. As a result, natural gas supply must correspond to the growing power demand. In addition, potential industrial use could increase the demand for natural gas. However, the existing three producing fields have peaked, and production has declined (Figure 13**)**. Without any additional fields, production is likely to decline significantly by 2030[58], which can negatively affect Ghana's energy security.

Also, gas flaring from the oil and gas industry accounts for 30% of energy sector emissions[59]. For instance, about 46.8 billion cubic feet (bcf) of gas was flared between 2019 and 2021[60], and represent about 50 Million standard cubic feet per day (mmscfd), which is equivalent to the projected daily gas supply outlook from the West Africa Gas Pipeline between January and July[61]. This implies that critical investments are needed to effectively recover existing natural gas production to minimise the use of heavy fuel oil (HFO) as backup fuel, which is expensive and carbon-intensive. For instance, Ghana would import about 341,190 barrels of HFO at US$31.7 million to run the AKSA plants as standby for the anticipated gas supply outages.[62]

Figure 13 Forecast of Oil Production without New Fields



Liquified natural gas (LNG) imports have been contracted to address the domestic and WAGP

58 https://www.piacghana.org/ova_doc/assessment-on-10-years-of-petroleum-rrevenue-management-and-use-march_2022/
59 https://unfccc.int/sites/default/files/resource/gh_nir5_15052022_final.pdf
60 https://acep.africa/wp-content/uploads/2023/03/THE-STATE-OF-THE-ENERGY-AND-EXTRACTIVE-SECTORS-OF-GHANA-CRITICAL-REFORMS-REQUIRED-FOR-SUSTAINABLE-ECONOMIC-RECOVERY.pdf
61 https://www.energycom.gov.gh/newsite/index.php/planning/sub-codes
62 ibid

supply outages and strengthen energy security. The gas supply outages from WAGP and the potential decline in production over the medium to long term have created a need for LNG imports to complement supply, especially at Tema. Over the long term, LNG supplies will be a significant source of fuel supply for expanding thermal generation to meet the rising electricity demand. However, the existing supply arrangements are yet to deliver the first cargo shipment for LNG in Ghana. The floating regasification unit (FRU) arrived in Ghana in 2021 and the floating storage unit (FSU) also came in the same year but did not deliver any cargo. It is unclear when the LNG deliveries will begin, given that the 2021 and 2022 timelines have been missed partly because the pipeline and networks are still under construction[63]. Recently, the Chief Executive Officer of the National Petroleum Authority was reported to have said the LNG deliveries will begin by the end of this year.[64] However, they are not captured in the energy outlook for 2024, which means that financial provisions have not been made for the LNG supplies. Furthermore, concerns have been raised about the implication of the final delivered price of LNG on Ghana's weighted average gas cost. It is projected that LNG would result in a high cost of gas and higher end-user tariffs. Existing estimates put the cost of regasified LNG at between US$9 and US$11, which will be more expensive than the domestic and WAGP-delivered cost of gas. This can affect energy affordability and access for most consumers.

Critical investments are needed to address the potential gas supply risk. There is potentially wide uncertainty about the future supply outlook of natural gas in Ghana, which raises serious concerns for the growing electricity demand and the thermal production forecast of the energy transition plan. Significant investment in existing and future infrastructure is required to address potential supply constraints in the medium to long term. The existing facilities can deliver more gas to support the power sector but need investment. For instance, the Atuabo gas processing plant and the Sankofa Offshore Receiving Facility (ORF) can be upgraded to receive more gas. However, this requires financial investments in existing producing fields and potential discoveries in the sector. Also, the supply constraints and price issues make it imperative to create a supportive business climate to accelerate investment in renewable energy opportunities in Ghana.

3.2.2. Power Sector

Electricity consumption has more than doubled over the last decade, growing at an annual average rate of about 8%. This is driven by increasing economic growth[65], increased access to electricity for a larger part of the population (urban and rural)[66], and energy intensity[67]. Ghana is among the first countries in Africa[68] with the highest electricity access rate; 89% of the population had access to electricity in 2023 compared with 64% in 2010. The country's installed generation capacity increased significantly from 2,170 megawatts (MW) in 2010 to 5,454 MW in 2022. Ghana's power generation is mainly sourced from hydropower, thermal, and relatively small volumes of renewable energy.

Thermal power generation has increased significantly over the last decade to minimise the reliance on hydro and utilise domestic gas resources. The share of thermal generation capacity has increased from 45% in 2010 to 69% in 2022, growing at an annual average of about 13%[69] (Figure 14). Renewable energy, mainly solar PV, constitutes less than 1% of the generation mix, excluding hydro. The GH-NETF forecasts that the installed capacity will grow from 5,454 MW in 2022 to about 84,308 MW by 2070 to meet the electricity demand (Figure 15). Natural gas-powered power plants will be the main source of electricity until 2050 when nuclear power production is scaled up, and carbon capture and storage technologies are utilised to control emissions. The orderly transition from thermal to nuclear is likely to result in transition emissions of 14 $MtCO_2$ by 2070. Achieving these targets heavily relies on a stable natural gas supply from domestic sources, WAGP, and LNG. The risk of unreliable gas supply

63 https://www.bloomberg.com/news/articles/2024-02-20/ghana-s-lng-project-on-target-for-year-end-completion-regulator
64 ibid
65 https://doi.org/10.1080/14786451.2021.1974440
66 https://www.energycom.gov.gh/newsite/index.php/planning/energy-statistics?download=641:2024-energy-statistics
67 https://doi.org/10.1016/j.esr.2023.101090
68 https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=C9
69 https://www.energycom.gov.gh/newsite/index.php/planning/energy-statistics

over the medium to long term suggests that HFO and LCO may be considered for backup in the short to medium term, which can affect the emission reduction scenarios in the energy transition framework.

Figure 14 Installed Generation Capacity by Source

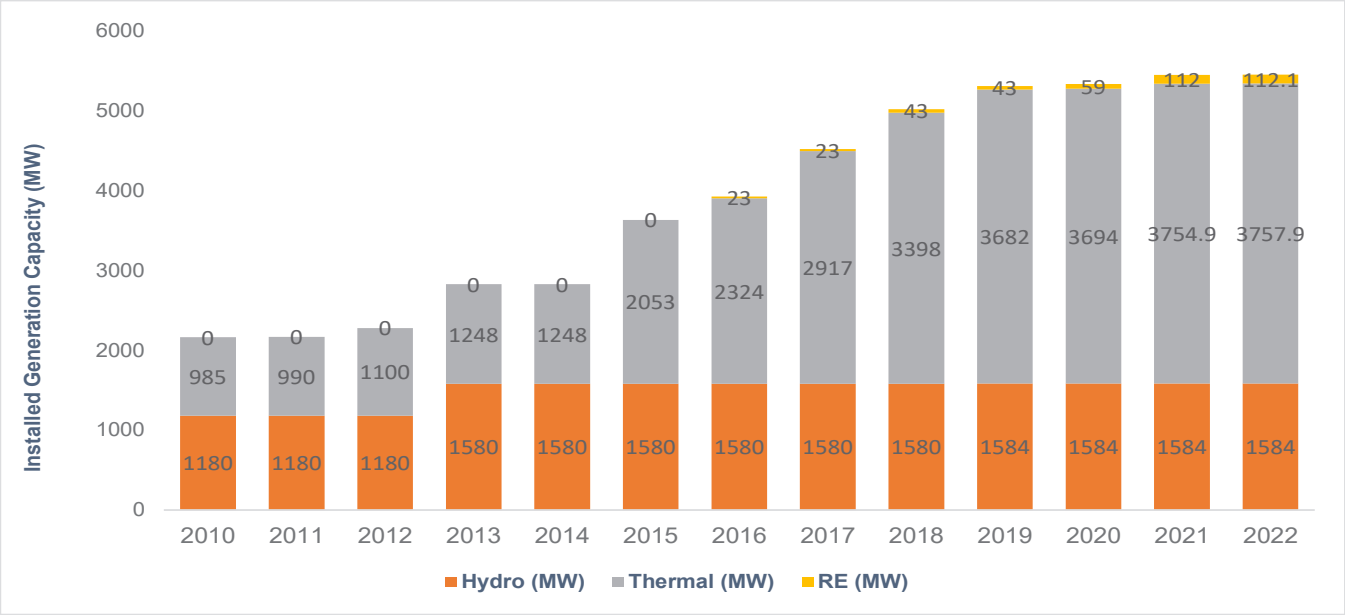
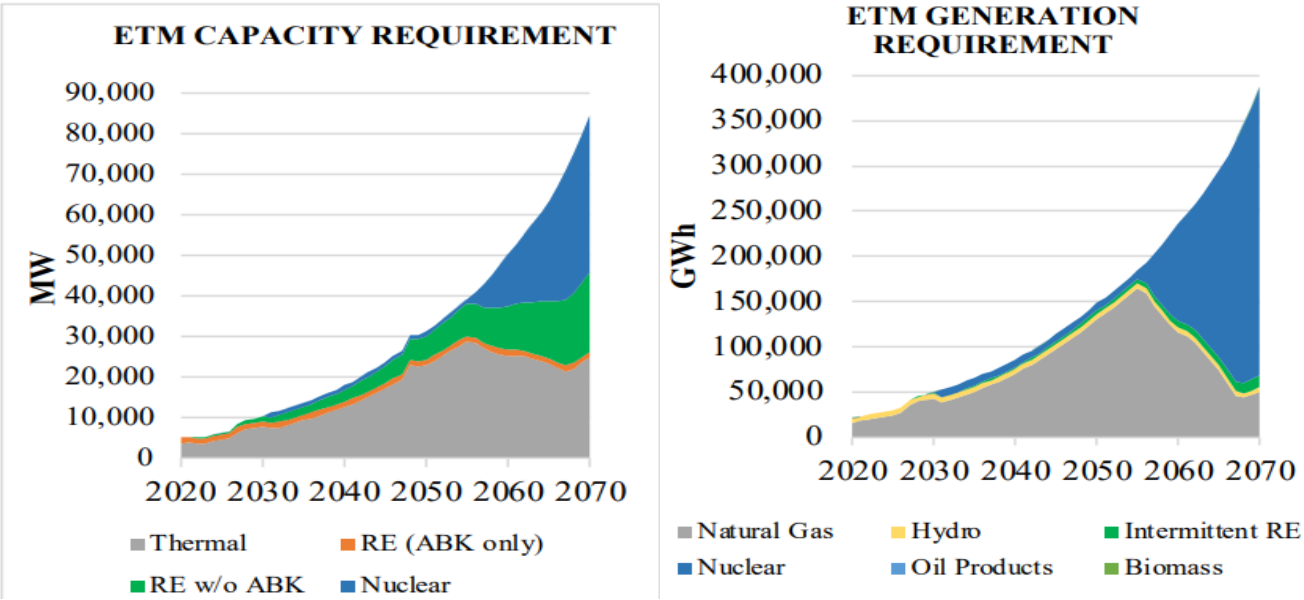


Chart: IMANI CPE I Source: Energy Commission

Figure 15 Long-term Generation Capacity Requirement



Source: Energy Transition Framework

Beyond the fuel supply constraints, the power sector faces severe liquidity issues that can affect the investments required for the energy transition. The sector is saddled with high indebtedness between the SOEs and the independent power producers (IPPs) mainly because of unreflective cost-recovery tariffs, high technical and commercial losses, and low collection rates. The energy sector debt has affected the country's debt and fiscal situation because the government must cover the revenue shortfalls. The energy sector debt accumulates despite the quarterly tariff adjustment to correct the revenue shortfalls. The verifiable energy sector arrears owed to IPPs and gas producers was 2.3% of GDP by the end of 2022[70] (US$1.6 billion), and the average arrears covered by the government in 2021 was estimated at 1.7%[71] between 2019 and 2021 (Figure 16). The arrears continued accumulating in 2023 due to the high local currency depreciation and the low revenue collection rate. Also, the Ministry of Finance cannot cover the arrears under the cash waterfall mechanism (CWM).

Figure 16 Energy sector debt, US$ million

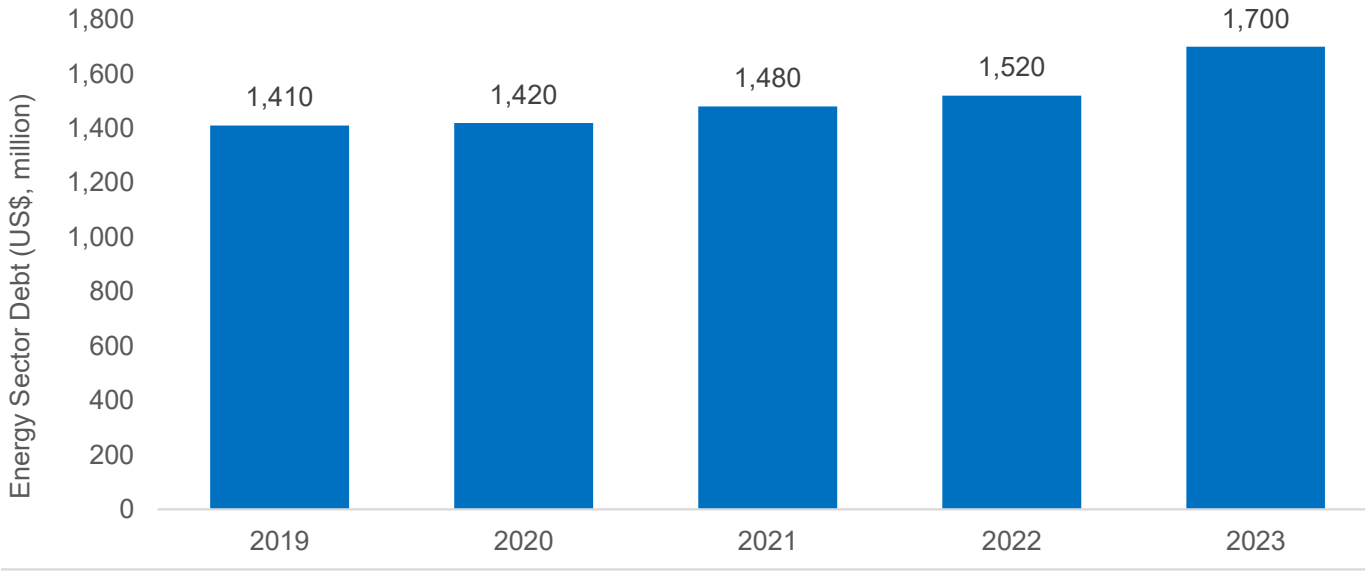


Chart: IMANI CPE I Source: IMF I *** 2023 – January – June*

The cash waterfall mechanism (CWM) has not worked as expected due to low revenue collection and non-compliance with the Electricity Company of Ghana, the leading distribution company. The cash waterfall mechanism (CWM) was implemented as part of the Energy Sector Recovery Programme (ESRP) to ensure each player in the value chain receives a share of the revenues. Between 2020 and the first half of 2023, the payments under the cash waterfall mechanism averaged about 73% of the total collection by distribution companies, which suggests that more than a fifth of the revenues are not distributed through the CWM[72]. Also, the Ministry of Finance is often unable to pay the shortfalls as agreed under the CWM. For instance, the Ministry of Finance has not paid the shortfall since August

70 https://www.imf.org/en/Publications/CR/Issues/2023/05/17/Ghana-Request-for-an-Arrangement-Under-the-Extended-Credit-Facility-Press-Release-Staff-533541

71 ibid

72 https://www.imf.org/en/Publications/CR/Issues/2024/01/25/Ghana-2023-Article-IV-Consultation-First-Review-Under-the-Extended-Credit-Facility-544137

2023[73]. This is likely to increase debt accumulation in the power sector; power generators like Volta River Authority and the renewable energy power producers are heavily affected by non-payment of the shortfalls.[74] Also, the continued low collection rate, high inflation and exchange rate crisis can potentially worsen the power sector debt. Furthermore, the energy sector levies intended to mobilise revenues to address the energy sector debt were collateralised to secure long-term bonds. Between 2017 and 2021, the government issued about GHS10.5 billion, and the outstanding debt is GHS8.3 billion[75] (Table 3). For instance, about 77% of the revenues from the Energy Debt Recovery Levies was utilised for debt servicing between 2017 and 2022[76] (Table 4). This implies that the future revenues of the existing energy sector levies may largely be used for debt services instead of dealing with the growing energy sector debt.

Table 3 Energy Sector Bond Issuance and Outstanding Debt

Description	Issued	Buyback & Cancelled	Exchange	Repayment	Outstanding
7-year bond - (E1) November 2017	2,408,626,000.00	(257,834,610.00)	(1,034,243,876.00)		1,116,547,514.00
10-year bond - (E2) November 2017	3,256,094,463.00	(695,661,399.00)		-	2,560,433,064.00
10-year bond - (E3) June 2019	1,000,000,000.00		1,073,260,326.00	-	2,073,260,326.00
12-year bond - (E4) January 2020	1,629,522,362.00			-	1,629,522,362.00
12-year bond - (E5) September 2021	2,052,556,028.00	(731,729,079.00)			1,320,826,949.00
Face value of Bonds as at 31st Dec 2021	**10,346,798,853.00**	**(1,685,225,088.00)**	**39,016,450.00**	**-**	**8,700,590,215.00**
7-year bond - (E1) November 2017		(100,468,516.00)		(304,823,700.00)	(405,292,216.00)
12-year bond - (E6) May 2022	159,240,259.00	(80,000,000.00)			79,240,259.00
Face Value of Bonds as at 31st Dec 2022	**10,506,039,112.00**	**(1,865,693,604.00)**	**39,016,450.00**	**(304,823,700.00)**	**8,374,538,258.00**

Source: Ministry of Finance

Table 4 Utilization of Energy Debt Recovery Levy

Description	Oct 2017 - Dec 2018	2019	2020	2021	2022	TOTAL
Debt Service	1,045.04	1,106.55	1,298.16	1,476.73	2,024.43	6,950.91
Administration Expenses	6.76	6.20	6.75	12.08	8.86	40.65
Bond Buybacks	218.27	446.45	-	1,020.50	180.47	1,865.69
Accrued Interest & Net Cost on Buybacks	11.77	12.60	-	48.35	(5.45)	67.27
Bond Issuance Cost	-	0.08	0.70	2.71	-	3.49
Company Income Taxes (CIT)	0.79	16.67	9.43	31.42	31.66	89.97
Total EDRL Utilisation	**1,282.63**	**1,588.55**	**1,315.04**	**2,591.79**	**2,239.97**	**9,017.98**

Source: Ministry of Finance

73 https://www.purc.com.gh/attachment/485159-20240124070114.pdf
74 ibid
75 https://www.mofep.gov.gh/sites/default/files/reports/economic/Final_2022-Annual-ESLA-Report.pdf
76 ibid

These financial challenges in the power sector threaten the viability of the SOEs and the IPPs to increase investments to meet the growing demand. Critical reforms are needed to improve the sector's revenue shortfalls, commercial and technical losses, and debt management. The liquidity constraints in the power sector can potentially delay the investments required for an orderly energy transition. Existing measures, such as the quarterly tariff adjustment to bring tariffs to cost recovery levels, must be accompanied by infrastructure investments to increase the collection rate and minimise the losses. Ghana needs financially viable IPPs and SOEs to enhance investment promotion of the energy transition plan.

3.2.3 Transportation Sector

Ghana's transportation sector has expanded significantly over the last decade, resulting in a high demand for petroleum products. Vehicle numbers doubled between 2010 and 2020 from 1 million to 2.75 million, mainly because of population growth[77]. In addition, increased off-road transportation (air and maritime) has also contributed to the growing transportation sector. This has resulted in a growth in demand for petroleum products in the sector. For instance, refined petroleum products imports have grown by about 10% between 2017 and 2021, from 3.8 million metric tonnes to 4.2 million metric tonnes[78] (Figure 17).

Industry body The Chamber of Bulk Oil Distributors (CBOD) reports that gasoline (petrol) consumption has increased from 1.1 million metric tonnes in 2016 to 1.71 million metric tonnes in 2021, about 55% growth in consumption, and gas oil (diesel) consumption has increased from 1.7 million metric tonnes in 2016 to 2.13 million metric tonnes in 2021, about 25% growth in consumption over the last five years[79] (Figure 18). Similarly, aviation fuel consumption doubled between 2010 and 2019. The consumption growth has resulted in a rise in the number of oil marketing companies (OMCs) and retail outlets, which have more than tripled between 2011 and 2021. For instance, the number of OMCs has increased from 60 to 230, and the number of retail outlets has risen from 1,252 to 4,557. While this is good for the industry, it has resulted in declining margins, making most OMCs unsustainable for the future. Also, more than 80% of petroleum products are imported, domestic production represents less than 10%, and the rest is sourced from stock opening.

Figure 17 Refined petroleum products supply

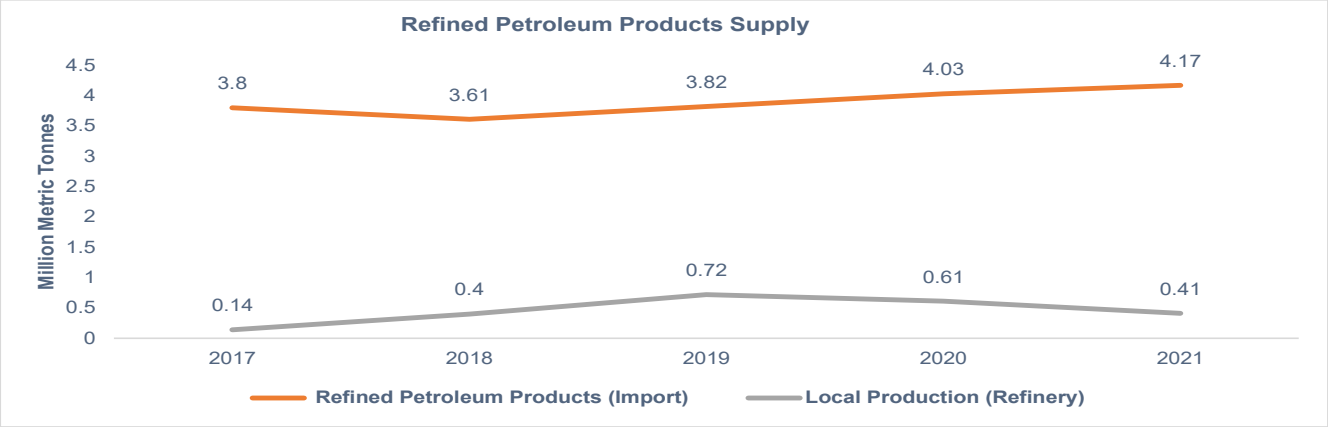


Chart: IMANI CPE I Source: CBOD

77 Ministry of Transport. (2022). National E-Mobility Policy. national-electric-mobility-policy-framework-ghana-final.pdf (unepccc.org)

78 https://cbodghana.com/industry-reports/

79 ibid

Figure 18 Gasoline and Gas Oil Consumption in Ghana

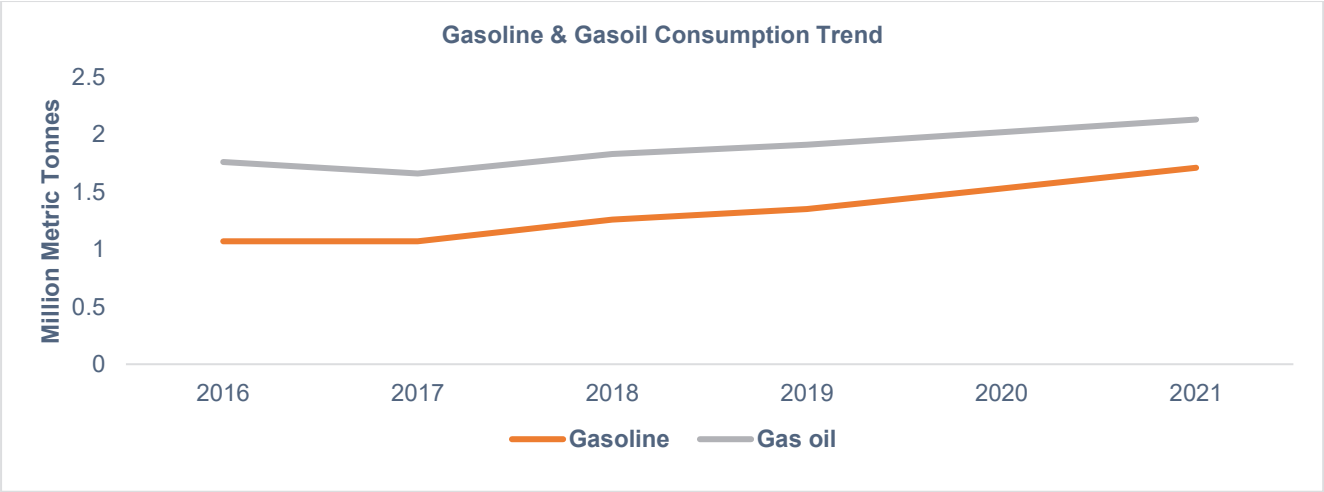
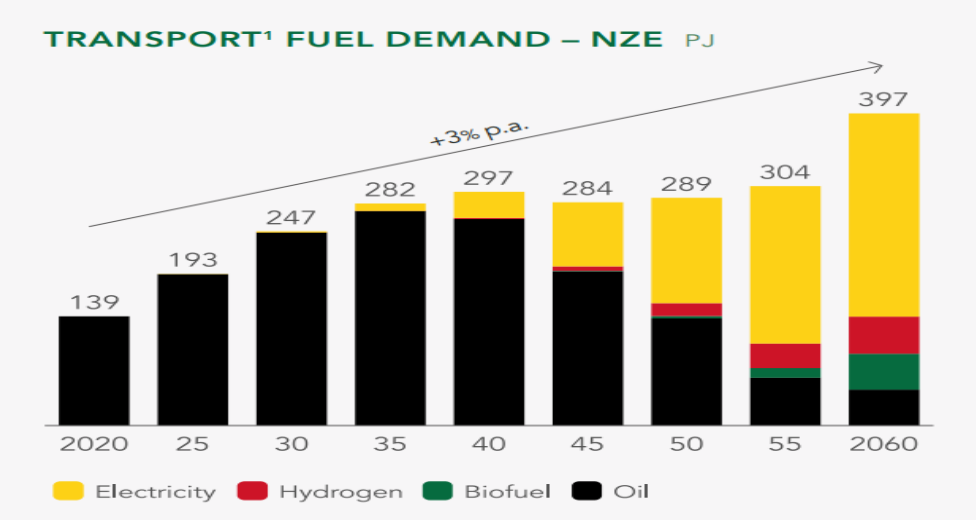


Chart: IMANI CPE I Source: CBOD

Given the upward growth in consumption of petroleum products, fossil fuels will continue to dominate the transportation sector in the near term. For example, the GH-ETIP projects that petroleum products will dominate the market until mid-2050 when EVs and hydrogen fuel will be key transportation fuels (Figure 19). This will require policy support to make EVs and hydrogen fuel competitive compared to ICEs.

Regarding interventions, the OMCs and BDCs are the main players in the downstream petroleum sector. Thus, the policy intervention must consider creating incentives for the BDCs and OMCs to explore biofuels to augment or replace Kerosene-based aviation fuel, hydrogen fuels and electric charging stations. This would ensure that the transition does not result in losing investments and jobs in the sector.

Figure 19 Transportation Fuel by 2070



Source: Energy Transition Framework

National E-Mobility Policy

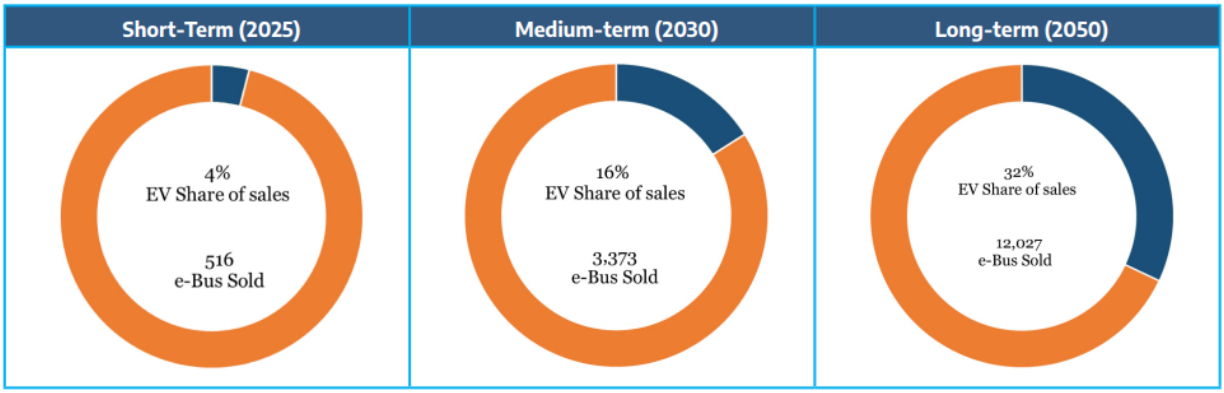
The National E-Mobility Policy is designed to accelerate EV adoption and create an enabling environment for EV investments. Recognising the contributions of the transportation sector to overall emissions, the e-mobility policy roadmap addresses the barriers to EV adoption and accelerates emissions reduction in the transportation sector. The policy prioritises EV adoption in two-wheelers (2W), three-wheelers (3W) and EV cars for private users and buses, taxis and '*trotro'* for public transportation. This means that EV interventions will focus on these areas of transportation. Key policy interventions for accelerating EV adoption include:

- **Special tax waivers and tax holidays for EVs, batteries and charging units**. This is intended to reduce the economic cost of switching to EV technologies. The waivers may be progressively reduced based on the price trajectory of the technology.
- **Special electricity tariff for EV vehicles**. This is intended to make EVs competitive against ICEs. The special tariffs may reduce the fuel cost of EVs and make them economically competitive. The policy intends to trade the carbon credit gained from these interventions to mitigate the potential revenue loss.
- **Review and revise the Harmonized Systems Customs (HS) Code to reflect EVs**. Currently, the HS codes identify EVs as hybrids and do not receive rebates. The policy seeks to revise the HS code to reflect EVs to implement waivers and other benefits effectively. This would support the harmonised licensing regime for EVs.
- **Support the private sector to construct multiple charging systems**. This intervention would target private sector actors who invest in EV charging infrastructure to ease the waiting time at charging stations. The policy would also encourage the installation of charging systems in homes.
- **Include EVs in government fleets**. The policy seeks to create local demand for EVs by including EVs in government fleets of vehicles.
- **The policy provides broad interventions to address the barriers to EV investments in Ghana.** It provides interventions that address the economic, infrastructural, technical and social barriers to EV penetration in Ghana. In addition, the policy provides specific timelines for EV adoption in the market for both public and private sectors. For instance, the policy targets 32% of EV sales to be e-buses (12,027) and e-cars (65,176) respectively by 2050 (Figure 20)[80]. This provides a clear timeline for tracking the effectiveness of the EV policy. The policy appears to reflect the goals for e-mobility in the ETFIP, where increased EV penetration is projected between 2030 and 2050. The institutional and governance framework for implementing the e-mobility policy is intended to benefit from the reforms that will accompany the revised National Transportation Policy, which seeks to establish strong and effective governance frameworks for implementing policies in the transport sector[81]. This demonstrates some form of linkages with existing policies.
- **Despite its alignment with ETIP, the policy is silent on truck electrification, as indicated in the ETIP**. Also, the policy does not provide clear guidelines for the expected financial investments required to achieve the targets and core investment attraction actions. Furthermore, the policy does not show linkages with the existing Automobile Assembling Policy even though it recognises the creation of a supportive ecosystem for EV local assembling.

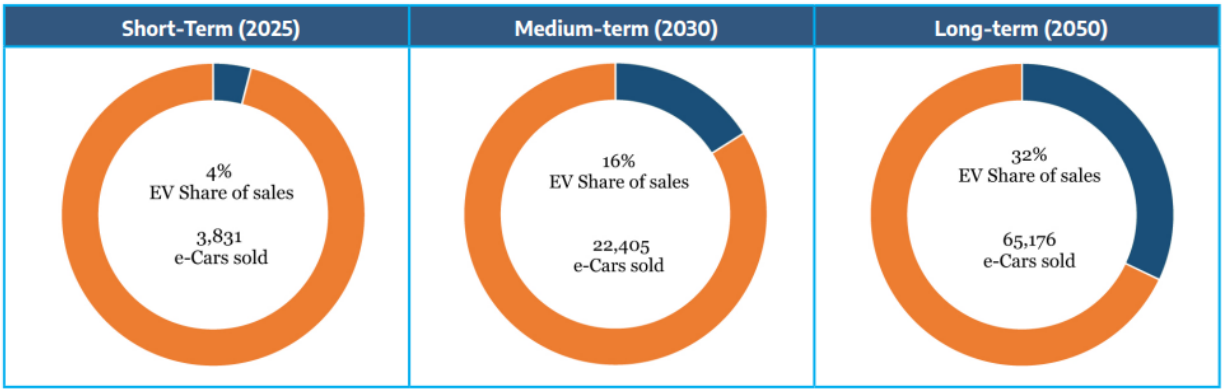
80 https://unepccc.org/wp-content/uploads/2022/08/national-electric-mobility-roadmap-upload-25072022.pdf
81 https://www.mot.gov.gh/files/resources/Final_Approved_Revised_National_Transport_Policy.pdf

Figure 20 Targets of EV Penetration in the E-Mobility Policy

E-Cars Targets



E-Bus Targets



Source: Ministry of Transport

3.3. Linkages between the Energy Transition Frameworks and the Nationally Determined Contributions (NDCs)

Ghana's nationally determined contributions (NDC) are anchored in nineteen (19) policy actions designed to contribute to the mitigation of greenhouse gases and support Ghana's climate change contribution to the Paris Agreement. The nineteen (19) policy actions are intended to amplify the synergies between adaptation and economic

development, leading to the achievement of the beneficiaries that accompany the mitigation of greenhouse gas emissions. The nineteen (19) policy actions consist of thirty-four (34) mitigation and thirteen (13) adaptation programmes of action.

The full implementation of the forty-seven (47) mitigation and adaptation programmes is expected to contribute to reducing greenhouse gas emissions by 64 $MtCO_2e$ by 2030[82]. About US$9.3 to US$15.5 billion of capital investment is needed to implement the forty-seven (47) programmes of action to achieve the climate targets by 2030.

82 See https://mesti.gov.gh/wp-content/uploads/2021/12/Ghanas-Updated-Nationally-Determined-Contribution-to-the-UNFCCC_2021.pdf

The energy transition is a pivotal component of the NDCs. The energy transition plan is reflected in the nationally determined contributions around eight (8) policy actions (Figure 21):

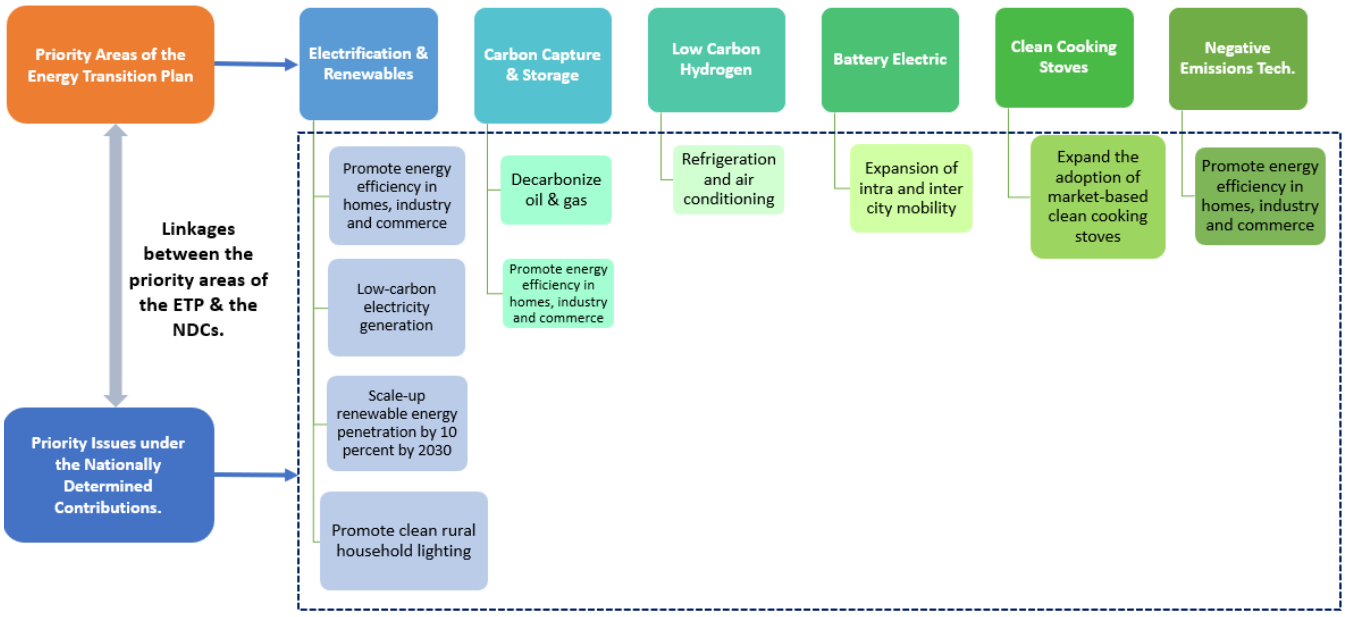
1. Promote energy efficiency in homes, industry and commerce.
2. Refrigeration and air conditioning.
3. Low-carbon electricity generation.
4. Expand the adoption of market-based clean cooking stoves.
5. Scale up renewable energy penetration by 10% by 2030.
6. Expansion of intra and intercity mobility.
7. Promote clean rural household lighting.
8. Decarbonise oil and gas activities- to be achieved by 2030.

This implies that these actions must align with the energy transition plan and targets within the same timeline. The key expected milestones of the energy transition by 2030 include:

1. Reduce flaring and venting by 80% by 2030 through competitive solutions.
2. Improve energy efficiency in industrial processes such as steel, cement, and other chemical industrial processes.
3. Improve new cars, freight and truck efficiency standards and encourage the use of public transport.
4. Replace traditional biomass cookstoves with oil-derived fuels and improved biomass cooking solutions.
5. The deployment of solar PV will begin in 2020.

The NDCs represent the broad policy framework for mitigating greenhouse gas emissions and improving the resilience of communities to climate change. The alignment between the nationally determined contributions and the energy transition plan indicates deliberate steps to ensure that the energy-related policy actions in the NDCs are integrated into energy policymaking because the energy transition plan will become the guiding blueprint for future energy policy development. Thus, **implementing the energy transition plan would catalyse the realisation of energy-related action programmes in the NDCs**.

Figure 21 Linkages between the Priority Areas of the ETP & NDCs



3.4 Summary

Ghana has developed its long-term decarbonisation strategy for achieving net zero by 2070. The strategy provides key outcomes, targets, and anchor technologies to achieve net zero. Achieving net zero in Ghana critically depends on decarbonising the transportation and electricity sectors and integrating clean solutions such as carbon capture and storage and negative emissions interventions to strengthen emissions reduction. Also, the ETIP aligns well with the NDCs and can complement their short-term goals.

Several sectoral challenges may delay the achievement of the targets in the GH-NETP or GH-ETIP. For instance, supply uncertainties of natural gas may affect the achievement of the projected thermal expansion to ensure an orderly transition. The existing supply risk creates room for LCO and HFO as back fuels, which may defeat the emission reduction goals in the NDCs and the transition plans. Decarbonising the transportation sector may take long, and any delays in accelerating EV penetration before mid-2050 may affect the realisation of expected emission reduction from the transport sector. The existing e-mobility policy aligns with GH-ETIP. However, it does not cover trucks and provides limited information on policy support for stimulating the financing of EVs in Ghana. The REMP and RE Act provide support for renewable technologies, but weak implementation and the absence of domestic manufacturing affect the effectiveness of the policy.



4.0

Ghana's National Energy Transition Financing Strategy Review

This section of the report assesses the various expected sources of financing for Ghana's energy transition plan by sector and financing type.

4.1 Financing analysis by sector

Despite the estimated cumulative capital investment needs of Ghana's energy transition at between US$550 billion (by 2060) and US$562 billion (by 2070), the sectoral emphasis substantially differs depending on which of the two transition plans/ frameworks one decides to go with, further adding to the policy incoherence and uncertainty. The **Ghana National Energy Transition Framework (GH-NETF: 2022-2070)**[83]**,** led and produced by The Ministry of Energy, envisages that the bulk of Ghana's energy transition investments will be in decarbonising the power sector given the sector's significant contribution to GHG emissions (Figure 22).

In contrast, the **Ghana Energy Transition and Investment Plan (GH-ETIP 2023-2060)**[84], produced by SEforAll under the auspices of the Ministry for Environment, Science, Technology & Innovation (MESTI), envisages a more significant investment requirement in the transportation sector. For example, under GH-NETF, US$266 billion (47%) of all investments will be in new generation sources such as nuclear and renewable energy. In comparison, another US$76 billion (14%) will be used for upgrading electricity transmission and distribution systems. The transport sector replacing or switching fuel is estimated at US$12.3 billion (2%). GH-ETIP, on the other hand, envisages that US$379.5 billion (69%) of all total capital investment to reach net-zero by 2060 would be in transportation while another US$115.5 (21%) will be for the power sector, including hydrogen use. Industry and buildings account for under 10% of total investment (Figure 23).

The fact that these two transition frameworks/ plans currently have widely different sectoral emission pathways and technologies adds to the policy uncertainty and confusion on which path Ghana is likely to follow. This is captured succinctly in the views of various participants during stakeholder consultations.

'We need clarity on both transition plans. The differences are not minimal, but rather major. If you look at the technologies, one is heavily solar, and the other is heavily focused on nuclear…We need investors to be sure of what is happening. Are we taking the nuclear option or going solar? If there is a middle ground to explore, we may need a third transition plan which would put the two existing plans together and then come up with some middle-ground technologies- because having two existing plans would definitely confuse investors. '

Another remarked:

"The energy transition investment plan tried to woo investors into implementing what is in the framework. I'll plead with the ministry to do a public dialogue with technical experts, comparing the documents and teasing out what is really wrong in terms of technology considerations and what is realistic. Most of us in the technical field attest to the fact that we can put as much solar as we can, but we can't have 100% solar in our energy mix."

83 https://www.energymin.gov.gh/sites/default/files/2023-09/FINAL%20GHANA%27S%20NATIONAL%20ENERGY%20TRANSITION%20FRAMEWORK_2023_compressed%20%281%29_compressed%20%282%29.pdf

84 https://www.seforall.org/system/files/2023-09/report-ghana-etip_WEB.pdf

Figure 22 Investment requirements under the National Energy Transition Framework (2022-2070)

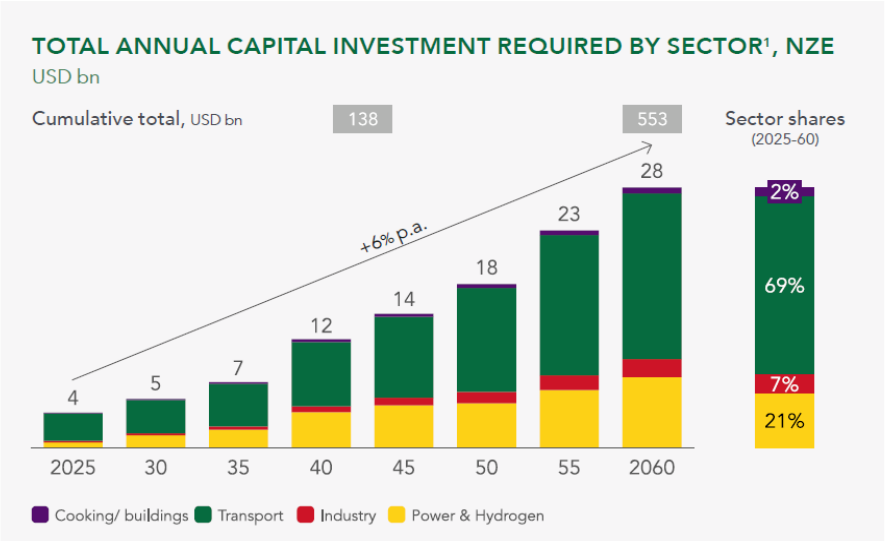
Investment needs for power supply in the transition

		Billion USD	% Share
Power Generation	Power Generation	266.1	47.4%
Residential	Appliances, modern fuels	148.2	26.4%
Services	Air conditioners	8.4	1.5%
	Refrigeration	6.1	1.1%
Industry	Electric motors	1.2	0.2%
	Gas and electric boilers	6.2	1.1%
Road Transport	Vehicle fleet renovations	12.3	2.2%
Infrastructures	Power Transmission and Distribution	76.0	13.5%
	CCUS	14.6	2.6%
	Electric charging stations	7.0	1.2%
	Gas Transmission	7.0	1.2%
	Gas Distribution	7.0	1.2%
	CNG stations	1.3	0.2%
	Storage	0.5	0.1%
Total Estimated Investments (2020-2070)		561.8	100.0%

Source: National Energy Transition Framework 2022: p.80

Figure 23 Investment requirements under the Ghana Energy Transition and Investment Plan (2023-2060)

Around USD 550 bn cumulative capital investment is needed, with power and transport accounting for around 90% of this total



Source: National Energy Transition Framework 2022: p.80

4.2 Financing analysis by source

- **Given limited national public funding, Ghana needs more international public financing and private sector capital as well as de-risking instruments to finance the country's energy transition.** We categorise the funding into two streams: Public finance from national and international sources and (2) Private finance from national and international sources (Figure 24). Funding is expected to come from sources such as the Government of Ghana (GoG), Multilateral Development Banks (MDBs), Development Partners (DPs) and Private Financiers and Beneficiaries (PF&B).

- **World Bank:** The World Bank provides loans, grants, and technical assistance, among other finance channels, to assist Ghana in achieving its energy transition. It also funds energy efficiency programs, renewable energy projects, and legislative changes to encourage sustainable energy development and lower greenhouse gas emissions.

- **International Finance Corporation:** The IFC, the private sector division of the World Bank Group, makes investments in clean technology, energy efficiency, and renewable energy projects in Ghana. It offers equity investments, advice services, and funding to encourage business sector involvement in the energy transformation.

- **African Development Bank:** Ghana's energy transition projects, such as those involving the development of renewable energy, energy access initiatives, and grid modernisation projects, are financially supported by the AfDB. To encourage sustainable energy initiatives and improve energy security, it provides loans, grants, and technical help.

- **European Investment Bank:** The EIB finances energy transition projects in Ghana through loans, grants, and technical assistance. It supports renewable energy deployment, energy efficiency improvements, and sustainable infrastructure development to mitigate climate change impacts and promote sustainable development. International development finance institutions (DFIs), including the World Bank, International Finance Corporation (IFC), and African Development Bank (AfDB), are important sources of funding and technical support for Ghanaian development projects. To achieve sustainable development, they are in favour of legislative reforms, infrastructure development, private sector investment, and capacity-building programs.

- **Ghana Infrastructure Investment Fund[85]:** GIIF is a sovereign wealth fund that was created to raise and oversee capital for projects related to the country's infrastructure development. It offers long-term funding for initiatives related to energy, transportation, water, sanitary facilities, and telecommunications.

- **Venture Capital Trust Fund[86]:** A government program called VCTF helps startups, SMEs, and creative businesses in Ghana by offering venture capital and equity financing. It makes investments in companies with significant growth potential in a number of industries, such as manufacturing, services, agribusiness, and technology.

- **Development, Commercial Banks and Financial Institutions:** Commercial banks and financial institutions in Ghana may offer loans, lines of credit, and other financial products to support renewable energy projects. They play a critical role in mobilising private capital and facilitating investment in the energy transition. Ghana has created the **Development Bank Ghana (DBG)**[87] as its development finance institution through which it would provide long-term capital provider in the market for businesses, including climate-smart enterprises.

85 https://mofep.gov.gh/sites/default/files/reports/economic/GIIF Investment Policy Statement_April62017.pdf
86 https://thebftonline.com/2022/06/10/the-climate-finance-highlights-financing-options-for-renewable-energy-in-ghana/
87 https://www.dbg.com.gh/who-we-are/

- **Climate Finance Mechanisms**: These funds provide financial resources and technical assistance to address climate change challenges:

- **Green Climate Fund**[88]**:** Ghana is one of the developing nations that receives climate money from the GCF for initiatives aimed at mitigating the effects of climate change. In order to mitigate the effects of climate change and advance sustainable development, it provides funding for renewable energy projects, climate-smart agriculture programs, and resilience-building techniques.

- **Global Environment Facility**[89]**:** The Global Environmental Fund (GEF) funds programmes that tackle global environmental issues, such as biodiversity protection, sustainable land management, and climate change adaptation and mitigation. It supports energy transformation projects in Ghana and other developing nations with funds and technical help.

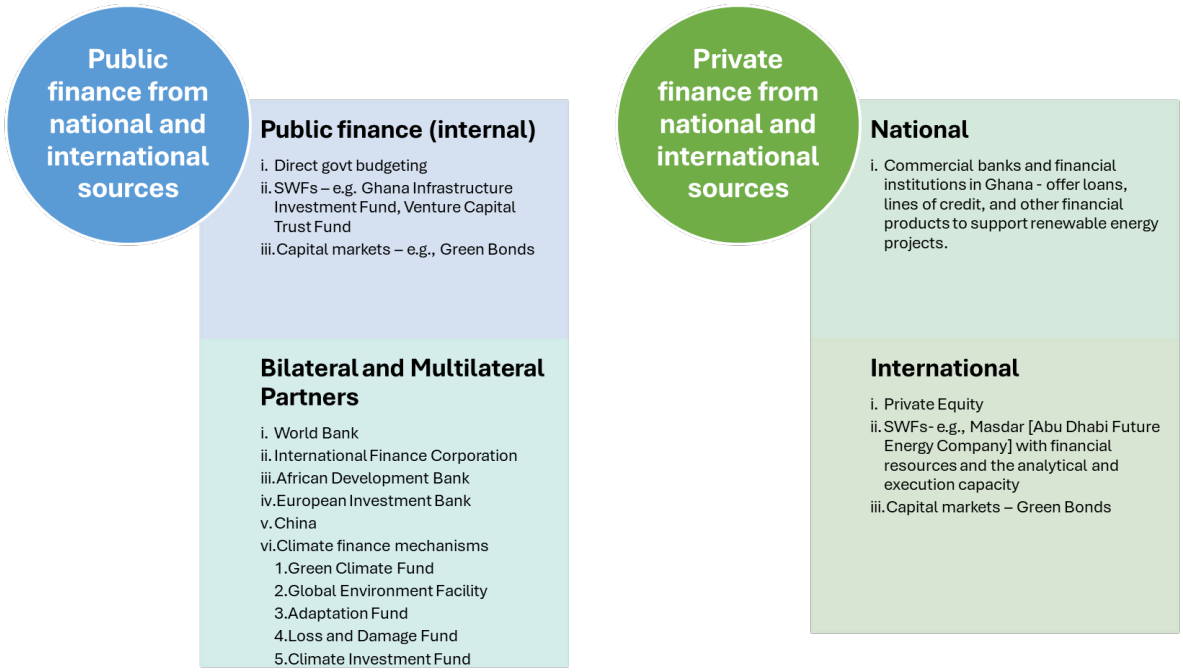
- **The Adaptation Fund:** A UNFCCC financing mechanism known as the Adaptation Fund was created under the Kyoto Protocol to support climate change adaptation initiatives in developing nations that are at risk of natural disasters. It seeks to increase community resilience, lessen vulnerability, and advance climate-sensitive industries including infrastructure, agriculture, and water resources through sustainable development. The sources of fund funding are voluntary contributions from governments, international organisations, and businesses in the private sector, as well as clean development strategies.

- **Climate Investment Fund**[90]**:** The international financing mechanism known as the Climate Investment Funds (CIF) was created in 2008 to give developing nations climate finance to aid in their efforts to reduce greenhouse gas emissions and prepare for the effects of climate change. The CIF was created under the UNFCCC to promote low-carbon, climate-resilient development through the provision of financial resources, technical support, and aid in building capacity. Through focused climate finance initiatives like the Clean Technology Fund and the Strategic Climate Fund, it transfers money from donor nations and IFIs to recipient nations.

- **Others:** There are proposals for a dedicated national climate finance facility (green bank) as well as issuing green bonds[91] along the recommendations of the AfDB's African Green Bank Initiative[92] to finance green finance architecture such as being done in Cote d'Ivoire and Benin, among others[93].

88 https://www.greenclimate.fund/project/fp231
89 https://www.thegef.org/projects-operations/country-profiles/ghana
90 https://www.cif.org/country/ghana
91 https://sec.gov.gh/wp-content/uploads/Final-Regulatory-Laws/Guidelines/Green_Bond_Guidelines_2024.pdf
92 https://www.afdb.org/en/topics-and-sectors/initiatives-and-partnerships/african-green-banks-initiative
93 https://www.afdb.org/en/news-and-events/benin-cote-divoire-premier-african-development-banks-african-green-bank-facilities-61092

Figure 24 The Architecture of the Various Financing Sources



Source: Authors' construct

The majority of the funding (US$133.2 billion; 42%) for the US$266.1 billion power generation component of the Ghana National Energy Transition Framework (GH-NETF: 2022-2070) is expected to come from MDBs (Figure 28). Another US$91.9 billion (35%) is expected to come from Private Financiers and Beneficiaries (PF&B), while US$29 billion (11%) would come from DPs. GoG is expected to contribute a co-financing amount of US$32 billion (12%).

Domestically, Ghana could unlock additional domestic financing through ongoing public financial management (PFM) reforms under the IMF programme and efficiency gains to fund some of the energy transition plans—we are unsure of the quantum of additional funding this could yield, but also there are spending pressures on the budget such as education, health and social spending. Also, **newly created domestic public financing bodies such as the Development Bank Ghana (DBG) could prioritise some of their portfolio allocation to fund the energy transition through catalytic co-investments with other multilateral agencies and private sector financing bodies**. This could support highly prospective early-stage energy ventures (including low-carbon ones) that need low-interest patient capital and technical assistance to derisk their investments. DBG already indicates[94] their support for SDGs 9, 13 and 17 as follows:

SDG 9— "Increase the access of small-scale industrial and other enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets".

SDG 13—"Promote mechanisms for raising capacity for effective climate change-related planning and management including focusing on women, youth, local and marginalised communities".

SDG 17—"Deepen global partnership for sustainable development, complemented by multi-stakeholder partnerships that mobilise and share knowledge, expertise, technology, and financial resources, to support the achievement of the sustainable

94 https://www.dbg.com.gh/sustainability/

development goals".

Despite the above initiatives, we still assess that most of the investment requirements would need to be externally sourced: **there is an avenue to tap into external sovereign wealth funds (SWFs), including from the Gulf States**[95] **who are looking at diversifying their portfolios into Africa**[96]Gulf-based SWFs such as Masdar (also known as the Abu Dhabi Future Energy Company), Qatar Investment Authority (QIA), and the Saudi Public Invest Fund (PIF), which have historically invested in North Africa, are considering expanding into Sub-Saharan Africa in search of low-carbon opportunities.[97] Media reports indicate that in 2023 alone, the Gulf states made investment pledges of over U$53 billion, almost four times more than the United States.[98] However, translating these pledges into low-carbon investment projects requires innovative government guarantee mechanisms and project scalability to make investments attractive to investors.

Figure 25 Financing the power generation component of the Ghana National Energy Transition Framework (GH-NETF: 2022-2070)

	GoG	MDBs	DPs	PI&B	Total
Co-financing amount (billion US$)	32.0	113.2	29.0	91.9	266.1
Share of co-financing	12%	43%	11%	35%	100%
Financing per decade in US$(billion)					
Period up to 2030	2.9	2.6	0.7	2.1	8.3
Period 2030-2040	3.4	5.7	1.5	4.6	15.2
Period 2040-2050	3.5	6.4	1.6	5.2	16.7
Period 2050-2060	9.5	32.3	8.3	26.2	76.3
Period 2060-2070	12.7	66.2	16.9	53.7	149.5

Source: National Energy Transition Framework 2022: p.83

In a broader sense, the strategies for raising funding for Ghana's energy transition, as captured in the GH-NETF (2022-2070) and the GH-ETIP (2023-2060), include:

Mobilising private and public finance to catalyse and create traction for RE investments. Renewables (especially solar) have been historically successful venues for blended (catalytic) finance interventions.[99]

Using Public Private Partnerships (PPPs) to co-finance the construction, development and deployment of transition infrastructure and extraction of fossil fuels and other critical minerals, including bauxite, copper, lithium and others.

95 https://ecfr.eu/publication/beyond-competition-how-europe-can-harness-the-uaes-energy-ambitions-in-africa/
96 https://www.africa-energy.com/news-centre/article/gulf-players-expand-africa-seeking-low-carbon-profits
97 https://energy-utilities.com/africa-energy-sectors-to-receive-rising-sovereign-news121231.html
98 https://time.com/6975593/gulf-investment-boom-africa/
99 https://blogs.worldbank.org/en/ppps/blended-finance-can-catalyze-renewable-energy-investments-low-income-countries

- **Domestic financing** for Small and Medium Enterprises (SMEs) in end-use technologies sector.
- **Community energy ownership**—encouraging municipalities and districts to contribute to own renewable energy installations such as mini-grid solutions / off-grid solutions).
- **Energy efficient technologies for industries**—for example, industrial carbon capture utilisation and storage (CCUS), Green steel facilities, including scrap steel (electric arc furnaces, gas/hydrogen).
- **Green and Municipal bonds** for long-term and capital-intensive projects.
- **Incentivise consumers** to use low-carbon technologies with flexible and affordable funding options from domestic banks and or special funds.

Nevertheless, meeting these strategic objectives requires overcoming some project financing challenges, including the need to develop appropriate financial instruments to de-risk investments, especially for renewable energy, CRM, and other related infrastructure projects. The next section discusses these in detail.

4.3 Financing risk analysis

Ghana faces significant challenges with financing its energy transition and broader climate aspirations as captured in the Nationally Determined Contributions (NDCs), stemming from capacity gaps in preparing bankable or commercially viable projects by the private sector and government agencies.

1. **The current challenging macroeconomic environment constrains central government and Ghanaian private sector investment in transition financing or broader climate action**. It is widely acknowledged that a combination of private sector capital and de-risking instruments is needed if Ghana (and indeed many African countries) are to meet their energy transition goals.

However, the current macroeconomic environment in the country, evidenced by a high cost of living, high inflation and cost of capital, and debt distress, means that the central government (GoG) and the Ghanaian private sector have limited capacity to finance the energy transition. Since December 2022, Ghana has been debt distressed and renegotiating its debt with creditors. Large fiscal deficits and the economic slowdown in the wake of the COVID-19 pandemic led to an increase in public debt from 63% of GDP in 2019 to 88.1% of GDP at end-2022 with external debt comprising 42.4% of GDP while domestic was 45.7% of GDP. About 80% of Ghana's overall debt service in 2022 was due to high interest rates and short average maturity. Ghana turned to the IMF for a bailout in May 2023[100] to address these macroeconomic imbalances[101]. These sentiments are shared by stakeholders who expressed:

"The truth is that we don't think long-term when we make policies. We shouldn't be expecting people to make investments when you are flip-flopping on your policies. Whether it's public money or private money, if the environment is not stable, the investor will be careful about what to do. So the starting point is for us to be clear on what we are doing and how we are doing it and have it as a stable regime going forward. "

100 https://www.imf.org/en/News/Articles/2023/05/17/pr23151-ghana-imf-executive-board-approves-extended-credit-facility-arrangement-for-ghana

101 https://theconversation.com/ghanas-return-to-the-imf-within-three-years-underscores-its-deeper-economic-problems-187041

They further remarked:

> *"The other part of it is stability. If you are going to bring in investment, [then] the macro environment is important. And if the macro is flying all over the place [as we have seen in recent times], everybody will be careful about bringing in money. It doesn't matter whether it is private money, public money, or it's outside money, or it's inside Ghana- If you are going to make an investment in dollars and then get revenue in cedis, you'd want to be careful in the context of the prevailing economic environment.*

2. **Ghana's power sector faces severe liquidity issues, affecting investments required for the energy transition.** Ghana's long-standing energy sector debt has far-reaching direct and indirect impacts on the economy as a whole and the energy sector. By end-2022, the outstanding energy sector debt had reached US$1.6 billion, owed mainly to IPPs and fuel suppliers, according to IMF estimates.[102] These debts arise due to (1) the chronic non-payment of bills for electricity used by public institutions; (2) over 30%[103] technical and commercial losses compared to a Sub-Saharan African average of about 15%[104], and estimated to cost several millions of dollars annually; and thus, poor revenue collections by distribution utilities—namely Electricity Company of Ghana (ECG) and the Northern Electricity Distribution Company (NEDCo); (3) electricity tariffs that are not cost-reflective/below cost; (4) excess capacity combined with take-or-pay contracts, and (5) exchange rate impacts (power sector costs such as fuel, capital recovery, other variable costs are dollar-denominated while revenues are received in the local currency (cedi). Thus, even when tariffs are increased, the depreciating cedi mitigates the impacts. For example, the dollar value of electricity tariffs reduced by about 25% between 2017 and 2023.[105]

As a stakeholder remarked:

> "*The key challenge in Ghana is that over 50% of our energy comes from thermal sources, which means that every month, we are buying fuel. And the sad part is that we need to collect all our revenues in the local currency, both for repayment of the infrastructure, that is the thermal plants, and also to pay for the fuel that we import to power our thermal plants."*

3. **There is a need for more appropriate instruments that will allow the de-risking of some project archetypes to improve bankability.** De-risking by use of catalytic (concessional) capital should be targeted, as concessional funds are scarce and not all sectors and projects offer the right mix of private and public benefits to justify the use of (largely) public money for this purpose.[106] Various energy projects, especially clean energy ones, are not able to reach the final investment decision (FID) due to significant perceived investment risks such as political/country risk, credit/liquidity risk,

102 https://www.imf.org/en/Publications/CR/Issues/2024/01/25/Ghana-2023-Article-IV-Consultation-First-Review-Under-the-Extended-Credit-Facility-544137
103 https://www.energycom.gov.gh/newsite/index.php/planning/energy-statistics?download=641:2024-energy-statistics at p.31
104 https://iea.blob.core.windows.net/assets/220b2862-33a6-47bd-81e9-00e586f4d384/AfricaEnergyOutlook2022.pdf at p.130
105 https://www.energycom.gov.gh/newsite/index.php/planning/energy-statistics?download=641:2024-energy-statistics at p.51
106 https://www.nber.org/papers/w32287

operational risk, construction risks, and offtake risk, among others (Figure 30). Various derisking instruments, especially from multilateral and bilateral global development finance institutions (DFIs) and green finance funds, are needed to unlock additional private sector capital to drive Ghana's energy transition. These de-risking instruments include equity, loans (debt financing), export credits, political risk insurance (PRI), partial risk guarantees (PRG), and currency hedging instruments, among others. Consultations with stakeholders point to the need for closer collaboration among the DFIs, the government and the private sector to understand project risks better and, therefore, deploy the appropriate instruments to derisk them.

. A combination of private sector (commercial, financial institutions, corporations) and domestic public capital (public institutions), as well as de-risking instruments (e.g., guarantees, insurance, first-loss capital, among others) by DFIs (for example, The World Bank, AfDB, USAID, GIZ, and others.) and Green Finance funds (for example, Clean Tech Fund, Global Environment Facility, among others.), is critical for meeting energy transition goals. Ghana has had **Sustainable Banking Principles**[107] since 2015, which are meant to catalyse more lending to growth-enhancing sectors such as agriculture, construction, and energy. This comes in addition to other guidelines and regulations issued by the Ghana Stock Exchange and the Securities and Exchange Commission to guide financial institutions and other businesses on sustainable financing in Ghana. However, bank lending (and, by extension, other forms of credit) is still largely concentrated in the services sector of the economy, including commerce and finance. Manufacturing, energy, and other sectors, such as agriculture, continue to receive less credit. [108] **There are renewed calls for banks to take deliberate actions towards financing projects within Ghana's renewable energy space**.[109]

A stakeholder remarked:

No investor at the moment is looking to invest in areas where they don't know for certain the returns to be made on those investments. We've all heard of non-performing loan portfolios and how they keep increasing. The risk default might be too high.

107 https://www.bog.gov.gh/wp-content/uploads/2019/12/Ghana-Sustainable-Banking-Principles-and-Guidelines-Book-1.pdf

108 See Table 3.4: Sectoral Distribution of Banks' Outstanding Credit - https://www.bog.gov.gh/wp-content/uploads/2024/05/Bank-of-Ghana-2023-Annual-Report-and-Financial-Statements.pdf#page=50.99

109 https://www.asaaseradio.com/kpmg-to-banks-be-deliberate-about-financing-renewable-energy-and-sustainability-focused-projects/

Figure 26 Project risks and other de-risking instruments to attract private capital

NON-EXHAUSTIVE

INSTRUMENT	RISK								
	MACRO		CREDIT			TECHNICAL		MARKET	
	POLITICAL/ COUNTRY RISK	CURRENCY RISK	CREDIT RISK	LIQUIDITY RISK	DEMAND RISK	CONSTRUCT-ION RISK	OPERATIONAL RISK	LACK OF PIPELINE	OFF-TAKE TISK
1. Guarantees	■		■	■		■	■		■
2. Insurance	■			■		■	■		
3. Hedging		■			■				
4. Junior/ subordinated cap			■	■		■	■	■	
5. Securitization			■	■					
6. Contractual mechanisms					■				■
7. Results-based incentivies							■		
8. Grants								■	

Source: Ghana Energy Transition and Investment Plan, 2023: p.32

4. **Improve project viability through the launch of the portal with pre-assessed investment-ready projects across the energy and climate lifecycle.** Both the National Energy Transition Framework (GH-NETF: 2022-2070), Ghana Energy Transition and Investment Plan (GH-ETIP 2023-2060) and even the nineteen (19) Policy Actions from Ghana's nationally determined contributions (NDCs)[110] need to be translated into a pipeline of investment-ready projects. For example, deploying electric vehicles and hydrogen requires extensive enabling infrastructure, such as electric charging points and stations. Similarly, within the industrial sector, the plans talk about replacing biomass boilers with gas and electric boilers to improve efficiency. Within renewable energy, the plans talk about deploying utility-scale renewables and mini-grids to scale-up renewable energy penetration by 10% by 2030. Others include expanding the adoption of market-based cleaner cooking solutions (clean cookstoves).

   Interactions with financiers and other stakeholders, however, reveal the need for the government to move one step further in bridging the information and project asymmetry gap through a publicly accessible national project portal that would showcase pre-assessed or partially derisked investment-ready projects across the energy and climate lifecycle. Such a portal would allow locally based companies to access green finance opportunities from different agencies, including DFIs and private sector funds. It has the potential to catalyse new low-carbon investments in renewables, hydrogen, circular economy, nature-based solutions and sustainable materials, energy storage and clean heat. Unlocking the potential of green finance is, therefore, integral to Ghana's energy transition aspirations. Technical assistance being provided by donor partners to Ghanaian government ministries, departments, and agencies could be channelled into making this happen. Two stakeholder comments highlight the potential of such a portal in catalysing additional financing for the energy transition:

110 https://unfccc.int/sites/default/files/NDC/2022-06/Ghana%27s%20Updated%20Nationally%20Determined%20Contribution%20to%20the%20UNFCCC_2021.pdf

An already existing prepared list of projects would imply that the country has accepted that these are the projects to be focused on going forward. But if we don't have that and somebody creates a project and tries to convince somebody to go forward with it, there might be the likelihood that the idea may die at inception…it may not have been well tested and accepted by everybody. It will be important to have a portfolio of projects that we have prepared, that we know are wise and the direction we want to go.

Another remarked:

The climate desk at the Finance Ministry should help local entrepreneurs and investors- basically getting the local entrepreneurs to work with them to plan the projects, identify the risks, and do all of the necessary background work that is required before engaging with investors. Donor or technical assistance that's coming could actually go into helping with the project improvement or the project screening in that regard.



5.0

Conclusions

As the global energy transition picks up momentum, Ghana is implementing a raft of measures to attract the needed investment to transition from a fossil-based energy system to a green economy that sustainably meets its growing population's energy and job needs. Recognising the vast green growth opportunities, the government is implementing the energy transition and investment framework to attract about US$550 billion to invest in critical clean energy technologies such as solar PV, batteries for electric mobility, hydrogen fuels and carbon capture, utilisation and storage technologies to reach net zero by 2060 or 2070 based on the Energy Transition Framework. Given the country's slow growth in climate finance mobilisation, **it faces significant constraints in accessing domestic and international private investments to drive its energy transition agenda**.

This report sets out to assess the government's net zero strategies, critically analyse the global and domestic green financing landscape, and identify the institutional and political economy issues critical to unlocking green financing to support Ghana's energy transition programmes. **The assessment reveals a conflicting roadmap evidenced by the contradictions in the net zero timelines, key sectors of focus, anchor technologies, and forecasting assumptions in the GH-ETF developed by the MoE and the GH-ETIF developed by MESTI**. This can potentially create uncertainty for domestic and international investors. Additionally, there are gaps in the institutional, policy, and regulatory alignments needed to develop a robust and predictable legal and policy environment that will attract green investment in Ghana. **There is a patchwork of laws and policies governing the energy transition, however, they are not properly aligned to the future energy transition needs of the country.**

Furthermore, the analysis shows that Ghana needs more international public and private investments and de-risking financial instruments to achieve the financing needs of the energy transition plan. This would complement the limited domestic public and private green financing. Despite the domestic financing constraints, **several opportunities exist for unlocking financing to support the energy transition**. Key avenues identified in the study include **leveraging newly created development banks to design green investment portfolios linked to the energy transition**. The Development Bank Ghana can potentially serve as a vehicle for designing innovative financing instruments to attract international public and private investment to support the energy transition.

Additionally, **Ghana can benefit from global sovereign wealth funds that are diversifying into green investments**. However, this would require creating bankable project portfolios and attractive investment stimulus packages to make the projects viable.

Lastly, achieving a robust and sustainable transition requires that **energy utility companies are financially viable**. Most state-led energy utility companies are severely indebted and cannot invest capital in the existing infrastructure because of high revenue under-recoveries and unreflective tariffs.

Ghana needs the right mix of policies to create a supportive investment climate to attract the financing required to implement the energy transition targets on time. The following policy reforms are recommended:

1. **Clarify which of the two energy transition plans Ghana implements:** The Ghana National Energy Transition Framework (2022-2070) envisions emissions peaking in the mid-2050s and Ghana attaining net zero by 2070. On the other hand, the Ghana Energy Transition and Investment Plan (2023-2060) seeks more rapid decarbonisation: emissions peak by 2035 and begin a rapid decline thereafter, with net zero being reached by 2060. There are significant differences in terms of technology choices and timing of emissions depending on the plan, creating policy uncertainty and confusion among investors.

2. **Solicit for more international public financing and private sector capital as well as de-risking instruments:** There is an avenue to tap into external sovereign wealth funds (SWFs) including from the Gulf States who are looking at diversifying their portfolios into Africa in search of low-carbon opportunities. Also, innovative government guarantee mechanisms and scalability of projects in order to make investments attractive.

3. **Build investor confidence by fixing macro-imbalances and energy sector debt issues:** It is urgent to address the high indebtedness between the SOEs and the independent power producers (IPPs) through reflective cost-recovery tariffs, reduction in technical and commercial losses and improvement to collection rates. Structural reforms under Ghana's current IMF programme (2023-2026) seek to partly address some of these issues.

4. **Improve project viability through the launch of the portal with pre-assessed/investment-ready projects across the climate and energy lifecycle:** This portal will help reduce the information and project asymmetry gap between project developers and financiers by showing pre-assessed or partially derisked investment-ready projects across the energy and climate lifecycle. Such a portal would allow locally-based companies to access green finance opportunities from different agencies including DFIs and private sector funds. It has the potential to catalyse new low-carbon investments in renewables, hydrogen, circular economy, nature-based solutions and sustainable materials, energy storage and clean heat.

Appendix- Stakeholders Consulted

A-Rocha Ghana
Africa Centre for Energy Policy (ACEP)
Africa Centre for Entrepreneurship and Youth Empowerment (ACEYE)
African Center for Economic Transformation – ACET
Arthur Energy Advisors (AEA)
Bank of Ghana
Centre for Climate, Law and Policy (CCLAP), University of Professional Studies
Centre for Extractives Development Africa (CEDA)
Charge d'Affaires, High Commission Malaysia
Institute of Energy Studies (IES)
K.APP Law
Kasa Initiative Ghana
Legon Centre for International Affairs & Diplomacy (LECIAD)
Local Governance Network (LOGNet)
Ministry of Energy
Ministry of Lands and Natural Resources
Ministry of Sanitation and Water Resources
Natural Resource Governance Institute (NRGI)
Public Utilities Regulatory Commission (PURC)
Pushis Health Perspectives
Solar Taxi
Strategic Youth Network for Development (SYND-Ghana)
Total Energies
Translight Solar Limited



Office Loc: No. KD14 Darko Street
KOANS Estate-Kutunse
P.O.Box Box 443, Achimota, Accra-Ghana
Tel: +233 554 309 966 | 0302 972 939
Email: info@imanighana.org
www. imaniafrica.org

