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NAMA STUDY FOR A SUSTAINABLE
CHARCOAL VALUE CHAIN IN

GHANA



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FOREWORD

Charcoal is one of the main sources of domestic energy in Ghana. The national census undertaken in 2010 reveals that 80 percent of the rural population is dependent on wood fuel as their primary source of fuel, while charcoal is the primary source of fuel for more than 50 percent of the population living in urban areas. Given the projected growth of the urban population in Ghana, charcoal use in the short and medium term, will continue to be an important source of household energy particularly in urban areas of the country.

Charcoal is mainly used for cooking, an important and vital service for a large part of the population. The long-term goal for the provision of this service is a transition to modern cooking fuels that are cleaner, more environmentally friendly, safer, more affordable and provide a higher quality performance. However it is realistic, to assume that charcoal will remain the fuel of choice of a large part of the population for many years to come.

The use of charcoal as a cooking fuel is also associated with a number of side effects that carry a high cost for society. Because the majority of the charcoal is not produced sustainably, there are serious negative impacts on the natural environment. Incomplete combustion and smoke, in particular when used in traditional unimproved stoves, has important health implications for the primary users, women. Children are often affected either when used in the production process or by spending a lot of time being exposed to smoke in in-door situations.

Faced with this situation, UNDP believes that as a first step towards a more long-term sustainable provision of cooking fuels, it is important to improve the production and use of charcoal as well as aim at achieving sustainability across its entire value chain. Doing so will address multiple goals and generate important co-benefits. Providing people with cleaner charcoal, that is produced sustainably and used more efficiently (in improved stoves), will have critical environmental dividends (in the form of reduced greenhouse gas emissions and reduced deforestation), can professionalize the value chain and create jobs and livelihoods, and will be beneficial to the end-users (health-wise but also result in cost-savings and hence will have a positive impact on household budgets).

When framed within the context of climate change, the Nationally Appropriate Mitigation Actions (NAMAs) modality, presented in this study, can provide the essential holistic framework for the improvement of the complete value chain in the charcoal sector. This focus on the entire value chain is particularly innovative and is increasingly being recognized as the most promising approach for achieving lasting results. During recent years, NAMAs have become a focus of climate change mitigation negotiations in the United Nations Framework Convention on Climate Change (UNFCCC) process.

The objective of this NAMA study, the third to focus on charcoal (following last year's study of the sector in Uganda, and this year's study in Côte d'Ivoire) is to provide Ghana with an important opportunity to help shape its future low carbon development. The implementation of a sustainable value chain NAMA will help Ghana to increase the efficiency and effectiveness of the current value chain. At the same time, it would enable the country to remove a major driver of deforestation while increasing energy security and sustainability. The NAMA design proposed in this study also addresses cross-sectoral issues and adopts a phased approach. The action plan described in the study is intended to kick-start the implementation of a sustainable charcoal NAMA in Ghana. This action plan is realistic, can be achieved in the short term, and still have transformative and sustainable effects on the charcoal sector of Ghana.

The understanding of the NAMA concept is still evolving, and there is relatively little on the ground experience with respect to turning the concept into concrete actions. In this regard, UNDP's MDG-Carbon programme and the Regional Bureau of Africa regional environment project on the Management of Environmental Services and Financing for Sustainable Development, have supported the development of this NAMA policy framework in order to contribute to further shaping the NAMA concept and translating it into action.

UNDP will continue to work with a broad range of stakeholders to assist communities move towards low-carbon pathways while advancing long-term sustainable development benefits. This NAMA study for a Sustainable Charcoal Value Chain in Ghana is an exciting mitigation programme that can achieve both objectives.



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Executive Summary

Over the past two decades Ghana has evolved into a stable and mature democracy. The country has a vibrant multiparty political system, relatively free media, and a strong and active civil society. According to the Ghana Shared Growth and Development Agenda (GSDA) economically the country aims to become a “middle-income country” by 2020, which would require rapid growth rates along with investment in the energy sector, a key driver of growth. (NDPC, 2010)

As part of its developmental aspiration, Ghana seeks to make “modern cooking fuels” (e.g. cooking gas) accessible to its people. However as can be observed from the experience of several developed economies, such energy transitions can absorb significant amounts of time and resources. Policymakers need to ensure that in the course of its economic restructuring a sudden “high technology fix” does not have a dramatic impact on society. In the short and medium term, charcoal, a fuel source already familiar to more than half of the urban population, provides an ideal “energy transition solution”.

Yet charcoal is not without its challenges and is recognized globally as one of the key drivers of deforestation that in turn contributes towards climate change. However, deforestation is one element of the charcoal value chain, and policy interventions that support the continuing use of charcoal also need to tackle supply planning, demand management and institution building.

Ghana recognizes the need to tackle its charcoal challenge and has prioritized efficient cookstoves as one of the five sectors for NAMA (Nationally Appropriate Mitigation Action) development. Efficient cookstoves represent one aspect of the charcoal value chain and to achieve sustainability, the country needs to look into the other aspects of the value chain including procurement of biomass, its carbonization, transportation, distribution and demand-side management.

This study aims to view the charcoal value chain holistically and to provide an overview of the country-specific conditions and actions required under a “Sustainable Charcoal NAMA”. It proposes improvements that must be made in the formalization of the sector through establishment of a Charcoal Unit, a Charcoal Fund, co-operatives, eco-labelling and awareness creation that can allow government programmes to reach out and encourage private-sector participation.

The study is structured into four parts with Part 1 covering the regional and country profile of Ghana and looks into existing policies and programmes under which the NAMA can be located. Part 2 of the study discusses the characteristics of the “building block” of a charcoal value chain. Part 3 focuses on transforming the building blocks into a sustainable charcoal value chain with policy actions and required technology intervention and capacity-building. Part 4 of the study highlights specific short-term actions that can be undertaken in preparation of the NAMA.

List of Abbreviations

AfDB	African Development Bank
BAU	Business as usual
CFMP	Community Forest Management Project
CISR	Council for Scientific and Industrial Research
EC	Energy Commission
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
EREF	ECOWAS Renewable Energy Facility
EREP	ECOWAS Renewable Energy Policy
FAO	Food and Agriculture Organization
FC	Forest Commission
FIP	Forest Investment Programme
GDP	Gross Domestic Product
GH¢	Ghana Cedi (Currency)
GHG	Greenhouse Gases
GHACCO	Ghana Alliance for Clean Cookstoves
GPDP	Government Plantation Development Programme
GPRS	Ghana Poverty Reduction Strategy
GSGDA	Ghana Shared Growth and Development Agenda
HIPC	Heavily Indebted Poor Countries
IMF	International Monetary Fund
INBAR	International Network for Bamboo and Rattan
KNUST	Kwame Nkrumah University of Science and Technology
ktoe	kilo tons of oil equivalent
LDC	Least Developed Countries
MLGRD	Ministry of Local Government and Rural Development
MLNR	Ministry of Lands and Natural Resources
MoE	Ministry of Energy and Petroleum
MoF	Ministry of Finance
MRV	Measuring Reporting and Verification

NAMA	Nationally Appropriate Mitigation Action
NFPDP	National Forest Plantation Development Programme
NGO	Non-Governmental Organization
NREG	Natural Resources and Environmental Governance Programme
RE	Renewable Energy
REDD+	Reducing Emissions from Deforestation and Forest Degradation plus sustainable management of forests, and the conservation and enhancement of forest carbon stocks
SD	Sustainable Development
SNEP	Strategic National Energy Plan
tcuf	Trillion cubic feet
VRA	Volta River Authority
WB	World Bank

Part 1: Ghana – Regional and Country Profile

CHAPTER 1: GHANA – REGIONAL AND COUNTRY PROFILE

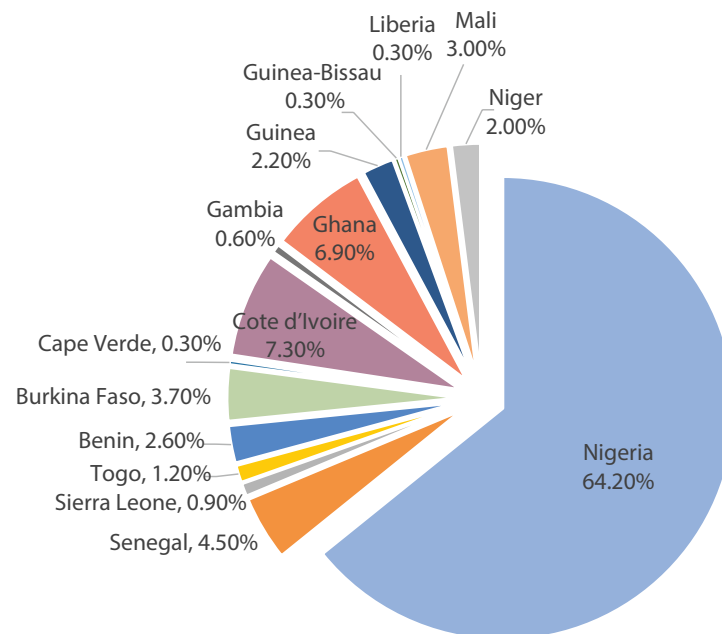
1.1. ECOWAS – Regional Profile

The Economic Community of West African States (ECOWAS) is a regional body of 15 member states consisting of Benin, Burkina Faso, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo. The total population of the 15 countries in 2011 stood at about 308.7 million and with an annual growth rate of 2.61% (UNESCO, 2012). Three of the member countries—Nigeria, Ghana and Côte d'Ivoire— account for two-thirds of the population of ECOWAS, and the region is characterized by uneven distribution of its natural resources.

With the exceptions of Cape Verde, Nigeria and Ghana, 12 of the 15 countries in the ECOWAS region are classified as Least Developed Countries (LDCs) and 13 countries, including Ghana, are eligible to receive assistance under the Heavily Indebted Poor Countries (HIPC) initiative led by the IMF (UNCTAD and IMF, 2014).

All countries rank low (below 130 of 182 countries) on the UN's Human Development Index which indicates that a significant share of the population lives below the poverty line and lacks access to sufficient energy services to meet basic human needs (HDR, 2014).

Figure 1. Share of total ECOWAS GDP by Country



Source: ReSAKSS.

The regional economic “powerhouse”, Nigeria, accounts for almost two-thirds of the region’s GDP and holds 2.5% percent of the world’s oil reserves (OPEC). But the average share of biomass among the ECOWAS countries is almost 80% of the total energy use, and it is expected to remain a major source of energy and employment and means of conserving foreign exchange for all ECOWAS countries in the foreseeable future (ECREEE, 2012a).

1.2. ECOWAS Centre for Renewable Energy and Energy Efficiency

ECOWAS was established in 1975 as a means to tackle the region’s susceptibility to rising food and energy prices and to adopt a plan to cope up with them. The ECOWAS Vision 2020, adopted in 2008 sets out its strategic vision:

“To create a borderless, peaceful, prosperous and cohesive region built on good governance and where people have the capacity to access and harness its enormous resources through the creation of opportunities for sustainable development and environmental preservation” (ECOWAS, 2011).

In 2008, the ECOWAS Commission provided the legal basis for the creation of the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE) with a mandate to mainstream renewable energy (RE) and energy efficiency (EE) among its other regional activities and policies. ECREEE’s mandate is aligned to the broader strategic goals of the ECOWAS Vision 2020, from which two of its components draw directly, namely:

(1) “A region that anchors its development on sustainable development, including agricultural and mineral resource development strategy, and on planned agricultural and industrial strategies; a region that develops its infrastructure and makes services accessible to its citizens and enterprises.”

(2) “A region that conserves its environment and resources, promotes modes of equitable and sustainable development in economic, social and environmental fields; a region which brings its contribution to bear on resolution of the common problems and challenges confronting the planet.”

As part of its mandate, ECREEE has led the development and implementation of an ECOWAS Renewable Energy Policy (EREP) aimed at securing an increasing and eventually a dominant share of the member states’ energy supplies and services from the timely, reliable, sufficient, least-cost and affordable use of renewable energy sources enabling:

- Universal access to electricity by 2030;
- A more sustainable and safe provision of domestic energy services for cooking.

The EREP has targeted three sets of applications (EREP, 2012)

- Grid-connected renewable energy applications;
- Off-grid and stand-alone applications;
- Domestic renewable energy applications.

In the context of the NAMA, the last of these applications includes targeting improvements in cookstoves, efficient charcoal production, and the use of modern fuel alternatives for cooking. The table below provides the targets for the two criteria that are relevant to charcoal production and use.

Table 1. ECREEE targets for Domestic Energy

	2010 (%)	2020 (%)	2030 (%)
Population with access to improved cookstoves	11	100	100
Efficient charcoal production share	—	60	100

Source: ECREEE, 2012b.

The EREP recognizes that countries face the challenges of energy poverty, energy security and climate change mitigation simultaneously. Key characteristics of the energy supply and demand situation in the ECOWAS region include:

- A large volume of suppressed demand;
- Generally poor access to electricity;
- An unsustainable wood fuel supply that no longer meets growing demand, leading to overexploitation of wood resources and, for some countries, deforestation.

The EREP aims to act as a catalyst by providing a vision and quantified targets. However the ECOWAS member countries are expected to define their own strategies for achieving the regional targets.

1.3. Ghana: Country Profile

Located a few degrees north of the equator off the Gulf of Guinea in Western Africa, the Republic of Ghana is classified as a lower middle-income country by the World Bank with a per capita GDP of US\$1,300. The country has seen its population grow from 19.4 million in 2001 to 25.9 million in 2012 - an increase of over 33 percent in 11 years (Energy Commission, 2013).

In terms of economic and population indicators, Ghana has proved itself capable of tackling its poverty and advancing economically. In recent years Ghana has focused on transforming its agriculture sector, and apart from exports of minerals, such as gold, bauxite, manganese and diamonds, the country is the world's second largest producer of cocoa (second only to its neighbour Côte d'Ivoire) and a major source of timber, both of which have put additional pressure on the country's forests.

In 2009, the government adopted a new Medium-Term National Development Policy Framework for 2010-2013, emphasizing economic growth and development. The main target of this policy framework is to put the economy on the path to achieving a per capita income of least \$3,000 by 2020 and attaining the Millennium Development Goals. The policy emphasizes the importance of sound management of natural resources and the environment in attaining these goals.

The country is divided into 10 administrative regions which are further divided into 161 districts (each with its own District Assembly), 49 municipalities and six metropolitan areas, giving a total of 216 MMDAs (Metropolitan, Municipal and District Assemblies) (Ghanadistricts.com).

Table 2. Administrative Regions of Ghana (2010)

Region	Population	Area (km ²)	Density
Greater Accra	4,010,054	3,245	1235.8
Upper East	1,046,545	8,842	118.4
Central	2,376,021	9,826	241.8
Upper West	702,110	18,476	38.0
Eastern	2,633,154	19,323	136.3
Volta	2,118,252	20,570	103.0
Western	2,376,021	23,921	99.3
Ashanti	4,780,380	24,889	192.1
Brong-Ahafo	2,310,983	39,557	58.4
Northern	2,479,461	70,384	35.2

Source: GSS, 2012.

The country's government is based on a presidential system supported by a multi-party parliament. The constitution encourages decentralization, stipulating that "Parliament shall enact appropriate laws to ensure that functions, powers, responsibilities and resources are at all times transferred from central government to local government units in a coordinated manner".

Box 1. Decentralization and Delegation

The process of decentralization is led by the Ministry of Local Government which undertook a review of decentralization policy in late 2009, leading to the development of the National Decentralization Framework and the National Decentralization Action Plan. The decentralization process seeks to transfer political, administrative and financial authority from the centre to the regions.

The framework document clarifies "decentralization" and what it means at different levels of government. At the national level it is proposed to limit the functions of the government to policy-making, planning, evaluation and monitoring.

At the regional level it is envisaged that there should be departments that operate as extensions of the national level ministries, and coordinate and harmonize the plans and programmes of the regional assemblies.

The district level administrations are expected to be empowered as legislative, administrative, development planning, budgeting, and service delivery authorities. They are to have clearly defined functions, have their own budgets, have structures to promote and enhance probity, accountability and transparency, manage their resources and have adequate capacities to deliver on their mandates.

Decentralization at the level of the sub-district structures would be guided by the principle of delegation: they would take decisions based on the functions and powers conferred on them by law and delegated to them by the districts but would not take responsibility for those decisions.

Given that a sustainable charcoal policy will take effect across all levels of the country's governance system, the policy frameworks underlying a potential NAMA need to take into account the proposed decentralization when assigning responsibilities to different levels of the administration. However, they also need to take into account the realities of decentralization.

A news item on the Government of Ghana website quotes the Minister of Local Government, Mr. Oppong-Fosu, who noted that while the government was committed to decentralization, “the lack of understanding and appreciation of the nature and benefits of decentralization reforms had led to the slow implementation process and the low level of engagement” (GoG, 2014).

1.4. Country-Specific Challenges and Issues

Two decades of political stability in Ghana have helped the country achieve significant economic growth but despite improvements in the field of agriculture and other sectors of the economy, Ghana, like most African countries, continues to face several developmental challenges. About 60 percent of the population are dependent on agriculture, and most farmers in Ghana are subsistence farmers, who grow crops and rear animals just to feed themselves and their families.

GDP growth in the last decade has been driven by oil revenues, the services sector and the strong export performance of cocoa and gold. The African Development Bank notes that Ghana's medium-term growth outlook remains positive, primarily due to large investments in the mining industry, public infrastructure and commercial agriculture, such as cocoa beans (AfDB, 2014).

Agricultural growth in Ghana is unequally distributed, with the southern half of the country outstripping the rest. Poverty rates in the northern regions are said to be two to three times the national average, and chronic food insecurity remains a critical challenge there.

Ghana's poor have limited access to assets that would aid a shift from subsistence farming to modern agriculture. Some of the constraints include a lack of infrastructure and facilities for storing and processing products, poorly functioning markets, and inadequate skills, financial services and technical assistance. With few employment opportunities locally, rural young men and women leave villages for urban centres. This migration leaves behind an aging and generally less dynamic population in the rural areas.

Most villages in Ghana today lack good drinking water, hospitals, basic sanitation (lack of basic sanitation remains a major problem even in the capital Accra) and quality education. The education of young people, especially girls, and sex education have greatly helped to break the cycle of HIV/AIDS in Ghana and it is predicted that Ghana is set to dramatically reduce its level of poverty and hunger. Table 3 provides an overview of the country's status in the context of Millennium Development Goals (MDGs) and indicators.

Table 3. Ghana's MDG Status

MDG Goals/Indicators	Value (Yr)	Remark
Goal 1: Eradicate extreme poverty and hunger		
Percent of population living below US\$1.25/day	28.6 (2006)	Very high poverty
Percent of population below minimum level of dietary energy consumption	0.0 (2012)	Very low hunger levels
Goal 2: Achieve Universal Primary Education		
Net enrolment ratio in primary education per 100	82.6% (2012)	Moderate enrolment
Goal 3: Promote Gender equality and Empower Women		
Ratio of girls to boys in primary education	0.95 (2012)	Close to parity
Percent share of women in wage employment in non-agriculture sector	31.7 (2000)	Medium share
Percent of seats held by women in national parliament	10.9% (2014)	Low representation
Goal 4: Reduce Child Mortality		
Under five mortality rate per 1,000 births	72.0 (2012)	Moderate mortality
Goal 5: Improve Maternal Health		
Maternal mortality ratio per 100,000 live births	350 (2010)	High mortality
Percent of women aged 15-49 using contraception	23.5% (2008)	Low access to reproductive health
Percent of women aged 15-49 with unmet need for family planning	35.7 (2008)	
Goal 6: Combat HIV/AIDS, malaria and other diseases		
Number of new HIV infections per year per 100 people aged 15-49	0.08 (2011)	Intermediate incidence
Number of new cases of tuberculosis per 100,000	79 (2011)	Intermediate incidence Low mortality
Number of deaths from tuberculosis per 100,000	7.5 (2011)	
Goal 7: Ensure Environment Sustainability		
Percent of land area covered by forest	32.7 (1990) 21.7 (2010)	The country has lost 34 percent of its forest cover in 20 years
Percent of population with access to improved drinking water	86.3 (2011)	Moderate coverage
Percent of population with access to improved sanitation facility	13.5 (2011)	Very low access
Percent of urban population living in slums	40.1 (2009)	Very high proportion
Goal 8: Develop Global Partnerships for Development		
Internet users per 100 inhabitants	17.1	Moderate usage

Source: UNSDMI.

1.5. Sectoral Issues: Forestry

According to the FAO, 21.7 percent of land in Ghana (equivalent to 4,940,000 ha) is covered by forests. As shown in Table 4 below, of this, 8 percent (395,000 ha) is classified as highly bio diverse and carbon-dense primary forest and 260,000 ha are plantations (FAO, 2010).

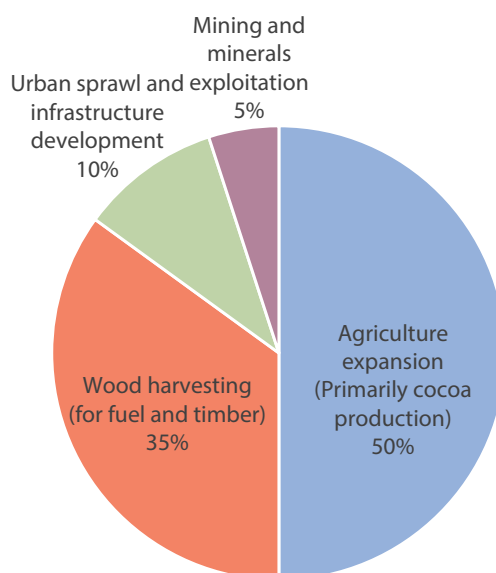
Table 4. Ghana's Forest Cover ('000 ha)

Forest Category	1990	2000	2005	2010
Primary forest	395	395	395	395
Other naturally regenerated forest	7,003	5,639	4,962	4,285
Planted forest	50	60	160	260
Total	7,448	6,094	5,517	4,940

Source: FAO, 2010.

The Ministry of Lands and Natural Resources (MLNR) of Ghana recognizes that the forest resources of Ghana are depleting at an alarming rate of almost 2 percent annually, leading to an annual loss of 125,000-135,000 ha. Figure 2 below shows the principal drivers of deforestation.

Figure 2. Principal drivers of deforestation in Ghana



Source: MoLNR, 2012.

In its Ghana Investment Plan, submitted to the World Bank for securing finance for its Forest Investment Programme, the MLNR notes the challenges in managing deforestation namely:

- Illegal harvesting, degradation and poor management of forest reserves;
- Insufficient incentives to conserve or plant trees;

- The imbalance in domestic timber demand and supply, and illegal chainsaw milling;
- The expansion of cocoa farms, and a shift from shaded to open cocoa farming;
- Poor inter-sectoral coordination to address these cross-sectoral challenges.

1.6. Sectoral Issues: Energy

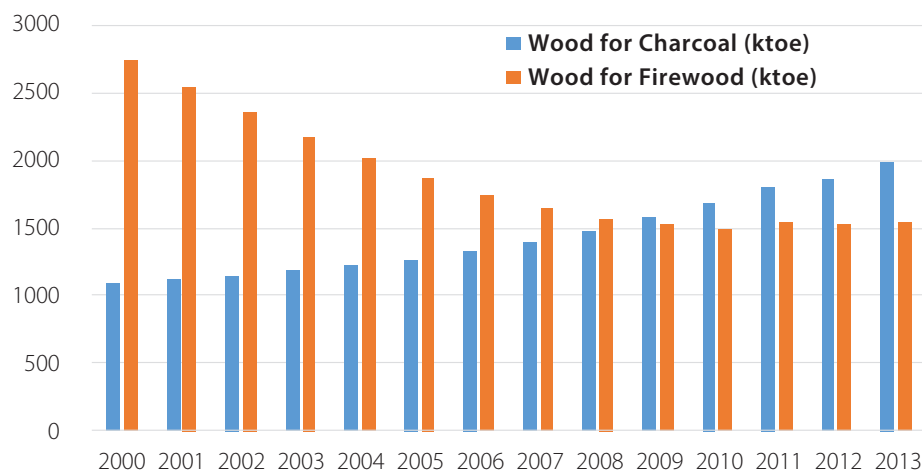
Ghana's energy sector can be classified into two main categories, petroleum and power. The country's petroleum industry is divided into upstream and downstream sectors. Upstream activities include the procurement and refining of crude oil by the nation's only petroleum refinery, Tema Oil Refinery. Downstream activities include the marketing and distribution of petroleum products by oil marketing companies (OMCs), which are mainly multinational. In recent times, a number of local small- and medium-scale OMCs have been established.

Hydroelectricity is the primary source of Ghana's power and is generated by the Volta River Authority (VRA). The Electricity Company of Ghana distributes electricity mainly in the southern sector of the country, while the VRA is responsible for distribution in the northern sector. The VRA has a monopoly over the generation of hydro power in the country and the main source of power is hydroelectricity, which is environmentally friendly. A relatively small percentage of power is generated from thermal sources. Population growth, rural electrification and industrial expansion have led to an increase in thermal power. To satisfy this growing demand, the government of Ghana in collaboration with a private company has completed the Takoradi thermal plant which supplies power to the VRA. There are more projects underway including the construction of a hydroelectric plant at Bui.

In 2012, final energy consumption stood at 6,759 ktoe (kilo tons of oil equivalent). The energy supply as noted above consists primarily of petroleum (48.9 percent), hydro power (11.8 percent and biomass (39.3 percent) of which the latter consists of wood fuel (wood and charcoal). However, almost 80 percent of the petroleum products was consumed by the transport sector alone, leaving biomass as the dominant source of fuel for energy use in the country.

The use of total wood fuel has seen significant fluctuations in the past decade, peaking at 1,461,800 tons in 2002 and dropping to 984,000 tons in 2010, primarily due to variations in the consumption of wood fuel. However, as can be observed in Figure 3 below, wood for charcoal production has seen a gradual increase.

Figure 3. Biomass Supply in Ghana (ktoe)



Source: Energy Commission, 2014a.

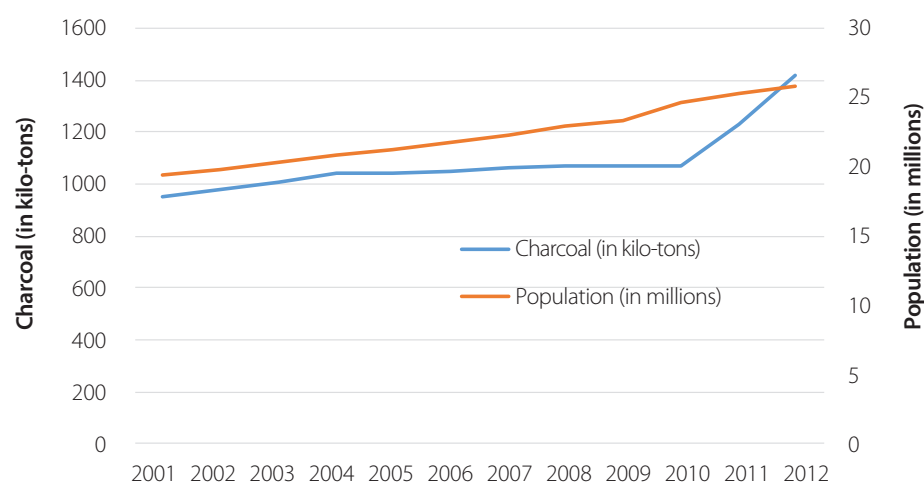
CHAPTER 2: CHARCOAL IN GHANA

2.1. Scenario Analysis

The latest data from the Energy Commission indicate a conversion efficiency of wood to charcoal at 22 percent (i.e. approximately 4.5 tons of wood produce 1 ton of charcoal) (Energy Commission, 2013a). This is similar to the “carbonization ratio” (tons of wood used per ton of charcoal produced) of 4.35 estimated by the FAO (FAO, n.d). Efficiency levels are dependent on several factors, including moisture content, the type of wood, and the type of kiln, and carbonization ratios can be as poor as 12.6 (FAO, n.d.).

The Energy Commission reports that charcoal production in Ghana increased from 950,000 tons in 2001 to 1,416,000 tons in 2012, while the population rose according to World Bank data rose from 19.4 million to 25.9 million during the same period. As can be observed in the figure below, both population and charcoal consumption have been rising over the last decade.

Figure 4. Comparison between population growth and demand for charcoal



Charcoal production in Ghana, as in most of Africa, remains an unorganized and informal activity undertaken by groups of landless labourers using the “cut-and-burn” system. Such groups can produce an average of 10-15 bags of charcoal in a week, which is then collected by the first layer of middlemen who are responsible for getting the bags to accessible roads. These bags are collected by the second layer of middlemen, typically truck drivers who deliver truckloads of charcoal bags to urban areas. The charcoal bags are then bought at bulk rates by wholesalers, who are responsible for final retail and distribution in smaller quantities. Ghana has a system of “maxi-bags” (in the range of 50 kg) and “mini-bags” (in the range of 25 kg).

The 2010 Population and Household Census, undertaken by the Ghana Statistical Service, reveals that while 80 percent of the rural population is dependent on wood fuel as their primary source of fuel, charcoal is the primary source of fuel for more than 50 percent of the population living in urban areas. The urban population in this case also includes settlements in semi-urban areas (also referred to as “peri-urban” in several official documents) and slums (GSS, 2008).

Table 5. Number of households by cooking fuel type and region, 2012

Region	Western	Central	Greater Accra	Volta	Eastern
No Fuel	29,196	26,767	71,797	12,888	29,214
Wood	267,976	232,964	36,560	283,048	315,386
Gas	82,912	65,955	429,464	46,084	74,339
Electricity	3,314	1,221	9,645	972	3,438
Kerosene	2,413	2,935	11,627	2,512	3,393
Charcoal	164,627	194,256	470,277	146,677	203,053
Crop residue	1,864	1,477	724	2,419	2,198
Sawdust	597	514	2713	389	548
Animal waste	211	209	919	104	147
Other fuel	524	465	2644	507	329
Total	553,634	526,763	1,036,370	495,600	632,045

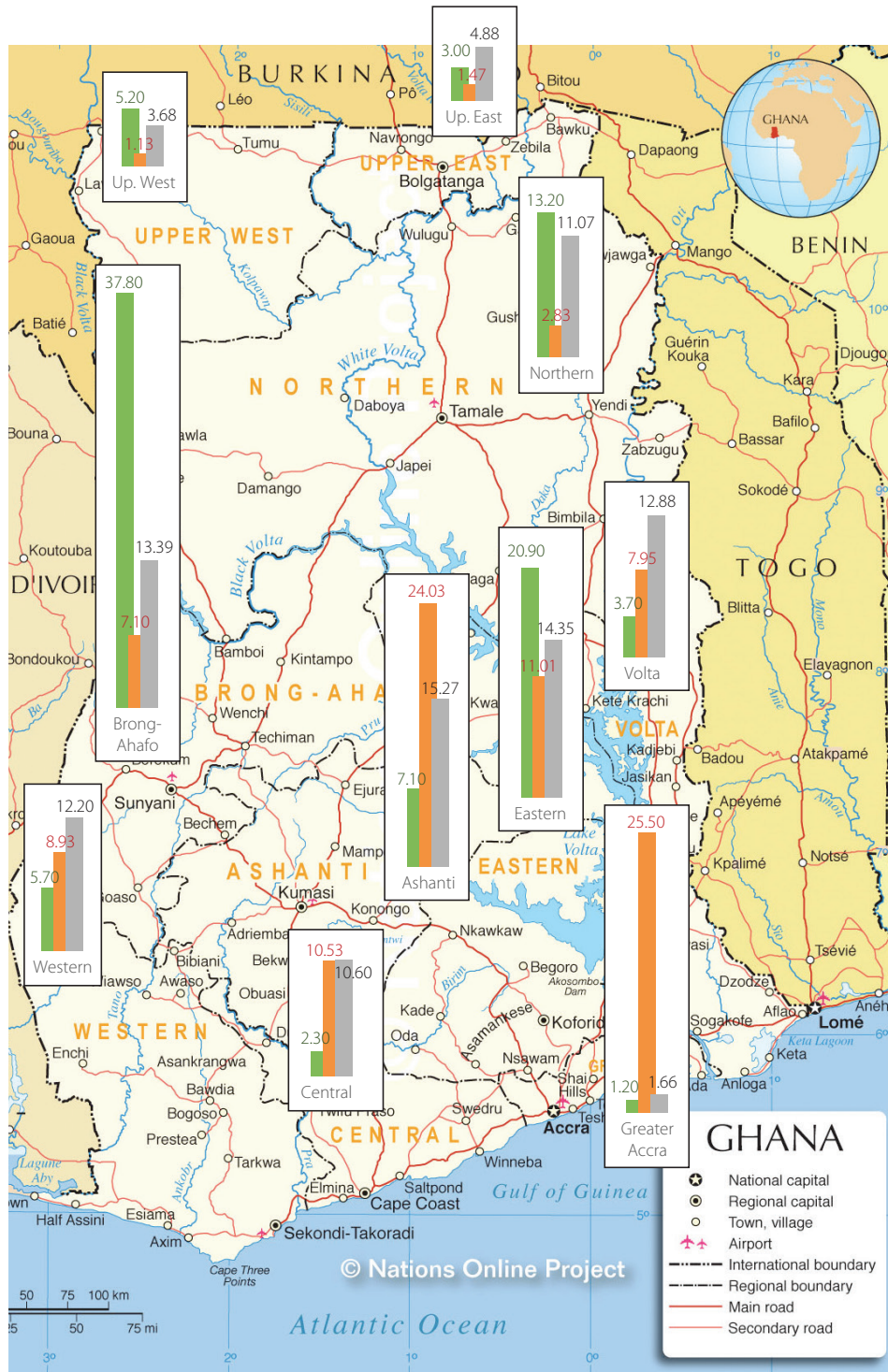
Region	Ashanti	Brong-Ahafo	Northern	Upper East	Upper West
No Fuel	91,717	32,285	6,713	3,272	2,269
Wood	335,439	294,170	243,314	107,310	80,916
Gas	237,251	36,641	10,584	8,735	4,553
Electricity	7,952	1,073	1,396	383	400
Kerosene	4,263	929	1,116	402	278
Charcoal	443,144	122,190	52,124	27,021	20,921
Crop residue	2,573	1,788	1,804	29,725	720
Sawdust	1,545	1,023	515	93	63
Animal waste	427	87	84	124	20
Other fuel	1,894	329	469	564	34
Total	1,126,205	490,515	318,119	177,629	110,174

Source: GSS, 2012.

Data collected by the Energy Commission which tracks charcoal-related statistics, including price variations, note that the Brong-Ahafo and Eastern regions produce over half of the country's charcoal and that all inland regions including Upper West, Upper East and Northern are also net charcoal producers.

The net charcoal consumers are the coastal regions with Greater Accra and Ashanti accounting for half of the country's consumption. Consumption is particularly high in the two largest cities, the capital Accra (in Greater Accra Region) and Kumasi (in Ashanti Region), with populations of 2 million each. Figure 5 illustrates the regional variations, including charcoal production, charcoal consumption and wood fuel consumption. Higher wood fuel consumption is also indicative of higher poverty levels in the respective regions.

Figure 5. Percent share of charcoal production (green), consumption (orange) and wood fuel consumption (grey) by region



Sources: GSS, 2012; Energy Commission, 2014b.

2.2. Projecting Ghana's Future Charcoal Demand

To forecast future charcoal demand, it is necessary to determine per capita charcoal consumption based on population growth trends and the percentage of charcoal users. These data are shown in Table 6 below.

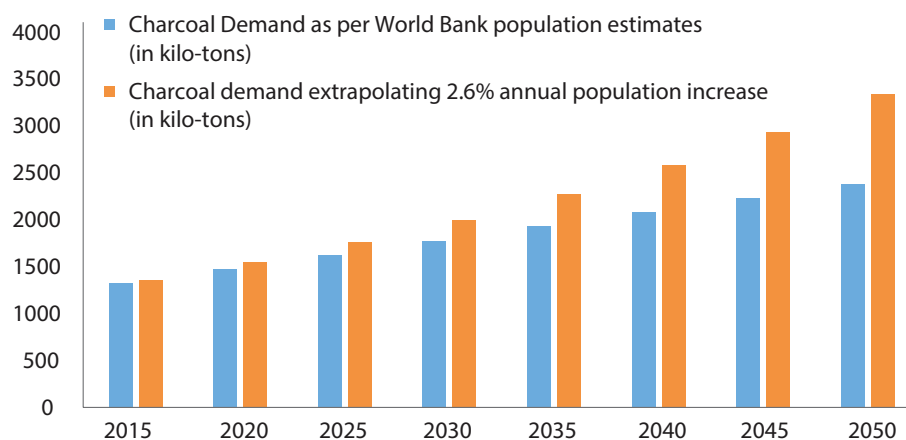
Table 6. Per Capita Charcoal Consumption in Ghana, 2001-2012

Year	Population (Million) ^a	Charcoal Users ^b	Charcoal consumed (kilo-tons)	Per Capita (kg/person/year)
2001	19.4	6,596,000	953.7	144.58
2002	19.8	6,732,000	977.6	145.21
2003	20.3	6,902,000	1006.9	145.88
2004	20.8	7,072,000	1042.2	147.36
2005	21.3	7,242,000	1043.7	144.11
2006	21.8	7,412,000	1051.7	141.89
2007	22.3	7,582,000	1066.2	140.62
2008	22.9	7,786,000	1070.8	137.52
2009	23.4	7,956,000	1071.5	134.67
2010	24.7	8,398,000	1072.7	127.73
2011	25.3	8,602,000	1233.6	143.40
2012	25.9	8,806,000	1416.6	160.86
Average				142.82

^a World Bank estimates. ^b Estimates based on assumption that 34 percent of the population are charcoal users.

As can be observed from the above table, per capita charcoal consumption in Ghana has remained fairly stable in the past decade and this trend is not expected to change in the future unless there is a dramatic change in eating or cooking habits in the country. A typical charcoal-consuming family of five in Ghana consumes an average 2 kg of charcoal for cooking daily.

To determine future charcoal demand, the baseline scenario forecast is based on projections for Ghana's population until 2050 and the assumption that per capita charcoal consumption will remain relatively stable at historic levels. Two population scenarios have been considered, one based on World Bank estimates and the second based on extrapolation of the historic population growth rate of 2.6 percent per year. The World Bank population estimates are based on "projections for medium fertility" (World Bank website). Figure 6 below provides a comparison of the impact on charcoal consumption of the two population scenarios.

Figure 6. Projections for Charcoal Demand in Ghana, 2010-2050

Population increase is not the only factor that will influence charcoal consumption; there are several other factors that need to be taken into account when modelling changes to household demand for charcoal. One of these is the rate of increase in urbanization; the urban population in Ghana was projected to grow by 3.5 percent per year in the 2011-2015 period. General economic prosperity (GDP growth in Ghana averaged between 4 and 6 per cent annually in the last decade); the introduction of fossil fuels including cooking gas and kerosene; literacy rates (education increases awareness of the adverse effect on health of burning wood and charcoal); and access to healthcare will also exercise an influence on charcoal demand. Modelling of the potential impact of such factors on charcoal consumption patterns is beyond the scope of this study.

For the purpose of this study, charcoal consumption is forecast on the basis of averaging the World Bank and historic population growth rates, as indicated in Table 7 below.

Table 7. Baseline scenario for charcoal consumption in Ghana, 2010-2050

Year	Charcoal (kilo-tons)	Base Year (2010=100)
2010 (rounded off)	1,200	100
2015	1,350	112.5
2020	1,500	125
2025	1,700	140
2030	1,900	160
2035	2,100	175
2040	2,350	195
2045	2,600	215
2050	2,850	237.5

CHAPTER 3: STAKEHOLDER AND POLICY ANALYSIS

3.1. Development of a Sustainable Charcoal NAMA

Nationally Appropriate Mitigation Actions (NAMAs) were introduced into the climate lexicon only fairly recently, being introduced at the Bali Action Plan in 2007. Since then they have come to be understood as a new policy instrument to support voluntary climate-change actions in developing countries supported by financing, technology and capacity-building measures.

However the definition and structure of NAMAs are still evolving and the types of climate change initiatives proposed can vary greatly, comprising setting different types of targets—national emissions reduction targets in tons CO₂ equivalent, national intensity-based targets, and deviations from business-as-usual emissions—and undertaking a wide variety of actions, including national policies and strategies, sector-focused policy approaches and specific programmes or projects.

Charcoal is a biomass-based fuel that is a result of incomplete combustion of wood, due to an inadequate supply of oxygen. Apart from being affordable and easily available, charcoal is lighter in weight than wood fuel and therefore easier to transport, can be stored for long durations, produces less smoke (as compared to wood, agricultural waste or dung) and charcoal fires are easier to manage. There is also a social perspective in that food cooked over charcoal is perceived to taste better.

As the planet warms and its resources become increasingly constrained, Ghana needs to find a balance between climate action and economic growth. This would require the government, businesses and communities to work together in tackling the supply of and demand for energy while trying to improve the management of the charcoal value chain.

Mere technological innovation is insufficient and radical transformation is required in lifestyle and consumption patterns. Businesses operating in an appropriate regulatory environment can play a significant role in driving these transformations and encouraging consumers to adopt more sustainable behaviours. A fragmented approach to tackling the value chain can only lead to marginal improvements. To be truly sustainable, the components of the value chain need to be addressed simultaneously. This will require collaboration between public and private actors, an understanding of what value means to the different stakeholders and consideration for their needs, practices and attitudes. The development of a Sustainable Charcoal NAMA can facilitate the process in Ghana.

By promoting a Sustainable Charcoal NAMA, Ghana will support its communities in generating new jobs and thereby support income generation, which in turn can help establish the basis for social development. This will lead to improved healthcare, education, drinking water, and sanitation. A NAMA will also allow greater private sector participation. Tackling the entire charcoal value chain will allow businesses easier access to markets, improved efficiency of the supply chain, lower costs of production due to increased demand for cookstoves, kilns etc., leading to greater profitability. A NAMA approach will mean that the Government will need to work towards a coherent policy that combines sectors such as forestry, agriculture, land use, energy, trade, and finance, all sectors that are relevant to charcoal. A NAMA will also allow the Government to take advantage of available international finance and donor contributions. But a NAMA can only succeed if there is an open and inclusive dialogue between citizens, community leadership, businesses, civil society and authorities. This paper proposes that a NAMA be developed which takes into consideration the country specific characteristics and uses an approach that is inclusive and promotes multi-stakeholder participation.

3.2. Timeframe for Implementing a Sustainable Charcoal NAMA

In its aspirations for socio-economic growth, the government of Ghana, like many other countries in Sub-Saharan Africa, seeks to make modern cooking technologies, such as cooking gas, accessible to its people. However as can be observed with several developed economies, such energy transitions can take significant time and resources. Policy developers need to ensure that in the course of restructuring the economy, a sudden “high technology fix” does not have a dramatic impact on society. Trying to promote gas stoves without assuring supply and price of cooking gas while at the same time banning charcoal can be disastrous, not only for society but also for the government that is taking this course. Transitions need to take account of their social and economic implications, gradually building acceptance for new technology, while improving general economic conditions to make modern technologies affordable and available. Therefore, in the short and medium term, charcoal, a fuel source already familiar to a significant percentage of the (urban) population, provides an ideal “energy transition solution”.

Having an unsustainable charcoal value chain is a problem faced not only by Ghana. Countries have tried different ways to reform the chain or components of it through initiatives such as banning charcoal production, as was done for at least some time in Mauritania and Kenya. However, for a combination of reasons, an example of a fully sustainable national charcoal value chain still remains to be seen. Among these factors, which apply to the majority of sub-Saharan African countries, including Ghana, are:

- Governments ignore the fact that charcoal is a leading source of energy and leave its development to the informal sector;
- Policy coherence is weak;
- Baseline information for policy formulation is lacking;
- The will/governance capacity to reorganize the charcoal production sector is limited;
- Charcoal is an under-priced energy resource.

A sustainable charcoal NAMA has the potential to help address all of these issues, assisting economies such as Ghana’s to meet their short- to medium-term energy demands in a sustainable manner while allowing market conditions to develop in a way which fosters a gradual transition to modern cooking fuels. The remainder of this study will provide recommendations about how to provide an enabling environment for a sustainable Ghanaian charcoal value chain.

3.3. Role of ECOWAS / ECREEE in the Context of a Sustainable Charcoal NAMA

Given that ECREEE coordinates, executes, co-funds and supports programmes and projects related to RE, including specific activities such as capacity-building, policy support, and finance mechanisms, a proposed NAMA on sustainable charcoal in Ghana needs to be developed to align with and benefit from activities undertaken by ECREEE, including:

- Development and implementation of a tailor-made policy and regulatory framework;
- Securing investments in sustainable energy projects to start and run businesses;
- Strengthening networks, knowledge management, awareness creation and advocacy;
- Benefitting from (existing and future) capacities developed in various aspects of sustainable energy;
- Development of a symbiotic relationship with ECREEE as an agency for the promotion of sustainable energy.

3.4. Stakeholders in the Context of a Sustainable Charcoal NAMA

Involving stakeholders at the early stages of the development of a NAMA is essential for successful implementation. As well as providing a holistic view of the effect of developing and implementing a NAMA, multi-stakeholder involvement can help reduce conflicts between various governmental departments and agencies. Stakeholder engagement is thus one of the key components of making a NAMA successful, especially as the NAMA may result in policy and regulation changes that will affect a large number of stakeholders in different sectors. This is especially true in the case of charcoal, which clearly encompasses sectors, such as energy, forestry, land rights and finance, and also, though less obviously, involves other sectors, such as health.

Given the widespread use of wood fuel and charcoal in Ghana and its direct impact on several sections of society (such as end-users, charcoal producers, and middlemen) the stakeholders that should be included in the NAMA development process include (but are not limited to):

- Relevant ministries and governmental agencies;
- Research and Academic institutions with a focus on charcoal, forestry, energy and related areas;
- Multilateral institutions and funding agencies working in the charcoal/wood fuel sector in Ghana;
- Members of civil society and NGOs;
- Charcoal producers, transporters, middlemen and other stakeholders in the charcoal value chain.

Figure 7. Overview of NAMA Stakeholders along the Value Chain



3.4.1 Stakeholders for Policy Development

The Ministry of Energy and Petroleum (MoE) is mandated to develop and ensure a reliable supply of high-quality energy services at minimum cost to all sectors of the economy through the formulation, implementation, monitoring and evaluation of policies.

The Ministry of Local Government and Rural Development (MLGRD) exists to promote the establishment and development of a well-resourced decentralized system of local government to ensure good governance and balanced rural-based development.

The Ministry of Finance (MoF) is responsible for the financial management of the public sector.

The Ministry of Lands and Natural Resources (MLNR) is the ministry entrusted with the management of Ghana's land, forest, wildlife and mineral resources.

3.4.2 Stakeholders for Policy Implementation

The Energy Commission was set up by the Energy Commission Act, 1997 with functions relating to the regulation, management, development and utilization of energy resources in Ghana. The Energy Commission is the technical regulator of Ghana's electricity, natural gas and renewable energy industries, and the advisor to Government on energy matters.

The Forestry Commission (FC) of Ghana is responsible for the regulation of utilization of forest and wildlife resources, the conservation and management of those resources, and the coordination of policies related to them.

3.4.3 Academic and Research Institutions

The Technology Consultancy Centre of Kwame Nkrumah University of Science and Technology (KNUST) operates through its five units to undertake community-impact and enterprise-focused research and development, often working in collaboration with other departments of KNUST as well as external partners.

The Forestry Research Institute of Ghana (FORIG) conducts research on forests and forest products for the social, economic and environmental benefit of society. Other institutions that can be involved in the NAMA include the Council for Scientific and Industrial Research (CSIR) that:

- Conducts policy studies to support the formulation and implementation of relevant policies;
- Facilitates the transfer, diffusion and commercialization of technological innovations;
- Promotes the acculturation and popularization of Science and Technology (S&T) in the wider society;
- Supports S&T human-resource development and management;
- Provides advocacy for a commitment to S&T on the part of all stakeholders.

3.4.4 Inter-Governmental institutions

The challenge in evolving a Sustainable Charcoal NAMA is that it is interlinked to multiple sectors (and Ministries) including forestry, energy, agriculture, land use, health, social development, transport, rural, urban development etc.

Hence developing any sustainable charcoal policy would require cross-sector collaboration and communication between the regulatory agencies. This would require establishing a single national charcoal institution with the support of all the concerned ministries. Ghana can look at INBAR to draw inspiration when setting up a similar institution to implement the sustainable charcoal NAMA.

INBAR in Ghana

International Network for Bamboo and Rattan (INBAR) is an intergovernmental organization dedicated to improving the livelihoods of poor producers and users of bamboo and rattan, within the context of a sustainable natural environment. It operates through a global network of partners from the government, private and non-profit sectors in over 50 countries and promotes sustainable development using bamboo and rattan by consolidating, coordinating and supporting strategic and adaptive research and development.

Under an EU- and Chinese Government-funded project, INBAR is working in Ethiopia and Ghana to reduce deforestation and land degradation by using bamboo as a highly-renewable alternative for wood fuel and charcoal production. INBAR has thus far facilitated the use of nearly 450,000 energy-saving stoves in Ethiopia and Ghana, each of which is estimated to save about 3 kg of wood per day which will therefore lead to saving up to 500,000 tons of wood/year.

This project also supports policy initiatives to facilitate bamboo charcoal production and use, and also the marketing of these products. In this way INBAR and its partners in Ethiopia and Ghana are paving the way for these activities to be scaled up in the future to continue mitigating land degradation, supporting renewable clean household energy, and raising rural incomes (INBAR)

REDD+ in Ghana

As of 2013 there were seven pilot REDD+ (Reducing Emissions from Deforestation and Forest Degradation plus sustainable management of forests, and the conservation and enhancement of forest carbon stocks) schemes in operation in Ghana related to cocoa production, bee-keeping and woodlot development and also several pilot schemes. In addition, there are other initiatives and planned carbon projects such as the Nyankamba Community Resource Management Area REDD Project, which supports sustainable forest management and local communities. REDD+ projects of particular interest in the context of the NAMA are the Nkoranza District Sustainable Charcoal Production Project and Cocoa Carbon Initiative. These projects can act as a precursor for developing strategies and policies that can enable communities to benefit from accessing carbon finance and regulate the predominant drivers of deforestation in Ghana (REDD).

3.4.5. Civil Society and Charcoal Stakeholders

In Ghana, there is general dissatisfaction with the quality of publicly-provided services. Even government agencies concede that efforts to improve them have met with limited success, particularly because there has been little citizen involvement. For example, the Ghana Shared Growth and Development Agenda 2010-2013 (GSGDA) acknowledges:

“Ghana’s underdevelopment to some extent may be attributed to inability of our policy makers to engage stakeholders fully in the formulation and implementation of national development plans. Sitting Governments have claimed sole ownership of economic policies and strategies, which, more often than not results in successive Governments wanting to abandon policies and projects started by previous Governments. This has cost the stability, consistency and continuity of our development policies, programmes and projects and engendered poor development results” (NDPC, 2010).

While the roles of community leaders and charcoal stakeholders are elaborated in the subsequent section, Civil Society Organizations (CSO) are expected to play an important role in promoting values relating to human rights, socio-economic and environmental impacts, labour standards and anti-corruption measures. As the NAMA is developed, the role of CSOs will be of particular importance in aligning economic activities with social and environmental priorities.

The Energy Foundation

One of the CSOs identified as a potential collaborator is the Energy Foundation. The Energy Foundation Ghana is a non-profit, private-sector institution, devoted to the promotion of energy efficiency and renewable energy, as a key strategy for managing Ghana's growing energy needs in a sustainable manner. Established in November 1997, by private-sector energy stakeholders, the primary objective of this NGO is to promote sustainable development and efficient consumption of energy in Ghana. The NGO currently specializes in offering energy efficiency and renewable energy solutions with a focus on residential, industrial and commercial energy consumers in urban areas. The Foundation is the implementing agency for the Energy Demand Management Programme of Ghana's Ministry of Energy, and has gained recognition for its innovative and effective interventions.

Box 2. The Energy Foundation

The Energy Foundation is governed by an Executive Council made up of representatives of energy sector stakeholders including the major producers and distributors as well as major energy consumers. This gives it the flexibility and versatility to pursue programmes efficiently and with minimal delays. The Energy Foundation Ghana is particularly strong in the following areas:

Public education and awareness building;

- Institutional development and capacity- building for energy efficiency;
- Policy advocacy for the adoption of energy efficiency as a national strategy;
- Design and implementation of climate change mitigation projects
- Efficiency standards labels for domestic appliances;
- Design and implementation of energy efficiency projects in industry and commerce;
- Provision of energy management advisory services;
- Energy related studies and research.

Source: Energy Foundation.

3.5. Energy Policies in the Context of a Sustainable Charcoal NAMA

“When starting a NAMA development process, stakeholders tend to focus on solving technical issues within the implementation. The first challenge however, is really to secure commitment from domestic stakeholders” (Ecofys, 2010).

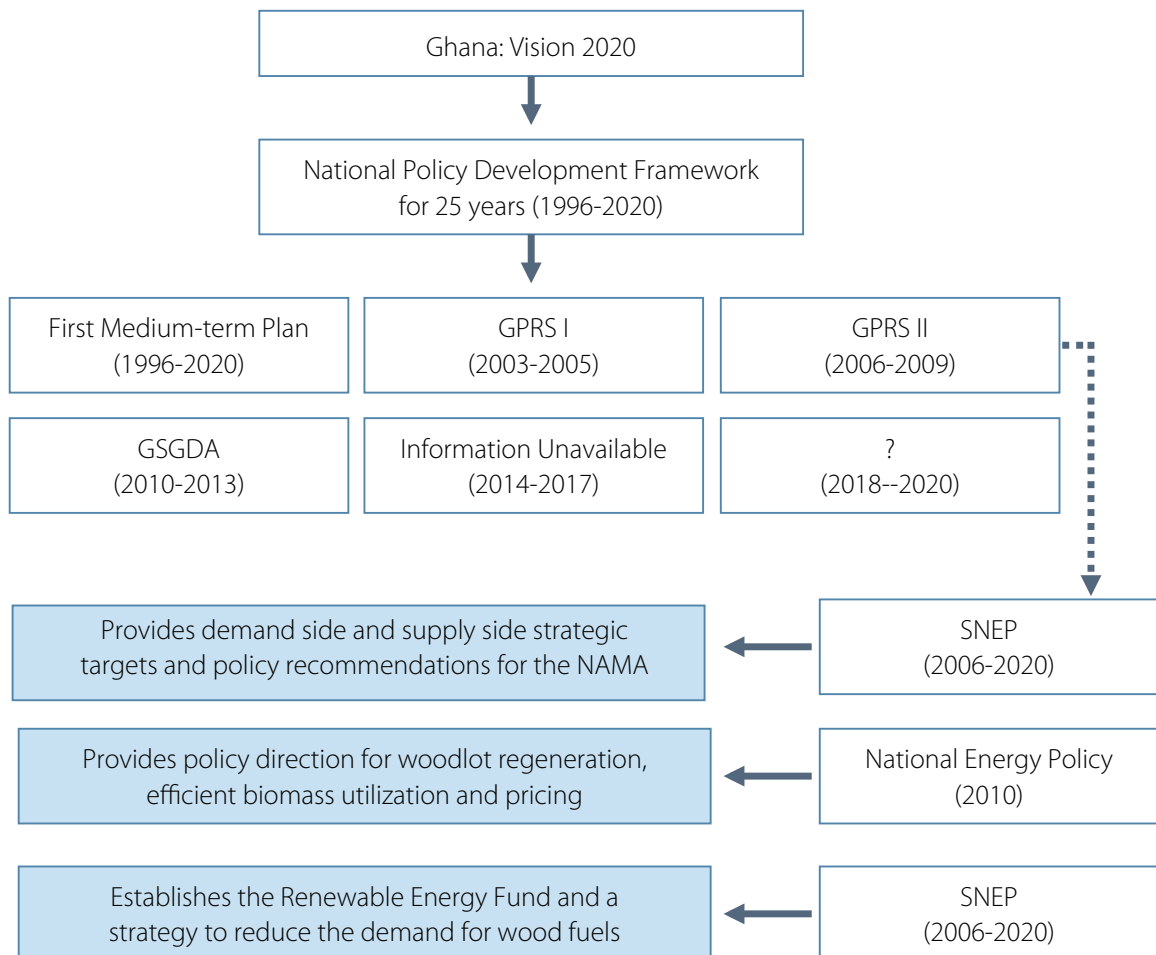
Apart from identifying the key stakeholders, in developing a Sustainable Charcoal NAMA it is essential that the proposed NAMA is aligned with existing sectoral goals and policies. This is essential because NAMAs are expected to contribute

towards global climate action and alignment will be viewed as a positive sign by international donors. In the context of charcoal, the key sectors are energy and forestry. The following section looks at existing policies in these two sectors in detail.

Ghana’s blueprint for sustainable socio-economic development is set forth in the Vision 2020 document put together by the National Development Planning Commission (NDPC). The details were set out in the ‘Presidential Report’, which provided a long-term, 25-year perspective, covering the years 1996-2020 (Government of Ghana, 1995).

Ghana has incorporated the MDGs into its medium-term national development policy framework, which comprises: the First Medium-Term Plan (1997-2000), the Ghana Poverty Reduction Strategy (GPRS I), 2003-2005; the Growth and Poverty Reduction Strategy (GPRS II), 2006-2009; and the Ghana Shared Growth and Development Agenda (GSGDA), 2010-2013. (Note: The next National Medium Term Development Policy Framework was not available to the author at the time of drafting this document)

Figure 8. Ghana Policy Overview in the Context of a Sustainable Charcoal NAMA



3.5.1. Strategic National Energy Plan (SNEP), 2006-2020

The main sectors that will drive Ghana's economic growth are agriculture, manufacturing and information and communications technology (ICT). With a growing population, Ghana faces major challenges in providing the required energy in a reliable and sustainable manner while keeping in mind the environmental and economic impacts of energy production. Given this background, the Energy Commission developed the Strategic National Energy Plan with the objective of developing a sound "energy roadmap" that is aligned to the economic objectives of the country (Energy Commission, 2006). The strategic targets for cooking fuel as covered by the SNEP are as presented in Box 3.

Box 3. SNEP Targets for Cooking Fuel

SNEP Strategic Targets: Demand Side—Residential Sector

To reduce the average wood fuel energy intensity per urban household by 30 percent by 2015 and by 50 percent by 2020.

To reduce wood fuel intensity per rural household by 10 percent by 2020.

SNEP Strategic Targets: Demand Side—Commercial Sector

To reduce the wood fuel share of energy demand to 50 percent by 2015 with a further fall to 40 percent by 2020.

To achieve 5 percent penetration in the use of improved efficiency cookstoves by 2015 and 10 percent penetration by 2020.

To achieve penetration of 1 percent in the use of biogas for cooking in hotels, restaurants and institutional kitchens by 2015 and of 2 percent by 2020.

SNEP Strategic Targets: Supply Side

To reduce the wood intensity of charcoal production (ratio of wood input to charcoal) from the existing 4:1 to 3:1 in the Savannah zone and from 5-6:1 to 4:1 in the forest zone by 2015.

To ensure that the energy share of traditional biomass in the national final energy mix is reduced from about 60 percent to at most 50 percent by 2015 and eventually to 40 percent by 2020.

To increase the supply of renewable energy and modern biomass in the Ghanaian final energy supply to achieve at least 10 percent penetration by 2020.

Source: SNEP, 2006

The SNEP further recommends the following strategies to ensure future supply of wood fuel:

- Expanding forest plantation cover;
- Promoting fuel substitution in households and commercial cooking (e.g. hotels, institutions);

- Setting up a national agency dedicated solely to wood fuel production and marketing along the same lines as the Volta River Authority (VRA), the Electricity Company of Ghana for electricity, and the Ghana National Petroleum Corporation.

3.5.2. The National Energy Policy, 2010

Ghana's National Energy Policy provides an outline of the "policy direction" for the energy sector. One of the goals of the policy is to increase installed power generation capacity, from about 2,000 MW at present to 5,000 MW by 2015, and improve access to electricity. One of the ways proposed is to move away from the traditional hydro-generation of power into a diversified portfolio of other renewable energy sources.

National Energy Policy: Overview of the Renewable Energy Sub-Sector

The goal of the National Energy Policy is to increase the proportion of renewable energy, particularly solar, wind, mini hydro and waste-to-energy, in the national energy supply mix and to contribute to the mitigation of climate change. The challenge is to increase renewable energy in the national energy mix in a sustainable manner. With regard to biomass, the policy directions are:

- Support sustained regeneration of woody biomass resources through legislation, fiscal incentives, and attractive pricing;
- Promote the establishment of dedicated woodlots for wood fuel production;
- Promote the production and use of improved and more efficient biomass utilization technologies;
- Promote the use of alternative fuels such as LPG as substitutes for wood fuel and charcoal by addressing the institutional and market constraints that hamper access to them.

The policy for pricing wood fuel operates on the following principles:

- Prices are to be based on market forces; and
- Taxes and levies on wood fuel are to be regulated by the appropriate national agencies or local authorities, as may be necessary (MoE, 2010).

3.5.3. The Renewable Energy Act, 2011

The aim of the Renewable Energy Act of 2011 is to support the development, utilization and efficient management of renewable energy sources in Ghana. The act introduces a feed-in tariff and provides for the establishment of a renewable energy fund which will be used to pay for the promotion and development of renewable energy sources as well as to fund the feed-in tariff. It is intended that the Renewable Energy Act will stimulate a significant increase in the country's solar, wind and biomass installed capacity.

With respect to cooking fuels, the main policy issues are the over-dependence on wood fuels and inefficient utilization of resources. The strategies outlined to reduce the demand for wood fuels include:

- Support regulation in the production, transportation and marketing of the wood fuel industry;
- Promote production and use of improved and more efficient wood fuel technologies such as cookstoves and charcoal production techniques;

- Promote the use of alternative fuels such as biogas, LPG, and wood-briquettes for cooking and heating;
- Support sustainable regeneration of woody biomass resources through legislation and fiscal incentives for reforestation, particularly in “stools”. (Energy Commission, 2011).

3.6. Forestry Sector Policies and Programmes in Ghana

The Forestry Commission (FC) is responsible for the execution of several Forestry Sector Programmes and Projects to achieve its mandate of protecting, developing, managing and regulating the country’s forest and wildlife resources. Some of the key policies in the forestry sector in Ghana are set out below.

3.6.1 Key Forestry Sector Policies and Legislation

The Forestry Commission Act, 1999

This act established the Forestry Commission, giving it responsibility for the main public bodies and agencies carrying out the protection, development, management and regulation of forests and wildlife resources.

The Forest and Wildlife Policy, 1995

This policy updates specific government guidance and control of forestry activities in Ghana as a result of changes that have occurred in the nature of Ghana’s forests since the adoption of the 1948 Forest Policy. The policy provides a basis for the development of forests and the timber industry. The new policy promotes public participation in decisions about the share of benefits and responsibilities in forest management and encourages integrated coordinated research in forest-related issues. It also provides for conservation of all valuable wildlife habitats and communities.

Forest Plantation Development Fund Act, 2000

This act supports the establishment of a Forest Plantation Development Fund to provide financial assistance for the development of private commercial forest plantations, to provide for the management of the fund and related matters. The sources of the fund are expected to be:

The proceeds of the timber export levy imposed under the Trees and Timber Decree 1974 (NRCD 273) as amended by the Trees and Timber (Amendment) Act, 1994 (Act 493) will be used as, or in conjunction with;

- Grants and loans for encouraging investment in plantation forestry;
- Grants provided by international environmental and other institutions to support forest plantation development projects for social and environmental benefits;
- Money provided by Parliament for private forest plantation purposes (FC).

3.6.2 Key Forestry Sector Programmes

The next section looks at some key forestry programmes in the context of a Sustainable Charcoal NAMA¹.

¹ Note: The information has been taken from the current data available on Ghana’s Forestry Commission website. As the website may not be up-to-date at the time of writing, some of information may be outdated.

National Forest Plantation Development Programme (NFPDP)

The NFPDP was initiated at Abofoo in the Offinso District of the Ashanti Region as a critical intervention for the resurrection of the region's forestry resources. Launched in 2001 to recover degraded forest areas, improve employment opportunities and improve environmental quality, the NFPDP focused on increasing timber stocks for the national market. In 2010, the NFPDP was expanded and re-launched at Ayigbe in the Wenchi District of the Brong-Ahafo Region.

The aim of the programme is to encourage the development of sustainable forestry to ensure supplies to meet future demand for industrial timber and enhance environmental quality, thereby reducing pressure on existing natural forest. The programme's objectives include restoring the forest cover of degraded forest reserves, addressing the wood deficit situation in the country, and creating employment opportunities at the rural community level to improve the income of rural households and significantly increase food production in the country.

The programme has various components including the Community Forest Management Project (CFMP) and the Government Plantation Development Programme (GPDP). A 2012 annual report published by the programme shows that of the 9,631.2 ha targeted for afforestation, 7,525.9 ha have been reported of which 5,928.4 ha have been verified (by third-party verifiers).

Natural Resources and Environmental Governance Programme (NREGP)

The NREGP is designed to provide annual budget support to sustain the implementation of the Natural Resources and Environmental Governance reforms and innovation initiated by the government. The programme focuses on a set of policies and reforms in the inter-related sectors of forestry and wildlife, mining and environmental protection.

The NREGP draws on the Framework Memorandum of Understanding agreed between the Government of Ghana with five participating Development Partners (DPs): Royal Netherlands Embassy (approximately €7 million per year over the five years 2008-2012); U.K Department for International Development (DFID) (approximately £2.1 million per year for the three years 2009-2011); Agence Française de Développement (AFD) (approximately €1 million per year over the five years 2008-2012 ; the European Commission (EC) (approximately €4 million per year over the three years 2010-2012); and the World Bank's International Development Association. The total contribution from development partners was approximately US\$77 million.

The direct benefits expected at the completion of the programme at the end of five years include:

- Improved management of government revenues and finances in the forestry and mining sectors;
- Reduced illegal logging;
- Reduced social conflict in forestry and mining communities;
- Integration of environmental considerations into policy formulation and implementation across government, including risks associated with climate change.

Community Forest Management Project (CFMP)

The project is being funded by the African Development Bank (AfDB) and is designed to rehabilitate degraded forest reserves while increasing production of agricultural, wood and non-wood forest products and strengthening

the capacity of relevant institutions. The project commenced in October 2003 and was expected to rehabilitate six degraded reserves in the four regions of Ashanti, Brong-Ahafo, Eastern and Western Ghana.

Forest Investment Programme (FIP)

The Forest Investment Programme (FIP) is a targeted programme of the Strategic Climate Fund (SCF), which is one of two funds within the framework of the Climate Investment Funds (CIF). The FIP supports Ghana's efforts to reduce deforestation and forest degradation (REDD) and promote sustainable forest management that leads to emission reductions and the protection of carbon reservoirs. It achieves this by providing scaled-up financing to developing countries for readiness reforms and public and private investments, identified through national REDD readiness programmes or equivalent strategies.

The FIP typically takes into account country-led priorities and strategies for the containment of deforestation and/or forest degradation, while building on existing forest or related initiatives. It promotes programmatic investments aimed at transformational change in the forest sector or sectors affecting forests.

The FIP supports:

- Investments that build institutional capacity, forest governance and information;
- Investments in forest mitigation efforts, including forest ecosystem services; and
- Investments outside the forestry sector necessary to reduce the pressure on forests, such as alternative livelihood and poverty reduction opportunities.

FIP investments also mainstream climate resilience considerations and contribute to multiple co-benefits such as biodiversity conservation, protection of the rights of indigenous peoples and local communities, and poverty reduction through rural livelihoods enhancements

The FIP in Ghana has been designed through an extensive consultative process to develop approaches to tackle the multiple layers of forestry related issues. In the medium to long term the expectation of Ghana's FIP strategy is to reduce emissions from deforestation and degradation, while strengthening institutional capacity in forest resources management, expanding and diversifying management options, improving governance, strengthening the regulatory mechanisms, streamlining tenure and tree rights, improving local livelihoods and supporting mitigation and adaptation to climate change. The FIP also notes that the means for achieving this will be defined by extensive and innovative collaboration between multiple stakeholders on a number of key pilot projects. The challenge then will be to extend what is learned through pilot projects over a significant proportion of Ghana.

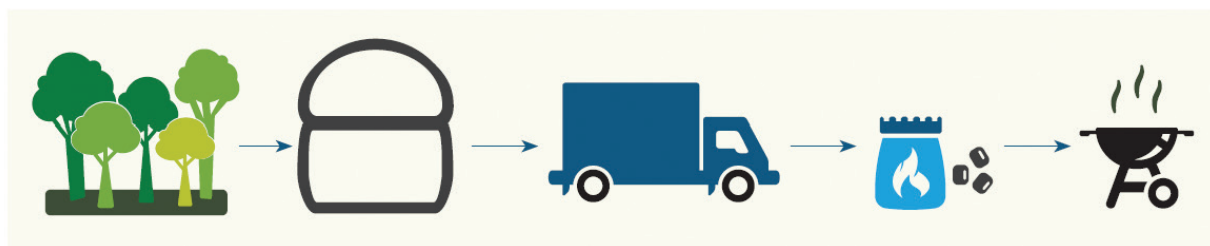
Part 2: 'Building Blocks' of the Charcoal Value Chain

CHAPTER 4: THE CHARCOAL VALUE CHAIN

4.1. The Value Chain 'Building Blocks'

Although charcoal is seen as being a rudimentary fuel source, with proper initiatives in place, it can become a sustainable and affordable transition fuel. In order to achieve this sustainability, improvements must be made along each step of the value chain. As illustrated in Figure 9, these steps include both supply and demand components: forest management; carbonization; transport, distribution (including storage) and retail; and consumption.

Figure 9. The Charcoal Value Chain

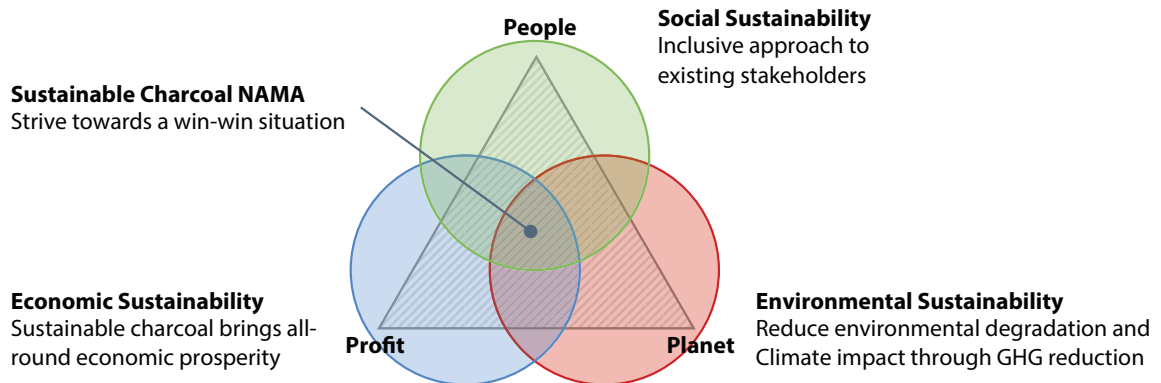


Elaborating on the supply side and the demand side this study looks at the following steps along the charcoal value chain:

- Procurement of biomass;
- Carbonization of biomass;
- Charcoal transportation, distribution and retail;
- Charcoal consumption.

The terms, "Procurement", "Carbonization", "Logistics" and "Demand-side" are used to denote the individual charcoal value chain steps in the subsequent sections of this NAMA study. In developing a Sustainable Charcoal NAMA, the framework will lead to several economic, social and environmental benefits as depicted Figure 10 in below:

Figure 10. The sustainable development benefits of a Sustainable Charcoal NAMA

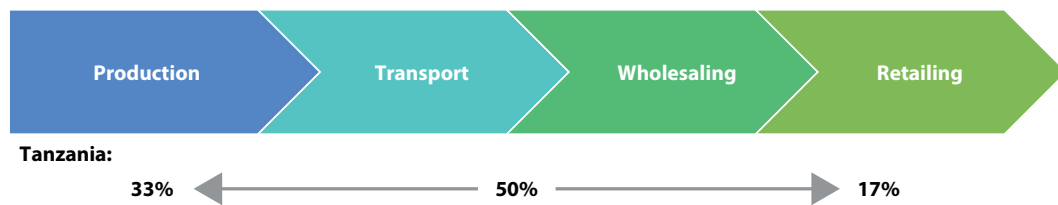


4.1.1 Economic Development

Charcoal production plays a significant role in the economy of most sub-Saharan African countries, including Ghana's. The value chain provides numerous jobs at each step of the chain.

Although jobs are provided throughout the value chain, currently a significant amount of the revenue goes to connectors—middlemen, transporters and wholesalers—with very little going to charcoal producers. Figure 11 below illustrates the distribution of profits for each step along another sub-Saharan African country's charcoal value chain, that of Tanzania. A mere 33 percent of the profits accrued through the sale of charcoal goes to the charcoal producers and suppliers of wood.

Figure 11. Profit distribution along the Tanzanian charcoal value chain



Source: World Bank, 2009.

A formalized value chain will provide many private-sector actors with increased income due to efficiency improvements and a fairer profits distribution. It will also provide the government with increased revenue from permits and taxes. Furthermore, the use of efficient kilns and improved cookstoves will provide stakeholders with an increased amount of time, as less wood will need to be collected. This time can then be used for other income-generating activities.

4.1.2 Social Development

Equally important are the social benefits of an improved charcoal value chain. These benefits will mainly be for existing stakeholders involved with the current charcoal trade, including some of the poorest and least educated groups of society.

Sustainable charcoal NAMAs should be developed in a way that helps to improve the economic circumstances of stakeholders such as charcoal producers. Those, such as middlemen, who may lose their role, need to be given alternative opportunities to continue operating legally.

The charcoal NAMA will also provide health benefits. Improved cookstoves and more efficient kilns result in less smoke. Smoke inhalation is a leading cause of many respiratory problems; in the case of smoke from cooking, it is most often women and children who are most vulnerable to smoke-related diseases. A reduction in smoke generated will improve the health of those exposed to it.

4.1.3. Environmental Development

Deforestation and forest degradation, as well as the associated land degradation and soil erosion, are well-documented outcomes of unsustainable biomass use. A reduction in biomass consumption and improved forest management will help to tackle these issues. Reduction of deforestation, forest degradation, land degradation and soil erosion lead to in a reduction of greenhouse gas (GHG) emissions through increased carbon storage in biomass and soils.

4.2. Procurement

As with any manufacturing process, the charcoal value chain starts with the obtaining (procuring) of raw materials, namely woody biomass and/or agricultural residues/waste. In Ghana, the bulk of the woody biomass is obtained directly from the natural forest. A small percentage (about 10 percent) of this raw material constitutes wood waste i.e. sawdust residue from the timber industry and planted forests. The process of collecting the raw material is carried out by the rural poor, such as subsistence farmers, either by picking up fallen branches and twigs or chopping off existing trees.

The major charcoal production areas are the savannah semi-deciduous and rainforest regions of Brong-Ahafo Eastern Region and the Northern Region.

Box 4. Scenario Model

Ghana Forest Statistics:

Ghana Total Area: 238,535 km²

Total forest cover: 21.7 percent (as per MDG table)

Forest Area: 51,762 km² (Calculated from above data)

Calculating for Deforestation Scenario:

Current annual deforestation rate: 135,000 ha (*Source: FIP*)

Deforestation over 10-year period: 13,500 km²

Ghana's total forest cover will be lost over the next 40 years.

Policy Gap and Challenges

That the government has considerable understanding of the challenges of deforestation and the economic consequences of depleting forest reserves can be observed by the various programmes driven by the Forest Commission (FC), such as the Community Forest Management Project, the Forest Preservation Programme, and the recent Forest Investment Programme. However, the country lacks up-to-date data on forest cover and annual deforestation rates, types of wood species and related matters.

Interviews between the author and the FC indicate that forest-related information based on satellite tracking can greatly improve the quality of forest data. Current forest data are computed over a 10-year cycle with limited information on private forest land.

A Sustainable Charcoal NAMA can tackle deforestation through sustainable woodlot management and implement policies and programmes that encourage rural population and government to invest in forestry programmes. Forestry policies therefore need to address:

Land-use conversion to agriculture: A growing population will require additional land to be brought under cultivation with food crops such as maize, rice, millet, sorghum, cassava, yam, cocoyam, plantain, groundnuts, and soybeans. The Ministry of Food and Agriculture notes that the country currently produces about half of its cereal and meat needs and less than one-third of the raw materials for its agro-based industries. But the main source of deforestation from land-use conversion is likely to be the production of cocoa, of which Ghana is the world's second largest producer.

The timber industry and demand for wood fuel: The general policy direction adopted in Ghana has focused on reducing the country's dependence on charcoal due to its high environmental impact. While afforestation and reforestation are being encouraged through initiatives such as the NFPDP and more recently the FIP, the focus is on the economically lucrative timber industry.

Unorganized urban growth: The lack of sufficient opportunities in rural areas is the primary cause for urbanization. Unplanned urban development results in unorganized urban sprawls, poor drainage, limited access to water, poorly built housing in limited space, and an energy crunch. This leads the newly migrating population to use neighbouring forest resources for building materials, food and energy supply, and leading to additional deforestation.

Mining and minerals: Ghana's mineral exports are dominated by gold and Ghana ranks among the top 10 producers of gold. Apart from gold, the mining industry in Ghana produces bauxite, manganese and diamonds through a handful of large-scale and 300 registered small-scale mining companies. Most mines are open-pit, which results in significant levels of deforestation.

4.3. Carbonization

Carbonization refers to the process where wood is converted into charcoal under controlled combustion. The process typically involves the following steps:

- **Preparation of the wood—2-5 days:** Once the wood has been cut and collected, it is laid out, usually in the open sun, to dry and reduce its moisture content.

- **Preparation of the traditional earth mound kiln—1-2 days:** The most common technology used for the carbonization process is the traditional earth mound kiln. The process involves stacking the dried wood in a pyramid and covering it with a layer of earth to prevent direct contact with the air.
- **Carbonization—15-24 days:** The wood is then set on fire and allowed to burn slowly (carbonize) under controlled conditions (lack of oxygen), allowing the wood to be converted to charcoal without getting completely burnt. However, the traditional earth mound allows efficiencies to be as low as 10-15 percent (i.e. almost 90 percent of the wood gets burnt to ashes). Policy intervention is required at this phase to encourage the use of efficient charcoal kilns. Efficient charcoal kilns allow efficiencies of 25-35 percent, thus producing more charcoal per ton of wood.
- **Cooling Period—2-5 days:** Once the combustion is complete, the kilns are allowed to cool down before the charcoal can be stored in bags for transportation.

This entire carbonization cycle can last between 20 and 36 days. As the quantity of charcoal produced can greatly vary, the author has conducted unstructured interviews with various stakeholders to estimate typical statistics for charcoal production using the traditional technique:

- Charcoal from 1 m³ (cubic meter) of wood: 30 to 50 kg of charcoal, depending on the type of wood.
- Typical volume for traditional kilns: 10 to 25 m³—though this can vary greatly, especially since professional charcoal producers have been setting up large kilns.
- Average charcoal production per carbonization cycle: 300 to 1,250 kg.
- Average charcoal production per carbonization cycle in bags: 20 to 50 bags.
- Average number of people working in the carbonization process: Charcoal producers typically operate in small groups of 4-10 people
- Average annual production from a single traditional charcoal kiln: 5-10 tons per year. Production of charcoal is seasonal. It drops during the monsoon seasons and picks up during the dry season.

Box 5. Scenario Model: Energy- efficient Kilns

Policy recommendation: Reduce the wood intensity of charcoal production (ratio of wood input to charcoal) from:

4:1 to 3:1 in the Savannah zone

6:1 to 4:1 in the Rainforest zone

Source: SNEP 2006

According to the SNEP, Ghana expects to improve its carbonization efficiency from the existing (BAU) 25 percent to 33 percent in the Savannah zone and 16-20 percent (BAU) to 25 percent in the Rainforest zones. Considering that most major charcoal producing regions are in the northern half (the Savannah zone), the scenario model considers a 75:25 savannah/rainforest split as elaborated below.

Wood fuel (in kilo-tons)	Base Year 2010	Scenario 1 2015	Scenario 2 2020
Charcoal demand	1,200	1,350	1,500
Charcoal from Savannah zone (75 percent)	900	1,012.5	1,125
Charcoal from Rainforest zone (25 percent)	300	337.5	375
Wood input, Savannah zone (at BAU ratio 4:1)	3,600	4,050	4,500
Wood input, Rainforest zone (at BAU ratio 6:1)	1,800	2,025	2,250
Total wood used for charcoal (BAU scenario)	5,400	6,075	6,750
Wood input, Savannah zone (at proposed ratio 3:1)	--	3,037.5	3,375
Wood input, Rainforest zone (at proposed ratio 4:1)	--	1,350	1,500
Total wood required if SNEP is implemented	--	4,387.5	4,875
Effective wood savings	--	1,687.5	1,875
Efficiency of kilns over BAU scenario*		1.385	1.385

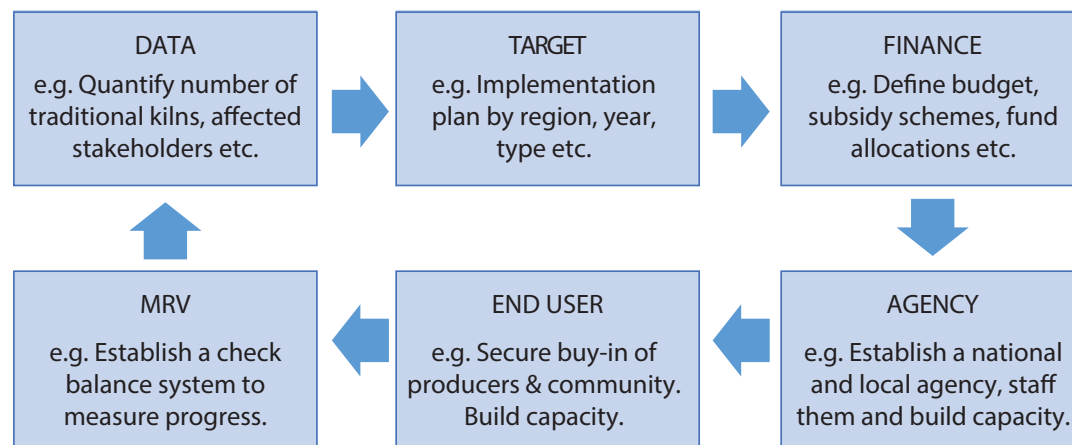
* Ratio of wood input under BAU scenario to wood input under energy-efficient kiln scenario.

The above analysis shows that use of more efficient kilns would reduce the amount of wood required to produce the amount of charcoal required by 38.5 percent under each scenario. The policy initiatives should therefore focus on gradually replacing traditional earth mound kilns with more efficient charcoal kilns, such as the Casamance or the Adam kiln. As the time span for effective replacement may be too short to achieve the SNEP target (of 2015 under its Scenario 1), SNEP's Scenario 2, (by 2020), provides a more realistic time horizon for the technology switch to efficient kilns.

Policy Gap and Challenges

The role of energy efficiency and efficient kilns is well understood within the Energy Commission, academia and the private sector, as is well demonstrated by the EC's eco-labelling programme for energy equipment, the KNUST Technology Centre's support for development of efficient cookstoves and the interest shown by the private sector in charcoal briquetting.

The information gap lies in transferring technical knowledge about building efficient kilns and convincing charcoal producers of its economic benefits. The challenge stems from the almost zero-cost of operating traditional kilns where wood fuel is obtained for almost nothing and from the fact that earth kilns can be built at the source of wood fuel, using local materials, local labour and hand-held tools.

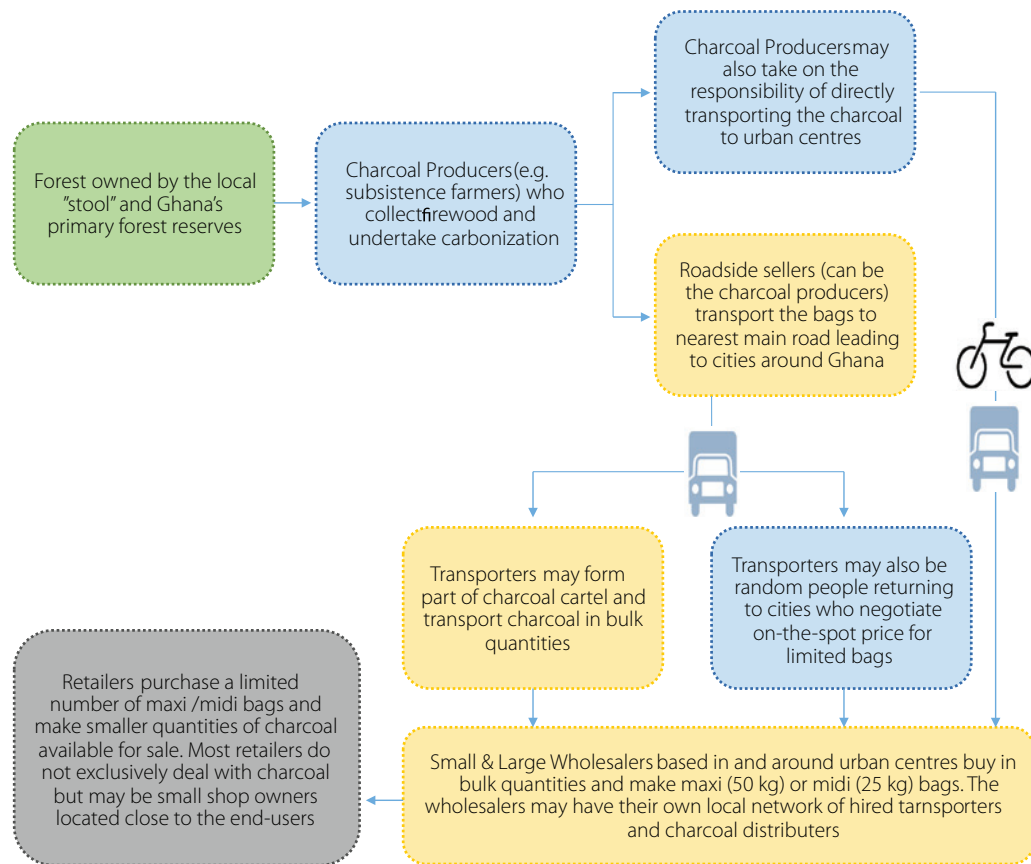
Figure 12. Implementing Policies for Efficient Kilns

There exists good technical experience in Ghana in the use of efficient kilns. Sustainable Charcoal NAMA Policies for the introduction of efficient kilns need to be approached with the same rigour as other energy efficiency/technology policy and to focus on the entire implementation cycle.

Implementing energy efficiency policies for sustainable charcoal would involve: data collection to determine the exact number of efficient kilns required by region; setting targets for the number of kilns that need to be installed over a given timeframe; creating a financial mechanism to establish and operate kilns and train kiln operators; establishing a national agency to coordinate this process; securing feedback from end users (kiln operators and local communities); and setting up a Measuring, Reporting and Verification (MRV) system to measure the social, economic and environmental impacts of the kilns.

4.4. Logistics

Charcoal logistics, as defined in this document, involves the entire set of activities pertaining to collection of charcoal, packing into bags, transportation to urban centres, storage with wholesalers, distribution of charcoal to the point of purchase by end users where it is retailed. The charcoal supply chain in Ghana is similar to that in many other countries in sub-Saharan Africa and involves a network of charcoal producers, transporters, middlemen/wholesalers and retailers and an uneven distribution of profits. Most of the bargaining power is in the hands of the middlemen and wholesalers who operate through “charcoal cartels” and often by-pass the existing regulatory and taxation systems, which are not sufficiently resourced to be properly implemented.

Figure 13. The supply, transportation and distribution of charcoal in Ghana

Note: "Stools" are parcels of land owned by communities through a form of community ownership.

Policy Gaps and Challenges

Supply and distribution represents the weakest link in the charcoal value chain, and the role of charcoal transportation and distribution remains a politically sensitive issue. Charcoal cartels operate across Ghana in groups and any attempt to tackle them head-on will lead to disruption of charcoal supply. The middlemen involved make the maximum profit and control the supply of charcoal from rural to urban areas. While the government licensing system tries to regulate the sector, at present it covers only a small section of the stakeholders, primarily those companies involved in the export of charcoal. Any attempt to abolish the charcoal cartels or cut their income will lead to disruption of initiatives to create a sustainable charcoal value chain.

The Energy Commission currently issues the following set of licences for activities related to the charcoal production and supply chain, namely:

- **Bulk Charcoal Production Licence:** Issued to applicants who wish to produce more than 100 tons of charcoal per annum.
- **Bulk Charcoal Transportation Licence:** To authorize licence-holders to use registered vehicles for transportation of charcoal.

- **Charcoal Wholesale Storage Licence:** To authorize the licence-holders to store charcoal in commercial quantities for sale locally.
- **Charcoal Export Licence:** To authorize licence-holders to export charcoal. However in its latest amendment, the licence only allows the holder to produce charcoal for export. For each consignment exported, the licensee is required to obtain a Charcoal Export Permit through an online application system.

While the licensing system provides guidelines in certain areas (e.g. transport licence-holders need to have vehicles recertified by the relevant statutory body annually), the policy challenge for Ghana lies in ensuring that the entire charcoal trade is regularized.

4.5. Demand Side

The need for efficient cookstoves is a well understood element of the charcoal value chain in Ghana, primarily thanks to the efforts of the Ghana Alliance for Clean Cookstoves (GHACCO). Consisting of 23 stakeholder representatives of Civil Society Organizations, NGOs, private cookstove producers, distributors, financial institutions, researchers, grass-roots practitioners, marketers, donor agencies and partners, GHACCO helps promote coordination, information sharing and capacity development among stakeholders, particularly actors in the cookstoves sector in Ghana. The objectives of GHACCO are to:

- Provide a roadmap for concerted action and measurable results that can change the lives of 25 million Ghanaians by using clean energy and fuels;
- Become a beacon of best practice for the West African sub-region that will foster a unified vision for the sector while building a common sense of engagement among all stakeholders on the most critical actions required for the universal adoption of clean cookstoves and fuels;
- Strengthen local actors working in the cookstoves sector and increase consumer awareness of the importance of fuel-efficient and clean cookstoves;
- Support the Government to achieve its renewable energy policy and climate change programme goals;
- Support the global efforts of the Global Alliance for Clean Cookstoves in international and local networking and advocacy (GHACCO).

Scenario Model: The Impact of GHACCO

Box 6. Scenario Model

- GHACCO target for distributing efficient cookstoves: 5 million by 2020.
- Population of Ghana in 2020: 30 million
- Average household size: 4 (GSS, 2008)
- No. of households in 2020: 7.5 million
- GHACCO target coverage: two-thirds of the projected households

Given the scale and reach of this initiative, policy efforts need to be focused on creating a market environment that is conducive for the growth of efficient cookstoves. The challenges include a lack of quality control, lack of awareness, and creating an enabling environment that is conducive for the existing actors (under GHACCO) to achieve their set targets.

Policy Gaps and Challenges

Changing demand from end users can have a significant impact on the sustainable charcoal trade. Currently, there is a significant disconnect between the supply side and demand side, especially with respect to information related to the quality and type of charcoal. Also, there is a lack of understanding about the various types of charcoal end-users. These can be divided into four groups:

- Industrial consumers: These buy charcoal in bulk quantities and demand assured supply.
- Food Industry: Consisting not only of formal restaurants or catering services, the food industry in Ghana consists primarily of roadside food eateries which consume significant quantities of charcoal.
- Households: These are the classic end users to be tackled through the introduction of efficient cookstoves
- Others: These include institutions and schools that operate large community kitchens.

Ghana's lack of a cohesive national policy, strategy and coordination framework for the cookstoves sector is exacerbated by inadequate regulation in the cooking sector, including the charcoal and wood fuel supply chain. The policies on subsidies (such as LPG subsidies) inhibit sector growth), and this effect is compounded by the lack of incentives to promote the cookstoves sector, such as import duties and taxes on technologies and regulation of raw material inputs (such as scrap metal).

The poor quality of existing cookstoves, which mainly rely on local production but lack technical standards, quality control and effective testing and monitoring mechanisms, results in poor performance and low durability.

The other challenges include:

- The need for improved consumer awareness, education and outreach;
- Inadequate market and business dynamics to build the cookstove value chain;
- Limited knowledge and access to information.

Part 3: Developing the Sustainable Charcoal Value Chain

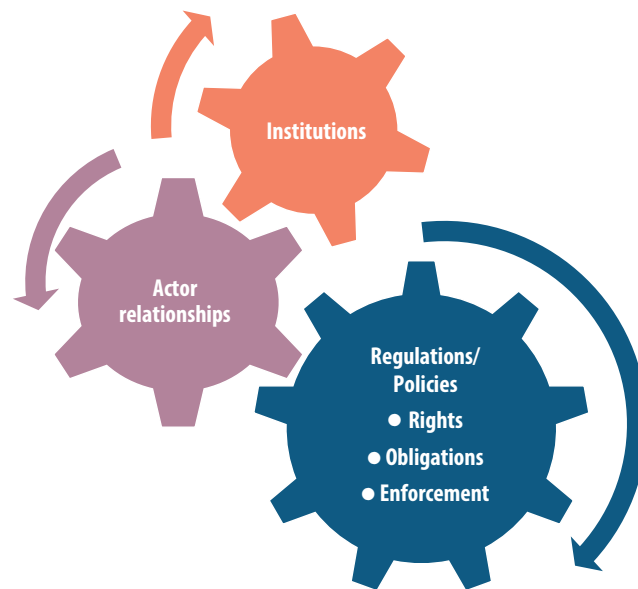
CHAPTER 5: DEVELOPING A SUSTAINABLE CHARCOAL VALUE CHAIN

The following sections detail specific actions that need to be taken in order to implement an ideal sustainable charcoal value chain and fill in some of the gaps mentioned in Part 2. It is expected that this ideal scenario could only be achieved in the long term. In this part of the report, cross-cutting activities are first detailed. Activities will then be listed by step of the value chain: procurement; carbonization; transportation, retail and distribution; and consumption. Within these steps, information measures, policy actions, technology transfer and capacity-building will be addressed.

Addressing cross-cutting issues is one of the defining elements of this NAMA study on the Sustainable Charcoal value chain. In Ghana, there are ongoing initiatives focusing on various steps of the value chain. However, in order to improve the chain, it must be looked at and managed holistically.

Formalization of the charcoal value chain comprises establishing institutions, working inter-actor relationships, and coherent policies and regulation which are properly enforced. These components should be set up in a way which allows each to work smoothly with the other, as demonstrated in the figure below.

Figure 14. Components of formalizing the value chain

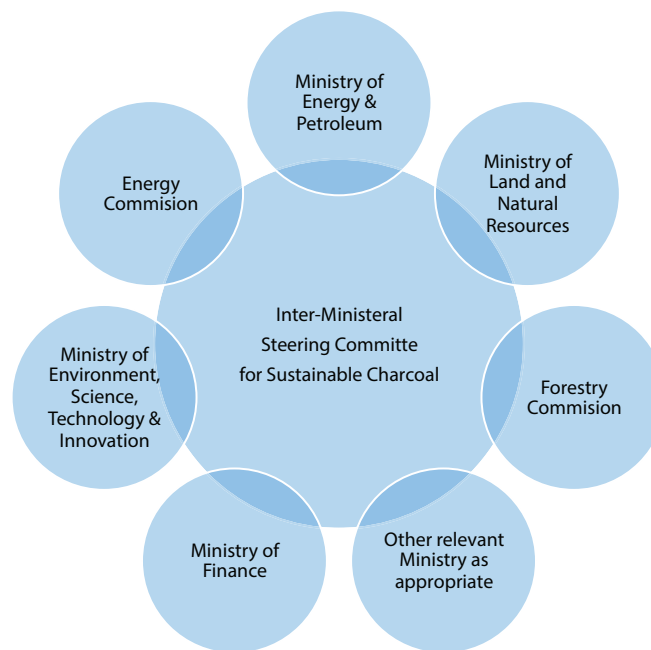


Inter-Ministerial Steering Committee

The establishment of an inter-ministerial steering committee to discuss and coordinate activities improving the charcoal value chain is of the utmost importance. Forestry management is influenced by issues which fall under a number of ministries—i.e. Ministry of Lands and Natural Resources; Ministry of Environment, Science, Technology and Innovation; Ministry of Energy and Petroleum; Ministry of Food and Agriculture; Ministry of Trade and Industry - as well as their implementing agencies such as the Energy and Forestry Commissions. However, there is a lack of communication and coordination among the various ministries, and establishing an inter-ministerial steering committee to align policies and to discuss different priorities of the ministries is an essential first step to improved policy design and implementation.

It is proposed that Ghana establish an “Inter-Ministerial Steering Committee”. If established, such a committee may serve as an appropriate coordinator of the charcoal value chain.

Figure 15. Potential ministries for Charcoal Steering Committee



5.1. Charcoal Unit

An institution that is crucial in the holistic implementation of a charcoal NAMA is a National Charcoal Unit. The unit could be based in a cross-sectoral Directorate of Green Economy under either the Ministry of Energy and Petroleum or the Ministry of Land and Natural Resources and should work in close coordination with the Energy and Forestry Commissions and the REDD+ team. The Charcoal Unit will be responsible for coordinating and facilitating charcoal-related activities in the country, including acting as the NAMA coordinator, providing assistance to and managing the NAMA-related MRV. This unit will play the key role in ensuring that sustainable charcoal value chain activities are looked at holistically.

Data collection

The Charcoal Unit should be the hub for information about charcoal activities. Once the information is collected, it should be communicated to and held by the Charcoal Unit so that there is one entity which holds an inventory of information about the sector. This information will include quantitative data (such as forested area, amount of charcoal produced, number of producers, amount and type of cookstoves used) as well as qualitative data (e.g. an organigram, or a map showing the relationship between all stakeholders in the value chain and their roles).

Promotion and awareness-raising

The Charcoal Unit should promote the benefits of legal charcoal production and green charcoal production among a variety of stakeholders, including ministry employees, local government, charcoal producers, transporters and consumers. Promotional activities include promoting the benefits of: enhancing forest management, using energy-efficient kilns, upgrading transport systems, buying sustainable charcoal to support the system and using improved cookstoves. As charcoal producers are often not registered and are using wood that they have collected without payment, they need to understand the benefits of registering as a charcoal producer (such as access to capacity-building and the Charcoal Fund), and of using an improved kiln. Charcoal consumers have a clear economic incentive to reduce their consumption, but they need to understand all of the benefits of switching to an efficient stove despite its higher up-front cost. The Charcoal Unit should also promote the use of biomass waste for briquette production, as well as the promotion of briquette consumption.

5.1.1 Eco-labelling

The need for eco-labelling will be briefly touched on in the discussion of charcoal taxation through the use of green and black charcoal bags. Eco-labelling is already in existence in Ghana, but the concept needs to be expanded in the context of the NAMA to include efficient cookstoves, efficient kilns and the quality and type of charcoal. Eco-labels can be an excellent tool for raising awareness on sustainable charcoal and for market creation, but more importantly, if applied appropriately, can support the NAMA Measuring, Reporting and Verification (MRV) system.

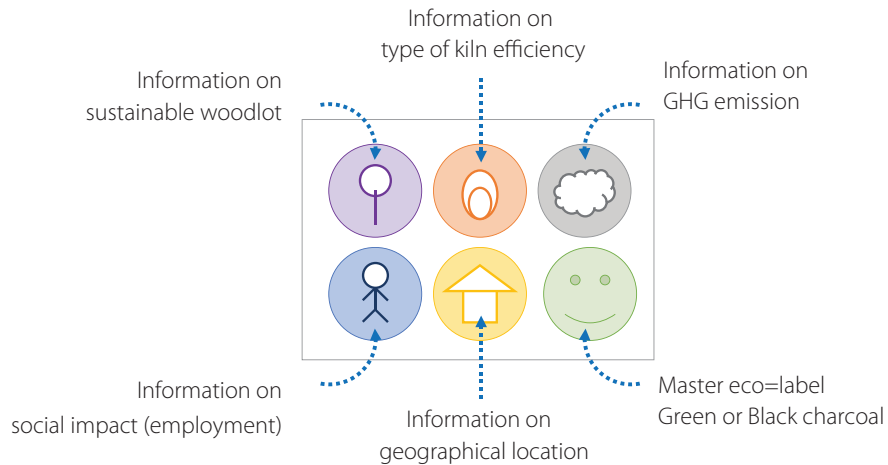
The Charcoal Unit will be responsible for establishing and promoting an eco-labelling programme for black (conventional) and green (sustainable) charcoal. The Charcoal Unit will develop standards for eco-labelling. The standards will address the levels of biomass management and carbonization efficiency necessary in order for charcoal to be considered “green”. The unit will establish an accreditation process to accredit auditors to verify the charcoal. It will also design labels for bags which communicate the type of charcoal contained in the bag.

Once standards and an accreditation process have been established and labels have been designed, the Charcoal Unit should coordinate the production of labelled bags. A fixed number of these bags will be allocated to local government bodies. These bodies will then encourage existing private-sector stakeholders, such as middlemen, to bulk-purchase the bags and sell them to charcoal producers. Pre-selling of the bags by the local administration will mean that the charcoal revenue generated is directly received by the local government. The sale of the bags to actors currently working illegally in the charcoal value chain will help to ease the transition of these actors into a legal charcoal value chain. The type of bag used by producers will give a clear indication if the charcoal is produced illegally, without proper permits in place, or legally by a registered producer who has obtained all required permits and, if legally, whether it is “black” or “green”. The use of these bags will help to facilitate the MRV system for charcoal.

In the example of eco-labelling shown in the figure below, information such as Greenhouse Gas emissions and Sustainable Development (SD) indicators (such as employment creation) can be easily quantified. Some creative thinking about such eco-labels can help streamline the MRV process (see Section 5.3. below) of the NAMA while raising awareness of sustainable charcoal. For example, if each bag has the emissions quantified based on the type of kiln, its efficiency etc. then adding up

the emissions of all charcoal bags sold and comparing against a baseline scenario can provide the total emission reduction. The figure below provides a list of information categories that can be provided on each bag through a system of eco-labels.

Figure 16. Socio-economic and environmental datasets through Eco-labelling

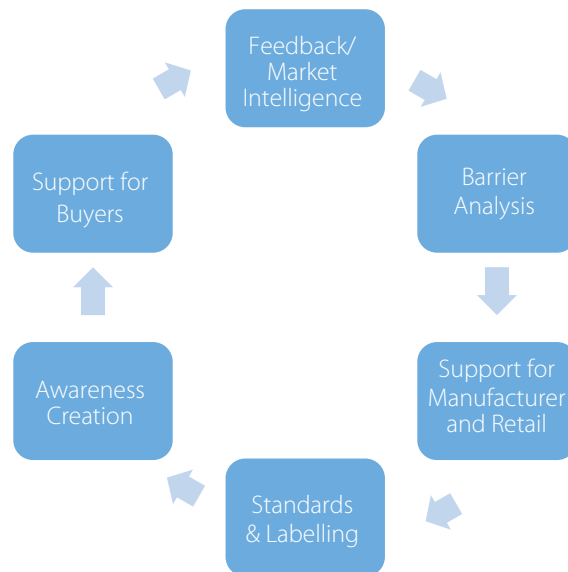


5.1.2. MRV

The Charcoal Unit will establish a Measuring, Reporting and Verification (MRV) system to ensure that the bags are filled with the appropriate type of charcoal. Therefore, establishing and coordinating a thorough MRV system will comprise an important part of the Charcoal Unit’s activities. It is only with proper enforcement that the eco-labelling system will function properly.

The bulk of monitoring of charcoal will be done by private entrepreneurs under the guidance of the Forestry Commission but the Charcoal Unit will play an auditing role. The Charcoal Unit will employ or contract a number of auditors who will ensure that charcoal labelled legal is actually produced legally and that, in the case of charcoal labelled green, sustainable forest management is being implemented and efficient kilns are used for production.

Figure 17. Creating an enabling environment



- **Market Intelligence:** The Charcoal Unit can play a key role in improving charcoal trading through the establishment of an electronic trading platform. This platform can serve to connect producers and sellers who want to buy in bulk. Furthermore, via a text messaging/SMS system, producers should be able to find out the market price for the day or week.

Ghana has a well-established national statistical system that can be tapped into for gaining the first level of market intelligence. This can provide a good basis for quantifying the demand for efficient cookstoves across regions and end consumers (households, institutions, urban, rural etc.) and their willingness and ability to pay for a certain quality grade of cookstoves (type A may be more viable in Greater Accra but type B maybe more suitable for urban regions in the northern part of Ghana).

The Charcoal Unit can support the creation of a holistic enabling environment by addressing the following areas:

- **Barrier Analysis:** Understanding the demand-supply gap gives rise to an analysis of barriers faced by cookstove manufacturers, cookstove retailers and cookstove end-users. The barriers may be financial (the need for soft loans for cookstove start-ups) and non-financial (such as poor publicity and marketing).
- **Support for Manufacturers and Retailers:** The support can be wide ranging and as well as financial support, the policies can focus on setting up institutes that provide support for enhancing the design and technical performance of cookstoves.
- **Standards and Labelling:** Policies can support the creation of institutions that can establish stove testing and performance standards, and then manage their adoption through an accreditation process.
- **Awareness:** Creating market demand through educating people about the advantages of efficient cookstoves is crucial for the success of an efficient cookstoves programs.
- **Support for Buyers:** Awareness campaigns can provide additional information about financing schemes and soft loans that can be made available to buyers to purchase cookstoves.

Research and development (R&D)

The Charcoal Unit should coordinate with universities and other research institutions to encourage the development of improved methods of forest management and biomass waste management, efficient carbonization, briquetting and improved cookstoves. A grant or scholarship scheme for R&D can be established.

Stakeholder engagement

The Charcoal Unit should help to organize stakeholder consultations and meetings at both the national and local level. The national level stakeholders should include policy-makers who should be brought together to discuss problems and solutions with respect to the charcoal value chain. The Charcoal Unit can help to coordinate meetings of the inter-governmental steering committee mentioned above. At a local level, stakeholder engagement should encompass stakeholder consultations about improving each step of the value chain to ensure that no regulations/policies are revised or passed without taking into account local stakeholder opinion.

As well as stakeholder engagement facilitating discussions among different actors in the value chain, communicating with various stakeholders will allow the Charcoal Unit to draw together the “bigger picture” across the range of relevant activities. Awareness of what everyone is doing will allow the unit to coordinate activities and will help to ensure coherence and alignment. It is expected that the Charcoal Unit’s activities will be partly funded through the national budget and partly funded by NAMA financing. A graphic summarizing the Charcoal Unit tasks can be seen in Figure 19 below.

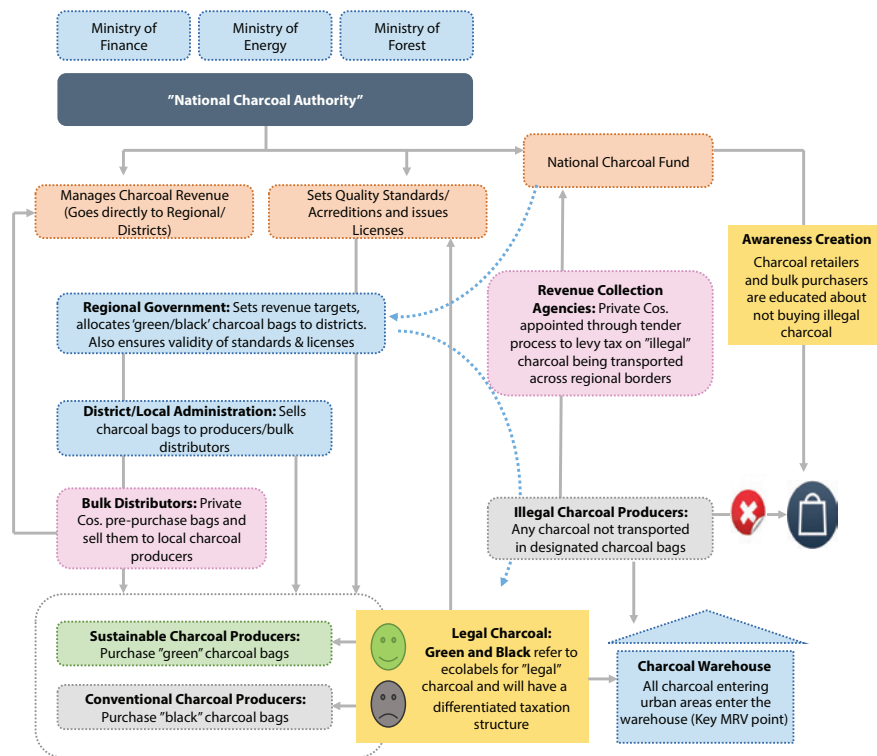
Figure 18. The Charcoal Unit: Key Tasks



5.2. Charcoal Fund

Financing for the Charcoal Unit’s activities will come from the Charcoal Unit’s own budget and a Charcoal Fund. The Charcoal Fund will receive significant NAMA funding. In conjunction with the NAMA funding, another, more sustainable source of funding can be taxes on illegal charcoal. Charcoal needs to be viewed as a commodity and the NAMA should aim to realize its true economic cost. Together with the task of pursuing an inclusive approach towards existing stakeholders, the NAMA should propose a charcoal taxation model for example as shown below.

Figure 19. Charcoal Taxation Flow



In

this example, charcoal is divided into “legal” and “illegal” charcoal. Legal charcoal is produced by a registered association either using conventional (“black” charcoal) or sustainable means (“green” charcoal). A system of eco-labels, pre-purchase of charcoal bags, and a quota system will ensure that legal charcoal is allowed easy passage to warehouses while illegal charcoal is taxed (by existing stakeholders in the charcoal value chain, i.e. adopting an inclusive approach) indirectly forcing them to opt for the legal route.

The revenues collected from legal charcoal are retained by district/regional administrations, encouraging the authorities to promote sustainable charcoal. The taxes collected on illegal charcoal are parked in the national Charcoal Fund that can be then used by the national authorities to carry out awareness creation and capacity-building efforts to promote sustainable charcoal. Similar models can be elaborated in greater detail in a Sustainable Charcoal NAMA.

5.3. Sectoral co-operatives

The majority of private sector actors in the value chain work independently of each other. Having the actors form co-operatives would be beneficial in two ways.

The first benefit is that collectively, actors have a greater voice. Currently, as individuals, the value chain stakeholders have a limited voice, which hinders their ability to influence the development of policies and regulations. Once collectives are formed, the stakeholders’ voices will be stronger. The Charcoal Unit can then arrange consultations with the cooperatives’ representatives. The opinions of the cooperatives should be taken into consideration in policy and regulation development, ensuring that the new policies/regulations are designed in a manner which reflects the actual situation on the ground and therefore has a higher chance of being successfully enforced.

The second benefit of establishing sectoral cooperatives is that they provide stakeholders with an opportunity to pool their resources. This lack of resources is problematic throughout the value chain but is a particularly acute one when it comes to the sale of charcoal by charcoal producers. If producers form co-operatives, they can gather a large number of bags and collect funds to transport the bags to urban areas, without the use of a middleman to facilitate transportation. This will result in significantly higher revenue for charcoal producers and a more equitable distribution of income.

5.4. Governance

Good governance and proper enforcement are particularly important if a taxation system which incentivizes sustainable charcoal is to be established. This system can only be successful if the steps of the value chain are properly monitored, to ensure that charcoal is being produced sustainably. Ensuring good governance and giving an adequate mandate to participating organizations can significantly improve enforcement within classified forests, national parks and national reserves.

Together with improved enforcement and good governance, policies and regulation should also be revised or designed in a way that increases incentives and decreases disincentives for compliance. Incentives can be provided in the form of finance (e.g. subsidies or tax incentives), technology or capacity. To reduce disincentives, the process for compliance should be streamlined.

Therefore, a combination of carrots (incentives) and sticks (improved enforcement and governance) needs to be included in the design of a formalized value chain. After a long history of having an informal charcoal value chain, it will take a number of new mechanisms and time to formalize the value chain.

In the following sections, these overarching, cross-sectoral issues will be incorporated into policy and regulation reform at a sectoral level. At each step of the way, consideration of rural actors should be highlighted. Formalization of the value chain is likely to improve the situation for urban actors involved in the later steps of the value chain, such as transport and distribution. This therefore should be kept in consideration throughout the formalization process and initiatives should be put in place to assist rural actors.

Once institutions such as the Inter-ministerial Steering Committee, the Charcoal Unit and sectoral cooperatives are established, maintaining good relationships within and between institutions is crucial. This means that, to foster good intra-institutional relationships, key bodies, such as the Steering Committee, the Charcoal Unit and the cooperatives, need to meet regularly so that common visions can evolve and appropriate actions follow suit.

CHAPTER 6: IDEAL SCENARIO

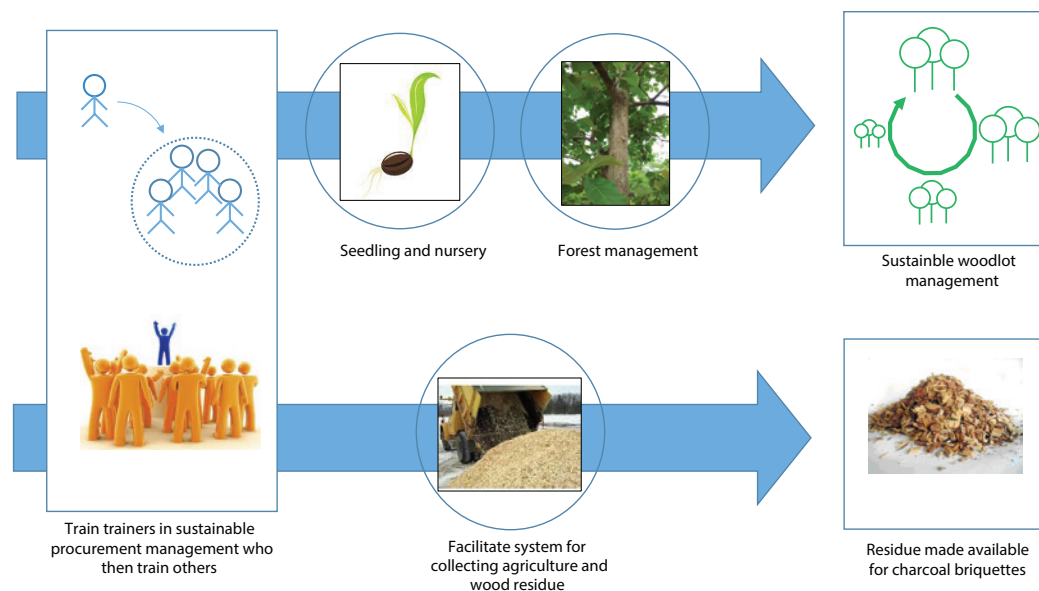
In order to facilitate the formalization of a charcoal value chain, government services should be decentralized and brought down to an accessible local level in line with Government of Ghana's plans for decentralization.

However, certain major activities should remain centralized, including granting permits for logging and charcoal production; for these permits, producers must travel to Accra. This requires actors to journey to Accra at least twice: once to request the permit and once to pick it up. Issuing permits locally will enable serious actors to participate in the sustainable charcoal value chain as well as allowing greater control over data collection.

The following sections are divided according to the stages of the charcoal value chain. Each section first presents a depiction of how the stage will look under a fully sustainable charcoal value chain. This will be followed by descriptions of the activities required to achieve these scenarios. These activities are divided into information-related activities, policy activities and capacity- building and technology transfer.

6.1. Procurement

Figure 20. Ideal Scenario - Procurement



6.1.1. Information measures

At the procurement stage, the first actions to be taken should be to fill the large information gaps which exist. In order to evaluate the amount of forest and the amount of biomass waste in the country available for production of sustainable charcoal or briquettes, the following steps must be taken.

One consistent national forest definition needs to be established. This definition will include details about the minimum tree crown cover, minimum land area and minimum tree height needed to constitute a forest. A thorough forest inventory will need to be completed, which will then serve as the baseline for all future forest activities in the country.

In addition to gathering information about standing forest in the country, better information about deforestation and degradation rates is necessary. This will be challenging to gather on a local level, due to the informality and illegality of most extraction, but applying tools such as aerial photography, remote sensing and local biomass surveys over several years will provide a fairly accurate picture of the rate of deforestation and degradation.

Information about the amount, type and location of wood waste and agricultural residues is necessary in order to plan for briquette production. This information can be acquired through local surveys of waste producers at district level and by extrapolation.

6.1.2. Policy Actions

Once the information gaps are filled, policies to ensure sustainable biomass management need to be established. The activities listed below would serve to improve forestry policies in Ghana. Funding can come from NAMA funding or ministry budgets.

As previously mentioned, the establishment of a functional inter-ministerial committee is extremely important for coordination of the value chain. A schedule of regular meetings should be established, with coordination assistance offered to the Charcoal Unit.

The first step will involve bringing greater clarity to what constitutes each type of forest in the country, national forest definition, rules for use of each forest type, rights and obligations of all relevant stakeholders, management plans or procedures to establish management plans and how sustainable forest management is to be incentivized and promoted. Forest taxation needs to be consolidated and aligned within the relevant institutions charging the tax. This will require close coordination between the Ministries most directly involved, the Commissions and the Ministry of Finance. Tax incentives for activities such as sustainable forest management should be included in the redesigned taxation system. Once the taxation system is revised, the tax changes need to be communicated to local level.

Policies should also be designed to include incentives to encourage sustainable management of private and community owned forests. These incentives can include both capacity-building and fiscal incentives. Training in forest management can be provided at a local level. As was previously mentioned, tax incentives can be provided for forest owners who develop and follow management plans.

6.1.3. Technology transfer and Capacity-building

Capacity-building in sustainable forest management should be offered to both public and private forest managers. Improved forest management can help to increase productivity, providing more cubic metres of wood per

hectare. A national level training programme for government agencies and private-sector representatives should be developed. This can be funded by the NAMA, as well as by the Charcoal Fund. Local staff should participate in a training programme for trainers in sustainable forest management. Following this training of trainers, the trainers can then hold training sessions at a local level. Government employees should hold free training sessions but private-sector trainers can charge a fee for training to other private-sector foresters, if there is demand for the training. The training will include:

- Seedling management;
- Nursery management;
- Forest management.

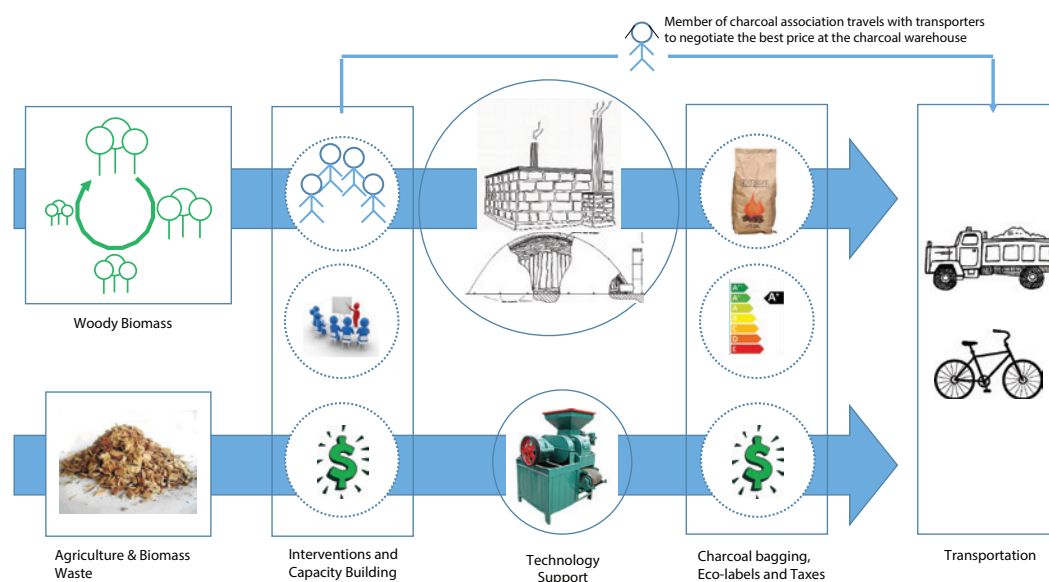
Following the training sessions, the trainers should be available to assist regularly. Government trainers should also monitor the sustainable management of the forests and verify that forests are sustainably managed in order to verify that forest owners/managers deserve tax incentives. Private-sector trainers can provide follow-up as part of their training package.

Training in the acquisition and use of biomass waste, such as agriculture and wood residues, should also be offered to entrepreneurs interested in the production of briquettes. This training will include:

- Establishing cooperatives of waste producers;
- Setting up collection points for the waste;
- Proper waste management (including transport and storage).

6.2. Carbonization

Figure 21. Ideal Scenario—Carbonization



6.2.1. Information measures

In order to gather information, surveys of charcoal producers in various regions should be undertaken. These surveys will need to be conducted in a non-confrontational and confidential manner, since the majority of charcoal production is conducted illegally. Below are examples of data which should be included in a database about charcoal production in the country:

- Number of kilograms of wood needed to produce one kg of charcoal (efficiency of charcoal production);
- Estimated number of charcoal producers;
- Volume of charcoal produced;
- Wood used in charcoal production;
- Location of charcoal production;
- Price of charcoal sold by producers to a transporter/middleman.

Information about briquette production should also be gathered. This information should include:

- Companies/individuals producing briquettes;
- Volume of briquettes produced
- Type of waste used in briquettes;
- Most appropriate briquette technology for the available waste;
- Institutions conducting research on the best composition of briquettes.

6.2.2. Policy actions

The importance of the vast amount of charcoal produced and consumed in the country needs to be acknowledged, and charcoal policies should be incorporated into all forestry sector documents. For instance, promotion of the use of efficient kilns should be highlighted in all national forestry documents and REDD++ documents. When providing charcoal production permits, the use of efficient kilns should be encouraged. One possible way to incentivize producers to use efficient kilns is to charge a lower price for a charcoal production permit if an efficient kiln is used for production.

A fiscal measure which could encourage the use of efficient kilns is the introduction of a tax on bags of charcoal produced. Currently, some charcoal producers pay a tax to the forest owner but this is not an official or regulated tax. A regulated tax system could be designed whereby sustainable charcoal is not taxed, legal “black” charcoal is taxed at a low rate and illegal charcoal is taxed at a higher rate. In order to collect taxes on illegal charcoal, enforcement of checking labelled charcoal will need to be diligent. As was mentioned with respect to procurement, policies need to be adjusted to allow for private entrepreneurs under the Forestry Commission to be able to enforce laws. The taxes collected will then go into the Charcoal Fund.

As more charcoal producers acquire permits for charcoal production, more tax will be provided to the regions. This tax should partly be used to support social programmes, such as technology and business training for charcoal producers, so that the rural value chain actors see benefits from formalizing the value chain.

A final fiscal incentive could be designed to less the amount of income tax paid by charcoal producers who produce efficiently. Charcoal producers who produce charcoal in a sustainable manner could receive tax breaks or producers who do not demonstrate that their production is sustainable could have a higher tax rate. Both of these options, of course, face challenges which need to be considered in the design of the tax. The former results in a loss of tax income and may not be financially sustainable; the latter may be a significant disincentive for producers to acquire permits.

6.2.3. Technology transfer and capacity building

MRV by charcoal tax collectors of charcoal produced, with auditing by the Charcoal Unit, is an important component in achieving the successful legalization of the charcoal value chain. The enforcers should be trained in techniques to catch illegal charcoal transporters, and should be trained to use and provided with the necessary equipment, such as Global Positioning System (GPS) devices which facilitate tracking.

Charcoal production in Ghana is still predominantly informal, with charcoal produced in rudimentary kilns. The wood-to-charcoal conversion rate is highly inefficient; this can be increased significantly through drying wood and the use of efficient kilns. Therefore, a nationwide program to sensitize and train charcoal producers about how to improve the efficiency of carbonization should be established. Furthermore, training in briquette production should be offered to interested entrepreneurs.

This programme will train charcoal producers to create and use efficient mobile kilns such as Casamance kilns, as well as very efficient installed kilns such as retort kilns. Installed kiln training should be given in conjunction with forest management training as a sustainable supply of wood close to installed kilns will be necessary. Installed kiln training may be given to cooperatives of charcoal producers who will jointly use the kiln.

Equipment, such as chimneys and bricks, can be provided to training participants free or at a subsidized price. The funds for the equipment can come from the Charcoal Fund.

Entrepreneurs can be trained in briquette production techniques. This training should be given in conjunction with the waste-management training. The training will explain the technologies available to produce briquettes. Briquette factories can be encouraged through soft loan schemes and tax breaks, financed through the Charcoal Fund. In the following sections, information is provided about a number of technology options for the production of sustainable charcoal.

Efficient Kilns

Traditional earth kilns are most commonly used for charcoal production. Although they require very little investment to build and they allow for mobile charcoal production, they have very low efficiencies. The Casamance kiln is a form of "improved earth kiln". It is more expensive than traditional kilns because of the additional expenditure required for the purchase of one or multiple chimneys. The wood must also be placed in a manner which provides air channels to allow for improved air circulation. This improved air circulation reduces the amount of wood that is not carbonized, thereby improving yields and speeding up the carbonization process.

There are various other types of kiln technology that are available globally, including metal kilns which have been used in East Africa, retort kilns which have been trialled in Ghana and portable kilns which have the advantage of being easily transported to the source of the wood and which have a shorter carbonization cycle. There is

significant experience with the use of Casamance kilns in sub-Saharan Africa, particularly in West Africa and, to a lesser extent, experience with Adam's retort kiln; both kilns provide cost-effective solutions that can double the efficiency of charcoal production.

In addition to producing charcoal in efficient kilns, briquettes from biomass waste can also be produced as part of the sustainable charcoal value chain. As Ghana has an agriculture-based economy, it offers a significant volume of agricultural waste, as well as wood waste. Technologies which utilize biomass waste reduce emissions in two ways: through a reduction in the use of wood; and through a reduction in the release of methane produced from inorganic decomposition.

6.3. Logistics

6.3.1. Information measures

Information regarding transportation should be collected from a number of actors via surveys. Information about the methods of transport of charcoal can be collected via surveys of transporters conducted by police along the roads. Information about unofficial fees may be best collected from legal charcoal producers who are willing to discuss their charcoal production and transport process.

6.3.2. Policy actions

In recent years Ghana has pursued aggressive reforms to make its trade, port, and transit services more competitive, often working with its landlocked trading partners. Ghana began re-engineering its procedures for goods transportation in early 2006, with reforms aimed at cutting down transit times and costs. These reforms have helped Ghana to streamline and modernize the country's customs and transit. Though progress has not been easy, the main elements of its transportation reforms can be reproduced for charcoal transportation if there is the necessary political will to overcome resistance to change. The spread of Ghanaian reforms in the transport sector to other countries also shows that reforms in one country can create a foundation for reform in the wider region. Some of the key actions that need to be undertaken include:

- Revising policies to make them more coherent and enforceable;
- Reforming the institutional framework;
- Establishing a database under the Ministry of Transport for charcoal transporters;
- Constructing new roads;
- Facilitating the professionalization of transport sector actors;
- Creating a transporters association.

When implemented, these reforms will have a number of benefits for the charcoal value chain including:

- Professionalization of transport actors, increasing efficiency and reliability ;
- Improved information availability about the transport sector;
- Facilitation of the establishment of a system of taxation of charcoal;
- A decrease in payments requested en route by charcoal transporters;
- Increased transparency in the transport process.

6.3.3. Technology transfer and capacity-building

Technology transfer can happen in regards to two technologies: vehicles and charcoal depots. Currently, charcoal is often purchased by middle men who then rent trucks—or use their own trucks—and employ drivers to transport the charcoal. Alternatively, producers themselves rent vehicles or pay for space on a truck and employ drivers to transport the charcoal.

An alternative to renting trucks is for charcoal cooperatives to purchase trucks to transport the charcoal. This will give greater flexibility and will eliminate the need for a middleman. However, this is of course an ideal scenario because of the cost of purchasing and maintaining a truck, employing a driver and obtaining the required permits. It is therefore a long-term option, open to producers once they have acquired capital and organized themselves into cooperatives. The Charcoal Fund can help to facilitate the purchase of trucks through the provision of subsidies and soft loans for cooperatives which use the trucks exclusively to transport charcoal. In the shorter term, middlemen can be excluded through the provision of market information by the Charcoal Unit. This information can be provided free to producers via SMS/text. If producers are aware of where there is a demand for charcoal and what the market rate is, a producer cooperative representative can travel with the charcoal to pre-determined urban locations and oversee the sale of the charcoal to wholesalers.

Furthermore, a programme should be implemented to construct charcoal depots at strategic locations in urban areas; distributors and retailers should also receiving training in the importance of proper charcoal storage and how storage can be improved. The construction of charcoal depots in urban areas can yield many benefits that help create an improved charcoal value chain. They can serve as centralized points for transporters to bring in sacks of charcoal. If the depots are located in areas that are easily accessible, this will prevent the trucks which are transporting the charcoal from being stuck in traffic and will also help to relieve congestion in the city. Furthermore, the depots will help to overcome two challenges currently faced by charcoal distributors: the destruction of charcoal due to rain and the theft of charcoal bags. The construction of such depots can be facilitated by finance from the Charcoal Fund.

6.4. Demand Side

Efficient use of sustainably produced charcoal is the final step in transforming the charcoal value chain. The main method to achieving this is through the promotion and use of efficient cookstoves.

6.4.1. Information Measures

GHACCO is the key agency that can be entrusted with sectoral mapping. This mapping will provide the baseline information for the NAMA covering:

- Cooking habits;
- Types of cookstoves used and the percentage of people using each type;
- Fuel usage and availability in urban and rural areas;
- Prevailing fuel costs;
- Impact of the purchase of cooking fuel on the rural economy
- Assessment of the cost of available cookstoves.

6.4.2. Policy actions

The existence of GHACCO offers an excellent opportunity to develop regional policies on clean cookstoves, including regional cookstove standards. The development of these standards will ensure that products sold as improved cookstoves are of a high quality and are providing cooking heat in an efficient manner. Products will be certified by the Ghana Standards Authority and Technology Centre at KNUST, and later placed under the purview of the Charcoal Unit

The promotion the Clean Development Mechanism (CDM) and/or voluntary carbon market standards, such as the Gold Standard, should take place as part of the Charcoal Unit's activities. Existing Programmes of Activities (CDM-PoAs) are an important facilitation tool for private sector and CSO involvement in improved cookstove activities in sub-Saharan Africa.

6.5. Summary

The sustainable charcoal value chain NAMA will address all aspects of the value chain, including cross-sectoral and sectoral issues. Cross-sectoral issues to be addressed include formalization, the establishment of new institutions, inter-actor relationships and governance. Sectoral issues span procurement; carbonization; transport, retail and distribution; and consumption. Information gaps along the value chain require filling, in order to establish a baseline and to properly plan policy and implementation activities. Policy measures need to be taken in all sectors, in order to improve coordination and efficiency in addressing the shortcomings of the charcoal value chain in Ghana. Crucial to the success of these activities is the establishment of a Charcoal Unit which can maintain a holistic overview and can coordinate activities between the various stakeholders in the various sectors. The Charcoal Unit and its operations can be financed at least partly using NAMA funds. Further NAMA funds should be used to finance a Charcoal Fund which will provide grants, soft loans, R&D funding and competitive financing to sustainable charcoal-related activities and organizations.

Part 4: Short-term Actions for Sustainable Charcoal Value Chain

CHAPTER 7: SHORT-TERM ACTIONS FOR A SUSTAINABLE CHARCOAL NAMA

Part 3 of this report described the activities required to achieve a completely sustainable charcoal value chain. However, the cost of transforming the entire Ghana charcoal value chain into a sustainable charcoal value chain would be significant and the scale of the activities necessary would be massive. Part 4 of this report now proposes a shorter-term action plan to kick-start the implementation of a sustainable charcoal NAMA.

7.1. Procurement

While there are several policies and programmes which aim to improve forest cover and create an adequate governance structure with well-defined roles and responsibilities, the FC has seen mixed results in the implementation of its programmes. The opportunity to improve forestry programmes lies in adequately tackling the following (not necessarily in the order presented):

7.1.1. Facilitating access to forest stakeholders

Access is particularly important in the case of charcoal producers who are nomadic by nature and practice slash-and-burn. There are several steps that need to be taken to prepare the rural population, especially charcoal producers, to participate in the forestry programmes:

Figure 22. Securing buy-in by community leaders and charcoal producers



Securing community leaders' buy-in

Being sensitive towards Ghana's social set-up and the influence of village elders, the government needs first to approach local community leaders and village administrations and persuade them of the value of the concept of sustainable woodlot management. Once convinced, the community leaders should be encouraged to reach out to the other members of the community and secure their commitment.

Establishing charcoal producers' associations

The next step will involve building strength in numbers by supporting the creation of charcoal producers' associations. Associations can be formally registered and will have enhanced bargaining power when negotiating for better charcoal prices. This is the first step in organizing the industry.

Signing formal agreements

Once the associations are registered, the government can then proceed to sign formal agreements with the beneficiaries, highlighting the kind of support they can expect provided that they shun illegal deforestation practices.

7.1.2 Income enhancement and employment creation

Raising incomes and creating employment are both essential if urban migration (a key driver for increasing charcoal consumption) is going to be reduced and the rural population is to be provided with sufficient reasons to pursue sustainable woodlot management. The actions mentioned below in this phase of the short-term action plan may occur over a 4-6 year time frame (or earlier depending on how fast the trees grow) and hence it is important to initiate these actions with all speed and make the short term plan operational before the start of a formal NAMA.

Figure 23. The Seedling-to-Cash Programme



Training and capacity-building

The agreements with the producers' associations should spell out a clear business plan for monetizing of the wood fuelchain. As part of awareness creation and capacity-building, efforts need to be made for beneficiaries to see long-term economic value in pursuing sustainable woodlot practices. This will indirectly help reduce urban migration while encouraging greater participation in reforestation programmes.

The Seedling-to-Cash Programme and the Kick-Start Fund

By aligning the proposed short term actions with the proposed efforts of the Forest Investment Programme (FIP), the charcoal producers' associations should be provided with adequate training and a supply of free saplings to kick-start the plantation programme. However, to ensure that the producers retain their interest in maintaining the woodlots, the government will need to provide them with a monthly stipend until the saplings turn into trees ready for harvest. Establishing a Kick-Start Fund to finance the stipend will potentially deter charcoal producers from reverting to traditional charcoal production methods and can be discontinued once the income cycle from monetizing wood fuel is established.

7.2. Carbonization

There is not enough policy in place related to the implementation of efficient kilns for charcoal production although the Strategic National Energy Plan has set efficiency targets. Improving efficiency levels of charcoal production requires the two-pronged approach described below.

7.2.1. Facilitating briquette manufacturing

Agricultural waste, human waste and particularly waste from the timber industry offer significant opportunities for private businesses to participate in the sustainable charcoal value chain. As with introducing any new industry, efforts need to be made to showcase the technology with charcoal producers and consumers. Ghana has the distinct advantage of having small groups of people who have perfected briquette making from bamboo, palm kernels, human waste and other biomass in small quantities, and immediate steps need to be taken to support the development of this nascent industry to large scale production.

Figure 24. Existing charcoal briquette technology in Ghana



Source: SNV.

Establishing show-case briquetting units

In partnership with Kwame Nkrumah University of Science and Technology (KNUST), private entrepreneurs and agencies such as the Dutch aid agency, SNV, and INBAR which are currently active in briquetting, the government should establish a programme to setup a number of small-scale manufacturing units in places where biomass for briquettes is available (such as sawdust mills, agricultural waste). Such a live technology demonstration should target the private sector and the rural communities to generate awareness of the new technology and create an increased demand for charcoal briquettes in Ghana.

Knowledge-sharing

There is currently at least one briquette manufacturer in Ghana in the process of establishing a sawdust based briquetting unit next to a timber mill. Given the importance and scale of the timber industry in Ghana, efforts should be made to inform entrepreneurs about the business opportunity that exists, identifying the roadblocks

and potential solutions. The primary roadblock is the high cost of importing briquetting machines, which can be addressed through a financing mechanism (e.g. soft loans, tie-up between local entrepreneurs and donor country organizations to secure grants)

7.2.2. Practical Alternatives to Traditional Kilns

Awareness-creation and offering practical alternatives to charcoal producers to move away from traditional earth kilns while still retaining the benefits of zero-cost, portability (i.e. minimizing the physical distance from the source of wood fuel to the kiln) and ease of use is a pressing problem. At present, the challenge is to find viable alternatives to the zero-cost traditional earth kilns.

Promoting Casamance kilns

The Casamance kiln is based on the idea that an efficient, low-cost kiln, well-adapted to local conditions and economic circumstances, could be developed in sub-Saharan Africa. The kiln, which was developed in the late 1970s, takes its name from the Casamance region in southern Senegal where the original project was located. In simple terms, the Casamance introduced a chimney (made from discarded oil tins) and an improved wood stacking technique which allowed for improved efficiency over traditional earth kilns. Promoting Casamance over traditional earth kilns can offer charcoal producers immediate benefits in terms of a greater quantity of charcoal without any significant input in cost.

Awareness-creation and showcase projects

The present challenge is to help charcoal producers understand the economic benefits of more efficient charcoal production techniques. Although there is sufficient technical knowledge in Ghana about efficient kilns, the information needs to be presented to rural communities as a live example. As part of the community leaders' buy-in programme, it is essential that there are working examples of efficient kilns that can be showcased along with business models that are sensitive to local problems, such as forest ownership issues. As with briquetting, the government should help establish demonstration projects in some of the key charcoal producing areas and study the potential challenges and practical issues in implementing such projects on a larger scale.

7.3. Logistics

Tackling the logistics building block needs an approach that is seen as more inclusive by existing stakeholders (for example, cartels might be motivated to operate as private businesses).

7.3.1. Charcoal Taxation

Setting up a mechanism for charcoal taxation that distinguishes between legal (sustainable) and illegal (conventional) charcoal will help reduce the government's dependence on external finance while regulating the charcoal trade.

The model explained in Figure 25 is an example of a charcoal taxation mechanism, but it needs to be developed by experts with the participation of the government, the relevant agencies and other regulatory bodies in Ghana. This approach will lead to a solution based on a better understanding of local conditions, what can realistically be

pursued and what will fail, differential pricing models, and other issues which are beyond the scope of this study. In the short term, the government needs to consider whether such a charcoal taxation model can be implemented to help bring pricing into line with the real economic cost of charcoal and if it can, initiate dialogue with various actors to introduce it.

7.3.2. Licensing System

While a licensing system formally exists, it currently lacks the required reach and rigor. If the taxation system is entrusted to the private sector, it will require a more demanding approach to selecting, certifying and continuously verifying the stakeholders.

Expand and enforce the licensing system

While Ghana has a licensing system, it has not been effectively implemented. The first task of the government is to reach out to existing charcoal transporters' associations and educate them about the need to license their vehicles. This can be pursued through a carrot-and-stick approach, where truck owners, transporters and middlemen (who hire out the trucks for transportation) are informed about the need for registration, backed up through a system of fines and confiscation of vehicles.

This practice needs to be expanded to include stakeholders involved with the distribution of charcoal, namely wholesalers, middlemen, and retailers, not just those dealing with charcoal exports (the current focus of the licensing system in Ghana). Information about proposals to reform the taxation system and opportunities to participate in the value chain in the near future can be an incentive to encourage transporters and distributors to sign up.

The objective of the licensing system is to get a better understanding of the market players, their financial potential and geographical reach, all of which can support the development of a charcoal taxation system.

7.4. Demand Side

Influencing end users to play a positive role in the sustainable charcoal value chain can be achieved through:

7.4.1. Eco-labelling

Ghana already has experience with eco-label programmes and the Technology Centre of KNUST is developing standards for the design of efficient cookstoves. These provide an excellent starting point to develop and promote an eco-labelling programme for efficient cookstoves.

Eco-labelling for cookstoves

As a starting point for eco-labels, the Technology Centre at KNUST or a similar organization should work with members of GHACCO to initiate an eco-labelling programme for efficient cookstoves. This will encourage existing cookstove manufacturers to distinguish their products. For example, at present manufacturers of steel cookstoves fail to highlight the superiority of their product and thereby justify its higher price compared with earth-based cookstoves.

7.4.2. Facilitating localized cookstove manufacturing

To achieve the GHACCO target of 5 million cookstoves by 2020, the private sector needs to be incentivized to produce efficient cookstoves locally to keep costs low and after-sales within easy access of the end-users to increase the popularity of efficient cookstoves.

Government Supported Media Campaign

The eco-labelling programme needs to be backed by a government-supported media campaign and road shows in towns across the country to showcase cookstoves from a variety of manufacturers and demonstrate those which consume less wood fuel or charcoal.

Data Collection

Before the development of a full-fledged NAMA, it is essential that, with the participation of GHACCO member organizations, the Ghana Statistical Service, and the Energy and Forest Commission, all charcoal-related data are collected and cross-verified to identify data gaps, and confirm the authenticity and validity of the data. This will provide a foundation for further data-gathering and building a base for market intelligence, which is essential for establishing an enabling environment.

7.5. Conclusion

Ghana is a country that has been plagued by deforestation challenges, with commercial logging, extraction of biomass for household energy use and clearing of land for agricultural purposes all contributing to the rapid rate of deforestation in the country. Although policies, regulations and plans have been designed to attempt to alleviate the pressure on the nation's forests, depletion rates remain a cause of major concern.

Charcoal, one of the main fuel sources in the country, has often been overlooked in the country's deforestation prevention strategies, which have emphasized reforestation and switching to modern fuels. However, the reality is that charcoal production is and, at least in the short term, will continue to be, an important source of household energy, particularly in urban areas of the country. If left unaddressed, its unsustainable production will continue to contribute to deforestation.

This report has focused on how to establish a sustainable charcoal value chain in a holistic manner. The report looks at various steps of the charcoal value chain—broadly classified into procurement; carbonization; logistics (transportation, distribution and retail); and demand side (consumption). Existing national policies, regulations and plans were summarized and both the policy and information gaps were identified. Ideal scenarios for each step of the value chain, as well as proposed measures at the levels of information, policy and technology and capacity-building, which can facilitate achieving these scenarios, were provided. Finally, a short-term action plan to kick-start the NAMA, one which is realistic and feasible for development and implementation in the short term, was provided.

Establishing a sustainable charcoal value chain is a daunting task. However, with a clear vision, efficient coordination and the encouragement that will follow the success of implementing a Sustainable Charcoal NAMA, Ghana will be able to transform its charcoal sector. This will greatly decrease the pressure on the country's forest stock, contributing to emissions reductions and the sustainable development of the country.

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