

GHANA



NDC PRIVATE SECTOR ENGAGEMENT PROJECT

Engaging private sector in NDC implementation - Assessment of private sector investment potential in the energy sector

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UNDP's work on climate change spans more than 140 countries and USD \$3.7 billion in investments in climate change adaptation and mitigation measures since 2008. With the goal to foster ambitious progress towards resilient, zero-carbon development, UNDP has also supported the implementation of the Paris Agreement on Climate Change by working with countries on achieving their climate commitments or Nationally Determined Contributions (NDCs).

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TABLE OF CONTENTS

ACRONYMS	5
1. INTRODUCTION	6
2. GREENHOUSE GAS EMISSIONS AND CLIMATE TARGETS	7
2.1 Overview of Ghana's GHG emission profile	7
2.2 Ghana's energy sector and its GHG emissions	8
2.3 NDC and sectoral targets	9
3. ENABLING ENVIRONMENT	13
3.1 Policy environment in the energy sector	13
3.2 Private sector policy environment	18
3.3 Energy sector institutions and institutional framework	19
3.4 Overall business environment	20
3.5 Ease of doing business	23
3.6 Enabling environment for cross-border and foreign investments	24
4. PRIORITIZED SECTOR CONTEXT	33
4.1 Renewable energy	33
4.2 Clean cooking (efficient cookstoves and clean energy)	42
4.3 Energy efficiency	48
4.4 BRT and transport	50
4.5 Financial institutions providing green financing relevant to the energy sector	50
5. PRIVATE SECTOR INVESTMENT POTENTIAL	58
5.1 Data sources	58
5.2 Investment potential	61
6. REPORTING FRAMEWORK TO ALIGN BUSINESS OPPORTUNITIES WITH NDC IMPACT TARGETS IN GHANA'S ENERGY SECTOR	64
6.1 Rationale for private sector alignment with NDC impact targets	64
6.2 Reporting frameworks	64
7. CONCLUSION	73

LIST OF TABLES & FIGURES

TABLES

Table 1: Ghana's GHG emissions (2016)	8
Table 2: Energy sector mitigation actions to achieve NDC mitigation goals	10
Table 3: Energy sector investment needs to achieve NDC mitigation goals	10
Table 4: Specific renewable energy source objectives under the REMP	11
Table 5: Energy-related mitigation measures under the BUR	12
Table 6: Government institutions and institutional framework in the energy sector	19
Table 7: Ghana's risk profile	21
Table 8: Ghana's Doing Business score and ranking (2016-2020)	23
Table 9: Taxes applicable in Ghana	30
Table 10: Renewable energy investments in Ghana	35
Table 11: Financial institutions providing green financing to Ghana's energy sector	51
Table 12: Commercial bank products provided to Ghana's energy sector	51
Table 13: Renewable energy objectives and targets	58
Table 14: Energy efficiency objectives and targets	59
Table 15: Renewable energy and energy efficiency baseline data	59
Table 16: Sources of renewable energy investment costs	60
Table 17: Sources of renewable energy investment costs	61
Table 18: Calculation of renewable energy investment potential	62
Table 19: Calculation of renewable energy-related technologies investment potential	62
Table 20: Calculation of energy efficiency investment potential	63

FIGURES

Figure 1: National aggregate net greenhouse gas emissions (1990-2016)	7
Figure 2: National energy sector GHG emissions trend (1990-2016)	9
Figure 3: Renewable energy power generation and solar home PV ecosystem in Ghana	33
Figure 4: Value chain for on-grid renewable energy generation in Ghana	34
Figure 5: Selected EPC and solar system installers in Ghana	36
Figure 6: Value chain for C&I use of renewable energy generation in Ghana	38
Figure 7: Value chain for Ghana's solar home system/off-grid energy generation in solar PV	39
Figure 8: Selected renewable energy developers and technology providers in Ghana	40
Figure 9: Ghana's clean cooking ecosystem	43
Figure 10: Value chain for clean cooking stoves and efficient fuel in Ghana	44
Figure 11: Selected cookstove manufacturers in Ghana	44
Figure 12: Selected improved fuel manufacturers in Ghana	45
Figure 13: LPG fuel distribution value chain in Ghana	45
Figure 14: Ghana's energy efficiency ecosystem	48

ACRONYMS

AFD	Agence Française de Développement	MNC	Multinational corporations
AfDB	African Development Bank	MtCO₂e	Metric tonne of CO ₂ equivalent
AFOLU	Agriculture, forestry and other land uses	NAMA	Nationally Appropriate Mitigation Action
BAU	Business-as-usual	NCCP	National Climate Change Policy
BoG	Bank of Ghana	NDC	Nationally Determined Contributions
BRT	Bus Rapid Transit	NEEAP	National Energy Efficiency Action Plans
BUR	Biennial Update Report	NEP	National Energy Policy
CDM	Clean Development Mechanism	NOA	NEoT Offgrid Africa
CFL	Compact fluorescent lamp	NREAP	National Renewable Energy Action Plan
CVC	Corporate venture capital	OECD	Organisation for Economic Co-operation and Development
DESCO	Distributed energy service company	OMC	Oil marketing company
DFI	Development finance institution	ORR	Obligor risk rating
ECOWAS	Economic Community of West African States	PPA	Power purchase agreement
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency	PPP	Public-private partnership
EESDP	Energy Sector Strategy and Development Plan	PURC	Public Utilities Regulatory Commission
EPC	Engineering, procurement and construction	RE Act	National Renewable Energy Act (Act 832)
EREP	ECOWAS Renewable Energy Policy	REMP	Renewable Energy Master Plan
GCF	Green Climate Fund	RLP	Rural LPG Programme
GCIC	Ghana Climate Innovation Centre	SDG	Sustainable Development Goals
GEF	Global Environment Facility	SE4ALL	Sustainable Energy for All
GDP	Gross domestic product	SHS	Solar home systems
GHG	Greenhouse gas	SMEs	Small and medium enterprises
GRR	Ghana Reference Rate	SNEP	Strategic National Energy Plan
IEA	International Energy Agency	SNV	Stichting Nederlandse Vrijwilligers
IMF	International Monetary Fund	SOE	State-owned enterprise
IPP	Independent power producer	SSA	Sub-Saharan Africa
IPPU	Industrial processes and product use	SUNREF	Sustainable Use of Natural Resources and Energy Finance
IRENA	International Renewable Energy Agency	UNDP	United Nations Development Programme
LCDS	Low Carbon Development Strategy	UNFCCC	United Nations Framework Convention on Climate Change
LED	Light-emitting diode	VAT	Value-added tax
LI	Legislative Instrument	VC	Venture capital
LPG	Liquefied petroleum gas	VRA	Volta River Authority
LPGMC	LPG marketing company		
MFI	Microfinance institution		

1. INTRODUCTION

Transforming Nationally Determined Contributions (NDCs) into tangible actions that lead to long-term zero-carbon and climate-resilient development requires financing. Access to finance is fundamental to realize the objectives set by the NDCs. However, countries continue to face challenges in securing the financial resources needed to achieve their NDC targets.

To support the transition to low-emission and climate-resilient development, private sector resources must be mobilized to fill the gap caused by a lack of public investment. The adoption of the Paris Agreement provided a strong policy signal for private sector investment in climate finance. The development of NDCs has also provided numerous investment opportunities for the private sector. In 2015, private sector investments reached US\$299 billion, before dropping to \$242 billion in 2016, due to the combination of falling technology costs and lower capacity additions in some countries.¹ Project developers are by far the largest provider of climate finance, investing \$125 billion in 2016.

Investments are needed on a broader scale to achieve the objectives set in the NDCs and the Paris Agreement. For example, it is estimated that a total of \$23 trillion is required from public and private investments, the majority of which will have to come from the private sector, given the magnitude of finance needed.² Ensuring the transition to low-carbon agriculture, forestry, water and waste sectors, among others, will require additional capital. Global estimates of the cost of adapting to climate change may rise to between \$280 billion and \$500 billion per year by 2050; costs may be higher under higher emissions scenarios.³

To bridge this gap, it is important to identify the private sector stakeholders engaged in markets and industries and understand which financial instruments and services are available to technology providers and users and providers of capital.

Significant potential exists in developing countries and emerging economies for private sector players to participate in climate finance and climate actions. Those players include multinational corporations (MNC) and financial institutions; small and medium enterprises (SMEs) may also be mobilized in these countries. However, private sector players face barriers, such as financial and regulatory barriers and technical limitations, to investing and engaging in climate actions.

This report estimates the investment potential within the private sector for delivering NDC sectoral targets for the energy sector in Ghana. Section 2 assesses greenhouse gas (GHG) emissions and climate targets in relation to the energy sector, describes the importance of the energy sector for emission reductions in Ghana and identifies targets. Section 3 focuses on the enabling environment, providing an overview of the main policies relevant to private sector investment and energy, while also assessing macroeconomic risks and the business environment.

Section 4 assesses investments in the energy sector in Ghana in renewable energy, energy efficiency, clean cooking and transport. It also provides an overview of the main challenges to private sector investment. Section 5 analyses private sector investment potential in Ghana's energy sector by subsector, using targets identified based on Ghana's policy documents. Section 6 presents the reporting framework to align business opportunities with Ghana's NDC targets in the energy sector and SDGs.

1 Climate Policy Initiative. October 2017. *Global Landscape of Climate Finance 2017*.

2 NDC Partnership. Unlocking private finance to help governments achieve their climate goals. <http://ndcpartnership.org/unlocking-private-finance-helps-governments-achieve-their-climate-goals>

3 Sustainable Development Goals. 2016. UNEP report: *Cost of adapting to climate change could hit \$500B per year by 2050*. <https://www.un.org/sustainabledevelopment/blog/2016/05/unep-report-cost-of-adapting-to-climate-change-could-hit-500b-per-year-by-2050/>

2. GREENHOUSE GAS EMISSIONS AND CLIMATE TARGETS

Ghana is a relatively low emitter of greenhouse gas (GHG) emissions, with total 2016 national GHG emissions estimated at 42.92 million tonnes of carbon dioxide equivalent (MtCO₂e). However, its GHG emission levels are increasing. Emissions reported in 2016 were 40.4 percent and 7 percent higher than those reported in 2000 and 2012, respectively. Ghana submitted its NDC in September 2015 and is committed to periodically prepare, publish and update its GHG emissions inventory as part of its national communications every four years. The inventory is essential to understand the current state of emissions, compare results at both regional and international levels, and assess the change.

Energy sector emissions represented approximately 36 percent of total emissions. It is the second-highest emitting sector in Ghana after the agriculture, forestry and other land uses (AFOLU) sector. GHG emissions from the energy sector have been increasing steadily and correlate with gross domestic product (GDP) and population growth and thus, with the increasing use of liquid fuels in electricity generation and transportation. Achieving emission reductions in the energy sector is therefore essential to achieving Ghana's climate objectives.

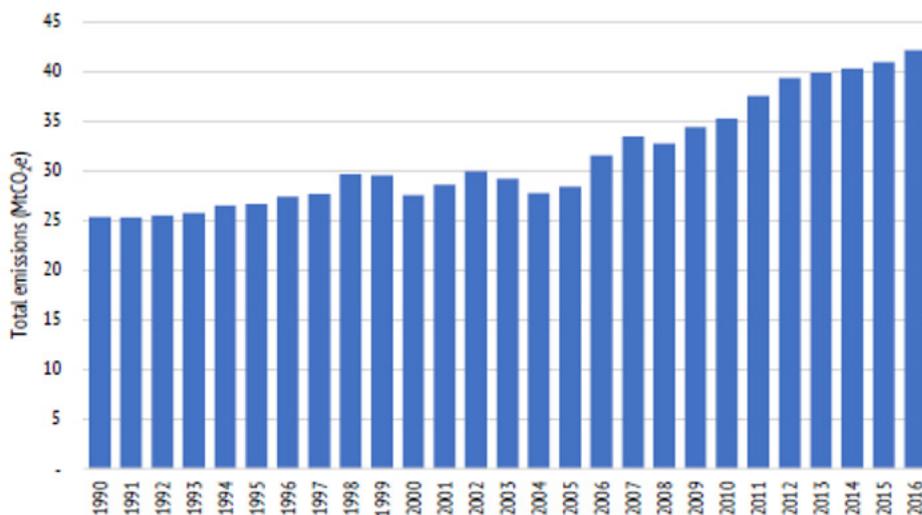
This section presents Ghana's GHG emission profile and GHG emissions from the energy sector. This section also details the objectives related to the energy sector included in the NDC.

2.1 OVERVIEW OF GHANA'S GHG EMISSION PROFILE

Ghana's GHG and short-lived climate pollutant emissions inventory⁴ was conducted for the period 1990-2016 using the 2006 Intergovernmental Panel on Climate Change (IPCC) Guidelines. The GHG inventory incorporates anthropogenic emissions by source and removals by sinks of carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O) and Fluorocarbons (F-gases) in the energy, industrial process and product use (IPPU), AFOLU, and waste sectors.

Total 2016 national greenhouse gas emissions were estimated at 42.92 MtCO₂e, or 40.4 percent and 7 percent above previously reported levels for 2000 and 2012, respectively. The annual growth rate of national emissions stood at 2.1 percent between 1990 and 2016.

Figure 1: National aggregate net greenhouse gas emissions (1990-2016)



Source: Environmental Protection Agency (EPA) 2019. Ghana's Fourth National Greenhouse Gas Inventory Report

⁴ Environmental Protection Agency (EPA) 2019. Ghana's Fourth National Greenhouse Gas Inventory Report.

Expressed in per capita and in GDP, GHG emissions present a declining trend over the same period. Emissions per capita decreased from 1.7 MtCO₂e in 1990 to 1.5 MtCO₂e in 2016, while the emissions intensity of GDP fell from 2.1 kg per GDP (constant 2010 US dollar) to 0.87 kg per GDP (constant 2010 US dollar). Therefore, the economy and population are growing at a higher rate than GHG emissions.

The changes observed in national emission trends since 1990 are attributed to economic expansion, which relies heavily on hydrocarbon, precious mineral, timber and cocoa exports. The production, processing and use of these commodities and the rising urban population significantly influence growth in Ghana's GHG emissions.

Ghana's business-as-usual (BAU) emissions are expected to increase from 43.02 MtCO₂e in 2016 to 48 MtCO₂e in 2020, 59.1 MtCO₂e in 2025 and 73.3 MtCO₂e in 2030.

The AFOLU sector is the most significant source of GHG emissions in Ghana. In 2016, 53.4 percent of total national emissions came from the AFOLU sector, followed by the energy (36.8 percent), waste (7.4 percent) and IPPU (2.4 percent) sectors. When emissions from the land category are excluded from the national inventory, emissions totalled 19.99 MtCO₂e in 2016. With more than 79 percent of emissions, the energy sector was the main source. The AFOLU and energy sectors are the two largest sources of carbon dioxide emissions, while the AFOLU and waste sectors are the main sources of methane emissions.

Table 1: Ghana's GHG emissions (2016)

SECTOR	TOTAL EMISSIONS IN MTCO ₂ E	PERCENT SHARE
ENERGY	15.79	36.70
IPPU	1.04	2.42
AFOLU	23.02	53.51
WASTE	3.17	7.37
TOTAL EMISSIONS	43.02	36.70

Source: Environmental Protection Agency (EPA) 2019. Ghana's Fourth National Greenhouse Gas Inventory Report

The energy sector's share of total emissions rose from 15 percent in 1990 to 36 percent in 2016. This sector is thus extremely important if Ghana is to reach its mitigation goals.

2.2 GHANA'S ENERGY SECTOR AND ITS GHG EMISSIONS

Ghana's energy sector is composed of a number of subsectors, including energy industries and transportation. Electricity generation is included within energy industries. Solid biomass constitutes the largest share of fuel consumption (73.7 percent), followed by crude oil (22.8 percent) and natural gas (3.5 percent).⁵

2.2.1 ENERGY SUPPLY (ELECTRICITY GENERATION)

In Ghana, electricity from the national grid is produced primarily from hydro and thermal sources. In 2018, installed grid electricity generation totalled 4,780 MW (of 4,961.5 MW when including solar plants at the sub-transmission level).⁶ Hydro power plants represented 1,580 MW, or 32 percent, while thermal plants represented 3,339 MW, or 67 percent. Solar and biogas generation represented the remaining 42.5 MW. The development of large hydropower generation has played a significant role in Ghana's energy mix. It is important to emphasize that Ghana is an energy exporter, with 285 GWh exported to Togo and Benin, 277 GWh to Burkina Faso, and 77.5 GWh to Côte d'Ivoire in 2018.⁷

5 Ibid.

6 Ghana Energy Commission, 2019. *Energy Outlook 2019*.

7 Ibid.

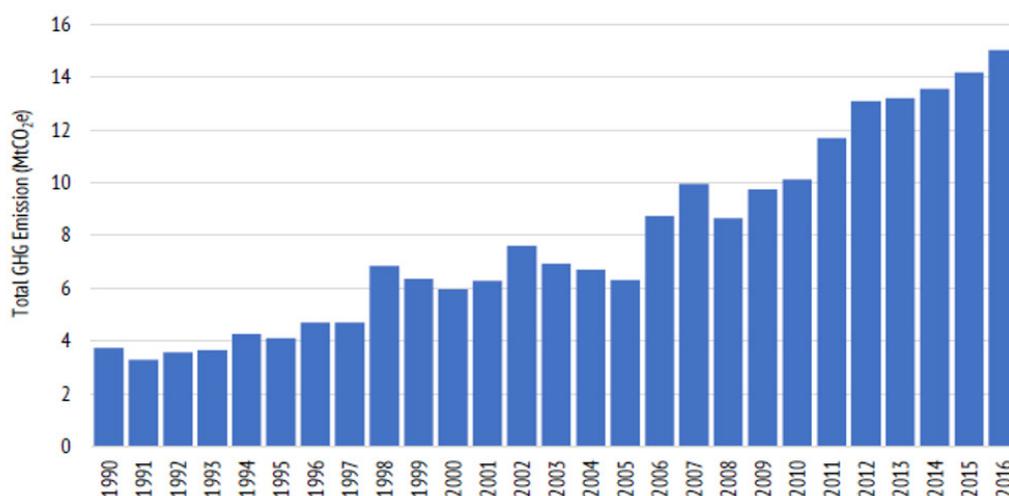
2.2.2 ENERGY DEMAND

In 2019, peak load, including exports, was 2,371 MW. This exceeds Ghana's energy demand, reflecting an oversupply of electricity. The demand for electricity is expected to grow in coming years, together with Ghana's GDP.⁸ Other energy sources include liquefied petroleum gas (LPG) and charcoal. Charcoal consumption is expected to increase due to the high price of LPG.

2.2.3 GHG EMISSIONS IN THE ENERGY SECTOR

The energy sector represented 15.02 MtCO₂e of Ghana's GHG emissions in 2016. This constitutes a 303 percent increase over 1990 levels. The trend correlates with GDP and population growth and, therefore, with the increasing use of liquid fuels in electricity generation and transportation.

Figure 2: National energy sector GHG emissions trend (1990-2016)



Source: Environmental Protection Agency (EPA) 2019. Ghana's Fourth National Greenhouse Gas Inventory Report

Transport is the most significant emitting subsector within the energy sector, with 47.74 percent of emissions (7.17 MtCO₂e), followed by the energy industry, with 34.69 percent (5.21 MtCO₂e). Both subsectors also grew significantly between 1990 and 2016, with 45.4 percent growth for transport and 18.1 percent for energy.

Within transport, the use of diesel for road transportation is one of the main causes of GHG emissions. Road transport consumes the country's largest share of liquid fuels, with 85.8 percent of fuel used in 2016. Passenger vehicles represented 49.3 percent of fuel consumption in 2016, followed by heavy duty trucks and buses, at 24.4 percent. Passenger cars used slightly more gasoline than diesel in 2016. They were the largest contributor to road transport emissions that year, accounting for 48 percent of total road transport emissions.

Electricity generation was by far the most significant source of GHG emissions from the energy sector in 2016, with 93 percent of total emissions (4.8 MtCO₂e), followed by petroleum refining at 5 percent and manufacturing of solid fuels at 2 percent.

2.3 NDC AND SECTORAL TARGETS

Ghana has developed 20 mitigation programmes of actions in seven sectors for a 10-year implementation period (2020–2030) in its NDC, including sustainable energy security and sustainable mass transportation. The country aims to unconditionally lower its GHG emissions by 15 percent relative to a BAU scenario emission of 73.95 MtCO₂e by 2030.

If it receives external support, it expects to achieve an additional 30 percent decrease in those emissions.

To achieve the country’s mitigation goals, the following policy actions in the energy and transport sectors have been identified:

Table 2: Energy sector mitigation actions to achieve NDC mitigation goals

SECTORS	INDC POLICY ACTIONS	STATUS	PROGRAMME OF ACTIONS
ENERGY	Scale up renewable energy penetration by 10 percent by 2030	Conditional	Increase small-medium hydro installed capacity up to 150-300MW
			Attain utility-scale wind power capacity up to 50-150MW
			Attain utility-scale solar electricity installed capacity up to 150-250MW
			Establish solar 55 mini-grids with an average capacity of 100kW, which translates to 10MW
ENERGY	Promote clean rural households lighting	Conditional	Increase solar lantern replacement in rural non-electrified households to 2 million
	Expand the adoption of market-based cleaner cooking solutions	Conditional	Scale up adoption of LPG use among peri-urban and rural households from 5.5 percent to 50 percent by 2030 Scale up access and adoption of 2 million efficient cook stoves by 2030
ENERGY	Double energy efficiency improvement to 20 percent in power plants	Unconditional	Scale up 120 million standard cubic feet natural gas replacement of light crude oil for electricity generation in thermal plants
			TRANSPORT

A total of \$9.81 billion is expected to be required to finance mitigation activities, including the energy and transport sectors. Ghana intends to mobilize 21 percent of the total investment cost, or \$2.02 billion for unconditional actions.

Table 3: Energy sector investment needs to achieve NDC mitigation goals

SECTORS	NDC POLICY ACTIONS	INVESTMENT NEEDS PER THE NDC
ENERGY	Scale up renewable energy penetration by 10 percent by 2030	\$2.214 million
	Promote clean rural households lighting	\$300 million
	Expand the adoption of market-based cleaner cooking solutions	\$50.6 million
	Double energy efficiency improvement to 20 percent in power plants	\$1.000 million
TRANSPORT	Scale up sustainable mass transportation	\$1.021 million

2.3.1 SECTORAL TARGETS IN THE ENERGY SECTOR

Detailed objectives for 2030 sectoral targets by energy source were developed as part of the 2019 Renewable Energy Master Plan (REMP). The Master Plan is aligned with the NDC and the Energy Sector Strategy and Development Plan (EESDP) and aims to contribute to scaling-up renewable energy penetration by 10 percent by 2030. The REMP details the objectives for specific renewable energies and specific subsectors/uses. They are detailed in Table 4.

Table 4: Specific renewable energy source objectives under the REMP

TECHNOLOGY/INTERVENTION	UNIT	REFERENCE (2015)	2030
1. SOLAR PV			
1.1 Utility-scale	MW	22.5	447.5
1.2 Distributed PV	MW	2	200
1.3 Standalone PV	MW	2	20
1.4 Street/community lighting	MW	3	25
1.5 Solar traffic signals	%	14	60
1.6 Lanterns	units	72,000	1,000,000
1.7 Irrigation	Ha	150	46,150
1.8 Crop dryers	units	70	700
1.9 Water heaters	units	4,700	135,000
2. WIND ENERGY			
2.1 Utility-scale	MW	0	325
2.2 Standalone systems	MW	0.01	2
2.3 Irrigation/water pumping	units	10	100
3. HYDROPOWER			
3.1 Small/medium hydropower	MW	N/A	150.03
4. WAVE/TIDAL ENERGY			
4.1 Wave energy	MW	N/A	50
5. SOLID BIOMASS			
5.1 Utility-scale power generation	MWe	0	72
5.2 Charcoal (export)	1,000 tonnes	190	428
5.3 Charcoal (local demand)	1,000 tonnes	1,551	1,840
5.4 Improved cookstoves (domestic)	million units	0.80	3
5.5 Improved cookstoves (institutional/commercial)	thousand units	1.8	18
5.6 Woodlot cultivation	1000 ha	190	428
5.7 Briquetting/pelleting	1000 tonnes	19.7	100
6. MINI GRIDS			
6.1 Mini-grids	units	13	300
7. WASTE-TO-ENERGY			
7.1 Utility-scale MSW + biogas	MW	0.1	50.1
7.2 Agricultural/industrial organic waste- based biomass	units	10	200
7.3 Institutional biomass	units	<100	500
7.4 Domestic biomass	units	<50	200
8. BIOFUELS			
8.1 Biofuel	tonnes	0	20,000

In its second Biennial Update Report (BUR) submitted to UNFCCC in 2018, Ghana included a number of updates related to mitigation actions, as well as the country’s needs. Table 5 presents an overview of energy-related mitigation measures and components.

Table 5: Energy-related mitigation measures under the BUR

MITIGATION MEASURES	SPECIFIC ACTIONS
ENERGY EFFICIENCY	Automatic timer switches
	LED streetlights
	Capacitor banks
RENEWABLE ENERGY	Utility-scale renewables
	On-grid distributed solar PV
	RE-based mini-grid
	Off-grid renewables
	Productive use of renewable energy in agriculture
	Solar lamps in place of kerosene lanterns
CLEAN COOKING	LPG stoves
	Improved stoves
LOW-CARBON ELECTRICITY AND REDUCED FLARING	Single cycle to combined cycle
	Fuel switch from crude oil to natural gas
	Reduced natural gas flaring

A more detailed mitigation action progress tracker is also available in the BUR. It details clear objectives for energy efficiency and renewable energy installation.

In the context of this report, sectoral targets in the energy sector will therefore be based on the NDC, REMP and the second BUR.

The energy sector presents key challenges to Ghana in the context of climate change. It is key to achieving the country’s economic development policies and supporting the growth of the private sector. However, energy is also the second-largest GHG-emitting sector in Ghana after AFOLU. Climate mitigation actions in this sector are thus crucial to achieve Ghana’s target of reducing its GHG emissions by 15 to 30 percent by 2030, compared to a BAU scenario. Transport and electricity generation were by far the most significant sources of GHG emissions in 2016. This is reflected in Ghana’s sectoral targets, which target both subsectors through comprehensive actions in renewable energy, energy efficiency, clean cooking and transport. Given the financing needs, private sector investment is essential to achieve these objectives.

3. ENABLING ENVIRONMENT

The existence of an enabling policy environment, including related legislation, laws, programmes and plans, is crucial to achieve the sustainable development targets in any country. Ghana's overall development policy is governed by a long-term vision to 2020 and medium-term development plans, under which sectoral policies are developed. This section presents the country's current enabling policy environment, including climate policies, energy policies and the ease of doing business.

3.1 POLICY ENVIRONMENT IN THE ENERGY SECTOR

Sectoral policies related to the energy sector in this report will target the renewable energy, energy efficiency and transport subsectors, in keeping with the classification of the energy sector in Ghana's climate-change related documents and policies, such as its BUR and GHG inventory.

3.1.1 CLIMATE-CHANGE RELATED POLICIES

Ghana's climate policies and climate action documents include its National Climate Change Policy (NCCP), the NDC (2015), Ghana's communications to the UNFCCC (its second BUR (2018)) and its third national communication. Ghana has also developed its low-carbon development strategy (LCDS).

3.1.1.1 NATIONAL CLIMATE CHANGE POLICY

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To ensure a climate-resilient and climate-compatible economy while achieving sustainable development through equitable, low-carbon economic growth	Development of a comprehensive climate change policy that takes into account the role of the private sector	<ul style="list-style-type: none"> • Opportunities for the private sector, including value chain financing, innovation and energy generation

The NCCP is Ghana's integrated response to climate change. The vision outlined is to ensure a climate-resilient and climate-compatible economy while achieving sustainable development through equitable, low-carbon economic growth. The NCCP analyses the current situation and provides an overview of Ghana's climate change mitigation and adaptation objectives and details on how to mainstream and implement the specific climate change programmes and actions identified.

The NCCP's three objectives are effective adaptation, social development and mitigation. Four thematic areas have been identified to address the country's adaptation issues: (1) energy and infrastructure; (2) natural resources management; (3) agriculture and food security; and, (4) disaster preparedness and response. In the policy theme and strategic focus area related to energy, industrial and infrastructure development, the NCCP acknowledges the importance of energy efficiency and cleaner energy technologies, including for transport.

The NCCP recognizes the private sector's role in addressing climate change. It also provides an initial list of opportunities by industry, including value chain financing, innovation and energy generation.

3.1.1.2 LOW-CARBON DEVELOPMENT STRATEGY

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To contribute to global climate change mitigation by developing an economically efficient and comprehensive low-carbon development strategy	Identification of priority technologies for Ghana to achieve mitigation objectives and emphasize private sector incentives	<ul style="list-style-type: none"> • Propositions related to private sector financing • Leveraging public funding for private sector de-risking • Leveraging public-private partnership (PPP) scheme for bus rapid transit (BRT) development

Ghana's Low-Carbon Development Strategy (LCDS) aims to ensure that the country's economic transformation follows a low-carbon pathway that leads to better growth, better lives and better climate. The LCDS aims to serve as the vehicle that can translate the NDC programme of actions into implementable activities, backed by clear institutional, financial and monitoring mechanisms. The mitigation actions chosen under the LCDS are therefore aligned with the NDC. The following technologies have been identified in the energy sector:

- Solar PVs
- Solar lanterns
- Wind power
- Efficient cookstoves
- LPG stoves
- Biogas
- BRT
- Capacitor banks
- Fuel switch in electricity generation.

The LCDS also highlights the private sector's role in developing climate change projects and their financing. The strategy proposes using public financing to kick-start private investments in low-carbon investments. It also proposes using the current PPP policy framework to support the development of BRT, while developing other policies/incentive schemes to support private investment in other sectors and actions.

3.1.2 ENERGY-RELATED POLICIES

Ghana has developed policies related to the energy sector in general that have been supplemented by policies related to renewable energy and energy efficiency. The **Strategic National Energy Plan** (SNEP – 2006,⁹ updated in 2019¹⁰), the **National Energy Policy** (NEP - 2010) and the **Energy Sector Strategy and Development Plan**¹¹ (EESDP - 2010) provide guidance on development of the country's energy sector.

The NEP and EESP provide information and targets related to renewable energy generation, such as the development of mini-hydro generation. They also provide guidelines for promoting the use of liquefied natural gas for cooking.

The SNEP aims at diversifying sources of energy supply, accelerating the development and use of renewable energy and energy efficiency, and enhancing private sector participation, among other goals. An updated version of the SNEP for the period 2020-2030 was drafted in 2019. It provides updated energy demand projections by sector up to 2030. Electricity demand is expected to reach between 30,570 GWh to 47,926 GWh (depending on the scenario chosen), compared to the 2020 baseline of 18,542 GWh.

3.1.3 RENEWABLE ENERGY-RELATED POLICIES

Ghana has developed many renewable energy-related policies. The National Renewable Energy Act of 2011 provides the basis for renewable energy development and private sector participation. Other important documents, which detail the enabling environment for renewable energy, include the Mini-grid Electrification Policy (2016) and the REMP (2019).

9 Ministry of Energy, Ghana, 2006. <http://www.energycom.gov.gh/planning/snep> (accessed August 2020).

10 Energy Commission, Ghana, 2019. http://www.energycom.gov.gh/files/SNEP%20Demand%20Oct2019_SNEP2030_Final.pdf (accessed August 2020).

11 Ministry of Energy, Ghana, 2010. https://ourolmoney.s3.amazonaws.com/media/documents/2016/06/09/energy_strategy.pdf (accessed August 2020).

3.1.3.1 NATIONAL RENEWABLE ENERGY ACT (ACT 832) (2011)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To ensure a climate-resilient and climate-compatible economy while achieving sustainable development through equitable, low-carbon economic growth	Development of a comprehensive climate change policy that takes into account the role of the private sector	<ul style="list-style-type: none"> • Opportunities for the private sector, including value chain financing, innovation and energy generation

The NCCP is Ghana’s integrated response to climate change. The vision outlined is to ensure a climate-resilient and climate-compatible economy while achieving sustainable development through equitable, low-carbon economic growth. The NCCP analyses the current situation and provides an overview of Ghana’s climate change mitigation and adaptation objectives and details on how to mainstream and implement the specific climate change programmes and actions identified.

The NCCP’s three objectives are effective adaptation, social development and mitigation. Four thematic areas have been identified to address the country’s adaptation issues: (1) energy and infrastructure; (2) natural resources management; (3) agriculture and food security; and, (4) disaster preparedness and response. In the policy theme and strategic focus area related to energy, industrial and infrastructure development, the NCCP acknowledges the importance of energy efficiency and cleaner energy technologies, including for transport.

The NCCP recognizes the private sector’s role in addressing climate change. It also provides an initial list of opportunities by industry, including value chain financing, innovation and energy generation.

3.1.3.2 MINI-GRID ELECTRIFICATION POLICY (2016)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide the enabling environment to mainstream mini-grid electrification	Identification and establishment of provisions for private sector participation in mini-grids	<ul style="list-style-type: none"> • Mini-grid customers should benefit from the same pricing policy as customers serviced by the main electricity grid

The Mini-grid Electrification Policy was developed in 2016 to mainstream mini-grid electrification. It states that mini-grid customers should benefit from the same pricing policy as customers serviced by the main electricity grid under the rural electrification arrangement. This has major implications for mini-grid financing, which may not be viable without cross-subsidies or external subsidies, especially in the context of private sector investment

3.1.3.3 RENEWABLE ENERGY MASTER PLAN (2019)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide an investment-focused framework for the development of Ghana’s renewable energy resources	Identification of opportunities for private sector investment in renewable energy	<ul style="list-style-type: none"> • Opportunities and targets identified in renewable energy • Provision of concessional financing • Local manufacturing encouraged

The REMP was developed to address long-term planning challenges and provide an investment-focused framework to promote and develop the country’s renewable energy resources for sustainable economic growth. The REMP, which details renewable energy targets, described in Section 2, emphasizes the importance of private sector participation. It stresses the importance of providing an enabling environment and supporting de-risking initiatives for increased private sector participation. Broad guidelines that encourage private sector participation include the provision of concessional financing and government on-lending facilities to renewable energy investments.

The REMP also encourages manufacturing and assembling in Ghana by providing tax reductions to locally-based companies and exempting them from VAT and import duty on selected equipment and plants.

3.1.3.4 TAX AND DUTY EXEMPTIONS

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide incentives for investments in renewable energy	Reduced taxes and duties to be paid on solar and wind generation	• Solar and wind generation investment more profitable

In 1998, the government reduced import duties and value-added tax (VAT) on solar and wind generation systems and components. Solar and wind energy generating systems are currently exempt from both. Components used with solar and wind generation systems benefit from a preferential import duty of 5 percent.

3.1.3.5 OTHER RENEWABLE ENERGY-RELATED POLICIES

Ghana has also developed other renewable energy-related policies. Its Bioenergy Policy,¹² drafted in 2010, provides guidance on the use and production of wood fuel and cookstoves. Ghana also participated in the Authority of Economic Community of West African States (ECOWAS) Renewable Energy Policy (ERP) process, which aims to increase the share of renewable energy in the region's overall electricity mix to 35 percent in 2020 and 48 percent in 2030.

3.1.4 ENERGY EFFICIENCY-RELATED POLICIES

Energy efficiency and conservation are regarded as “low-hanging fruit” in protecting the energy resources available in Ghana. Although there is no specific national policy pertaining to energy efficiency other than the National Energy Efficiency Action Plans (NEEAP), developed within a regional framework, the country has already developed standards and labelling regulations. While policies do not directly emphasize the role of the private sector, it is expected to be key in implementing energy efficiency measures, for example, in the construction industry and at household levels.

3.1.4.1 BUILDING CODE (GHANA STANDARDS GS 1207:2018) (2018)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide standards for building energy performance	Energy performance standards to be followed by all new buildings	• Opportunities for providers of energy efficient materials

The Building Code, developed in 2018, sets out requirements and recommendations for efficiency standards for residential and non-residential buildings and covers planning, management and practices in building construction. It also sets building energy performance standards.

3.1.4.2 LEGISLATIVE INSTRUMENTS

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide energy efficiency standards related to appliances and lighting	Standards to be followed by all stakeholders, including households	• Opportunities for household appliance providers

Ghana has developed a number of Legislative Instruments (LI) related to energy efficiency standards:

- LI 1815: standards applying to non-ducted air conditioners or self-ballasted fluorescent lamps manufactured in Ghana or imported for use in Ghana. Enforcement of minimum energy standards and labelling;
- LI 1958 (updated 1970): enforcement of minimum energy efficiency and labelling standards for household refrigerating appliances. Household refrigeration appliances conforming to energy efficiency standards for imports and locally made goods;

¹² Energy Commission, Ghana, 2019. <https://www.cleancookingalliance.org/resources/69.html> (accessed August 2020)

- LI 1932: Prohibition against the manufacture, sale and import of incandescent filament lamps and the import and sale of used air conditioners, refrigerators and freezers; and,
- LI 2353: Requirement to test the performance of lighting appliances (light-emitting diodes, LED) for import into Ghana.

3.1.4.3 REFRIGERATOR REBATE SCHEME (2012)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To provide incentives to replace inefficient refrigerators	Incentives provided to households	• Opportunities for household appliance providers

To reduce Ghana’s carbon emission and other energy-related ozone-depleting substances, the Government of Ghana launched a “rebate and turn in” programme in September 2012, with the support of UNDP and the Global Environment Facility (GEF). The scheme encourages consumers to exchange their old refrigerators for new and efficient ones, available at a discounted price. The rebate scheme aimed at replacing 15,000 units by the end of 2015.

3.1.5 TRANSPORT-RELATED POLICIES

Ghana’s transport-related policies consist primarily of the National Transport Policy (2008) and the Transport Sector Medium-Term Development Plan (2012-2014). Ghana also developed an Urban Transport Policy (2008). Although no formal policy document is available, it is also important to emphasize that e-mobility is being considered in Ghana.

3.1.5.1 NATIONAL TRANSPORT POLICY (2008)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To achieve a sustainable transportation system in Ghana	Development of BRT and an environment supporting private sector investment	• Opportunities in BRT development • Limitations on the importation of vehicles

The National Transport Policy (2008) provides the blueprint for the use of aviation, maritime and inland water transport, railways, roads, pipelines, non-motorized transport and inter-modalism. The policy aims at achieving an integrated, efficient, cost-effective and sustainable transportation system that responds to society’s needs, supports growth and poverty reduction, and can establish and maintain Ghana as a West African transportation hub.

The Policy’s specific goals include creating an accessible, affordable, reliable, effective and efficient transport system that meets user needs and ensuring the sustainable development of the transport sector.

The strategy provides detailed policy statements to achieve these goals, such as:

- Prioritizing mass transportation in urban areas, aiming to move at least 80 percent of passengers: specific strategies seek to develop BRT, school busing schemes and rail-based transport systems in urban areas;
- Encouraging the private sector to invest in transport infrastructure and services where commercially viable: including developing PPP schemes and alternative financing options such as bonds and tax incentives;
- Promoting fuel efficiency, conservation and pollution control measures for road transportation: closely linked with, among other actions, developing alternative fuels, introducing taxes and duties on vehicles more than 10 years old, and setting emission standards for road vehicles; and,
- Creating a vibrant investment and performance-based management environment that maximizes benefits for public and private sector investors.

The BRT plans are further detailed in Ghana’s Urban Transport Policy (2008), which describes a radial arterial route running from the outskirts of Accra to the central business district. It is expected to service over 12,000 peak hour passenger journeys per direction of travel with bus frequencies of 120 buses/per hour at peak periods, using new large buses.

3.1.5.2 DRIVE ELECTRIC INITIATIVE

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
Promote the use of electric vehicles and create demand for excess electricity produced	<ul style="list-style-type: none"> • Kick-starter for the electric vehicle industry • Long-term vision to support off-take of renewable energy in Ghana 	<ul style="list-style-type: none"> • Private sector investment encouraged to develop charging infrastructure • Household investment encouraged for the introduction of electric vehicles

The Drive Electric Initiative is spearheaded by the Energy Commission in Ghana. It seeks to introduce and promote the use of electric vehicles as an alternative means of mobility. Another objective is to create demand for the excess electricity the country produces. Stakeholder consultations are underway to discuss the opportunities and challenges facing public and private stakeholders.

3.1.5.3 TRANSPORT SECTOR MEDIUM-TERM DEVELOPMENT PLAN (2012-2014)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To create an efficient transport system in Ghana	Development of an environment supporting private sector investment	<ul style="list-style-type: none"> • Private sector investment encouraged in the transport sector

The Transport Sector Medium-Term Development Plan aims at establishing Ghana as a transportation hub for the West African subregion and creating an efficient transport system that meets user needs. The plan also seeks to create an investment environment that maximizes benefits for public and private sector investors and ensures the sustainable development of the sector.

3.1.5.4 LI 2180: ROAD TRAFFIC REGULATIONS

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To reduce emissions due to transport	Development of an environment supporting the introduction of LPG in cars	<ul style="list-style-type: none"> • Private sector opportunities to develop and provide LPG

LI 2180 was developed in 2012 pursuant to the Road Traffic Law Act of 2004 (Act 683). It includes information specific to reducing emissions and to the use of energy. Specifically, the regulations aim to regulate the use of LPG and CNG in cars.¹³ LI 2180 also addresses reducing road transport emissions, although it does not set emission level standards.¹⁴

3.2 PRIVATE SECTOR POLICY ENVIRONMENT

The Ghana Poverty Reduction Strategy I and II (GPRS I and II) describe the private sector as a key engine of growth. Both strategies sought to support development of the private sector by facilitating access to long-term financing, reducing institutional and legal bottlenecks, and promoting entrepreneurship.

As part of the GRPS II, a national medium-term Private Sector Development Strategy (PSDS) was developed (2004-2008, and 2010–2015 for PSDS II). The objectives of PSDS II included improving private sector productivity and competitiveness, increasing opportunities to participate in infrastructure development, and supporting the development of an efficient financial sector.

13 <https://partnersforsafedriving.wordpress.com/law-and-order/new-provisions-in-the-road-traffic-regulations-2012-l-i-2180/>
 14 Ministry of Environment, Science, Technology and Innovation (MESTI), 2016. Ghana’s low-carbon development strategy (LCDS).

The Government of Ghana still aims at supporting the private sector under the Agenda for Jobs: Creating Prosperity and Equal Opportunity for All, 2018-2021. It seeks to enable the potential of the Ghanaian private sector to emerge through invention, innovation, adoption and adaptation, especially in the economy's industrial sector. Under this policy, Ghana will also work to increase expenditures in the energy and transport sectors. Specific strategies to achieve these objectives include improving the business environment, promoting public-private dialogue and improving financing.

Two specific policies supporting the development of Ghana's private sector are described below.

3.2.1 NATIONAL POLICY ON PUBLIC-PRIVATE PARTNERSHIPS (2011)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To encourage private sector participation in infrastructure and services delivery	Development of an environment supporting private sector participation	<ul style="list-style-type: none"> Private sector opportunities in the transport sector

The National Policy on Public-Private Partnerships was developed in 2011 to encourage private sector participation in infrastructure and services delivery. The objectives were to facilitate private sector investment and increase the availability of public infrastructure. Since its adoption, 32 projects have been launched, with six in the transport sector.¹⁵

A PPP bill was submitted to the Cabinet in 2014, but was returned for re-drafting based on the Cabinet's concerns over the number of approval processes and preparation time required for prospective projects. As of 2019, remaining concerns include the length of the PPP project cycle, whether PPPs could instead be delivered through existing legislation, and the guarantee of local content.¹⁶

3.2.2 LOCAL CONTENT REGULATIONS, 2017 (LI 2354)

POLICY OBJECTIVE	POLICY RELEVANCE TO THE PRIVATE SECTOR	POLICY IMPLICATIONS FOR THE PRIVATE SECTOR
To encourage the private sector to source local materials and resources from local market	Direct relevance to the electricity supply sector	<ul style="list-style-type: none"> Private sector must consider the local supply market when developing projects in Ghana

The Local Content and Local Participation (Electricity Supply Industry) Regulations, 2017, LI 2354 governs local participation in the energy sector, setting the minimum amount of capital that must be invested to source goods and services from the local market. The regulations specify that in the electricity supply industry, stakeholders should achieve a minimum of 60 percent local content and 51 percent local participation.

3.3 ENERGY SECTOR INSTITUTIONS AND INSTITUTIONAL FRAMEWORK

Ghana's energy sector is composed of several key institutions. The table below summarizes the government institutions that shape the sector's overall direction.

Table 6: Government institutions and institutional framework in the energy sector

INSTITUTION	DESCRIPTION
Ministry of Energy	Responsible for formulating, implementing, monitoring and evaluating energy policy and for supervising and coordinating the activities of energy sector agencies
Ghana Grid Company Limited (GRIDCo)	Owns and operates the transmission network
Energy Commission (EC)	Responsible for the technical regulation of Ghana's electricity, natural gas and renewable energy industries. Charged with licensing companies in the energy sector, including renewable energy supply and installation companies

¹⁵ Ministry of Finance, Ghana, 2020. <http://ppp.mofep.gov.gh/>

¹⁶ Oxford Business Group, 2019. Ghana updates its legal framework for public-private partnerships.

INSTITUTION	DESCRIPTION
Public Utility and Regulatory Commission (PURC)	Oversees traditional economic regulatory functions for the on-grid sector. Functions include tariff approval, quality of service monitoring, and consumer protection
Environmental Protection Agency (EPA)	Leading public body for protecting and improving the environment in Ghana. Ensures the environmentally-sound and efficient use of both renewable and non-renewable resources in national development
Ghana Investment Promotion Centre (GIPC)	Provides tax incentives to foreign companies investing in local projects and duty exemptions for equipment used in those projects
Volta River Authority (VRA), BUI Power Authority (BPA)	Composed of the main public generation companies that operate Ghana's hydropower plants and some thermal power plants

3.4 OVERALL BUSINESS ENVIRONMENT

3.4.1 MACROECONOMIC ENVIRONMENT

Ghana maintained macroeconomic stability in 2019. Growth remained strong, at an expected 7 percent in 2019, and inflation is well within the target band, projected at 7.8 percent for 2019. The International Monetary Fund (IMF) stresses that Ghana remains committed to fiscal discipline. The adoption of the 2018 Fiscal Responsibility Act, which imposes a deficit ceiling of 5 percent of GDP, is a strong signal of commitment to fiscal stability. However, while the country's fiscal stance has improved in recent years, it continues to put pressure on the external position and has not completely offset the impact of contingent liabilities on public debt, which continues to rise.¹⁷

Fiscal risks are especially significant in the energy sector, with arrears at \$2.7 billion in late 2018.¹⁸ Without measures to address this challenge, the accumulated cost to the government, including current arrears, could reach \$12.5 billion by 2023, which would slow the sector's growth. It is important to highlight that the Government of Ghana has taken steps to improve the situation by increasing electricity tariffs and developing a multi-year Energy Sector Recovery Programme.

However, the COVID-19 crisis and falling oil prices have had an impact on the government's original 2020 fiscal projections. The government expects revenues to decrease significantly, while spending needs will increase to sustain the economy during the crisis. In response, the cap on withdrawals from the Ghana Stabilisation Fund, Ghana's sovereign wealth fund, has been lowered. Ghana currently receives support from the IMF and the World Bank.

Real GDP is forecast to contract by 4.1 percent in 2020.¹⁹ This is mainly due to the downturn in the hydrocarbon sector, as well as the spillover effects on the wider economy. The economy is expected to slowly recover starting in 2021, with a more pronounced rebound from 2022.

Before the COVID-19 crisis, the IMF also emphasized that Ghana's monetary stance contributed significantly to reducing inflation. Ghana's current inflation target range of 8±2 percent is relatively high compared to its sub-Saharan African (SSA) peers, such as Kenya (5±2.5 percent) and Uganda (5 percent). This should remain the case in 2020, with inflation expected to rise to 9.9 percent.²⁰

Although Ghana's performance in the financial sector began to improve before the crisis, the sector remained relatively weak, with access to credit still an important bottleneck. Heightened risk perception due to the crisis is likely to continue to have a negative impact on the sector.

Ghana faced significant challenges in the energy sector prior to the COVID-19 crisis, which has weakened the economic and fiscal outlook. Recovery could be achieved by steadily mainstreaming climate action into fiscal policies, as proposed by the Coalition of Finance Ministers for Climate Action, whose principles Ghana

¹⁷ International Monetary Fund, 2019. *Ghana, Staff report for the 2019 article IV consultation*

¹⁸ Ibid

¹⁹ The Economist Intelligence Unit Limited, 2020. *Ghana Country Risk Service July 2020*

²⁰ Ibid

has endorsed. The Coalition recently proposed a set of principles for stimulus packages that would provide the right balance between sustainability and investment strategy.

Coalition of Finance Ministers for Climate Action and recovery principles

In April 2019, governments from over 20 countries launched the Coalition of Finance Ministers for Climate Action, which recognizes the challenges posed by climate change, the unique capacity of the world’s finance ministers to address them, and the ways in which collective engagement could strengthen these efforts. The Helsinki Principles recognize the importance of finance to achieve climate action goals.

In July 2020, the Coalition published guidance related to climate action for the post-pandemic future.²¹ It emphasizes the importance of finance for recovery and long-term transformation, while recognizing that macro-fiscal contexts are more complex today than before the crisis. The document acknowledges the need for emerging economies to anticipate the substantial investments needed to drive the transformation to a low-carbon climate-resilient economy.

In this context, leveraging international climate finance to unlock fiscal space and leverage private finance will be crucial to achieve the goals set by the Paris Agreement and all NDCs. Efforts to shift the financial system must also continue, including on reporting (Task Force on Climate-Related Financial Disclosures), green taxonomies, risk management and returns.

Aligning national priorities, economic and fiscal policies on these principles could help Ghana attract private sector investment and achieve its climate goals in the energy sector. The country’s detailed performance is presented in the following subsections.

3.4.2 COUNTRY RISK

Based on the risk assessment performed by the Economist Intelligence Unit (EIU), Ghana has a B rating for overall country risk as of July 2020. It remains stable relative to its pre-COVID-19 crisis level. Investment in renewable energy and energy efficiency in Ghana face significant challenges. High government debt, low public revenue and high infrastructure needs remain important challenges for the country. At the same time, the impact of the crisis on Ghana’s sovereign risk increases the country’s need for foreign direct investments. Ghana’s risk profile is detailed in Table 7.

Table 7: Ghana’s risk profile

	SOVEREIGN RISK	CURRENCY RISK	BANKING SECTOR RISK	POLITICAL RISK	ECONOMIC STRUCTURE RISK
NOVEMBER 2019	B	BB	B	BB	CCC
JULY 2020	CCC	B	B	B	CCC

3.4.2.1 SOVEREIGN RISK

Ghana defaulted in 2018, as principal arrears to external official creditors exceeded 2 percent of total external debt stock.²² Its debt servicing costs grew at a faster pace than government and export revenue, which caused arrears to increase significantly. Public debt is rising, at 59.9 percent of GDP, and is above the 56.6 percent median of SSA states.²³ At the same time, government investment remained high in 2018, with estimated fiscal debt of 4.8 percent of GDP.

The global downturn caused by the COVID-19 pandemic and the related shock to oil markets, to which Ghana is a net exporter, are estimated to have caused GDP to contract in 2020. The cost of supporting affected households and businesses is expected to have a significant impact on public debt, which could rise to 75.3 percent of GDP, considerably above the median for similarly CCC-rated countries, at 62.5 percent of GDP.²⁴

21 Coalition of Finance Ministers for Climate Action, 2020. *Better Recovery, Better World: Resetting climate action in the aftermath of the COVID-19 pandemic*.

22 The Economist Intelligence Unit Limited, 2019. *Ghana Country Risk Service November 2019*

23 Ibid

24 The Economist Intelligence Unit Limited, 2020. *Ghana Country Risk Service July 2020*

However, international access to finance remains reasonably strong. The IMF has disbursed \$1 billion in emergency credits, while the World Bank has provided \$100 million. Overall, and despite the COVID-19 crisis, Ghana's access to finance is not expected to worsen dramatically in the short-term.²⁵

3.4.2.2 CURRENCY RISK

Ghana's currency risk rating has been downgraded from BB to B, compared to before the COVID-19 crisis. Before the crisis, its currency risk was relatively high, although exchange rate volatility had lessened over 2019 and was much lower overall than previous performance, such as in 2014-2015, when the Ghanaian cedi (GHS) was one of the most volatile currencies in the world.²⁶

The estimated contraction of GDP, decreasing exports and larger account deficits are the main drivers for the downgrade. However, thanks to support from multilateral institutions and issuance of Eurobonds in February 2020, the country has had access to additional foreign reserves. The cedi was not particularly volatile between March-May 2020. However, Ghana remains vulnerable to reduced foreign investment inflows and weaker oil prices.²⁷

3.4.2.3 BANKING SECTOR RISK

The most significant driver of banking sector risk in Ghana is related to financing and liquidity constraints. Access to financing remains limited and bank credit to the private sector is declining. This is partly due to banking sector compliance with a Bank of Ghana (BoG) directive that tripled the minimum capital requirement. The banking sector has now met this requirement and the pressure on credit has eased, but the stock of credit outstanding to the private sector is still lower than four years ago as a share of GDP.²⁸

The banking sector also faces a high level of non-performing loans (NPL), which is estimated by the central bank at 18.1 percent of total advances. State-owned energy companies with significant debt are a major driver of the high NPL ratio; the government continues to pay those debts.

As of July 2020, risk aversion in the banking sector remained high. This will likely continue throughout 2020.

3.4.2.4 POLITICAL RISK

Ghana has one of the African continent's strongest democracies, with well-established routes for the transfer of power, which is smooth. However, the rivalry between the two main parties creates tension during election periods and violence is a perennial feature of elections, usually aimed at intimidating opposition voters. Ghana is prone to poor institutional effectiveness and widespread corruption, which weigh on potential political risks. The perceived risk of ongoing default is also a major political risk for the country.

3.4.2.5 ECONOMIC STRUCTURE RISK

As of 2019, the main driver of risk in Ghana was the perception of default risk, which is expected to continue in 2020 and going forward. As arrears are likely to remain substantial, the perceived risk of ongoing default is also likely to remain high among investors. Ghana also remains vulnerable to volatile global commodity prices. Poor infrastructure and structural human capital issues also constitute risk factors, and the increased current account deficit is also driving the rating.

Ghana has a population of 30 million. Of its six million potential taxpayers, only two million are registered to pay taxes. As Ghana seeks to move beyond dependence on foreign aid, it must develop a solid domestic revenue base.²⁹

25 Ibid

26 The Economist Intelligence Unit Limited, 2019. *Ghana Country Risk Service November 2019*

27 The Economist Intelligence Unit Limited, 2020. *Ghana Country Risk Service July 2020*

28 The Economist Intelligence Unit Limited, 2019. *Ghana Country Risk Service November 2019*

29 US Department of State 2019. *Investment Climate Statements, Ghana*.

As described further in the section related to the ease of doing business, Ghana has complex procedures for starting business and paying taxes. The country also has underdeveloped infrastructure and lacks skilled labour.

3.5 EASE OF DOING BUSINESS

The ease of doing business in a country is an important decision-making factor for both local and foreign investors. Foreign investors may choose to invest in a different country with different opportunities if it is significantly easier to conduct business. Indicators such as the number of administrative procedures, the time and cost required to conduct and fulfil administrative duties, taxes, and quality of the legal system must be considered.

Through its Doing Business project, the World Bank Group provides objective measures of business regulations and their enforcement across 190 economies and selected cities at the subnational and regional levels. The study captures several important dimensions of the regulatory environment.

Ghana ranked 118th in the project's 2020 report, which is higher than in 2019 and 2018, although its ranking has fluctuated. Ghana's scores and rankings over the last five years are detailed in Table 8.

Table 8: Ghana's Doing Business score and ranking (2016–2020)

YEAR	SCORE	RANKING
2020	60	118
2019	59.22	114
2018	57.24	120
2017	58.82	108
2016	57.69	114

Source: World Bank. Doing Business reports (2016-2020)

This section provides an overview of important indicators related to doing business in Ghana, as captured in the 2020 Doing Business report.³⁰

3.5.1 STARTING A BUSINESS

This indicator measures the number of procedures, time, cost and paid-in minimum capital requirement for a small- to medium-sized limited liability company to start up and formally operate in the largest business city of each economy. It is relevant to Ghana's energy sector as SMEs are expected to participate in a number of value chains, such as efficient cookstoves and clean cooking fuel.

Ghana ranks 116th and scores above the average in SSA, but remains below Côte d'Ivoire (ranked 29th) and other neighbouring countries.

3.5.2 DEALING WITH CONSTRUCTION PERMITS

Ghana ranks 104th on procedures and time required to deal with construction permits, scoring higher than average. While the number of procedures and time required to deal with construction permits remains high – 170 days on average – the costs of the procedures are low compared to other countries.

3.5.3 GETTING ELECTRICITY

Getting electricity is an important indicator for doing business, especially in SSA, as it is crucial to support the development of businesses. This indicator measures the procedures, time and cost required for a business

³⁰ World Bank Group, 2019. *Doing Business 2020, Economic Profile Ghana*.

to obtain a permanent electricity connection for a newly constructed warehouse. Additionally, the reliability of supply and transparency of tariffs index measures reliability of supply, transparency of tariffs and the price of electricity. Ghana is one of the highest-ranked countries in SSA (79th), with good scores in terms of procedures, time and cost requirements compared to other SSA countries.

3.5.4 GETTING CREDIT

This indicator explores the strength of credit reporting systems and the effectiveness of collateral and bankruptcy laws in facilitating lending. It is important to measure this in Ghana as local private sector stakeholders require credit to invest in energy-related technologies. While Ghana is ranked 80th, its score still remains relatively below average. Obtaining credit in Ghana thus remains a challenge, especially in terms of credit registry coverage.

3.5.5 PROTECTING MINORITY INVESTORS

This indicator measures the strength of minority shareholder protections against directors' misuse of corporate assets for personal gain, as well as shareholder rights, governance safeguards and corporate transparency requirements that reduce the risk of abuse. This is important to encourage investments and foreign investments in the country.

At 72nd worldwide, Ghana is one of the highest-ranking SSA countries. It performs close to the Organisation of Economic Co-operation and Developments' (OECD) high income average level for the extent of disclosure, extent of director liability, ease of shareholder suits and extent of shareholder rights.

3.5.6 PAYING TAXES

This indicator measures the taxes and mandatory contributions that a medium-size company must pay or withhold in a given year, as well as the administrative burden of paying taxes and contributions and complying with post-filing procedures (VAT refund and tax audit). Ghana ranks lower than the regional average and low in general (152nd). Medium-size businesses in Ghana pay an average of 55 percent of profit in taxes, with a significant number of payments per year. This is a significant burden on conducting business and incentivizing investments.

3.5.7 ENFORCING CONTRACTS

This indicator measures the time and cost to resolve a commercial dispute through a local first-instance court and the quality of judicial processes index, evaluating whether each economy has adopted a set of good practices that promote quality and efficiency in the court system.

Ghana ranks higher than the regional average, but relatively low, at 117th. While costs are in line with OECD high-income country averages, the time required for procedures is close to two years (710 days).

3.6 ENABLING ENVIRONMENT FOR CROSS-BORDER AND FOREIGN INVESTMENTS

The enabling environment for cross-border and foreign investments constitutes another important factor in investment decisions for foreign investors. Foreign investors may have higher risk perceptions in some countries if regulations pertaining to foreign investment are perceived as unfavourable. For example, some investors may perceive restrictions on the payment of dividends to foreign investors, repatriation of funds and tax issues as constraints.

This section provides an overview of important laws and regulations pertaining to investment and foreign investment in Ghana, as well as an analysis of gaps and challenges for foreign investment.

3.6.1 REGULATIONS RELATED TO DIRECT FOREIGN INVESTMENT IN GHANA

The main policies related to direct foreign investment include the Ghana Investment Promotion Centre Act, Transfer Pricing Regulations and Technology Transfer Regulations.

OBJECTIVES OF THE REGULATIONS	IMPLICATIONS FOR FOREIGN INVESTMENT
<ul style="list-style-type: none"> • Provide the overall framework for foreign investment in Ghana • Provide the regulatory framework for multinational companies investing and operating in Ghana 	<ul style="list-style-type: none"> • Minimum capital requirements set at \$200,000 (joint ventures with a Ghanaian partner)/ \$500,000 • Dividend and payments to foreign entities guaranteed (including remittances in foreign currency and repatriation of funds) • Transfer pricing regulated • Technology transfer framework available

GHANA INVESTMENT PROMOTION CENTRE ACT (2013)

In Ghana, investment activities are regulated by the Ghana Investment Promotion Centre Act, 2013 (Act 865, GIPC Act). It covers the establishment of the Ghana Investment Promotion Centre (GIPC) and, more broadly, regulations on investment activities in a range of sectors. This includes entry, admission, protection of investment, investment guarantees, employment and compliance.

The GIPC set minimum capital requirements for foreign investments: \$200,000 for joint ventures with a Ghanaian partner, which should hold at least 10 percent of the joint venture's equity, and \$500,000 for enterprises that are wholly-owned by non-Ghanaian companies. Trading companies (or companies that only buy or sell imported goods or services) that are wholly-owned by non-Ghanaian entities have a more significant threshold of \$1 million. In addition, trading companies must employ at least 20 skilled Ghanaian nationals. Other sectors, such as banks, may also have specific capital requirements.

GIPC is responsible for formulating investment promotion policies, plans and incentives and for marketing strategies to attract foreign and local investment. It also seeks to support the preparation of project profiles, as well as potential joint venture opportunities in Ghana, to attract foreign investors.

GIPC coordinates and monitors all investment activities in the country. It provides assistance and guidance to companies and acts as a facilitator between the enterprise and relevant ministries, departments, agencies and other public institutions.

Registering with GIPC enables a company to access the benefits and incentives mentioned in the Internal Revenue Act, the Value Added Tax Act and other exemptions from customs duty.

Currently, GIPC prohibits foreign investment in eight economic sectors, which include petty trading and small-scale transportation services. However, overall, these sectors are not related to the energy sector. GIPC has also identified agro-processing, mining, manufacturing and services as priority investment sectors for the country.

The GIPC Act also guarantees the unconditional transferability in freely convertible currency of dividends, payments in respect of loan services, and other items (detailed under 3.6.5).

TRANSFER PRICING REGULATIONS (2012)

More than 70 percent of cross-border business activities in Ghana are transacted through multinational enterprises.³¹ The Ghana Revenue Authority (GRA) is responsible to develop and implement tax laws for local and foreign investments/transactions to maximize the government's revenue stream. The GRA identified multinational enterprises that had internal contracts with associated companies and were charged for intra-group services. In the absence of transfer pricing legislation, it was difficult to determine if the fees charged

31 Ghana Revenue Authority, 2012. *Transfer Pricing Regime*.

were fair or could lead to unfair practices, such as maximizing businesses' global profit at the expense of Ghana's tax revenue.

Thus, in 2012, the GRA introduced transfer pricing regulations (L.I. 2188) to maximize tax revenues from international transactions. Taxpayers must complete an annual return on transfer pricing transactions at the GRA's request. Transfer pricing must follow international guidelines, such as those defined by the OECD.³²

After an audit, the GRA may impose an adjustment, which is subject to the following penalties:

- 10 percent of the underreported income if the amount has been outstanding for less than three months;
- 20 percent of the underreported income if the amount has been outstanding for more than three months.

TECHNOLOGY TRANSFER REGULATIONS, 1992 (LI 1547)

The Technology Transfer Regulations, 1992 (LI 1547) provide for rules governing the registration of all technology transfer agreements (TTA). A TTA is an agreement between a foreign entity and a Ghanaian entity for a term of not less than 18 months and not more than 10 years. It involves services such as the licensing of industrial property, provision of technical expertise and technical knowledge required for turnkey projects, and installation of machinery and equipment.

Registering a TTA enables payments to the technology transferor, which vary between 0 to 6 percent of net sales or profit before taxes, depending on the nature of the TTA. These are considered expenses and may be deducted from the transferee firm's profit before tax, thereby benefiting both parties.

COMPANIES ACT, 2019

The Companies Act, 2019 (Act 992) provides the regulatory framework for the establishment and winding-up of companies. The insolvency-related procedures in Act 992 are detailed in Section 3.6.4. Specific to external companies, the Act details the procedures required for registration. These include providing a copy of the certificate of incorporation and related documents and a notarized statement certifying the company's official name, nature of the business, ownership and other information.

The Act details the procedures for public invitations, in which companies may sell or buy shares. This does not cover invitations to the company's existing shareholders and debtholders. It also applies to external companies. For public companies, the Act clarifies that there are no restrictions on the right to transfer shares when there are unpaid liabilities.

BILATERAL INVESTMENT TREATIES

Ghana has also signed and ratified bilateral investment treaties with several countries. As of July 2020, Ghana has signed them with Turkey, Barbados, Spain, Botswana, Zimbabwe, India, Mauritania, Mauritius, Zambia, Benin, Burkina Faso, Guinea, Serbia, Cuba, France, South Africa, Italy, Egypt, Côte d'Ivoire, Malaysia, Germany, Denmark, Switzerland, Bulgaria, China, Romania, the Netherlands and the United Kingdom.³³ These treaties establish the terms and conditions for private investment by nationals and companies of one state in another state and provide guarantees for investors, such as protection from expropriation.

3.6.2 CAPITAL MARKET LAWS AND REGULATIONS

Capital markets are important for foreign investment, as they facilitate the buying and selling of securities. The Ghana Stock Exchange (GSE) lists capitalized and established companies, while the Ghana Alternative Market (GAX) lists start-ups and smaller enterprises. The market regulator, the Securities and Exchange Commission (SEC), was established by the Securities Industry Act (Act 929) of 2016 and exercises oversight over GSE and GAX. It also authorizes and regulates the issuing of securities by foreign issuers.

³² OECD, 2017. *Transfer Pricing Guidelines for Multinational Enterprises and Tax Administrations*.

³³ <https://investmentpolicy.unctad.org/international-investment-agreements/countries/79/ghana>

The Securities and Exchange Commission Regulations (2003, SEC Regulations) provide additional information on foreign investment through securities. For example, foreign shareholders holding voting rights must be disclosed. In the case of securities offered by a foreign issuer in Ghana, the issuer’s offer document should disclose applicable provisions of any reciprocal tax treaty between Ghana and the foreign country. Primary listing procedures are similar for foreign and local companies.

OBJECTIVES OF THE REGULATIONS	IMPLICATIONS FOR FOREIGN INVESTMENT
<ul style="list-style-type: none"> • Provide the overall framework for foreign investment in capital markets in Ghana 	<ul style="list-style-type: none"> • Listing regulations and framework, approval process detailed by the GSE Listing Rules and Foreign Exchange Act • Non-residents allowed to invest in money market instruments (long-term more than three years)

REGULATIONS SPECIFIC TO FOREIGN COMPANIES LISTED IN GHANA (PRIMARY OR SECONDARY LISTING):

GSE Listing Rules provide additional information on the requirements to list foreign companies on GSE. They include:

- Primary listing on the GSE by a foreign company is not allowed unless there is a substantiable reason for its lack of listing in the applicant’s country or in the country in which it holds majority shares;
- For secondary listing, foreign companies must register with the Companies Registry in Ghana as an external company. All information disclosed to the foreign company’s primary exchange is required to be disclosed to the GSE simultaneously;
- All standard GSE listing requirements apply to foreign companies that seek primary or secondary listing on the GSE. Moreover, foreign companies listed on the GSE must have a minimum stated capital equivalent to \$1 million and at least 100 public shareholders should hold a minimum of 25 percent of the issued shares; and,
- For de-listing, the foreign company must submit a 60-day notice to the GSE, along with alternative arrangements to provide liquidity to shareholders who may exit due to the de-listing.

Ghana’s Foreign Exchange Act, 2006 (Act 723) also requires non-resident companies to seek prior approval from the SEC and BoG to issue securities on the local securities market. More importantly, the repatriation of proceeds from the sale of securities must be reported to the BoG.

REGULATIONS SPECIFIC TO SHAREHOLDING BY FOREIGN INVESTORS:

Ghana’s Foreign Exchange Act includes a number of provisions related to shareholding by foreign investors. It allows non-residents in Ghana to invest in money market instruments with a tenor of three or more years.

While there is no limit on non-resident foreign investors’ holdings in securities listed on the GSE, non-resident investors must seek prior approval from the BoG when acquiring more than a 10 percent stake in any listed banking stock.

Listed securities held by non-resident investors in Ghana are also eligible for a full and free foreign exchange remittance on the original principal amount, capital gains, dividends, interest payments and refunds.

3.6.3 BANKING SUPERVISION LAWS AND REGULATIONS AND OTHER REGULATIONS RELATED TO THE FINANCIAL SECTOR

The banking and financial sector is regulated by a number of laws and regulations, including the Banks and Specialized Deposit-Taking Institutions Act, the Non-Bank Financial Institutions Act, and the Borrowers and Lenders Act.

OBJECTIVES OF THE REGULATIONS	IMPLICATIONS FOR FOREIGN INVESTMENT
<ul style="list-style-type: none"> • Provide the overall framework for banking services and non-banking financial services in Ghana • Provide the overall framework for non-bank lending in Ghana 	<ul style="list-style-type: none"> • Minimum capital requirements set to GHS400 million for banks. Foreign entities are subject to similar requirements for incorporation • Credit agreements outside of banking institutions (possible to borrow funds from abroad) regulated by Borrowers and Lenders Act, facilitating debt recovery

THE BANKS AND SPECIALIZED DEPOSIT-TAKING INSTITUTIONS ACT, 2016 (ACT 930)

The Banks and Specialized Deposit-Taking Institutions Act (Act 930) is the primary law governing Ghana's banking industry. It took effect in September 2016, replacing the Banking Act, 2004 (Act 673) and the Banking (Amendment) Act, 2007 (Act 738). This law granted the BoG overall authority to supervise all banking, non-banking and forex bureau operations. The law does not apply to leasing companies or credit unions licensed under the Non-Bank Financial Institutions Act, 2008 (Act 774).

In 2018, the minimum capital requirement was set at GHS400 million. The minimum capital adequacy ratio required is 10 percent of the bank's assets and the bank must also maintain a capital buffer of at least 3 percent. While there is no restriction on foreign ownership of banks, individual entities acquiring more than 5 percent of a bank's equity need consent from the BoG.

Financial holding companies, defined as the bank parent company, must register with the BoG. They may invest in financial services companies, but are restricted from investing in agricultural, commercial, industrial and unincorporated companies.

Transactions between banks and their affiliates are governed by sections 64 and 65 of the Act. They prohibit primarily preferential terms for financial transactions, including in terms of creditworthiness, tenor and interest rate. Banks are also prohibited from purchasing and transferring non-performing assets from their affiliates. Transfer pricing rules are also applicable under the Transfer Pricing Regulations 2012 (LI 2188).

This law also defines the license requirements for banks and specialized deposit-taking institutions (SDI). Foreign entities are subject to the same process, with additional requirements. Foreign entities must provide notarized copies of certificates of incorporation and other relevant documents, shareholders' resolution authorizing the request for a license, and a written no-objection certificate from the supervisory authority of the foreign body.

The minimum capital requirement is GHS400 million for banks and GHS15,000,000 for SDIs. Foreign entities should ensure that a minimum 60 percent of this amount is brought into Ghana in a convertible currency.

NON-BANK FINANCIAL INSTITUTIONS ACT, 2008 (ACT 774)

The Non-Bank Financial Institutions Act, 2008 (Act 774) applies to non-bank financial services, such as leasing operations, money lending operations, money transfer operations, mortgage finance operations, non-deposit-taking microfinance services and credit unions. It provides the overall license requirements and procedures for such entities and other capital requirements. The law also provides details on application and licensing, capital and liquidity requirements, liquidation, powers of supervision, and financial statement specifications for non-bank financial institutions.

In the case of non-bank financial institutions, service providers must be incorporated in Ghana under Sections 8 and 9 of the Companies Act, 1963 (Act 179), with the sole authorized business of carrying out non-bank financial services. There are no specific restrictions on foreign ownership of non-bank financial institutions.

BORROWERS AND LENDERS ACT, 2008 (ACT 773)

The Borrowers and Lenders Act, 2008 (Act 773) aims at improving the standards for the disclosure of information on lending and borrowing and promoting a consistent loan recovery and enforcement system by lenders. It also provides the overall legal framework for credit in Ghana. Based on the Act, a collateral register was established and placed under the control of the BoG.

The Act applies to local and foreign lenders. It applies to small amounts, as well as any credit agreement exempted by the BoG. It excludes transactions such as shareholder loans, loans to shareholders and any other agreement that can be defined as between parties that are not dealing at arm's length.³⁴

3.6.4 INSOLVENCY AND BANKRUPTCY-RELATED REGULATIONS AND PROCEEDINGS

The Companies Act, 2019 (Act 992) and the Bodies Corporate Act, 1963 (Act 180) provide the overall legislative framework for insolvency and bankruptcy of limited liability companies operating in Ghana.

OBJECTIVES OF THE REGULATIONS	IMPLICATIONS FOR FOREIGN INVESTMENT
<ul style="list-style-type: none"> Provide the overall framework for insolvency procedures in Ghana 	<ul style="list-style-type: none"> Companies facing voluntary or official liquidation should first pay debts and liabilities of the company in Ghana

COMPANIES ACT, 2019 (ACT 992)

The Companies Act, 2019 (Act 992) provides the regulatory framework for solvent companies facing financial challenges to appeal for insolvency proceedings to undergo liquidation, restructuring or dissolution. The Act offers legislative protection to those companies, enabling them to resolve their financial headwinds through restructuring or administration, rather than liquidation.

External companies, defined as corporate bodies formed outside Ghana with an established place of business in the country, are also covered by the Act, notably under Sections 338 to 340. If an external company is found to be insolvent/bankrupt in another country, it also ceases to exist in Ghana. If assets are liquidated in Ghana, the debts and liabilities of the company due in Ghana should be paid first, before liquidated assets are transferred to the company's place of incorporation.

BODIES CORPORATE ACT, 1963 (ACT 180)

The Bodies Corporate Act, 1963 (Act 180) is expected to be replaced by the Corporate Restructuring and Insolvency Bill, which is currently before the Parliament. The Act applies to all insolvent companies that are ordered by the courts to liquidate (official liquidation). Under this law, the court may direct that external (foreign) companies' branches be treated as separate bodies. The assets of such bodies located in Ghana shall therefore be liquidated, with priority, in Ghana.

The current official liquidation process is detailed below:

1. Commencement of proceedings:	Mode of winding up, resolution procedure, petition procedures
2. Liquidator:	Appointment of liquidator, delegation of functions
3. Effects of commencement of proceedings:	Time of commencement, cessation of directors' functions and company's business, prohibition of company proceedings, custody of company's properties, avoidance of transfer of shares
4. Investigation into affairs of company:	Statement of affairs, proof of debt, examination of fraudulent or delinquent persons
5. Assets available for winding-up:	Property in liquidator's custody, repayment by preferred creditors, payment by money-lenders, sums to be credited to company's official account

³⁴ An arm's length transaction refers to a business deal in which buyers and sellers act independently without one party influencing the other.

6. General duties of liquidator:	Collecting debts, vest property, realizing assets, ascertaining priority of debt
7. Distribution of assets:	Fees and outgoings, dividends to creditors, distribution to members, disposal of unclaimed assets
8. Termination of proceedings:	Order terminating proceedings, dissolution of company, and disposal of books and papers of company

3.6.5 FOREIGN EXCHANGE

OBJECTIVES OF THE REGULATIONS	IMPLICATIONS FOR FOREIGN INVESTMENT
<ul style="list-style-type: none"> Provide the overall framework for foreign exchange in Ghana 	<ul style="list-style-type: none"> Proceeds and interests in foreign currencies attributable to investment in Ghana may be transferred abroad through authorized banks

FOREIGN EXCHANGE ACT, 2006 (ACT 723)

The Foreign Exchange Act, 2006 (Act 723) authorizes the transfer of proceeds and interests (in foreign currencies) attributable to investments in Ghana through authorized banks. Although Ghana's residents are not allowed to pay in foreign currency for goods and/or services, residents may transfer foreign exchange abroad to meet external debt obligations through authorized commercial banks.

Specifically:

- Dividends and net profits, attributable to foreign investments, may be transferred in freely convertible currency through any authorized bank in Ghana;
- Remittance of investment proceeds and interest attributable to investments in foreign currency is permitted through authorized commercial banks; and,
- Residents and non-residents of Ghana may maintain foreign exchange accounts and foreign currency accounts with licensed banks in the country.

Specific accounts, foreign exchange accounts (for revenues generated in Ghana) and foreign currency accounts (for credits received from abroad) must be created to transfer and/or receive foreign currencies.

3.6.6 TAX FRAMEWORK

Ghana's tax regimes are governed primarily by the Income Tax (Amendment) Act, Value Added Tax (Amendment) Act, Excise Tax Stamp Act, Customs Act, Excise Duty Act and Communication Service Tax Act. Major applicable taxes in the country are detailed in Table 9.

Table 9: Taxes applicable in Ghana

KEY TAXES	DESCRIPTION
GENERAL CORPORATE TAX	<ul style="list-style-type: none"> The general corporate income tax (CIT) rate in Ghana is 25 percent The rate may be modified based on industry, location and type of business and the nature of income
COMMUNICATION SERVICE TAX (CST)	<ul style="list-style-type: none"> A CST of 6 percent is levied on individual and corporate users of electronic communication services (ECS)
TAX ON DIVIDENDS AND INTERESTS	<ul style="list-style-type: none"> An 8 percent tax is levied on dividends or interest payments by listed companies
STAMP DUTY	<ul style="list-style-type: none"> Between 0.25 and 1 percent duty, depending on the type of transaction
VALUE-ADDED TAX (VAT)	<ul style="list-style-type: none"> 12.5 percent tax is levied on supply of goods and services made in Ghana and on the import of goods

There is no tax concession applicable to the energy sector.

3.6.7 DISPUTES AND ARBITRATION

Ghana is a member of the New York Convention, one of the key instruments in international arbitration. Arbitration is an increasingly common mode of dispute resolution in Ghana for internal disputes.³⁵ It is flexible and confidential and often faster than litigation, which makes it an important criterion for international investors. The Alternative Dispute Resolution Act, 2010 (Act 798) governs arbitration in Ghana. It applies to domestic and international arbitration and is based on the UNCITRAL Model Law.

The following types of matters are excluded from the scope of arbitration:

- the national or public interest;
- the environment;
- the enforcement and interpretation of the Constitution; or
- any other matter that by law cannot be settled by an alternative dispute resolution method.

For disputes between foreign investors and the government, the GIPC Act clearly states that arbitration is the preferred option for settlement, in accordance with either:

- the rules of procedure for arbitration of the UNCITRAL;
- the framework of any bilateral or multilateral agreement on investment protection to which the government and the country of which the investor is a national are parties; or
- any other national or international machinery for the settlement of investment dispute agreed to by the parties.

If the parties disagree on the method of dispute settlement, the Alternative Dispute Resolution Act applies.

Jurisdiction to enforce foreign judgement for debt recovery is established on the basis of reciprocity. The Foreign Judgement and Maintenance Orders Instrument, 1993 (L.I. 1575) lists the following countries for the enforcement of judgements: Brazil, France, Israel, Italy, Japan, Lebanon, Senegal, Spain and the United Kingdom. The judgment must be considered final to be enforced in Ghana and the court of origin must have jurisdiction over the matter. Enforcement is to be carried out within three months and in the local currency.

3.6.8 OTHER SIGNIFICANT REGULATORY LIMITATIONS ON FOREIGN INVESTMENT

Foreign companies and organizations are not required to obtain specific licenses to own land in Ghana. However, Ghana's Constitution prohibits foreigners from owning land for more than 50 years. In the energy sector, the Energy Commission Act, 1997 (Act 541) requires foreign entities to incorporate in Ghana to obtain licenses to transmit, distribute and sell electricity.

3.6.9 SUMMARY OF FINDINGS FOR FOREIGN INVESTMENT REGULATORY ENVIRONMENT

Overall, the regulatory environment for foreign investment in Ghana is supportive. There is no discrimination against foreign-owned businesses. The sectors in which foreign investment is prohibited or restricted are limited and have no bearing on the energy sector. Capital requirements remain reasonable, with a minimum threshold of \$200,000 for joint ventures with local partners, with limited local equity requirements.

Although investment in the banking sector is subject to specific requirements, such as obtaining a license for banking and financial activity in the country and prior consent from the BoG, the Borrowers and Lenders Act, 2008 provides a framework for credit agreements exempted by the BoG, including with a foreign investor and a local entity. There are no specific constraints on paying dividends to foreign investors, including in foreign currency, as per the regulations related to foreign exchange and the general framework for investment provided by GIPC. Capital may also be borrowed and repaid from abroad.

³⁵ International Bar Association, 2017. *Arbitration Guide, Ghana*.

Finally, a framework for disputes and arbitration exists in Ghana. In some cases, Ghana provides reciprocity and allows for foreign judgements to be enforced in the country, thereby enabling easier recovery of assets and liabilities. The country also adheres to international arbitration frameworks, paving the way to settlements recognized by international investors.

The overall enabling environment for private investment in the energy sector in Ghana is relatively strong.

Ghana's fiscal challenges in the energy sector predate the COVID-19 crisis and its macroeconomic outlook has degraded further due to the crisis. Although Ghana's pre-crisis economic outlook was strong, thus supporting the investment environment, the country now requires more direct foreign investment to achieve its objectives in the energy sector. There are risks – including currency and banking sector risks - but other factors mitigate them, such as the availability of a high level of foreign currency reserves and the restructuring of the financing sector. The current crisis may aggravate the risks identified. Ghana is expected to recover slowly in 2021, before achieving stronger growth starting in 2022. Although the economic outlook is not favourable, in the past 10 years Ghana has developed policies supporting the development of private investment in the energy sector. The availability of policies supporting feed-in tariffs and net metering, as well as the country's stance on PPP schemes, is encouraging for private sector engagement in the energy sector and its subsectors. The regulatory framework also supports investment in the energy sector, providing favourable conditions for foreign direct investment and cross-border investment in the sector.

4. PRIORITIZED SECTOR CONTEXT

Ghana's energy sector is constrained by barriers and challenges that prevent investment from scaling up in the country. This subsection presents the structure of each subsector through an analysis of its ecosystem and value chain, the current status of private sector engagement and investment, investment barriers and critical gaps, recommendations and entry points for private sector investment, and examples of best practices.

The ecosystem analysis focuses on providing an overview of the relationship between inputs and products for specific subsectors. It helps to understand the business environment for private stakeholders in each subsector. The value chain analysis builds on the ecosystem analysis, providing an illustrative representation of the value chain actors identified, their functions and an analysis of their relationships.

These combined analyses provide a better understanding of how and where stakeholders and organizations are positioned within the ecosystem and value chain and identify opportunities and engagement points for decision-makers in the public and private sectors.

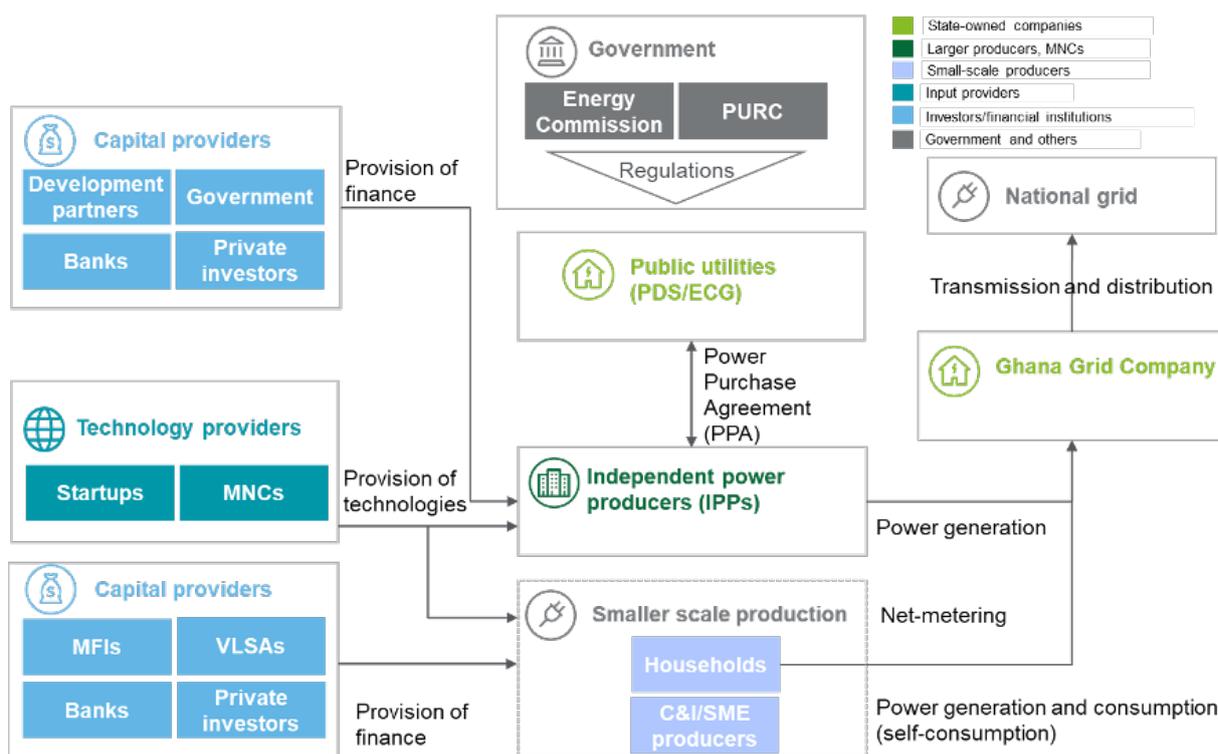
4.1 RENEWABLE ENERGY

Renewable energy targets in Ghana include the development of on-grid solar PV and solar home PV, mini-grids, and other renewable energies. They also include the development of off-grid solutions, such as solar LED lamps and renewable energy systems, for revenue generating activities. This subsection thus analyses the ecosystem and the value chain for renewable energy in Ghana.

4.1.1 ECOSYSTEM ANALYSIS

Figure 3 presents the renewable energy ecosystem, focusing on on-grid utility-scale power generation, commercial and industrial (C&I) customers, and solar home PV in Ghana.

Figure 3: Renewable energy power generation and solar home PV ecosystem in Ghana



This ecosystem can be divided among input providers, electricity producers and end users. Input providers include technology providers (mainly solar panel providers, SHS solution providers and developers) and capital providers. At the other end of the ecosystem, end users are either national grid users through the grid managed by the Ghana Grid Company, or households and C&I producers, which self-consume the off-grid electricity produced.

In this ecosystem, the price of electricity and the regulations imposed by the government have significant impacts on all stakeholders. They impact profitability and/or return on investment of all electricity producers through agreed power purchase agreements (PPA) and net metering arrangements. Stakeholders within the ecosystem are therefore linked closely to one another.

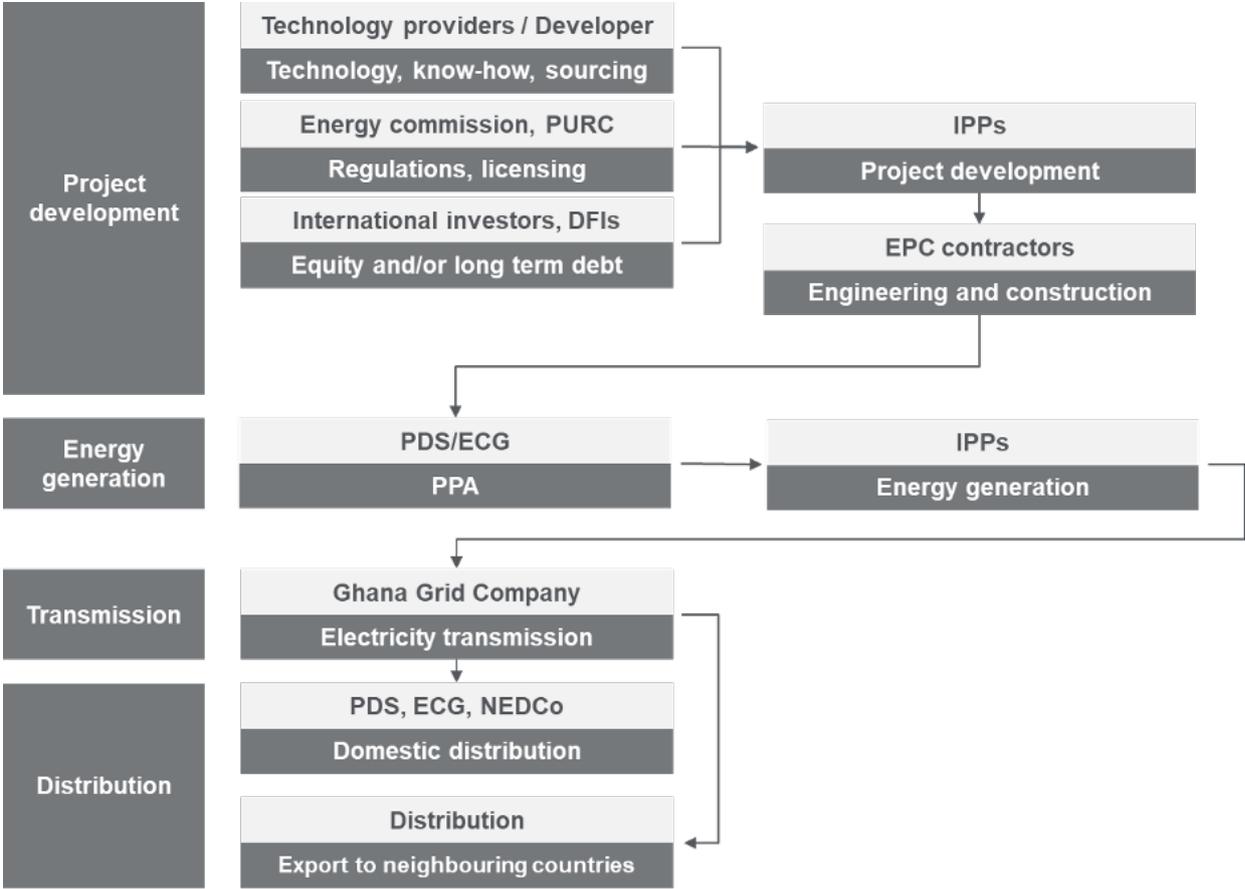
In Ghana, power production from renewable energy sources falls into three categories: utility-scale power producers; households; and C&I. Each has different needs in terms of capital provision and uses renewable energy differently. Utility-scale power producers seek to develop long-term projects and thus require long-term capital.

Households and C&I/SME renewable energy users develop projects on a smaller scale and usually seek to generate power for self-consumption. Typically, they have fewer links to other stakeholders in the ecosystem, although small producers could sell surpluses of energy through net-metering.

4.1.2 ANALYSING THE VALUE CHAIN, MAPPING PRIVATE SECTOR ACTORS AND IDENTIFYING BARRIERS TO ON-GRID UTILITY-SCALE RENEWABLE ENERGY GENERATION IN GHANA

Figure 4 shows the value chain analysis of on-grid utility-scale renewable energy generation.

Figure 4: Value chain for on-grid renewable energy generation in Ghana



Independent power producers (IPPs) are at the centre of the value chain for on-grid renewable energy generation in Ghana. Developers and IPPs are involved in developing utility-scale renewable energy generation. They bring key stakeholders together around potential projects, including technology providers, engineering, procurement and construction (EPC) contractors, financiers, and public utilities.

Investors in utility-scale projects are usually development finance institutions (DFI) and other international investors that can provide equity and long-term debt. The project is structured financially with the investors. PPA terms and conditions are agreed upon with public utilities. The government, through the Energy Commission, PURC and others, impacts the project through regulations and by issuing licenses to IPPs.

After project initiation, IPPs work with EPC contractors to commission the power plant. After commissioning, IPPs operate the plant and sell electricity based on the conditions established by the PPA. Electricity is then distributed to the domestic grid and international markets.

The main gap in the on-grid market value chain is the availability of long-term capital for project developers. In Ghana, the oversupply of electricity related to PPA renegotiation also weighs on the market.

DEVELOPERS/INDEPENDENT POWER PRODUCERS

IPPs are the key players in private sector investments in the renewable energy subsector. They develop utility-scale power plants, initiating projects and developing and operating them once the power plant is commissioned. At the project development stage, technology providers/developers and investors support IPPs. Technology providers/developers support the sourcing of the project idea and provide the technology and know-how required for project initiation and development. Technology providers and IPPs are often interlinked. Renewable energy IPPs and developers with investments in Ghana are detailed in Table 10.

Table 10: Renewable energy investments in Ghana³⁶

PROJECT NAME	TECHNOLOGY	CAPACITY (MW)	STATUS	SPONSORS/ STAKEHOLDERS
SAFISANA BIOGAS	Biogas	0.1	Commissioned	Safi Sana
VRA SOLAR	Solar	2.5	Commissioned	VRA*
BXC SOLAR	Solar	20	Commissioned	Beijing Xiaocheng Company
MEINERGY SOLAR	Solar	20	Commissioned	Meinergy Ghana
ENI TAMALE	Solar	20	Planned	ENI
VRA/UPPER WEST REGION	Solar	12	Planned	KfW, VRA
MERE POWER NZEMA	Solar	155	Unknown	Private, Blue Energy
SIGNIK ENERGY	Solar	50	Unknown	Private, Episolar
AYITEPA WIND FARM	Wind	225	Financial close	Lekela
JUABENG OIL MILL BIOMASS	Biomass	1.2	Commissioned	Unknown
VRA WIND PROJECT	Wind	150	Planned	VRA
TC ENERGY	Tidal	14	Planned	TC Energy
NEOT OFFGRID AFRICA (NOA) INVESTMENT PLATFORM	Off-grid solutions	N/A	Implemented	EDF, Mitsubishi, others

*VRA is a government-owned company

36 Developed from multiple sources: Energy Commission of Ghana, 2017, 2019. Energy Statistics 2017, and 2019 Electricity Supply Plan, VRA website, USAID, 2018, Power Africa Investment Brief for the Electricity Sector in Ghana, Inframart and CTCN

Although most of the investment values are undisclosed, the project investment for the Ayitepa Wind Farm reportedly totals \$525 million. Additionally, the Bui Power Authority has completed Ghana's first micro-hydropower plant to be known as the Tsatsadu Generating Station in 2019, with internal funding and a contribution from UNDP.³⁷

ENGINEERING, PROCUREMENT, CONSTRUCTION/INSTALLERS

Engineering, procurement and construction (EPC) refers to the contractors responsible for all activities from design to procurement, construction, commissioning and handover of the plant to the IPP. Ghana has a large number of installers and EPC companies. However, few of them have significant experience developing utility-scale projects. Most contractors focus on installing SHS and solar systems for C&I clients. Figure 5 provides selected examples of EPC and installers.

Figure 5: Selected EPC and solar system installers in Ghana



4.1.2.1 GAPS, CHALLENGES AND RECOMMENDATIONS FOR IPPS AND THE LARGER ON-GRID UTILITY-SCALE RENEWABLE ENERGY GENERATION VALUE CHAIN

ENERGY SUPPLY EXCESS AND TAKE-OR-PAY PPAs, PPA MORATORIUM

Ghana has signed a significant number of PPAs in the last few years seeking to address energy shortfalls in the country. However, current supply does not meet demand. As of year-end 2018, installed capacity totalled 4,961.5 MW, compared to a peak load of 2,371 MW, with a system peak at 1,525 MW.³⁸

Ghana decided to sign a number of PPAs on a take-or-pay basis, so the country is contractually obligated to spend money even if electricity is not being consumed. Two thousand three hundred (2,300) MW have been contracted on a take-or-pay basis.³⁹

This led the government to place a moratorium on signing new energy sector contracts; in November 2019, it prohibited key institutions in the sector from entering into any new agreements until further notice.⁴⁰ The government has also renegotiated existing PPAs to modify conditions, capacity and planned commission dates. As a result, no new PPAs are likely to be signed in the short term.

LACK OF FINANCIAL SUPPORT MECHANISMS TO IPPS (INCLUDING SOVEREIGN GUARANTEES)

Ghana's Renewable Energy Law provides the basis for the development of grid-connected renewable energy by providing supportive policy instruments, such as feed-in tariffs and renewable purchase obligations. However, the share of renewable energy in the electricity mix of bulk consumers is not yet defined. Defining this guaranteed share would provide assurance to IPPs in developing projects. It is also important to emphasize that distribution companies have significant debts in Ghana,⁴¹ which may undermine their credibility for investors and IPPs. The provision of payment guarantees would therefore influence private sector investment.

³⁷ <https://africa-energy-portal.org/news/ghana-bui-power-authority-completes-first-micro-hydropower-project-volta-region>

³⁸ Ghana Energy Commission, 2019. *Energy Outlook 2019*

³⁹ <https://theconversation.com/lessons-to-be-learnt-from-ghanas-excess-electricity-shambles-121257>

⁴⁰ <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/No-new-contracts-in-the-energy-sector-Ken-Ofori-Atta-799146>

⁴¹ <https://energymx.co.za/2019/10/30/ghana-ipp-waiting-on-state-owned-distribution-companies-to-settle-400m-in-debt/>, Centre for Global Development, September 2017. *The Electricity Situation in Ghana: Challenges and Opportunities*, Policy paper 109.

The structure of tariffs can be a deterrent for private sector investors. While tariffs are necessary at this stage of renewable energy development, they must be structured so that private sector stakeholders can still profit from their projects. Ghana has a uniform tariff policy for mini-grids, so they might not be appropriate for some locations, where installation, operation and maintenance costs are more expensive.

Ghana's tariff policy also constitutes a barrier for grid-connected investments. The PURC sets electricity prices in an administrative process; tariffs are often below cost-recovery levels, especially for residential consumers.

GRID CODE PROVISIONS DO NOT PROVIDE SUFFICIENTLY FOR THE INTEGRATION OF RENEWABLE ENERGY

Ghana's grid code was revised in 2009. It establishes requirements, procedures, practices and standards related to the development and operation of high-voltage transmission in Ghana. However, the Grid Code lacks the provisions related to generation forecasting and priority dispatch needed to integrate additional utility-scale variable renewable energy.

The 2009 Grid Code requires generators to submit their production forecasts a day ahead, which is a significant challenge for renewable energy generators. Variable renewable energy plants could, at best, provide accurate electricity output information on an hourly or sub-hourly basis. The Grid Code thus needs to be revised and include specific conditions enabling renewable energy generators to provide accurate data.

COMPLEXITIES OF ENTERING THE MARKET FOR IPPS

Renewable energy IPPs must interact with a significant number of regulatory agencies in the power sector to win project approval and obtain their licenses. Stakeholders include the Energy Commission and PURC, the Environmental Protection Agency, Ministry of Planning, the Ministry of Finance and the Ghana Investment Promotion Agency.

IPPs may also not be able to clearly identify which communities would benefit from off-grid projects, as there are no clear criteria differentiating communities that would benefit from off-grid and grid-connected electrification.

LOCAL CONTENT AND LOCAL PARTICIPATION REQUIREMENTS

Ghana has introduced a regulation requiring the participation of local companies in contracts, as specified by LI 2354 on local content and local participation. In the renewable energy generation sector, the initial level of local participation has been set at 15 percent. Ghana targets 51 percent participation in the next 10 years. Although this will contribute to the development of a local value chain for renewable energy, Ghana may not currently have enough technical capacity to manage local value chains at that level. That target could thus constitute a significant barrier to private sector investors, which will have to invest in capacity development and quality control to ensure the quality of installations.

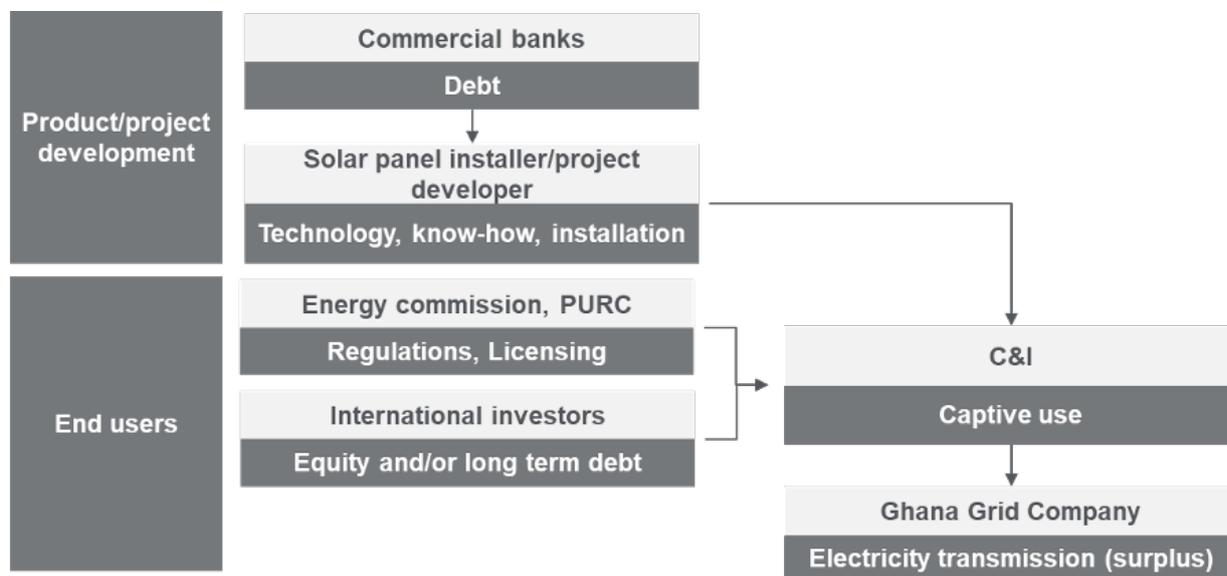
INSUFFICIENT EXPERIENCE AND CAPACITY IN RENEWABLE ENERGY DEVELOPMENT

Ghana's utilities, regulators, financial institutions and project developers have limited experience and capacity to structure and develop bankable PPAs. Ghana's utilities are also technically limited in their ability to select appropriate renewable energy technology options. This leads to inadequate project design and projects, which are often not investment ready.

4.1.3 ANALYSING THE VALUE CHAIN, MAPPING PRIVATE SECTOR ACTORS AND IDENTIFYING BARRIERS TO THE SHS AND C&I USE OF RENEWABLE ENERGY IN GHANA

Figures 6 and 7 present the value chain analyses of the use of renewable energy by SHS and C&I in Ghana.

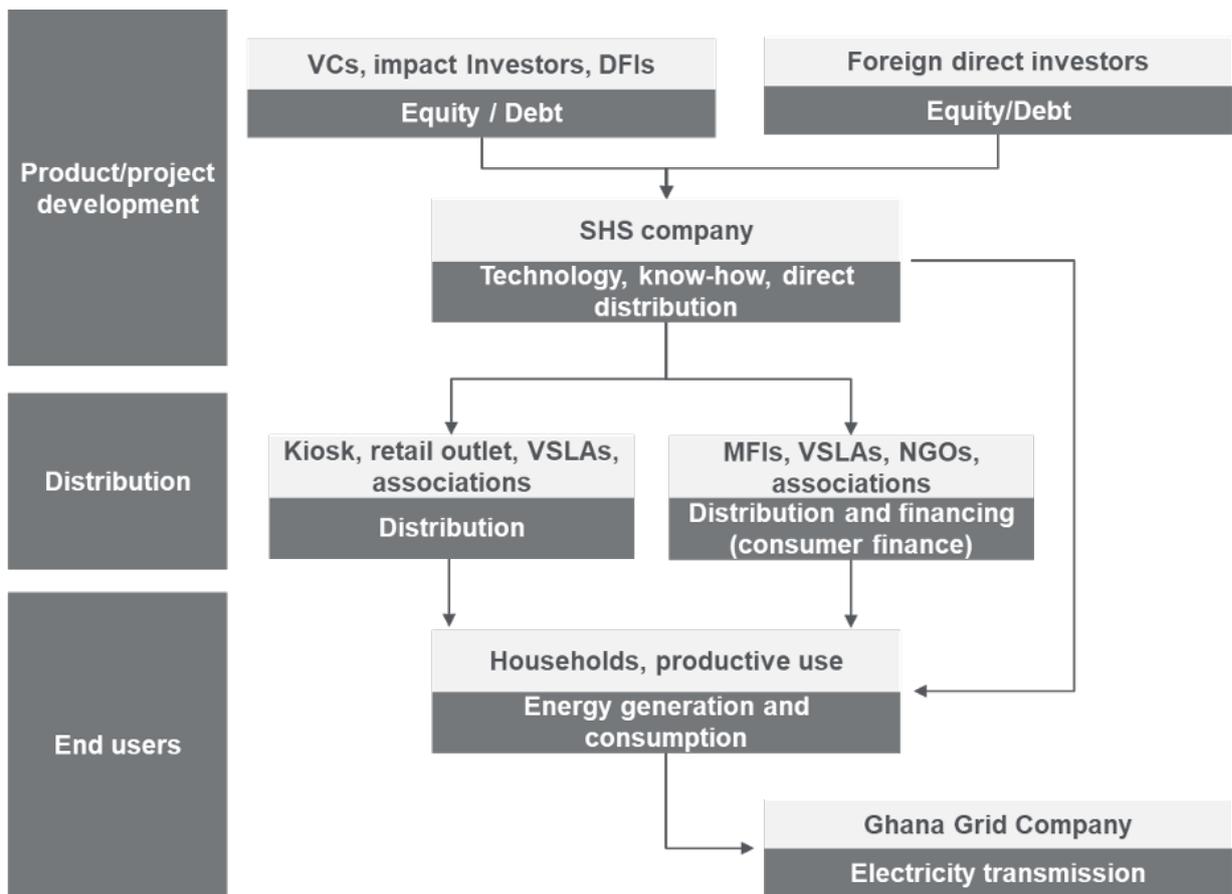
Figure 6: Value chain for C&I use of renewable energy generation in Ghana



The value chain of renewable energy for C&I use is centred on those institutions, which are the source of demand for technology solutions. Demand is driven primarily by efforts to achieve savings on electricity costs and improve power supply. Reducing fuel expenses may be another driver. While C&I solar solutions are often paired with energy storage, in Ghana, the grid is available primarily where C&I demand exists. Base load is therefore available. The contractual arrangements between project developer and customer represent a major challenge to the value chain. Selling electricity to a bulk customer requires a PPA, which requires a whole supplier license that is complex to obtain.

A request from a C&I user typically initiates a project. These users request the services of technology developers/installers to design and install a solution adapted to the business' and company's specific needs. Some developers also provide financial structuring services to support project financing. While C&I users in Ghana develop renewable energy generation capacity primarily for captive use, some also seek to sell the surplus to the grid through net metering arrangements.

Figure 7: Value chain for Ghana’s solar home system/off-grid energy generation in solar PV



The SHS market value chain is more complex than the on-grid generation and C&I use value chains. SHS companies, or technology providers, are at the centre of the value chain. Projects are usually initiated based on end-user demand, which is based on the services and products that SHS companies provide. Households and other end users thus request services and products developed by SHS companies.

In Ghana, SHS companies provide services and products to end users directly or through distributors and intermediaries. Distributors and intermediaries, such as kiosks, retail outlets, microfinance institutions (MFIs), and village savings and loan associations, allow products and technologies to reach more customers by reaching rural areas or by providing financial services to households and SMEs in areas linked with the SHS asset. End users may sell surpluses to the grid through the net metering scheme available.

Ghana’s SHS companies, especially those providing asset-based lending services, are usually financed by foreign investors such as venture capital (VC) and impact investors. DFIs have provided financing to mini-grids in the country. For example, the World Bank Group, through the Ghana Energy and Development Access Project, has funded five pilot mini-grids, while the State Secretariat for Economic Affairs (SECO) provided grant funding for three mini-grids in the country.⁴² DFIs, bilateral partners and corporate and social responsibility initiatives from private sector stakeholders, such as the World Bank, Spain, China and Elecnor SA have also supported the installation of off-grid solar systems for schools, health facilities and rural communities.

TECHNOLOGY PROVIDERS AND SMALL-SCALE DEVELOPERS

Technology providers in Ghana include SHS technology providers and C&I providers. Some provide services to a wide range of sectors and clients; they usually provide holistic solutions ranging from project design and development to financial structuring and project development. SHS-focused providers offer different sets of solutions, ranging from small-scale solar systems to larger systems covering several applications.

⁴² <https://www.worldbank.org/en/news/feature/2020/08/13/lighting-up-africa-bringing-renewable-off-grid-energy-to-communities>, <https://snv.org/update/lighting-isolated-communities-ghana-mini-grids>

Figure 8: Selected renewable energy developers and technology providers in Ghana

<p>Ghana-based developers and technology providers</p>	<p>Holistic solution providers</p> 	<p>SHS-focused providers</p>   
<p>Foreign developers and technology providers</p>	<p>Holistic solution providers</p>  	<p>SHS-focused providers</p> 

SHS-focused providers in Ghana typically use three distribution models. The first is agent sales. In this model, the SHS companies have their own team of sales agents responsible for sales and customer service. Other companies use a retail outlet sales model, usually through village-level kiosks. This allows distribution to reach last-mile areas. The third model is partnership sales. SHS companies may partner with institutions working in off-grid communities, such as MFIs, village savings and loan associations, NGOs and employers.

C&I sites are increasingly investing in solar projects. Investments in new on-site solar is cheaper than the electricity tariffs that Ghanaian C&I customers pay. By 2018, a total of 7 MW of C&I solar projects had been developed.⁴³

The Energy Commission also reports a combined 8 MW of investments in off-grids and mini-grids as of 2019. Through a partnership with companies including EDF, Meridiam and Mitsubishi, NEoT has launched an investment platform for off-grid renewable energy.

Off-grid investments: NEoT Offgrid Africa (NOA) Platform⁴⁴

The goal of the platform is to invest hundreds of millions of euros in distributed renewable energy projects in Africa over the next five years. The platform provides a solution to the challenge of replacing traditional, polluting electricity generation methods (including oil lamps and diesel engines) with clean solutions (solar power + batteries).

The market is estimated to be worth several billion euros and has become more accessible thanks to recent technological advances, particularly in batteries and the digital economy (mobile payment technologies in particular). NOA will invest in projects that serve both consumers and businesses (including industrial facilities, telecom towers, commercial buildings and hotels).

NOA will also invest in projects delivered in partnership with project and technology developers.

4.1.3.1 GAPS, CHALLENGES AND RECOMMENDATIONS FOR TECHNOLOGY PROVIDERS, SMALL-SCALE DEVELOPERS, SHS AND C&I RENEWABLE ENERGY GENERATION VALUE CHAIN

CONFLICTING OPINIONS AND LACK OF INCENTIVES TO DEVELOP MINI-GRIDS

Ghana’s mini-grid development policy clearly states that mini-grid users shall be subject to a similar tariff as the one that applies to users of on-grid electricity. Thus, without cross subsidies or external subsidies, off-grid/mini-grids may not be profitable enough to attract private sector development.

⁴³ Bloomberg Finance L.P. 2019. *Solar for Businesses in Sub-Saharan Africa, 2019*.
⁴⁴ <https://neotcapital.com/new-blog/2017/9/13/introducing-neot-offgrid-africa> (accessed May 2020)

In addition, the government’s goal is to complete Ghana’s electrification by 2030 by extending the main grid, thus limiting market potential for mini-grids. Mini-grids are therefore considered as solutions primarily for remote islands that are not serviced by the grid. However, conflicting opinions exist, including within the government, as to whether mini-grids and off-grids should be led by the public or private sector. This constitutes a significant risk factor.

At the same time, the over-supply of on-grid electricity and the current situation of PPAs make mini-grids a potential market opportunity if greater clarity can be provided on the role of private sector stakeholders.

RECOMMENDATION AND POINT OF ENTRY 1

Establishing a clear vision of the private sector’s role in mini-grid development

To support further investments in renewable energy, the government should develop a unified vision for private sector involvement in mini-grids. Ghana could choose to seek greater private sector involvement in financing mini-grids on remote islands. This could be done through a PPP agreement, which would also support the development of financial viability support mechanisms, such as grants, subsidies and minimum revenue guarantees, sometimes in the form of result-based financing.

Best practice example: Result-based financing for mini-grids

Result-based financing (RBF) provides additional cash flow to mini-grid operators based on specific milestones. RBF for mini-grids is usually indexed on the number of customers connected to the grid and the quality of the connection. This has been implemented in Tanzania through performance grants, where the World Bank–supported TEDAP programme provided up to \$600/new connection for hydro-based mini-grids and \$500 for those using solar mini-grids.⁴⁵

Main implementer	Government, through the development of the required enabling environment.
Private sector involvement	The private sector would be involved primarily at the implementation stage, either for PPP agreements or by directly developing mini-grid projects.
Financial benefits	The private sector would ultimately receive financial support in the form decided by the government (grant, minimum revenue guarantee, result-based financing).
Mitigation outcomes	Increased generation from renewable energy sources and decreased GHG emissions from the energy generation sector.

LIMITED TECHNOLOGICAL CAPACITY

Ghana has a limited pool of skilled personnel who can install, operate and maintain energy efficient technologies, such as solar photovoltaic (PV), industrial efficient motors, wind mills and biogas. This constitutes a critical barrier to the adoption and diffusion of these technologies. The capacity barrier is more acute in rural areas, where inadequate skills have limited the implementation of mitigation actions in the energy sectors.

This lack of technological capacity is addressed partly through Ghana’s objective to encourage more local participation in the development of energy projects through LI 2354 on local participation. This could encourage foreign firms to build local technological capacities over the long term.

CHALLENGES TO LICENSING AND CONTRACTUAL ARRANGEMENTS FOR C&I RENEWABLE ENERGY DEVELOPMENT

The C&I market offers significant potential to renewable energy production developers. Electricity for both C&I facilities in Ghana is more expensive than anywhere else in SSA. Renewable energy is already competitive compared to grid electricity tariffs. Although several companies now invest in C&I solar, there are significant challenges to setting up contractual arrangements between project developer and customer. Selling electricity to a bulk customer requires a PPA, which in turn requires a wholesale supplier license.

⁴⁵ IRENA, 2018. *Policies and Regulations for Renewable Energy Mini-grids*.

To obtain a wholesale supplier license, developers first need to obtain three other licenses: a provisional license; a construction permit; and an authorization permit. Acquiring the construction permit is conditioned on obtaining a fire certificate from the Ghana National Fire Service and a permit from the Environmental Protection Agency.⁴⁶ Each license is approved separately by the Energy Commission’s Board of Directors. Requests are supposed to be processed within 60 days.

Captive generation licenses are also available. However, these licenses are limited to generation capacities exceeding 1MW for own use and/or sale to an off-taker, without a connection to the national grid. This excludes the possibility of net metering and also requires processing time.⁴⁷

RECOMMENDATION AND POINT OF ENTRY 2

Reducing administrative costs and improving procedures to support the development of renewable energy use for C&I

Improving the approval process for wholesale supplier licenses and captive generation licenses appears to be the most important factor to kickstart the market. Additionally, extending the captive generation license to production capacities below 1MW would facilitate market expansion in rural areas where the government intends to build 50-65 factories/year, based on its One District, One Factory strategy.

Best practice example: Licenses and licensing processes in the C&I sector

Regulators have reduced thresholds for small-scale projects in some countries. In Nigeria and Kenya, C&I developers are allowed to install up to one MW for captive use (self-consumption) without a generation license. In Kenya, such projects require obtaining only a construction permit.⁴⁸

Best practice example: Facilitating the development of PPAs between IPPs or developers and C&I customers.

Corporate PPAs have been signed for significant volumes in several African countries. For example, In Namibia, Ohorongo Cement signed a 15-year PPA with German developer SunEQ for a 5 MW PV array. Allowing and facilitating such arrangements could support the development of the market.

Main implementer	Government, through the development of the required enabling environment.
Private sector involvement	The C&I market demand for captive use would be expected to increase. C&I customers would thus invest in new facilities and developers could provide support in installing the facilities.
Financial benefits	The private sector would benefit from decreased transaction costs, as the licensing process would be facilitated. Additionally, C&I customers would benefit from decreased energy costs and could also benefit from reduced initial costs if developers are involved in a PPA/lease agreement.
Mitigation outcomes	Increased generation from renewable energy sources and decreased GHG emissions from the energy generation sector.

4.2 CLEAN COOKING (EFFICIENT COOKSTOVES AND CLEAN ENERGY)

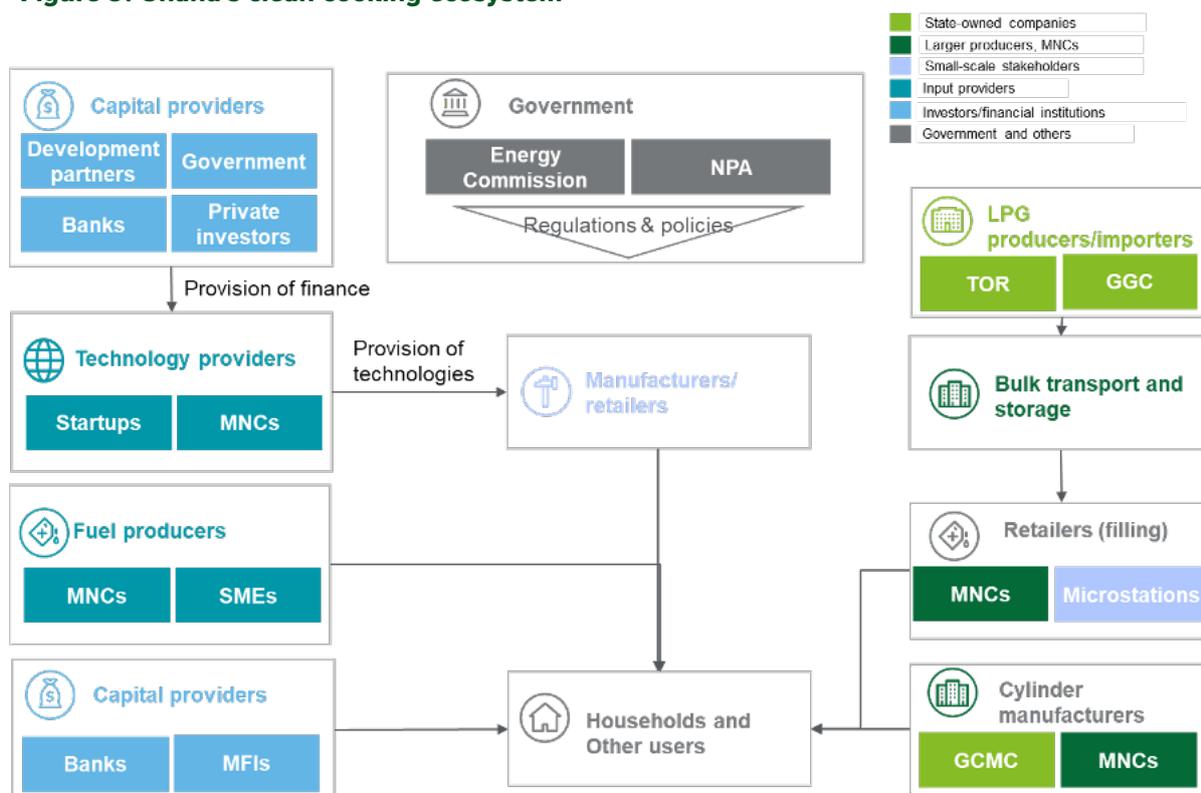
Ghana has developed targets in the clean cooking subsector to further advance the diffusion of LPG stoves and other efficient technologies. The clean cooking ecosystem and value chain involve a significant number of stakeholders – estimated at more than 500 - who manufacture stoves, produce fuel, and/or distribute stoves and fuel.⁴⁹ LPG is used primarily for cooking in the residential sector and in C&I establishments.

46 Energy Commission, 2018. *Licence and permit application manual for service providers in the electricity supply industry.*
 47 Bloomberg NEF, 2019. *Solar for Businesses in Sub-Saharan Africa.*
 48 Ibid.
 49 Centre for Energy, Environment and Sustainable Development, 2014. *Nationwide Mapping of Stakeholders in the Clean Cook Stove Value Chain in Ghana.*

4.2.1 ECOSYSTEM ANALYSIS

Figure 9 describes Ghana's clean cooking ecosystem.

Figure 9: Ghana's clean cooking ecosystem



This ecosystem can be divided into two separate value chains: LPG and other efficient technologies. It can also be divided among input providers, technology providers/manufacturers/retailers and end users. Depending on their business model, technology providers may serve as input providers, providing the technology to manufacturers, or directly as manufacturers, producing the product and distributing directly to end users.

Other input providers include raw material providers, such as LPG producers and importers, who provide fuel to retailers for distribution, and capital providers. End users are usually households. Other users, such as schools and other organizations, also use clean cooking solutions.

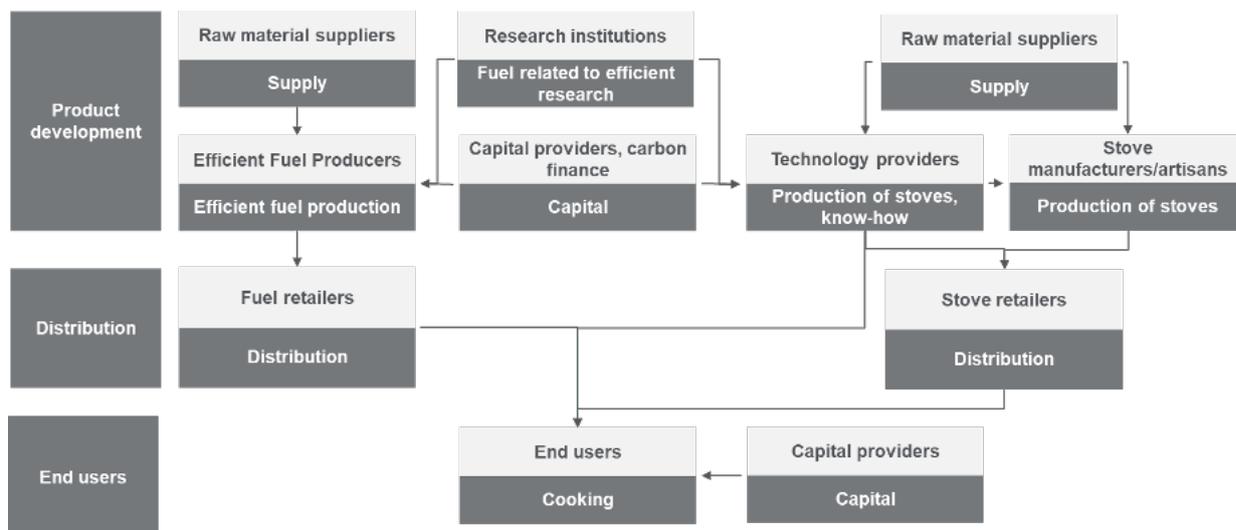
In this ecosystem, the government mainly impacts the LPG value chain, as LPG producers and importers are state-owned enterprises (SOEs). It can also influence the ecosystem by establishing distribution standards, licenses and safety regulations. Government initiatives for reviewing the LPG distribution system are addressed under the value chain for LPG fuel distribution.

Manufacturers of cooking stoves experience similar issues in both value chains, while the issues differ for fuel production and distribution. Private stakeholders constitute the bulk of the value chain for other fuels, as well as cooking stoves. Private fuel producers and stove manufacturers have similar issues in accessing capital.

4.2.2 ANALYSING THE VALUE CHAIN, MAPPING PRIVATE SECTOR ACTORS AND IDENTIFYING BARRIERS TO THE CLEAN COOKING VALUE CHAINS

Figures 10 and 13 present the value chain analysis of Ghana's clean cooking subsector.

Figure 10: Value chain for clean cooking stoves and efficient fuel in Ghana



The clean cooking value chain is structured around end users - households or larger institutions - who are the main drivers for product providers.

In Ghana, efficient cookstoves are produced based on one of two business models. Some enterprises have centralized their production of stoves, which are then distributed to retailers, while others provide the technology but rely on local artisans to manufacture and distribute the equipment. Stoves are then distributed either directly or through retailers.

The full potential of efficient stoves cannot be leveraged without efficient fuel. Raw material suppliers (usually informal private sector stakeholders) supply efficient fuel producers. The fuel producers manufacture briquettes, pellets and more efficient charcoal, which is then distributed to end users directly or through retailers.

Distribution is a significant challenge in the value chain as it constitutes the missing link to scale up production. Most stakeholders in the value chains are smallholders working with larger technology providers.

COOKSTOVE MANUFACTURERS

Cookstove manufacturers are responsible for the development of efficient technologies and/or the production of efficient cookstoves. Cookstove manufacturers in Ghana include both technology providers and artisans. Companies such as Gyapa Enterprises provide the technology, but rely on franchised artisans to manufacture the stoves and carry out retail sales.

Most technology providers are based in Ghana. Foreign companies, such as BioLite and Envirofit, have also started to explore the market. Figure 11 provides selected examples of cookstove manufacturers.

Figure 11: Selected cookstove manufacturers in Ghana



Man and Man Enterprise has implemented a Clean Development Mechanism Programme of Activities (CDM-POA) supported by the Republic of Korea.⁵⁰ Under this programme, the technology provider receives support wherein Korean companies provide all the implementation cost including stove subsidy and operation & maintenance cost for the programme. This allows the technology provider to sell affordable improved cooking stoves to end-users in Ghana.

FUEL MANUFACTURERS

Fuel manufacturers are responsible for the production of efficient fuel. Fuel manufacturers in Ghana include producers of charcoal briquettes and pellets. However, the number of players and their reach remains limited. Only a few limited players have the capacity to produce fuel at scale, such as Abellon, Zaacoal and Agricultural, Industrial and Commercial Products (AICP).

Figure 12: Selected improved fuel manufacturers in Ghana

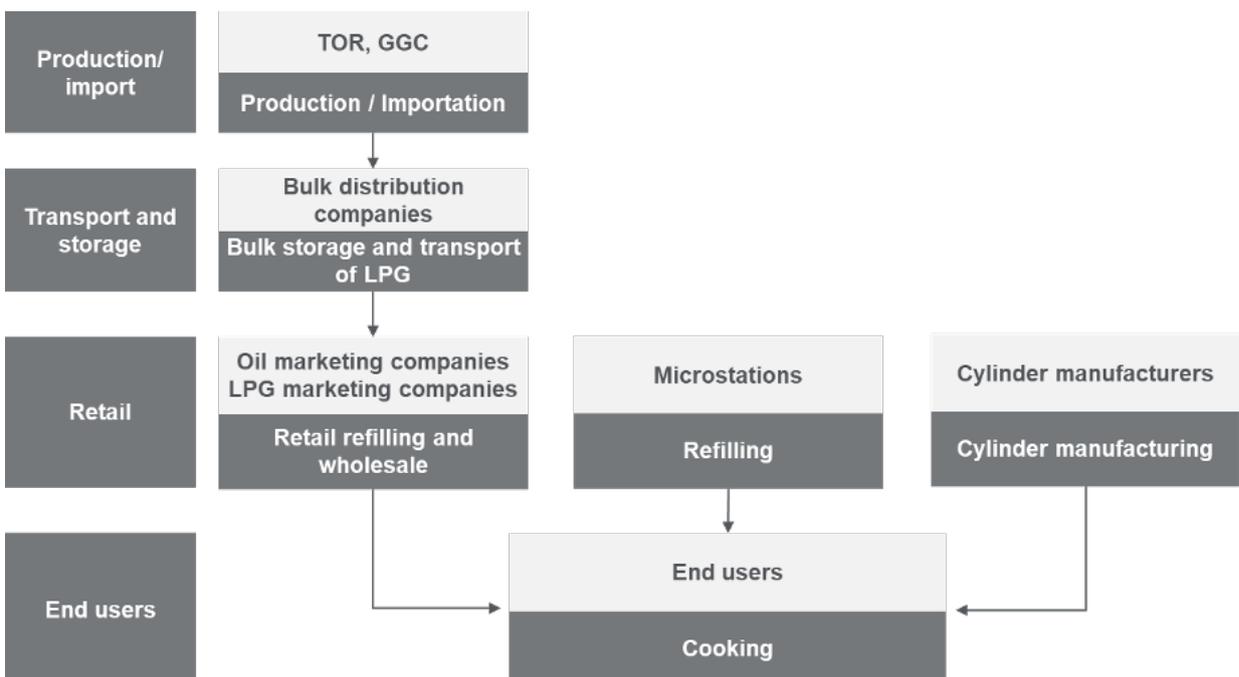


STOVE AND FUEL RETAILERS

Stove and fuel retailers are responsible for the distribution of efficient stoves and fuel in Ghana. The organization of retailers and distributors is a major bottleneck for the value chain. This encourages manufacturers to be directly involved in the distribution process or to work with local artisans to produce cookstoves. In the absence of distribution channels, manufacturers thus face challenges to reach rural areas, which also impact their capacity to scale up and seek financing.

The LPG value chain differs significantly and is detailed in Figure 13.

Figure 13: LPG fuel distribution value chain in Ghana



50 https://cdm.unfccc.int/ProgrammeOfActivities/poa_db/KQXLWC1G6IEY8OHVDFU9S27T5ZNMRP/view

In the Ghana LPG value chain, SOEs, such as the Tema Oil Refinery (TOR) and the Ghana Gas Company (GGC), produce and/or import LPG. Bulk distribution companies then store and distribute it in bulk to retail companies, oil marketing companies (OMCs) and LPG marketing companies (LPGMCs).

The value chain has evolved into a cylinder model in which cylinders are controlled by consumers, rather than managed and refilled by manufacturers and/or OMCs and LPGMCs. The cylinders are refilled at microfilling stations, where they are to be inspected for safety. In practice, however, these inspections are not performed systematically.⁵¹

The main private sector stakeholders are involved in bulk transport and storage, as well as in retailing.

TRANSPORT AND STORAGE

Bulk distribution companies are responsible for LPG transport and storage. Transport and storage refers to an intermediary position in the value chain, between producers and retailers. These companies obtain LPG from producers and importers or TOR and GGC, the SOEs. They usually have storage and transport facilities and sell LPG to OMCs and LPGMCs.

The market leaders in Ghana-Sage Petroleum, a subsidiary of Quantum group, and Fueltrade lead the market, with more than half the market share in this segment.⁵²

RETAIL

Retailers are responsible for distributing LPG, while microfilling stations handle retail sales. These stations are independent or owned by OMCs and LPGMCs.

Retailers/dealers own and/or operate microfilling stations located along main routes or near end consumers. Currently, users bring their own cylinder, which is refilled at the station. However, retailers are also responsible for safety inspections, which are not performed systematically. This is often because retailers cannot afford to purchase comprehensive inspection equipment and develop the necessary expertise.

LPG does not reach a significant share of customers, especially in rural areas, because the station network is concentrated in urban and rural centres. To accelerate the diffusion of LPG and improve its safety, the government is considering piloting a door-to-door distribution model. Empty cylinders would be taken to a central filling plant to be inspected, refilled and certified as safe for use and for sale.

Adopting this model will involve issuing licenses to marketers only and supporting their investment in new cylinders in Ghana. This will redefine the role of microstations.

Leading OMCs and LPGMCs include the Ghana Oil Company Limited (GOIL). Its shares are owned mainly by the government, the Hills Oil Marketing Company and XpressGas. GOIL has the largest retail network, while Hills Oil follows a franchise model in which independent LPG microstation operators are franchised to sell Hill Oil products.

XpressGas provides similar microstation filling services, as well as a swapping model. It provides branded cylinders to consumers and delivers filled cylinders to customers' doors, while picking up the empty cylinders. XpressGas also provides LPG stoves.

CYLINDER MANUFACTURERS

Cylinder manufacturers develop and manufacture LPG cylinders, which are then filled by OMCs, LPGMCs and microstations. Two companies currently manufacture LPG cylinders in Ghana and both are Ghana-

51 Global LPG Partnership, 2018. *National Feasibility Study: LPG for Clean Cooking in Ghana*.

52 Ibid.

based. The Ghana Cylinder Manufacturing Company (GCMC), a SOE, has a capacity of 500,000 cylinders/year. Sojafic Industries is privately owned and has a 200,000-cylinder capacity.

4.2.2.1 GAPS, CHALLENGES AND RECOMMENDATIONS FOR PRIVATE SECTOR STAKEHOLDERS AND THE LARGER CLEAN COOKING VALUE CHAINS

Private sector investment in clean cooking solutions focus on providing efficient cookstoves and efficient fuel.

LACK OF DISTRIBUTION CHANNELS FOR EFFICIENT COOKSTOVES AND FUELS, INCLUDING LPG

Distribution is a significant bottleneck for the value chain. Most Ghana producers lack the capacity to reach rural markets and must rely on rural artisans (franchise system). This limits diffusion of the technology to rural areas, where it is needed most. Fuel producers face a similar issue. This is also a major bottleneck for businesses to scale up and obtain financing. Banks and other investors also have limited interest in small investments, which offer low margins. Ensuring that distribution models are established could support enterprises to scale up their production and become commercially viable.

Some models are based heavily on carbon credits. The financing provided by carbon credits offers an additional source of revenue, which enables companies to reach more rural populations. In Ghana, Gyapa Enterprises has already implemented such a programme by involving local artisans extensively. However, scale and distribution challenges remain significant for the industry, as carbon credits constitute only a temporary subsidy.

RECOMMENDATION AND POINT OF ENTRY 3

Developing business models focused on achieving scale

Achieving scale is crucial to build investor interest in projects and enterprises involved in the clean cooking ecosystem. The private sector should thus consider models that will increase revenues by increasing customers or reducing production costs.

Some models to be explored include those that integrate stoves and associated fuels (tool and fuel models). These models have a stronger revenue stream from fuel sales and could take advantage of linkages between the stove and improved fuel to reduce the upfront cost of stoves.

These models can also be paired with SHS solutions. Clean cooking solutions would then become part of an overall “green model” for rural homes, which can be based on a pay-as-you-go (PAYGO) basis.

Best practice example: Tool and fuel models

Some companies have already tested providing tools and fuels in an integrated manner. The Rwandan company, Inyenyeri, leased customers an efficient biomass cookstove at no cost. In return, customers agreed to buy pellet fuel from the company. The solution was paired with fuel delivery and use of mobile money. This Cooking Power Purchase Agreement cuts monthly cooking cost almost in half, compared to charcoal. Other companies, such as Yenedi Cooking Stoves, have also tested this business model. Tool and fuel models are characterized by a significant initial investment by the company, which has to provide the stove to the end user as part of production costs. As margins on fuel remain limited, it is important that companies can ensure scale and reach a large number of customers.

Best practice example: SHS providers and distributors (distributed energy service companies, DESCs)

In Uganda, Fenix International, a major SHS provider, has already started providing efficient stoves from another company, EcoZomm, as part of its offer. The Kenyan company, M-KOPA, does something similar, offering clean cooking-related products to its SHS clients.

Main implementer	Clean cooking and SHS providers would lead the development of new business models.
Private sector involvement	Through clean cooking and SHS providers, the private sector is expected to be the driver for this entry point. Financial service providers, including commercial banks and non-banking organizations, may also be involved by providing financing to service providers and/or households.
Financial benefits	By reaching scale, solution providers can achieve additional revenues and decrease production costs, which would support growth.
Mitigation outcomes	Decreased use of biomass for cooking and decreased GHG emissions.

Similarly, although LPG is currently distributed through petrol stations, it is also complex for households to travel to petrol stations to recharge, especially in rural areas. Rural residents may have to travel further to reach petrol stations and transportation may not be available. The government is currently considering direct distribution to households, thus reducing the need for distribution intermediaries.

HOUSEHOLDS UNAWARE OF EFFICIENT COOKSTOVES AND EFFICIENT COOKING FUEL

Households in Ghana reveal a lack of awareness of improved cookstoves and fuel sources. If the technology is to scale up, awareness campaigns must be carried out to convince households of their benefits.

INAPPROPRIATE LPG SUPPLY AND PRICING

TOR currently supplies LPG, but its maximum output is 52,000 tonnes/year. Developing the LPG value chain for LPG and, thus, encouraging the private sector to invest in the technology, will require scaling up supply. Additionally, current LPG pricing discourages its import, supply and distribution.⁵³

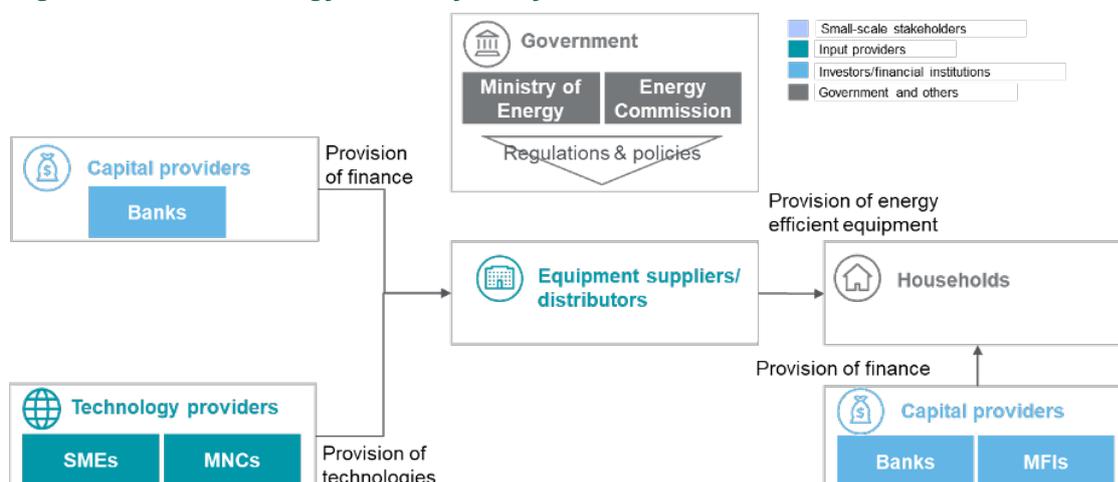
4.3 ENERGY EFFICIENCY

Ghana seeks to encourage the introduction of efficient lighting and efficient refrigerators, which it has done by applying standards and incentives programmes. However, the ecosystem for C&I use of energy efficiency, efficient lighting and appliances is still nascent in Ghana. There are no local manufacturers, so lights and appliances are imported. There were no specific stakeholders identified in this area.

4.3.1 ECOSYSTEM ANALYSIS

Figure 14 presents the overall energy efficiency ecosystem in Ghana.

Figure 14: Ghana's energy efficiency ecosystem



53 Ministry of Environment, Science, Technology and Innovation (MESTI), 2016. *Ghana's low-carbon development strategy (LCDS)*.

The energy efficiency ecosystem is organized into input providers, suppliers and end users. In Ghana, the technologies associated with energy efficiency, lighting and appliances are all imported from foreign providers. No local supply chain exists today.

Equipment suppliers and distributors are mainly small-scale suppliers and distributors, usually present in urban centres such as Accra, and service households. No energy service companies could be identified as part of the ecosystem.

Investment in the energy efficiency subsector focuses primarily on the industrial and household/commercial levels. On the industrial level, Ghana expects to reach 20 percent energy efficiency in power plants by 2030. Major investments should therefore be expected from the sector by then. According to the latest BUR to the UNFCCC in 2018, investments on the energy supply side for energy efficiency were yet to be implemented, except for the 330 MW increase from single cycle to combined cycle.

The Energy Commission will eventually consider developing a production plant for efficient appliances in Ghana. The objective is to eliminate the second-hand market in the country and attract investors to this kind of investment. This could also reach the ECOWAS area, with common rules being prepared now.

At this time, C&I end users appear to have little interest in energy efficiency measures; they prefer introducing captive uses of renewable energy.

Other value chain challenges include the inappropriate pricing of efficient appliances. Efficient appliances remain expensive for consumers in Ghana. The NEEAP emphasizes the need to reduce prices of on-grid and off-grid efficient lighting products by adopting incentives.

4.3.2 GAPS, CHALLENGES AND RECOMMENDATIONS FOR ENERGY EFFICIENCY

This subsector remains nascent in Ghana and demand appears to be limited in the current environment. At the household level, the price of efficient appliances appears to be a significant factor limiting the sector's growth. Despite the introduction of energy efficiency standards and labels for appliances and the success of programmes encouraging the purchase of efficient appliances, such as refrigerators through the provision of subsidized rebates, no commercial initiatives have been developed at scale yet.

RECOMMENDATION AND POINT OF ENTRY 4

Providing energy efficient appliances at an affordable price

To encourage households to replace appliances with more energy efficient equipment, that equipment must be affordable. Developing asset-based lending for appliances such as refrigerators and air conditioning could reduce the initial investment cost. This could be done by working with SHS providers that operate on a DESCO model. SHS providers then become the distributors of energy efficient appliances.

In the longer term, efforts could focus on developing a manufacturing plant for energy efficient appliances in Ghana. This would ease a major obstacle facing distributors of efficient appliances, as they must find suppliers and manufacturers that can produce high-quality products.

By establishing a manufacturing plant in Ghana, a business owner could also reach additional markets in ECOWAS countries. The ECOWAS represents a market of 350 million people in 15 countries, with free trade agreements. This could also be a first step towards economic integration in the context of the African Continental Free Trade Agreement (AfCFTA), which will open a larger free trade area in Africa.

Best practice example: Financing DESCOS: AfDB's DESCO Financing Programme⁵⁴

In 2019, the AfDB approved a financing programme aimed at DESCOS in Africa. It promotes securitization financing techniques to address barriers to accessing finance for DESCOS, as well as the use of local currency financing. The objective is to help offset some of the risks that both local banks and international investors

54 <https://www.afdb.org/en/news-and-events/african-development-bank-approves-new-financing-program-energy-providers-45-mln-people-sub-saharan-africa-benefit-grid-power-2025-25545>

perceive in financing in the sector, which include lack of familiarity with the technology, currency risk and limited information about consumers' credit history.

Main implementer	Energy efficient appliance importers and distributors will be the main implementers in the short term. They may partner with SHS providers to follow a DESCO model.
Private sector involvement	The private sector, through appliance importers, distributors and SHS providers, is expected to be the driver for this entry point. Financial service providers, including commercial banks and non-banking organizations, may also be involved by providing financing to service providers and/or households.
Financial benefits	The challenge of household energy efficiency in Ghana is primarily demand-based. By supporting demand, providers can expect additional and sustainable revenue streams from sustainable appliances.
Mitigation outcomes	Decreased use of energy and decreased GHG emissions.

4.4 BRT AND TRANSPORT

Private sector involvement in the development of BRT lines is paramount for Ghana. Involving the private sector, either through PPPs or direct investment, would help to catalyse investments and leverage public funding. The BUR reports that there is no private investment in BRT lines yet.

Some of the barriers identified for BRT development, as well as for the development of low-carbon mobility in Ghana in general, are detailed below.

POOR ROAD INFRASTRUCTURE AND LACK OF PLANNING FOR BRT DEVELOPMENT

To achieve efficiency and its objectives of emission reduction and cost performance, BRT requires adequate infrastructure and urban planning for its development. Poor planning may lead to traffic congestion, accidents, lower ridership and higher fares. Road networks are currently inadequate in Ghana and would lead to lower rate of returns on BRT-related investments; this makes them unattractive to private sector investors.

POOR ENABLING ENVIRONMENT FOR ELECTRIC VEHICLES

The diffusion of electric vehicles and development of an electric vehicle-related industry require significant investment. For example, charging stations must be deployed in multiple locations around the country so that mobility is not limited to large urban centres or the capital. The Drive Electric Initiative is still at an early stage, so roles and responsibilities for the development of the enabling environment and infrastructure are not yet clear. Infrastructure requirements include the charging infrastructure and specifications for the energy distributed to charging stations, as well as the infrastructure required to recycle or repurpose batteries.

The enabling environment may primarily define the ownership of charging stations, as well as fiscal and regulatory policies for the take-up of e-mobility. For example, fiscal policies may include incentives for the private sector to deploy charging infrastructure or for private vehicle owners, such as a scrappage bonus. New regulations could require new buildings and facilities to integrate charging infrastructure to meet market demand. This could be done by revising the building codes.

4.5 FINANCIAL INSTITUTIONS PROVIDING GREEN FINANCING RELEVANT TO THE ENERGY SECTOR

A limited number of institutions provide green financing and financing to Ghana's energy sector. They provide services to SMEs, as well as consumer finance. Table 11 presents a mapping of institutions providing green financing and the financial products and services provided by these organizations.

Table 11: Financial institutions providing green financing to Ghana’s energy sector

FINANCIAL INSTITUTIONS		SUBSECTOR SERVED	PRODUCTS AND SERVICES	DETAILS
Type	Example			
COMMERCIAL BANKS	Ecobank	Renewable energy	Corporate finance (debt)	Interest rates: 20-21% Tenor: five years at most
		Energy efficiency	Consumer finance (debt)	Interest rates: 22-24% Tenor: five years at most
MFIS AND RURAL BANKS	Opportunity International	Renewable energy	Consumer finance (debt)	Interest Rates: 36% Tenor: short term
IMPACT INVESTORS, VCS AND CVCS	Acumen, Energy Access Ventures, Total Ventures, GE Ventures, SunFunder	Renewable energy	Venture capital (debt, equity)	Significant ticket size Foreign-based
SHS PROVIDERS	PEG	Renewable energy	Asset finance/ asset-based lending	Provided directly or through partners
CARBON CREDIT BUYERS	N/A	Cooking stoves	Carbon credits	Emitted through Gold Standard
DFIS	AFD	Renewable energy and energy efficiency	Credit line to commercial banks	SUNREF
	KfW			Green Credit Line
	European Union	Renewable energy	Corporate finance (debt)	ElectriFI – electrification financing initiative
	IFC	Renewable energy	Project finance	Ayitepa wind farm
	AfDB, IFC and others	Renewable energy	Grant finance and project finance	Grant financing for mini-grids and project finance for utility scale solar PV/ wind generation

4.5.1 COMMERCIAL BANKS

The commercial banking sector in Ghana is not an active lender to on-grid and off-grid energy companies. The main banks involved in the country’s renewable energy sector include Stanbic Bank, Ecobank Ghana, Fidelity Bank, and CalBank. Ecobank provides financing to SMEs, corporates and consumers in renewable energy and energy efficiency projects. However, debt financing conditions are not favourable to the sector, given high interest rates and short tenors.

Table 12 presents specific products developed by Ecobank and Stanbic Bank, as well as general financing conditions.

Table 12: Commercial bank products provided to Ghana’s energy sector

FINANCIAL INSTITUTION	ECOBANK	STANBIC BANK
TYPE OF PRODUCT OFFERED	Consumer loans Commercial/ Corporate	Consumer loans Commercial products*
SEGMENT TARGETED	Solar PV and SGS, energy efficiency	Solar PV, energy efficiency, clean cooking
EXPECTED FINANCIAL RETURNS	20 - 24%, dependent on GRR and ORR	23% on average**
RISK PERCEPTIONS	Mainly related to equipment quality and durability, which could derail the expected cost savings and, thus, repayment capacity	Low to medium
TYPICAL TENOR	Up to five years	Up to five years

FINANCIAL INSTITUTION	ECOBANK	STANBIC BANK
LENDING/FINANCING REQUIREMENTS	Primary source of repayment should come from the client's cash flow and at least one other source of repayment as collateral	Salaried worker or prove reliable source of income for self-employed Financials: income statement, balance sheet and cash flow (3 years), 6 months' account statement, business registration documents, request letter
LIMITATIONS	Limited guarantee and de-risking schemes	High interest rate in Ghana (GRR) Lack of capacity to evaluate green products

* Awaiting approval

** Stanbic Bank is looking for concessional financing to reduce interest rates

High interest rates are partly driven by the cost of capital: the central bank's Ghana Reference Rate (GRR), which serves as the commercial banks' base rate. In May 2020, GRR was set at 14.77 percent.⁵⁵ At more than 20 percent, interest rates are prohibitive for most private sector stakeholders and depend on the margin set based on the Obligor Risk Rating (ORR). Overall, the tenor remains relatively short, at up to five years for asset financing facilities. Contract finance facilities are subject to shorter-term tenors.

EcoBank has a strong SME unit and implemented a scoring system to assess whether to provide financing. Most distributors have a basic governance structure. However, the primary challenge is that most SMEs in the energy sector are one-person businesses and are reluctant to formalize their operations. In addition to the compliance issue related to the sector's informality, EcoBank also encountered financial issues due to inadequate basic bookkeeping.

Most commercial banks in Ghana, including Ecobank, require a primary source of repayment from the obligors' cash flow and at least one other source of repayment, which includes collateral. Consumer finance usually depends on the client receiving a formal source of income, which excludes the informal sector.

In 2019, Ecobank in Ghana⁵⁶ became accredited to the Green Climate Fund (GCF).⁵⁷ This opens new opportunities for the bank in financing the energy sector. Ecobank will partner with the Energy Commission to develop a solar rooftop financing project in Ghana.

CalBank⁵⁸ was the first commercial bank to receive support from the Sustainable Use of Natural Resources and Energy Finance initiative (SUNREF), developed by the Agence Française de Développement (AFD).⁵⁹ It seeks to encourage energy efficiency and renewable energy through SMEs by providing more favourable financing conditions. Commercial banks also provide capital to rural banks and MFIs, which can reach remote areas.

4.5.2 MFIS AND RURAL BANKS

MFIs and rural banks provide some debt financing and consumer finance to SMEs in Ghana, especially in rural areas. However, they do not provide specific products for energy investments. Some organizations, such as Opportunity International,⁶⁰ offer general home improvement loans, through which households can access solar products. However, this represents a small fraction of its portfolio.

⁵⁵ Available on Ghana Association of Bankers' homepage: <https://gab.com.gh/index.php>

⁵⁶ <https://ecobank.com/gh/personal-banking/countries>

⁵⁷ <https://www.greenclimate.fund/ae/ecobank>

⁵⁸ <https://calbank.net/>

⁵⁹ <https://calbankgallery.com/photo-gallery/calbank-signs-on-sunref-agreement/>, <https://thebftonline.com/2019/business/trade/ghana-france-bilateral-cooperation-deepens/>

⁶⁰ <https://opportunity.org/>

Interest rates are high for debt financing from MFIs and rural banks. Capital is usually obtained from commercial banks. Depending on the institution's credit rating and spread, interest rates usually start at 36 percent, reflecting the perception of risk that MFIs pose. Risk aversion is driven primarily by the NPL ratio. However, MFIs do not all have clear data on their NPLs, which could lead to misperception of risk.

MFIs and rural banks are also important partners for sales and financing in the SHS sector.

4.5.3 IMPACT INVESTORS, VENTURE CAPITAL FIRMS AND CORPORATE VENTURE CAPITAL FIRMS

There is a limited supply of equity in Ghana's energy sector, including from local sources. Commercial banks do not provide equity. It is thus important to understand the level of activity of impact investors, VC and corporate VC (CVCs) in Ghana. Locally-based impact investors, VCs and private equity (PE) funds are rare in Ghana. Those present include Jacana Partners,⁶¹ Golden Palm Investments⁶² and Meltwater Entrepreneurial School of Technology.⁶³ They represent some of the most important investors in terms of number of deals. However, none specializes in energy.

Foreign-based impact investors, VCs and CVCs sometimes invest in Ghana-based companies. On the on-grid market, Actis⁶⁴ has invested in Lekela, which is developing the Ayitepa wind farm. On the off-grid market, PEG Africa,⁶⁵ a major stakeholder in the SHS sector, has received financing from impact investors such as Investissement & Partenaires,⁶⁶ a French firm, Acumen,⁶⁷ CVCs such as Total Ventures,⁶⁸ and firms such as SunFunder⁶⁹ and responsAbility⁷⁰. Regional and pan-African funds are also active in the VC space in West Africa. However, the energy sector in general is not characterized by a large number of deals.

Firms such as PEG and Zola Electric⁷¹ are working in a number of countries, which makes them attractive to international players and more scalable. They also have existing relationships with investors.

4.5.4 ASSET FINANCE AND COMMUNITY-BASED LENDING (SHS PROVIDERS)

Asset finance/asset-based lending is an important financial service in Ghana. Asset finance allows consumers to access equipment while repaying a loan. The asset (equipment) usually becomes the collateral for the financing institution. In Ghana's SHS sector, this type of financing is referred to as pay as you go, or PAYGO.

The SHS company finances the PAYGO sales initially. Customers pay the balance over one to three years. PAYGO is usually enabled by mobile money systems or, when unavailable, via cash collections. PEG and Zola Electric are the most significant players in this market, with some other providers seeking to enter as well.

Similar financing arrangements may be provided by SHS providers' partners, such as MFIs, rural banks, employers and NGOs.

A similar arrangement could be used in the cooking stove subsector, but this practice is not common yet.

4.5.5 CARBON CREDITS

A carbon credit, or carbon offset, is the emission reduction expressed as one tonne of carbon dioxide equivalent (tCO₂e). Carbon credits are issued after assessing third-party validation and verification of compliance with a specific methodology and carbon standard. Ghana has implemented carbon credit programmes in the clean cooking sector.

61 <https://jacanatest.wordpress.com/>

62 <https://www.gpalminvestments.com/>

63 <https://meltwater.org/seed-fund/>

64 <https://www.act.is/>

65 <https://pegafrika.com/>

66 <http://www.ietsp.com/en>

67 <https://acumen.org/>

68 <https://www.ventures.total/>

69 <https://www.sunfunder.com/>

70 <https://www.responsability.com/en/responsability-further-broadens-grid-solar-portfolio>

71 <https://zolaelectric.com/>

Specifically, Gyapa,⁷² introduced by ClimateCare,⁷³ has issued one of the largest number of credits for clean cooking, with more than four million tonnes of CO₂e avoided. The credits were issued through the Gold Standard Verified Emission Reduction (VER) scheme on the voluntary market. VERs are a type of carbon offset exchanged in the voluntary or over-the-counter market for carbon credits. Buyers voluntarily offset their own emissions or make an additional contribution to climate change mitigation.

ClimateCare also worked with CookClean,⁷⁴ which offers the potential to avoid one million tonnes of CO₂e over seven years. The project is registered under the Clean Development Mechanism (CDM), one of the mechanisms defined under the Kyoto Protocol. Under the CDM, certified emission reduction (CER) units are issued to emission reduction projects. The units may be traded and used to meet emission reduction targets under the Protocol and compliance with other market-based mechanisms, such as emission trading schemes. Annex I countries of the Kyoto Protocol were allowed to meet part of their emission reduction commitments by buying CERs.

While both of these projects use the benefits of credit programmes to improve their cash flow, future projects will have to take several cautions into account when considering participation in carbon markets. The price of carbon under the CDM plummeted after 2012, thus limiting the investment potential through the CDM in particular and carbon financing in general. Adoption of the Paris Agreement in 2015 and its Article 6 provide the overall framework and concept for the post-CDM carbon market. However, agreement has not yet been reached on its operationalization and final framework and its rulebook has not yet been developed.

It is also important to note that carbon credits remain temporary and are not a permanent source of cash flow. They are linked to specific and measurable results and as such, are better suited to a project than to a sustainable business model. Businesses that use carbon credits should therefore leverage the cash flow that the credits provide to support the development of a sustainable business model, which does not require additional subsidies.

4.5.6 RECOMMENDATIONS FOR THE FINANCIAL SECTOR

The energy subsectors are limited by the financial sector, which perceives renewable energy and energy efficiency as high risk and usually offers high commercial interest rates and limited tenor loans for all such activities. While indicative commercial bank interest rates in Ghana range between 15 and 20 percent,⁷⁵ interviews with key stakeholders suggest that commercial lending rates from major financial institutions range between 24 and 26 percent, while consumer finance, especially in rural areas, can reach rates of at least 34 to 36 percent. This limits the private sector's capacity to invest in projects, as well as households' capacity to invest in the technologies.

The lack of long-term financing, such as long-term debt and equity, is another important limiting factor, specifically for infrastructure projects such as on-grid utility-scale projects.

RECOMMENDATION AND POINT OF ENTRY 5

Providing capital at affordable conditions for blending and de-risking in commercial finance

Blended finance is a potential option for commercial banks in Ghana. Such transactions should address the risks perceived by investors; it constitutes a significant de-risking option for emerging markets and developing countries through the use of instruments such as guarantees and grant funding. Blended finance also offers an opportunity to increase returns on a specific investment. Blended finance mechanisms address specific risks perceived by investors, such as macroeconomic and technical risks.

The interest rates and tenors offered to loan applicants reflect the risks as perceived by Ghana's commercial banks. The GRR remains the key factor behind the high cost of capital in the country. This means that commercial banks in the country cannot access affordable capital and cannot provide favourable financing conditions to the private sector in the energy sector.

⁷² <https://climatecare.org/project/gyapa-stoves-in-ghana/>

⁷³ <https://climatecare.org/>

⁷⁴ <https://climatecare.org/project/cookclean-efficient-cookstoves-in-ghana/>

⁷⁵ <https://www.bog.gov.gh/treasury-and-the-markets/treasury-bill-rates/>

Commercial banks also perceive energy-related businesses as high risk, as shown by their ORR. Significant drivers of this perception include credit risks associated with the probability of default by the loan recipient, as well as technical risks, which can be explained by a lack of understanding of innovative models in the energy sector.

However, commercial banks have shown some interest in partnering with international organizations to provide products at an improved interest rate. This can be achieved by providing concessional finance or guarantees to commercial banks to cover part of the risk perceived by the bank (ORR). This could make it possible to lower interest rates by up to 15 percent, which is significantly lower than the conditions currently offered.

Some of the instruments that could be leveraged to achieve this include direct investments, concessional financing for lines of credit and guarantees. For example, direct investments may target significant infrastructure investments in the energy sector and increase the confidence of other investors. Credit lines may support commercial banks to target specific segments of the energy sector, such as SMEs in the SHS and clean cooking space. Finally, guarantees can provide the coverage needed for a loan recipient to improve its credit rating and decrease risks.

Blended finance programmes should be bundled with capacity-building programmes aimed at commercial banks. Commercial banks will have to assess business models with which they are not experienced or comfortable.

Best practice example: SUNREF Programme⁷⁶

The objective of the SUNREF initiative, developed by the AFD, is to support financial institutions and their clients to boost financing for sustainable natural resources management projects, with a focus on clean energy. SUNREF offers long-term concessional financing instruments to banks and contributes to building the technical capacities of financial intermediaries. Capacity-building programmes include helping banks to identify innovative green projects and appraising the corresponding loan applications. SUNREF's partners in Ghana include Cal Bank.

Main implementer	The main implementers should be providers of concessional capital, such as climate finance funds (GCF), international organizations, multilateral development banks and bilateral donors. This will require close discussions with local financial institutions and the government.
Private sector involvement	The private sector will be involved through the development of credit lines and specific instruments. This could target primarily commercial banks as well as investment funds (VCs and PE funds) that are ready to invest in innovative business models (related to point of entry 6). Ultimately, private sector stakeholders in the energy sector should be able to benefit from concessional financing, as well as end users such as C&I and households.
Financial benefits	Financial institutions will benefit from risk mitigation instruments. This may be achieved through reduced cost of capital, guarantees and other instruments. Private sector stakeholders and end users will benefit from reduced interest rates, thereby reducing the cost of the project to be implemented.
Mitigation outcomes	Decreased GHG emissions in the energy sector overall.

⁷⁶ <https://www.sunref.org/en/>

Ghana also has limited access to equity, VC and impact finance. The VC space remains nascent in the country.

RECOMMENDATION AND POINT OF ENTRY 6

De-risking innovative social models

To further support innovation in energy access and other energy business models, adequate financing conditions should be offered to innovative enterprises. Social ventures and enterprises require capital early on to develop their business model, proof of concept and prototypes and to grow at scale. This requires financial and technical support.

Ghana already has an incubation centre focused on climate innovation, the Ghana Climate Innovation Centre (GCIC), which mainly provides technical support to start-ups focused on the green economy. In the energy sector, GCIC focuses on energy efficiency and solar energy. GCIC is sponsored by a number of partners and is part of the World Bank’s infoDev Climate Technology Programme.

Although incubation and acceleration services need to be strengthened to further support entrepreneurs, capital is also needed before investors get involved. Given the current status of the innovation ecosystem, pre-seed and seed funding are required to further support innovation. This can be achieved by providing grants or other concessional finance to acceleration services and/or investors (impact investors/VCs).

Best practice example: Impact investors and GCF

GCF has provided financing to Acumen, an impact investment fund, to develop an investment fund, KawiSafi, to drive off-grid solar power in East Africa. The fund aims to drive a low-carbon paradigm shift and leapfrog fossil fuel grids to clean energy, using equity capital from GCF to leverage investment and grant capital to set up a technical assistance facility.

Best practice example: Acceleration services and funding throughout the investment cycle

Kenya Climate Innovation Centre (KCIC) provides holistic, country-driven support to accelerate the development, deployment and transfer of locally relevant climate and clean energy technologies. KCIC provides incubation, capacity-building services and financing to Kenyan entrepreneurs and new ventures developing innovative solutions in energy, water and agribusiness to address climate change. KCIC was the first incubation centre under the infoDev Climate Technology Programme.

KCIC also provides a number of financing options throughout the investment cycle. At seed level, it provides grants to entrepreneurs. After this stage, it provides loans. When companies become investable, KCIC can also invest through its VC firm, Kenya Climate Ventures.

Main implementer	The main implementers should be stakeholders in the innovation space, including providers of concessional capital, the government and acceleration service providers.
Private sector involvement	The private sector will be involved through the development of innovation support models, such as acceleration programmes for innovative business models. This could also target investment funds (VCs and PE funds) that are ready to invest in innovative business models. Ultimately, private sector stakeholders in the energy sector should be able to benefit from acceleration support and financing, as well as end users such as C&I and households.
Financial benefits	Acceleration service providers will benefit from concessional financing and technical support. This will be extended to entrepreneurs benefitting from the programmes, which will have access to these services at a reduced cost.
Mitigation outcomes	Decreased GHG emissions in the overall energy sector.

Private stakeholders have already been involved in the energy sector in the renewable energy, energy efficiency and clean cooking value chains. In electricity generation, IPPs have already deployed a significant generation capacity, although Ghana generates more electricity than it currently needs. This oversupply is expected to constitute a major barrier for short-term development of on-grid capacities. Although off-grid electricity generation remains a nascent sector, a number of players are already involved in the ecosystem with established business models. The availability of asset-based lending and similar solutions has been important in developing the ecosystem to this point.

Clean cooking will require greater private sector involvement in distribution. A number of stove and fuel manufacturers are already active in the value chain, but have not been able to reach scale. Achieving scale and reaching a larger number of customers in more rural areas will require developing distribution networks and alternative business models. These could be based on partnerships within the value chain or between value chains.

Energy efficiency is an important opportunity for the private sector, but pricing- and incentive-related barriers may still hinder the development of local value chains. In the longer term, providing more affordable appliances should support the development of the value chain and private sector investment. This can be achieved by developing partnerships or a local manufacturing line.

For the transport subsector, BRT development constitutes a major opportunity for private sector involvement. However, poor road infrastructure and planning will need to be addressed when engaging with the private sector.

Finally, to further support the private sector, it will be important to support the development of concessional financing schemes by developing blended finance with commercial banks or by developing impact investing funds, targeting more innovative enterprises.

5. PRIVATE SECTOR INVESTMENT POTENTIAL

Ghana has set an ambitious target in its NDC: to reduce its emissions by 30 percent relative to the BAU scenario by 2030. The government has developed 20 mitigation programmes of actions in seven sectors, including sustainable energy security and sustainable mass transportation. These objectives and actions have been supplemented by the BUR (2018), and the REMP (2019), which further develop Ghana's climate change mitigation targets.

This section provides an estimate of the private sector investment potential in the energy sector in general and in each related subsector in specific.

5.1 DATA SOURCES

Data sources for the targets adopted under this report and for investment costs are detailed below.

5.1.1 TARGETS

The Government of Ghana has provided a number of mitigation actions and targets in its NDC. Those have been supplemented by documents published by the government, such as the BUR, which provides a version of the measurement, reporting and verification system for mitigation actions in the energy sector and the REMP. Tables 13 and 14 address these objectives and targets.

Table 13 shows that some mitigation action targets are inconsistent across the renewable energy documents. For the purposes of this report, the most ambitious targets, or those providing sufficient details, were chosen for the investment potential calculation. The targets are consistent or more ambitious than the NDC, to the extent possible. The targets chosen for each reduction option are highlighted in green.

Table 13: Renewable energy objectives and targets

REDUCTION OPTION	UNIT	NDC TARGET	BUR TARGET	REMP TARGET
POWER GENERATION				
Mini-hydro power connected to main grid	1MW	150-300	300 by 2025	150.05 by 2030
Solar PV (utility-scale)	1MW	N/A	250 by 2025	447.5 by 2030
Solar home PV	50W	200,000	200,000 by 2025	N/A
Mini-grids	Units	55 mini-grids (av. capacity of 100kW, total 10MW)	138 mini grids, hybrid solar/diesel (40kw diesel) by 2025	300 mini grids*
Biogas from municipal solid waste	1000 t/ year plant	N/A	1	50MW
Wind turbines (onshore)	1MW	150-250	150 by 2025	325
Small-scale wind turbines	1MW	N/A	N/A	2
Tidal power	1MW	N/A	N/A	50
RENEWABLE ENERGY-RELATED				
Solar LED lamps	Units	2,000,000	2,000,000	1,000,000
Solar irrigation	Ha	N/A	N/A	46,150
Wind irrigation	Units	N/A	N/A	100
Crop dryers	Units	N/A	N/A	700
Water heaters	Units	N/A	N/A	135,000

*Mini-grids are assumed to have a 100kW average capacity.

Table 14: Energy efficiency objectives and targets

REDUCTION OPTION	UNIT	NDC TARGET	BUR TARGET
APPLIANCES			
Efficient lighting with LEDs	Units	N/A	7,000,000
Efficient lighting/ LEDs replacing CFLs	Units	N/A	13,000,000
Efficient refrigerators	Units	N/A	2,000,000
EFFICIENT/CLEAN COOKING			
Efficient woodstoves	Units	Scale up access and adoption of 2 million efficient cook stoves by 2030	2,000,000
LPG stoves replacing wood stoves	Units	Scale up adoption of LPG use from 5.5 percent to 50 percent among peri-urban and rural households by 2030	134,000

In terms of replacing wood stoves with LPG stoves, Ghana's population is project to reach approximately 37,833,000 by 2030.⁷⁷ Its average household size was estimated at 3.5 member per household in 2017.⁷⁸ The number of households projected for 2030 thus totals approximately 10,809,429. Under the NDC, the objective is therefore to replace 50 percent of wood stoves with LPG stoves (for 5,404,714 households).

In the transport subsector, the NDC refers to the expansion of inter- and intra-city mass transportation modes (rail and bus transit system) in four cities. Ghana's 2018 BUR translates this objective into the development of 200 km BRT lines.

Measures mentioned in the NDC, BUR and other documents but that lack detailed targets are not included in this report. Additionally, measures that the public sector is likely to introduce, such as public lighting, have not been included in this analysis.

5.1.2 BASELINE DATA FOR MITIGATION ACTIONS

The baseline data have been aggregated from a number of sources. When available, these data are based on private investment data. When unavailable, they are based on statistics from the Energy Commission, the BUR or the REMP. The baseline data for each mitigation action are detailed in Table 15.

Table 15: Renewable energy and energy efficiency baseline data

REDUCTION OPTION	UNIT	BASELINE DATA	SOURCE
POWER GENERATION			
Mini-hydro power connected to main grid	1MW	6.9	BUR
Solar PV, utility-scale	1MW	279.5	Investment data
Solar home PV	50W	N/A	BUR
Mini-grids	1MW	8	Energy Commission
Biogas from municipal solid waste	1000 t/ year plant	1.3	Investment data
Wind turbines (onshore)	1MW	375	Investment data
Small-scale wind turbines	1MW	0.01	BUR
Wind turbines (onshore)	1MW	375	Investment data

77 United Nations, Department of Economic and Social Affairs, 2019. *World Population Prospects 2019, Data Booklet*.

78 United Nations, Department of Economic and Social Affairs, 2017. *Household Size and Composition Around the World 2017 1*.

REDUCTION OPTION	UNIT	BASELINE DATA	SOURCE
RENEWABLE ENERGY-RELATED			
Solar LED Lamps	Units	72,000	BUR
Solar irrigation	Ha	150	REMP
Wind irrigation	Units	10	REMP
Crop dryers	Units	70	REMP
Water heaters	Units	4,700	REMP
ENERGY EFFICIENCY (APPLIANCES)			
Efficient lighting with LEDs	Units	0	BUR
Efficient lighting with LEDs replacing CFLs	Units	0	BUR
Efficient refrigerators	Units	0	BUR
EFFICIENT/CLEAN COOKING			
Efficient woodstoves	Units	1,200,000	BUR
LPG stoves replacing wood stoves	Units	85,000	BUR

5.1.3 INVESTMENT COSTS

To the extent possible, investment costs have been identified in similar development contexts. Renewable energy power generation investment costs are based either on market prices in Africa or costs recognized internationally in studies by the International Renewable Energy Agency (IRENA), World Bank or the US Department of Energy. For other related renewable energy technologies, studies related to similar markets have been leveraged, such as the Nationally Appropriate Mitigation Action (NAMA) on Access to Clean Energy through Establishing of Market-based Solutions in Ghana. Table 16 provides details on the sources for each technology.

Table 16: Sources of renewable energy investment costs

REDUCTION OPTION	SOURCE
POWER GENERATION	
Mini-hydro power connected to main grid	IEA-ETSAP and IRENA, 2015. Hydropower, Technology Brief
Solar PV (utility-scale)	IRENA 2018. Planning and prospects for renewable power: West Africa.
Solar home PV	IRENA, 2016. Solar PV in Africa: Costs and Markets
Mini-grids	The World Bank Group, 2019. State of the Mini Grid Market Globally
Biogas from Municipal Solid Waste	IRENA 2018. Planning and prospects for renewable power: West Africa.
Wind turbines (onshore)	IRENA 2018. Planning and prospects for renewable power: West Africa.
Small-scale wind turbines	US Department of Energy, 2018. 2018 Distributed Wind Market Report
Tidal power	IRENA, 2014. Tidal Energy, Technology Brief
RENEWABLE ENERGY-RELATED	
Solar LED lamps	UNDP, 2017. Access to Clean Energy Through Market-Based Solutions in Ghana
Solar irrigation	GET.invest, 2019. Senegal: Renewable Energy in Agricultural Value Chains
Wind irrigation	SNV, 2014. Renewable energy for smallholder irrigation
Crop dryers	ECREEE, 2015. Ghana Market Report on Solar Thermal Water Heating and Drying of Agricultural Products
Water heaters	

A similar approach has been chosen for energy efficiency. When available, costs in Ghana have been used. In other cases, costs in similar markets or international prices have been used. Table 17 provides details on each technology's sources.

Table 17: Sources of renewable energy investment costs

REDUCTION OPTION	SOURCE
APPLIANCES	
Efficient lighting with LEDs	IEA, Tracking Buildings
Efficient lighting with LEDs replacing CFLs	
Efficient refrigerators	BigEE, 2015. Appliances Guide, Energy efficient refrigerators in South Africa
CLEAN COOKING	
Efficient woodstoves	UNDP, 2017. Access to Clean Energy Through Market-Based Solutions in Ghana
LPG stoves replacing wood stoves	

BRT investment costs have been estimated based on regional projects financed by the World Bank Group. Investments costs were available for a BRT project in Ghana, but these are significantly lower than regional prices, which could be explained by different infrastructure. As the Abidjan BRT project costs were broken down between public and private sector investment, they were chosen as a benchmark for this report.

When only cost ranges were available, calculations were developed based on those ranges.

5.2 INVESTMENT POTENTIAL

The private sector investment potential for each subsector of the energy sector is based on Ghana's mitigation targets in the energy sector, baselines and investment costs, as follows.

5.2.1 RENEWABLE ENERGY

5.2.1.1 POWER GENERATION

As mentioned in Section 4, the Government of Ghana has placed a moratorium on new contracts in the energy sector. Thus, there is little short-term potential for the private sector in the on-grid renewable energy subsector. Based on the REMP objectives, potential still exists for on-grid renewable energy, especially in mini-hydro power generation and tidal energy. These may be considered on a longer-term perspective as of 2025 and beyond. The investment potential for on-grid energy is estimated at between **\$306.1 million and \$1,208.8 million**, depending on the increase in demand over time.

Investment in off-grid/mini-grid energy appears to offer some private sector investment potential, estimated at between **\$191.7 million and \$400.7 million**. Given the current PPA moratorium, mini-grid and off-grid investments are expected to be more attractive to the private sector in the shorter term than on-grid investments. However, opinions within the government differ regarding the involvement of private sector investment in mini-grid development. Additionally, the government expects mini-grids to be developed primarily in remote islands.

In other locations, investments in mini-grids need to be reviewed in the context of the government's grid extension plans. In the latter case, these would be led either by private developers or by communities. The potential use of incentives (subsidies) or different pricing options versus on-grid tariffs should be explored for mini-grids in order to be attractive enough to the private sector.

Although not directly related to Ghana's policy objectives, the potential for C&I investments in solar projects is also significant, with a pipeline estimated at 32 MW in the coming years.⁷⁹ The C&I incentives for investment in solar projects are significant, with the tariff more expensive than captive production and use.

79 Bloomberg Finance L.P. 2019. *Solar for Businesses in Sub-Saharan Africa, 2019*.

Table 18 presents the calculation of investment potential to achieve the targets identified.

Table 18: Calculation of renewable energy investment potential

REDUCTION OPTION	UNIT	BASELINE DATA	TARGET	DIFFERENCE	INVESTMENT COSTS (US\$/KW OR SYSTEM)	TOTAL INVESTMENT COSTS (US\$)
MINI-HYDRO POWER CONNECTED TO MAIN GRID	1MW	6.9	300	293.1	1,000- 4,000	293.1 million-1,172.4 million
SOLAR PV (UTILITY-SCALE)	1MW	279.5	250	Δ29.5	N/A	N/A
SOLAR HOME PV	50W system	N/A	200,000	200,000	225- 1,270	45 million-254 million
MINI-GRIDS	1MW	8	30	22	6,668	146.7 million
BIOGAS FROM MUNICIPAL SOLID WASTE	1000 t/ year plant	1.3	1	Δ 0.3	N/A	N/A
WIND TURBINES, ON SHORE	1MW	375	325	Δ 50	N/A	N/A
SMALL-SCALE WIND TURBINES	1MW	0.01	2	1.99	3,800	7.6 million
TIDAL POWER	1MW	14	50	36	150-800	5.4 million-28.8 million
TOTAL						497.8 MILLION-1,609.5 MILLION

5.2.1.2 DIFFUSION OF RENEWABLE ENERGY-RELATED TECHNOLOGIES

Private investment potential for the diffusion of renewable energy related technologies is estimated at **\$352.5 million**. Producers and households are expected to make the bulk of investments in these technologies. Specifically, investment related to LED lamps, solar irrigation and solar water heaters is estimated to have the greatest potential in Ghana.

Table 19 presents the calculation of investment potential to achieve the targets identified.

Table 19: Calculation of renewable energy-related technologies investment potential

REDUCTION OPTION	UNIT	BASELINE DATA	TARGET	DIFFERENCE	INVESTMENT COSTS (US\$/UNIT OR /HA)	TOTAL INVESTMENT COSTS (US\$)
SOLAR LED LAMPS	#	72,000	2,000,000	1,928,000	15	28.9 million
SOLAR IRRIGATION	ha	150	46,150	46,000	4,234	194.7 million
CROP DRYERS	Units	70	700	630	562	0.35 million
WATER HEATERS	Units	4,700	135,000	130,300	985.9	128.5 million
WIND IRRIGATION	Units	10	100	90	777	0.07 million
TOTAL						352.5 MILLION

5.2.2 ENERGY EFFICIENCY

Private investment in energy efficiency is estimated at **\$1,679.97 million**. Households are expected to make the bulk of investments in these technologies. The use of incentives should also be explored to support private sector involvement and household spending.

Table 20 presents the calculation of investment potential to achieve the targets identified.

Table 20: Calculation of energy efficiency investment potential

REDUCTION OPTION	UNIT	BASELINE DATA	TARGET	DIFFERENCE	INVESTMENT COSTS (US\$/UNIT)	TOTAL INVESTMENT COSTS (US\$)
EFFICIENT LIGHTING WITH LEDS	Units	N/A	7,000,000	7,000,000	5	35 million
EFFICIENT LIGHTING WITH LEDS REPLACING CFLS	Units	N/A	13,000,000	13,000,000	5	65 million
EFFICIENT REFRIGERATORS	Units	N/A	2,000,000	2,000,000	514	1.028 million
EFFICIENT WOODSTOVES	Units	1,200,000	2,000,000	800,000	25	10 million
LPG STOVES REPLACING WOOD STOVES	Units	85,000	5,404,714	5319714.286	100	531.97 million
TOTAL						1,679.97 MILLION

Although not reflected in the investment potential for energy efficiency, it is important to mention that Ghana is considering setting up an efficient appliance manufacturing plant in the country. This would be aligned with limiting the importation of second-hand products and allow access to the subregional market from Ghana.

5.2.3 TRANSPORT

Investments in the transport subsector are likely to focus on the development of BRT lines in Ghana. Private sector involvement in BRT will depend on the type of PPP arrangement and risk sharing agreed between the Government of Ghana and the BRT operator(s). This report will use the model adopted by the World Bank and the Government of Côte d'Ivoire in the Greater Abidjan Urban Master Plan, under which the public sector finances the infrastructure, while the BRT operator provides the rolling stock.

The total investment estimated for the 200 km of BRT lines is thus \$3.2 billion, of which \$1.1 billion will be leveraged from the private sector.

At this stage, it was not possible to confirm the private sector's interest in electric vehicles or how the private sector would be involved in developing the infrastructure required, such as charging stations. This is expected to be clarified as stakeholder consultations are conducted on the Drive Electric Initiative.

Private sector investment potential is estimated at between \$5.730 billion and \$6.842 billion, most of which will be leveraged from energy efficiency and transport. While there seems to be sufficient potential for private sector investment, it will be important to support the development of the enabling environment in mini-grids/off-grid generation, energy efficiency and clean cooking in order for investments to increase.

6. REPORTING FRAMEWORK TO ALIGN BUSINESS OPPORTUNITIES WITH NDC IMPACT TARGETS IN GHANA'S ENERGY SECTOR

Encouraging the private sector to invest in NDC actions is important if Ghana is to achieve its climate goals. It also constitutes a significant business opportunity for the private sector. However, the private sector can also capitalize on these opportunities by better aligning with the objectives detailed in the NDC and in the SDGs.

This section details the rationale for private sector alignment with NDC targets and the SDGs, and provides a reporting framework for the private sector.

6.1 RATIONALE FOR PRIVATE SECTOR ALIGNMENT WITH NDC IMPACT TARGETS

Governments and international organizations engage the private sector to leverage stakeholder investments in the NDC. The NDC can offer the private sector additional business opportunities, but it is often unaware of those opportunities. It is therefore important to highlight and translate these in clear reporting frameworks, which the private sector can then leverage to enhance its understanding of the added value that climate investments bring.

A clear understanding of this alignment, or the extent to which it can align with NDC actions, offers the private sector potential advantages. First, it enables the sector to identify actionable actions, which can be translated into business opportunities.

From a longer-term perspective, adopting reporting frameworks is also the first step towards reporting and disclosing impacts on climate objectives and SDGs. For the private sector, this can improve valuations and credit scores. Impact investors and climate finance sources may also be more comfortable providing financing to private stakeholders with established reporting frameworks and understanding the impact their business has on the country's climate challenge.

6.2 REPORTING FRAMEWORKS

The NDC and SDGs have been chosen as the main reporting frameworks for this report. Business opportunities in the energy sector identified in this report are linked to NDC objectives and SDG targets in the following tables. To provide the businesses more in-depth information, clear metrics representing measurable key performance indicators are also included.

The reporting frameworks are intended to be leveraged and tailored by individual businesses, depending on the specific characteristics of each. For example, SHS providers providing financial services, such as asset-based lending, may use impact metrics related to access to finance.

6.2.1 RENEWABLE ENERGY: ON-GRID UTILITY-SCALE POWER GENERATION

On-grid utility-scale power generation-related businesses, such as IPPs and developers, have a direct impact on the amount of clean energy available. They also offer important co-benefits, such as in health and education, and contribute to the larger and longer-term goal of reducing energy costs and increasing the ratio of renewable energy available on the grid.

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
DEVELOPING ON-GRID RENEWABLE ENERGY POWER GENERATION PLANTS (IPPS)	Scale up renewable energy penetration by 10 percent by 2030	Increase small-medium hydro installed capacity to 150-300MW Attain utility-scale wind power capacity of 50-150MW Attain utility-scale solar electricity installed capacity of 150-250MW	7 – Sustainable Energy	7.1 Ensure universal access to affordable, reliable and modern energy services 7.2 Increase substantially the share of renewable energy in the global energy mix	<i>Reduced energy cost (US\$)</i> <i>RE ratio in the energy mix (%)</i> # of households connected # and value (US\$) of investments Total capacity installed (by energy source) (MW)
			13 – Climate action	Accelerated decarbonization of the energy and C&I sectors (reduced GHG emissions)	Direct emission reduction achieved through installation of renewable energy capacity (tCO ₂ e)
			3 – Good health	3.9 Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Reduced ratio of fossil fuels used in the energy mix (total % of the energy mix)
			4 – Quality education	4.1, 4.2, 4.3 Improved access to education for all girls and boys	School attendance rate (increased # of students)

KEY

Direct impact

Long-term industry impact

Co-benefits

6.2.2 RENEWABLE ENERGY: C&I USE OF RENEWABLE ENERGY GENERATION

C&I use of renewable energy generation-related businesses, such as developers, have a direct impact on the provision of clean energy at reduced cost. They contribute to the decarbonization of industries and some developers also provide financing to these customers, therefore directly improving their access to finance. Customers also have an important impact, as they chose to introduce these measures.

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
PROVIDING RENEWABLE ENERGY SOLUTIONS TO C&I CUSTOMERS	Scale up renewable energy penetration by 10 percent by 2030	N/A	7 – Sustainable Energy	7.1 Ensure universal access to affordable, reliable and modern energy services	Reduced cost of energy (US\$)
				7.2 Increase substantially the share of renewable energy in the global energy mix	Reduced need for diesel generators (litres of diesel used)
					# and value (US\$) of investments
					Capacity installed with C&I customers (MW)
		9 – Innovation and Infrastructure	9.3 Increase the access of C&I customers to financial services, including affordable credit, and their integration into value chains and markets	# and value of deals (US\$)	
				# and value of loans (US\$) provided by local financing organizations	
			9.4 Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes	Direct carbon reduction achieved through installation of renewable energy capacity (tCO ₂ e)	
		13 – Climate Action	Accelerated decarbonization of the energy and C&I sectors		
		3 – Good Health	3.9 Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Reduced ratio of fossil fuels used in the energy mix (total % of the energy mix)	

KEY

Direct impact

Long-term industry impact

Co-benefits

6.2.3 RENEWABLE ENERGY: SHS/OFF-GRID ENERGY GENERATION IN SOLAR PV

SHS/off-grid energy generation-related businesses, such as SHS providers, have a direct impact on providing access to clean energy at reduced cost, especially with low-income households. They contribute to the decarbonization of industries such as agriculture and other small-scale industries, if they serve this type of customers. Some developers also provide financing to them, therefore directly improving their access to finance.

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
PROVIDING SHS SOLUTIONS TO HOUSEHOLDS AND SMALL INDUSTRIES/ SMES	Scale up renewable energy penetration by 10 percent by 2030	Scale up to 200,000 SHS for lighting in urban and selected non-electrified rural households	7 – Sustainable energy	7.1 Ensure universal access to affordable, reliable and modern energy services 7.2 Increase substantially the share of renewable energy in the global energy mix Improved access to energy, especially in rural areas	Reduced cost of energy (US\$) # of households with a SHS kit in rural areas # of households with a SHS kit in urban areas Average capacity installed by household (W) # of SMEs and other productive enterprises with SHS kit Average capacity installed by SME (W) Total capacity installed (MW)
			1 – No poverty	1.2 Reduce at least by half the proportion of men, women and children of all ages living in poverty in all its dimensions 1.4 Ensure that all men and women, in particular the poor and the vulnerable, have equal access to basic services, appropriate new technology and financial services, including microfinance	# of low-income households with SHS kit # and value of loans (US\$) (asset financing) developed directly by SHS providers (households/SMEs) # and value of loans (US\$) provided by local financing organizations
			9 – Innovation and infrastructure	9.3 Increase the access of SMEs to financial services, including affordable credit, and their integration into value chains and markets	
			2 – No hunger	2.1 End hunger and ensure access by all people to safe, nutritious and sufficient food all year round 2.3 Double the agricultural productivity and incomes of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists and fishers, including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.	# of water pumps using SHS kits

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
				2.4 Ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production	Direct carbon reduction achieved through installation of renewable energy capacity (tCO ₂ e)
			9 – Innovation and infrastructure	9.4 Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes	
			13 – Climate action	Accelerated decarbonization of the energy sector	
			3 – Good health	3.9 Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	Reduced use of fossil fuels (diesel generators, etc.) (litres of diesel)
			4 – Quality education	4.1, 4.2, 4.3 Improved access to education for all girls and boys	School attendance rate (increase in the # of students)
			5 – Gender equality	5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	Increased # of women with stable income generation activity

KEY

Direct impact

Long-term industry impact

Co-benefits

6.2.4 CLEAN COOKING

Clean cooking-related businesses, such as stove manufacturers and fuel producers, have a direct impact on the provision of clean energy for cooking. They also contribute to decreased rates of deforestation. These businesses have a significant impact on poverty levels and on improving access to finance for clean cooking. They offer significant co-benefits in health, gender equality and education.

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
MANUFACTURING IMPROVED COOKSTOVES	Expand the adoption of market-based cleaner cooking solutions	Scale up adoption of LPG use from 5.5 percent to 50 percent among peri-urban and rural households up to 2030	7 – Sustainable Energy	7.1 Ensure universal access to affordable, reliable and modern energy services	# of efficient stoves deployed
MANUFACTURING LPG COOKSTOVES			13 – Climate Action	Accelerated decarbonization of the energy sector	# of LPG stoves deployed
MANUFACTURING EFFICIENT FUELS			15 – Life on Land	15.2 Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally	Direct carbon reduction achieved through the use of efficient fuels (LPG, pellets, briquettes) (tCO ₂ e)
DISTRIBUTING CLEAN COOKING SOLUTIONS			1 – No poverty	1.4 Ensure that all men and women, in particular the poor and the vulnerable, have equal access to basic services, appropriate new technology and financial services, including microfinance	Volume of wood fuel/ inefficient charcoal used for cooking decreasing (tonnes) <i>Additional ha of forest preserved</i>
			3 – Good Health	3.9 Reduced deaths and illnesses from household pollution	# and value of loans (US\$) (asset financing) developed directly by clean cooking solution providers (households)
			5 – Gender equality	5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate 5.5 Ensure women's full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life	# and value of loans (US\$) provided by local financing organizations (MFIs, banks)
			4 – Quality education	4.1, 4.2, 4.3 Improved access to education for all girls and boys	# of related illnesses and deaths
			Reduced use of biomass (wood fuel) for cooking (tonnes) Time spent collecting fuel (hours per week) Time spent cooking (hours per week) Increased # of women with stable income generation activity		
			School attendance rate (increase in the # of students)		

KEY

Direct impact

Long-term industry impact

Co-benefits

6.2.5 ENERGY EFFICIENCY: APPLIANCES

Businesses providing energy efficiency solutions can have a direct impact on decreasing energy costs. Depending on the business model, these businesses can also impact low-income households by providing better access to finance

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK	SDG FRAMEWORK		METRICS
	BUR target	SDGs	Outcomes (SDG target or equivalent)	
DISTRIBUTING EFFICIENT APPLIANCES MANUFACTURING EFFICIENT APPLIANCES LOCALLY	Introduction of efficient lighting with LEDs (7,000,000 units), LEDs replacing CFLs (13,000,000 units) and efficient refrigerators (2,000,000 units)	7 – Sustainable energy	7.3 Improved access to energy efficient appliances	# of LEDs deployed
		13 – Climate action	Accelerated decarbonization of the energy sector	# of efficient refrigerators deployed # of other efficient appliances deployed Amount of energy savings realized due to the products / services provided (MWh) Direct carbon reduction achieved through the use of efficient appliances (tCO ₂ e)
		1 – No poverty	1.4 Ensure that all men and women, in particular the poor and the vulnerable, have equal access to basic services, appropriate new technology and financial services, including microfinance	# and value of loans (US\$) developed directly by DESCOs (households and SMEs) # and value of loans (US\$) provided by local financing organizations (MFIs, banks)
		8 - Good jobs and economic growth	Promoting a local and sustainable value chain for efficient appliances 8.2 Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high value-added and labour-intensive sectors	Total amount of investment in local manufacturing capacities (US\$) • # of workers employed Increased local labour (# of people hired/contracted) through the value chain (#) O&M unit cost reduction (US\$) # of units sold in Ghana and in West Africa
		3 – Good health	3.9 Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	Reduced ratio of fossil fuels used in the energy mix (total % of the energy mix)

KEY

Direct impact

Long-term industry impact

Co-benefits

6.2.6 BRT AND TRANSPORT

BRT and mass transport services have a direct impact on decreasing the amounts of fuel used for personal vehicles. They offer significant health benefits by reducing air pollution.

BUSINESS OPPORTUNITY	CLIMATE FRAMEWORK		SDG FRAMEWORK		METRICS
	NDC target	Specific action	SDGs	Outcomes (SDG target or equivalent)	
INFRASTRUCTURE DEVELOPMENT FOR BRT LINES OPERATION OF BRT LINES	Scale up sustainable mass transportation	Expansion of inter and intra city mass transportation modes (Rail and bus transit system) in four cities	11 – Sustainable cities and communities	11.2 Provide access to safe, affordable, accessible and sustainable transport systems for all	# of lines Kms of BRT operational # of users Decrease in personal vehicle traffic (# of vehicles per day) Decrease in commuting time (time per day used for commuting)
			7 – Sustainable energy	Promoting the use of energy efficient transportation systems	Reduced use of fossil fuels for personal vehicles (litres of diesel used)
			13 – Climate action	Accelerated decarbonization of the transport sector	Direct carbon reduction achieved through installation of BRT lines (tCO ₂ e)
			3 – Good health	3.9 Substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination.	Reduced ratio of fossil fuels used in the energy mix (total % of the energy mix and litres of diesel for personal vehicles)

KEY

Direct impact

Long-term industry impact

Co-benefits

To better leverage the reporting framework, it is recommended that private sector stakeholders use additional tools. For example, to calculate GHG emission reductions and better mainstream the NDCs and SDGs into their operations, private companies may consider leveraging the following tools.

Calculating GHG emissions: Greenhouse Gas Protocol⁸⁰

Calculating GHG emissions can be challenging for businesses. It requires following specific and complex methodologies, which may not be easy to approach without the appropriate guidance.

The Greenhouse Gas Protocol provides standards, guidance, tools and training for business and government to measure and manage climate-warming emissions. It provides online tools to measure and manage GHG emissions, as well as related trainings. The platform builds on a long-term partnership with international stakeholders, including the World Resources Institute (WRI) and the World Business Council for Sustainable Development (WBCSD).

Tools include the Project Protocol, which is used to quantify the greenhouse gas benefits of climate change mitigation projects. It provides specific principles, concepts, and methods for quantifying and reporting GHG reductions—i.e., decreases in GHG emissions or increases in removals and/or storage—from climate change mitigation projects (GHG projects).

The Protocol also provides extensive guidance on developing business-level emission inventories, measuring emissions from purchased/acquired electricity and estimating avoided emissions.

Aligning with and mainstreaming the SDGs/Sustainability: Impacti Solutions⁸¹

Aligning with the SDGs and integrating sustainability goals into operations can be an important step for enterprises. The SDGs and sustainability provide new business opportunities that the private sector can explore. However, businesses may find it complex to understand where they fit in the scope of the SDGs.

Impacti Solutions provides tools that can help the private sector understand the SDGs and impact areas where they can have the greatest impact. The Rapid SDG Opportunity Finder Tool provides personalized recommendations on priority SDGs and impact areas suited to specific businesses. After businesses choose their priority SDGs, the tool introduces them to thematic areas within each SDG. Businesses receive a personalized SDG business profile with chosen priorities at the end of the assessment. This helps businesses identify strategies to better integrate SDGs in their operations.

Impacti Solutions also provides an online platform to view and update an SDG business profile and connect with like-minded businesses and an Impact Data Management Tool, which makes it possible to streamline data management, track and manage impact, and create reports.

⁸⁰ <https://ghgprotocol.org/companies-and-organizations>

⁸¹ <https://impacti.solutions/>

7. CONCLUSION

Ghana is a relatively low emitter of GHG emissions, with total 2016 national greenhouse gas emissions estimated at 42.92 MtCO₂e. However, those emissions levels are increasing, with emissions from the energy sector representing approximately 36 percent of the total.

In its NDC, Ghana has developed 20 mitigation programmes of actions in seven sectors for a 10-year implementation period (2020–2030), including sustainable energy security and sustainable mass transportation. Ghana's ambitions in terms of emission reductions are significant, with an unconditional 15 percent decrease objective and a 30 percent objective conditional on external support. A total of \$9.81 billion is expected to be required to finance mitigation activities, which include the energy and transport sectors. Achieving emissions reductions in the energy sector is therefore essential to achieving Ghana's climate objectives.

The government has also developed the enabling environment for private sector investment in the country. In the energy sector, provisions related to feed-in tariffs and net metering, among others, are important drivers of investment, while a PPP scheme could allow more private sector investment in the transport subsector. However, major risks could also discourage private sector investments in Ghana, such as the energy sector's current fiscal situation and the macroeconomic environment due to the COVID-19 crisis.

With the development of the REMP (2019), which will contribute to achieving the objective of increasing the share of renewable energy in the energy mix, the government has set ambitious renewable energy targets. However, the current market for on-grid renewable energy power generation does not offer enough prospects for the private sector in the short term, due to an excess of supply. The government suspended the development of PPAs as of November 2019. The investment potential for on-grid energy is estimated at between \$306.1 and \$1,208.8 million, depending on the increase in demand starting in 2025.

The introduction of mini-grids appears promising for the private sector, although the government's expectations regarding private sector involvement are not clear. While mini-grids in remote islands and communities could be an option for the private sector, significant investment potential exists in C&I solar projects, estimated at between \$191.7 million and \$400.7 million. Given the current PPA moratorium, mini-grid and off-grid investments are expected to be more attractive than on-grid investments in the shorter term. However, this depends on the government clarifying its vision of the private sector's role in mini-grid development. In remote islands, which seem to be the preferred option for private sector engagement, this may be conditional on the government providing support to developers in the form of financial viability support such as grants, subsidies, minimum revenue guarantees and, sometimes, result-based financing.

Additionally, the C&I market has significant potential for renewable energy production developers. It could be supported further by simplifying administrative procedures, such as reducing the number of licenses required or by increasing the thresholds for captive use electricity generation.

The total private sector investment potential, including for renewable energy-related technologies such as solar lanterns and solar irrigation, ranges between \$850.3 million and \$1,962 million.

Limited information is available on the government's energy efficiency policy direction. As indicated in the BUR, reduction measures, such as introducing clean cooking solutions and efficient appliances, have been identified. This subsector offers significant potential for private sector investment, although those investments may be limited by insufficient access to finance, particularly at the household level. The limited standards for energy efficiency and their lack of enforcement may also constrain development of the market. Private investment in energy efficiency is estimated at \$1,679.97 million. This also includes investment in clean cooking-related equipment.

Households are likely to make the bulk of investments in these technologies. This could be further supported by encouraging the provision of affordable appliances to the market. For example, Ghana could consider developing a manufacturing plant for appliances in the long term. In the shorter term, DESCOs could distribute energy efficient appliances and provide similar financing conditions as those currently available on the SHS market. In the area of clean cooking, the private sector must take the lead in developing innovative business models, such as tool and fuel models and DESCO models, to resolve distribution and scale issues.

Emission reduction actions in the transport subsector relate primarily to the development of BRT lines. BRT development requires adequate infrastructure and urban planning to be efficient and achieve its emission reduction and cost performance objectives. Ghana faces similar challenges, which could limit the development of the market. The total investment estimated for the 200 km BRT lines is estimated at \$3.2 billion, of which \$1.1 billion will be leveraged from the private sector, depending on the PPP scheme used.

The total investment potential for the private sector is estimated at between \$5.730 billion and \$6.842 billion, most of which will be leveraged from energy efficiency and transport.

The financial sector should support private sector investment. Local financing is characterized by high interest rates and relatively short tenors. VC and impact investing activities remain limited. Providing improved financing conditions by leveraging blended finance with instruments such as guarantees, credit lines and concessional financing could be an option for local banks. These kinds of programmes, such as SUNREF, are already available in Ghana. The country has also obtained direct access to the Green Climate Fund through Ecobank, which may provide more opportunities for concessional financing in the energy sector.

Finally, it is crucial for Ghana to support innovation, which is a main driver of investments for VC firms, especially in models targeting low-income customers. It will be important to drive innovative business models in the climate and energy space by providing enhanced incubation and acceleration services.

UNDP NDC SUPPORT PROGRAMME

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