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NAMA STUDY FOR A SUSTAINABLE
CHARCOAL VALUE CHAIN IN

CÔTE D'IVOIRE



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MDG Carbon is an innovative programme to harness the resources of the carbon market in order to bring long-term sustainable development, at scale, to wide range of developing countries. Since its launch in 2007, MDG Carbon has assisted developing countries in implementing a host of low-carbon interventions, spanning multiple technologies, active in all regions of the world, and leveraging significant amounts in private-sector millions of dollars in independent co-investments.

UNDP's Regional Bureau of Africa regional environment project on the *Management of Environmental Services and Financing for Sustainable Development* provides support targeted at building the capacity of regional economic communities (RECs), governments, UNDP country offices and other stakeholders on sustainable ways to restore and manage natural ecosystems, while also, establishing enabling conditions for countries to access environmental finance from emerging carbon/environmental finance markets.

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FOREWORD

Charcoal is one of the main sources of domestic energy in Côte d'Ivoire. The overall share of charcoal use in the total national fuel consumption stood at 20% in 2002. In that same year it was the fuel of choice for at least 47% of the urban population. Given the increase in urbanization from 44.9% in 2002 to 52% in 2012, and the decrease of subsidies on butane, charcoal use has substantially increased over this period. This high and increasing demand for charcoal is an important driver for deforestation.

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 second to focus on charcoal (following last year's study of the sector in Uganda) is to provide Côte d'Ivoire with an important opportunity to help shape its future low carbon development. The implementation of a sustainable value chain, this NAMA will help Côte d'Ivoire to increase the efficiency and effectiveness of the current value chain. At the same time, it will 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 NAMA Phase I described in the study is realistic, can be achieved in the short term and still has transformative and sustainable effects on the charcoal sector of Côte d'Ivoire.

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 Côte d'Ivoire is an exciting mitigation programme that can achieve both objectives.



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Executive Summary

Since independence in 1960, Côte d'Ivoire has experienced periods of rapid growth interspersed with periods of turbulence, including three political crises since 1999. Until recently, the instability of the country has caused governance to degrade. The fallout from the crises and the lack of governance, compounded by a shift to intensive agriculture, forest exploitation associated with mining, the extraction of wood for cooking purposes and population pressures, have led to dramatic deforestation. At independence, it had 16 million hectares (ha) of forest; the remaining forest area is now estimated by the FAO at 10 million ha, with some sources putting it as low as 1.7 million ha.

Charcoal is one of the main sources of domestic energy in the country, particularly for urban areas where it is the main energy source for 47 percent of households. The future of Côte d'Ivoire is expected to be one of increasing wealth, population and urbanization, all factors which indicate that the consumption of charcoal will increase, at least until an affordable, reliable alternative fuel source is available. Butane is used by a considerable share (18 percent) of the urban population, thanks to a government promotion programme, but recent cuts in subsidies and supply challenges indicate that, in the short term, it will not replace charcoal. As charcoal is currently produced, transported and consumed in an inefficient manner with limited enforcement of existing regulations and policies, the consumption of charcoal will continue to put pressure on the country's forests, contributing to the on-going deforestation.

In order to make the current charcoal value chain sustainable, the value chain needs to be viewed holistically. It is therefore important to establish a cross-sectoral Charcoal Unit which can maintain an overview of the various elements in the chain involved: forest management; charcoal production; transport, distribution and retail; and consumption.

At an overarching level, improvements must be made in the formalization of the sector. A number of institutions such as an inter-ministerial steering committee, a Charcoal Unit, a Charcoal Fund and co-operatives should be established. Relationships need to be established among the many stakeholders in the value chain, and communication, particularly at a policymaking level, needs to be improved. Decentralization of government activity in the value chain will also help to improve the efficiency of the chain. At a sectoral level, activities to increase value chain efficiency fall within three categories: information gathering; policy improvements; and technology transfer and capacity-building. As the private-sector and civil-society organizations (CSOs) are the main stakeholders in the value chain, activities should be designed and implemented in a way which facilitates the shift to a formal, efficient charcoal value chain.

A number of actions will be required to render the entire Ivorian charcoal value chain sustainable. In the short term, a smaller Phase I Nationally Appropriate Mitigation Action (NAMA) can begin to improve value chain sustainability. Phase I will consist of three main activities. First, the Charcoal Unit will begin to coordinate activities and stakeholders, and to implement measuring, reporting and verification systems. Second, grant funding will be made available to the private sector and CSOs to encourage the sustainable production of charcoal. Finally, the activities of a MALEBI (Association of Women Producers and Traders of Secondary Forest Products), an existing CSO working on the sustainable charcoal value chain, will be funded so that the organization can be improved and up-scaled, serving as a model organization for the country.

Abbreviations

AIENR	Ivorian Association for Renewable Energy
ANDE	National Environmental Agency
APV	Agreement of Voluntary Partnership
BNETD	National Office for Technical Studies and Development
CDM	Clean Development Mechanism
CFAF	Côte d'Ivoire Franc
CICCPF	Inter-ministerial Steering Committee on Forestry Policy
CO₂e	Carbon Dioxide Equivalent
COP	Conference of Parties
CPTI	Centre of Development for Industrial Technology
CSO	Civil Society Organization
DGIS	Dutch Ministry of International Trade and Development Cooperation
ECOWAS	Economic Community of West African States
ECREEE	ECOWAS Centre for Renewable Energy and Energy Efficiency
ESRI	Environmental Systems Research Institute, Inc
EU	European Union
FAO	Food and Agriculture Organization
FLEGT	Forest Law Enforcement, Governance and Trade
GACC	Global Alliance for Clean Cookstoves
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHG	Greenhouse Gases
ha	Hectare
hh	Household
HIV	Human Immuno-Deficiency Virus
ICT	Information and Communications Technology
kg	Kilogram
ktoe	Kilo-tonnes Oil Equivalent
LPG	Liquid Petroleum Gas
m³	Cubic Metres

MALEBI	Association of Women Producers and Traders of Secondary Forest Products
MDG	Millennium Development Goals
mm	Millimetre
MINEF	Ministry of Water and Forests
MINESUDD	Ministry of Environment and Sustainable Development
MRV	Measuring, Reporting and Verifying
NAMA	Nationally Appropriate Mitigation Action
NCCP	National Climate Change Programme
NDVI	Normalized Difference Vegetation Index
NOAA	National Oceanic and Atmospheric Administration
ODA	Official Development Assistance
OIPR	Ivorian Office of Parks and Reserves
PAMFP	Protected Areas Management Framework Project
PETROCI	National Petroleum Operations Company of Côte d'Ivoire
PNAE-CI	National Environment Action Plan
PNIASE-CI	Programme for Investment in Energy Access Services
PoA	Programme of Activities
R-PP	Readiness Preparation Proposal
REDD+	Reducing Emissions from Deforestation and Degradation plus conservation, sustainable management of forests, and the enhancement of forest carbon stocks
SE4All	Sustainable Energy for All Initiative
SMEs	Small and Medium Enterprises
SODEFOR	Society for the Development of Forests in Côte d'Ivoire
TPES	Total Primary Energy Supply
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US\$	United States Dollar
WACCA	West Africa Clean Cooking Alliance
yr	year

Part 1: Country information: general, relevant policies and regulations

COUNTRY PROFILE: CÔTE D'IVOIRE

Côte d'Ivoire became an independent nation in August 1960. The country is divided into 32 regions and 95 departments (Republic of Côte d'Ivoire National Institute of Statistics, 2013). The political capital is Yamoussoukro and the administrative and economic capital is Abidjan.

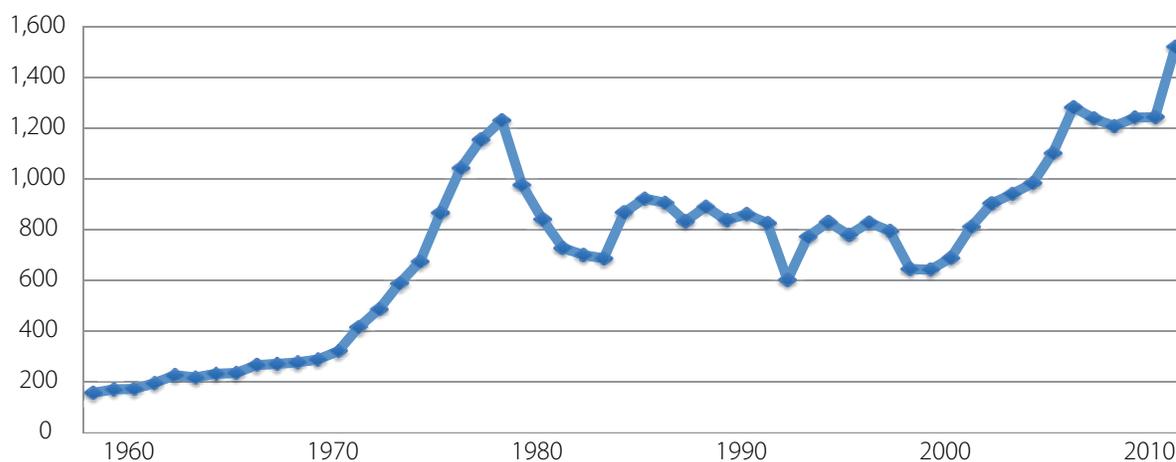
Located a few degrees north of the equator in western Africa, Côte d'Ivoire is classified by the World Bank as being at the lower end of the lower-middle-income economies group (in the US\$1,036-US\$4,085 range); in 2013, its per capita (GDP) was US\$1,057 (International Monetary Fund, 2013). The country's population grew from 16.4 million in 2001 to 19.9 million in 2012 (World Bank, 2014), a 21 percent increase.

Côte d'Ivoire has had a volatile post-colonial history. There was a steady rise in GDP per capita from 1960 to 1979, but after 1979 GDP fell and growth has been volatile over the last 30 years. The main reasons for the economic decline since 1979 are:

- i. a falling trend in average international market prices for cash crops (cocoa, coffee) until the beginning of 2000;
- ii. political instability, characterized by three serious crises: the 1999 coup d'état; the military-political crisis of 2002, which brought about the partition of the country; and the post-electoral crisis from November 2010 to April 2011;
- iii. a consistently high level of population growth; and
- iv. a steady decline in overall productivity (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013).

The evolution of per capita GDP from 1960 to 2013 and its volatility after 1979 can be seen in Figure 1.

Figure 1. GDP per capita, 1960-2013 (current US\$)



Source: World Bank, 2014.

Since the 2011 post-election crisis, the situation in Côte d'Ivoire has stabilized. President Alassane Ouattara, who took office following the 2011 crisis, has been praised for leading an economic renaissance (Bavier, 2014), although progress on the political and security fronts remains slow (Boutellis, 2013). GDP per capita has increased and is expected to continue to rise steadily (International Monetary Fund, 2013).

Côte d'Ivoire's Economic Growth Strategy

The National Development Plan 2012-2015 sets out the future strategy for Côte d'Ivoire. The goal is that the country should move from a reliance on cash crops to implementing a new policy "aimed at accelerating the growth dynamics revolving around judiciously selected 'powerful growth engines' on the basis of the country's comparative advantages and their cohesive and inclusive social impacts" (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013)

The National Development Plan identifies two major drivers of growth. The first is "transversal" sources of growth which cross all sectors and promote a growth-fostering environment. The transversal sources of growth include (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013):

- Security;
- Peace and social cohesion;
- Justice (the rule of law);
- Human rights and public freedoms;
- Administrative and national governance, including the fight against corruption;
- Economic governance, including creating a business climate conducive to private investment;
- Communications;
- Education, with the focus on higher and technical education;
- Scientific research and technological innovation;
- Health, nutrition and preventing and treating HIV/AIDS;
- Housing and urbanization;
- Environmental protection and sustainable development;
- Sanitation, drinking water, water resources and forestry;
- International cooperation and regional integration.

The second set of drivers of growth in the National Development Plan is the "vertical" axes of growth. These are those sectors which can flourish and contribute to GDP, building on the enabling environment provided by achieving the transversal goals. Vertical priority sectors for growth include (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013) :

- Infrastructure and transport;
- Energy, mines and hydrocarbons;

- Agriculture, livestock and fisheries resources;
- Information and communications technology (ICT);
- Private sector/industries and small and medium enterprises (SMEs);
- Trade, handicrafts and tourism;
- Others (culture, employment, youth and sports, civil protection, social affairs and population, protection of gender equality, and family and children's well-being).

The quantitative goals for the years 2012-2015 are:

- Primary sector growth should average 4 percent per year driven by subsistence farming and mining;
- Secondary sector growth should average 13 percent per year, led by construction and public works;
- Tertiary sector growth should average 14 percent per year, driven by the return to full production of factories and businesses, the creation of new SMEs through the improvement of the business climate, and the development of ICT and telecommunications.

Since the installation of the new government and the launch of the development plan, growth has been robust, with GDP expanding by 9.8 percent in 2012 and 8.7 percent in 2013. The economy is expected to grow by 8-10 percent in 2014. As a result, Côte d'Ivoire has been described as an "African Tiger" (Business Day Live, 2014). However challenges do still remain.

Country-Specific Challenges and Developmental Issues

Despite the recent economic successes, growth has not yet been sufficient to significantly lessen the development challenges which were exacerbated in the decades of political instability.

As of 2014, the country's score on the Millennium Development Goals (MDG) Track Index stands at only 25 percent, (where 0 is "off track" and 100 percent is "all goals achieved") (TAC, 2014). Following the 2011 crisis, over half of the population was living below the poverty line (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013). Sixty eight percent of the workforce are reliant on primary agriculture and 43.1 percent are illiterate (Central Intelligence Agency, 2014).

Life expectancy is one of the lowest in the world (58 years), the majority of the country (76 percent) lacks access to improved sanitation facilities, and the risk of major infectious diseases is very high (Central Intelligence Agency, 2014). Communicable diseases account for more than 50 percent of adult deaths and about 80 percent of deaths of children under five years of age. Diseases which place a high burden on the country include acute respiratory illness in children, diarrheal illnesses, malaria, tuberculosis and HIV/AIDS (World Health Organization, 2010).

An overview of the country's status in the context of the MDGs is presented in Table 1.

Table 1. MDGs - performance indicators

MDGs / Indicators	Value (Year)	Remark
Goal 1: Eradicate extreme poverty and hunger		
Percent of population living below US\$1.25/day	23.8 (2008) ¹	High poverty
Percent of population below minimum level of dietary energy consumption	20.5 (2012)	Moderately high hunger levels
Goal 2: Achieve Universal Primary Education		
Net enrolment ratio in primary education per 100 children	61.5 (2009)	Low enrolment
Goal 3: Promote Gender equality and Empower Women		
Ratio of girls to boys in primary education	0.83 (2011)	Not at parity
Percent share of women in wage employment in non-agriculture sector	..	Low share
Percent of seats held by women in national parliament	10.4 (2013)	Low representation
Goal 4: Reduce Child Mortality		
Under-five mortality rate per 1,000 births	107.6 (2012)	High mortality
Goal 5: Improve Maternal Health		
Maternal mortality ratio per 100,000 live births	400 (2010)	High mortality
Percent of women aged 15-49 using contraception	18.2 (2012)	Low access to reproductive health
Percent of women aged 15-49 with unmet need for family planning	28.9 (1999)	
Goal 6: Combat HIV/AIDS, malaria and other diseases		
Number of new HIV infections per year per 100 people aged 15-49	0.15 (2011)	Intermediate incidence
Number of new cases of tuberculosis per 100,000	191 (2011)	Low mortality
Number of deaths from tuberculosis per 100,000	24.0 (2011)	
Goal 7: Ensure Environment Sustainability		
Percent of land area covered by forest	32.7 (2010)	Medium forest cover

¹ This is the most recent figure available from the UN.

MDGs / Indicators	Value (Year)	Remark
Percent of population with access to improved drinking water	79.9 (2011)	Moderate coverage
Percent of population with access to improved sanitation facility	23.9 (2011)	Very low coverage
Percent of urban population living in slums	57.0 (2009)	Very high proportion
Goal 8: Develop Global Partnerships for Development		
Internet users per 100 inhabitants	2.4 (2012)	Very low usage

Source: *United Nations Statistics Division, 2013.*

Sectoral Issues

Forests

Estimates of the amount of forested area in Côte d'Ivoire range widely due to the use of different definitions of forest and because the National Forest Inventory has not been updated since 1979 (FCPF and UN-REDD, 2013). The range of estimates of remaining forest area is as follows:

- 10.4 million ha (Food and Agriculture Organization, 2010)
- 9.7 million ha (FCPF and UN-REDD, 2013)
- 3.5 million ha (Oura, 1999)
- 2.5 million ha (USAID, 2013)
- 1.7 million ha (Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and United Nations, 2012).

The Food and Agriculture Organization (FAO) provides a systematic evaluation of forest resources in a large number of countries (233 in the 2010 evaluation); therefore, the most recent FAO estimate is the one adopted throughout this report, although it should be noted that among the available estimates, the value it gives is the highest. The FAO estimates that 10.4 million ha, or 32 percent of the land area of Côte d'Ivoire (Food and Agriculture Organization, 2010) is considered as forested area. This area has remained constant since 2004 but has diminished compared with the estimate of 16 million ha in 1960 (Mongabay, 2014).

The forested area is under pressure from a number of factors. These include: the presence of a strong industrial logging sector and high household consumption as 70 percent of households are dependent on biomass. In the light of a rapid population growth rate, averaging 6.6 percent a year since 2005 (World Bank, 2014), if no affordable alternative to household biomass use for energy is made available in the near future, pressure on the forests will continue to increase (Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and United Nations (2012). Along with population pressure and logging, agricultural expansion and factors arising from the country's political instability have caused the rates of deforestation and degradation in Côte d'Ivoire (FCPF and UN-REDD, 2013); agricultural expansion and pressures attributed to political instability are outside the scope of this report.

According to the FAO (Food and Agriculture Organization, 2010), of the remaining forests in Côte d'Ivoire, only an extremely limited share—625,000 ha or 6 percent—of the forested area is primary forest. 9.4 million ha, or 91 percent of the country's forests, are modified natural forests. Plantations comprise the remaining 3 percent of forest cover. These data are summarized in Table 2.

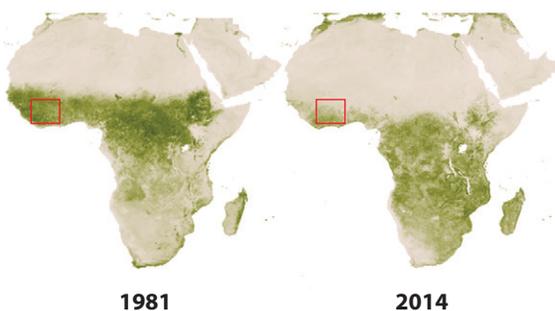
Table 2. Forest characteristics

	2010 forest area (1,000 hectare)	2010 forest area (%)
Primary	625	6
Modified natural	9,441	91
Productive plantation	337	3
Total	10,403	100

Source: Food and Agriculture Organization, 2010

An indicator which is frequently used to calculate vegetative cover in remote sensing measurements is the Normalized Difference Vegetation Index (NDVI). NDVI is calculated from the visible and near-infrared light reflected by vegetation (Weier and Herring, 2000). The images seen in Figure 2 are provided by the National Oceanic and Atmospheric Administration (NOAA) Environmental Visualization Laboratory and demonstrate the stark change in NDVI² in the region and in Côte d'Ivoire (highlighted in red). Figure 3 shows a detailed Environmental Systems Research Institute, Inc. (ESRI) Landsat image of the change in NDVI from 1975 to 2010. Areas of grey demonstrate no change in vegetation while green³ demonstrates a negative change in vegetation, showing that there was more vegetation in 1975. As can be seen, the majority of the country has seen decreases in vegetation, with the southern part of the country having experienced major decreases in vegetation.

Figure 2. Regional Change in NDVI, 1981-2014



Source: National Oceanic and Atmospheric Administration

Figure 3. NDVI change in Côte d'Ivoire, 1975-2010^a



^a Green indicates decrease in vegetation.

Source: Environmental Visualization Lab, 2014

² Note that the index covers all types of vegetation, not just trees.

³ Magenta areas would indicate an increase in vegetation since 1975.

As seen in the 2013 Readiness Preparation Proposal (R-PP) for the United Nations (UN) Reducing Emissions from Deforestation and Degradation plus conservation, sustainable management of forests, and the enhancement of forest carbon stocks (REDD+) programme, Côte d'Ivoire encompasses three ecological zones (FCPF and UN-REDD, 2013):

- Guinean: this is the largest zone in the country, accounting for 50 percent of the territory, located in the south of the country. This zone was formerly covered with dense moist forests but it is now largely degraded. The climate is sub-equatorial with four seasons and more than 1,500 millimetres (mm) of rain per year. The majority (66 percent) of the cultivated surface is covered with coffee and cocoa. One quarter of the surface is covered with food crops such as maize, rice and cassava; these crops are often inter-cropped with cocoa. The remainder of the surface area is covered with palm, coconut and rubber trees.
- Sudanese Guinea: this zone covers 19 percent of the country, forming the transition zone between the north and south. It is characterized by four seasons: long and short wet and dry seasons. Rainfall ranges between 1,200 and 1,500 mm per year. The sub-humid forests in this zone are degraded and the zone is turning into a savannah.
- Sudanian Savanna: this zone covers 31 percent of the country, in the north. It has only one rainy season, with an annual rainfall between 900 and 1200 mm. The land is highly degraded. Food crops such as maize, rice and groundnuts are the dominant crops. The main cash crops are cotton and cashew, along with mango, shea butter and livestock products.

Up to 75 percent of the land in the country is arable (Republic of Côte d'Ivoire MARA, MEF, and MESRS, 1999). The cultivation of the country occurred rapidly and the amount of cultivated land has continued to increase. The agriculture sector employs 66 percent of the population and 70 percent of export revenue comes from agricultural products, with 40 percent of this revenue coming from coffee and cocoa sales (FCPF and UN-REDD, 2013). One of the main objectives of the National Development Plan is the diversification and modernization of the agriculture sector (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013). If left unaddressed, a high reliance on income from agriculture will lead to an ever-growing demand for land, often met through the clearing of still more forested land.

Within the three ecological zones, Côte d'Ivoire is divided into two domains: rural forest and permanent forest. Seventy percent of the forested land is categorized as rural forest land (Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and United Nations, 2012). This land is owned by individuals and collectives, although land without official title owners is claimed by the State. Much of this land is used for agriculture. In addition to serving agricultural purposes, 90 percent of the volume of wood exploited in the country comes from the rural forest land. This rural forest land is divided into 384 logging areas (Republic of Côte d'Ivoire Ministry of Water and Forests, 2011).

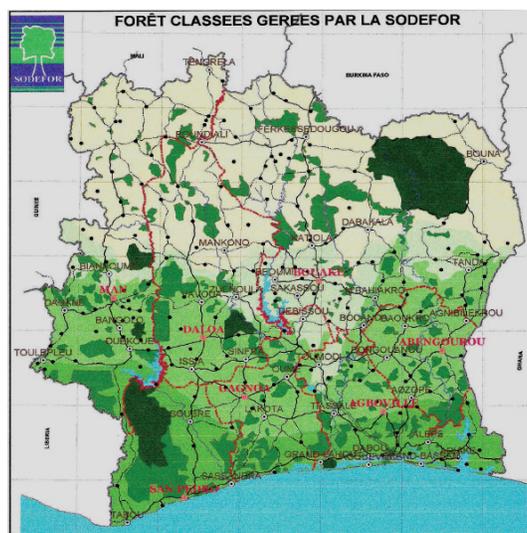
The remaining forested land in the country—permanent forest—is state-owned. The permanent forest is divided into classified forest, national parks and natural reserves. This land is then classified as “private” or “public”; no logging is allowed on public permanent forest. The permanent forest comprises:

- 231 classified forest areas (considered “private”);
- Eight national parks (“public”);
- Five natural reserves (“public”).

The Society for the Development of Forests in Côte d'Ivoire (SODEFOR), a state-run entity, is in charge of managing classified forest areas. Of the 231 classified forests, 86 have so far established management plans, which have a

strong focus on reforestation (Banga, 2010). As part of these plans, SODEFOR promotes the sale of timber from natural forests and plantations (SODEFOR, 2014b). The forests managed by SODEFOR can be seen in Figure 4 below.

Figure 4. Classified forests managed by SODEFOR



Source: Banga, 2010.

The national parks and natural reserves are managed by the Ivorian Office of Parks and Reserves (OIPR); logging is not allowed in these protected areas. These areas cover about 1.93 million ha of protected forest (ABCD Consulting, 2013).

Energy Supply

In 2011, the total primary energy supply (TPES) of Côte d'Ivoire was 11,233 kilotonnes oil equivalent (ktoe). The components of the TPES can be seen in Table 3.

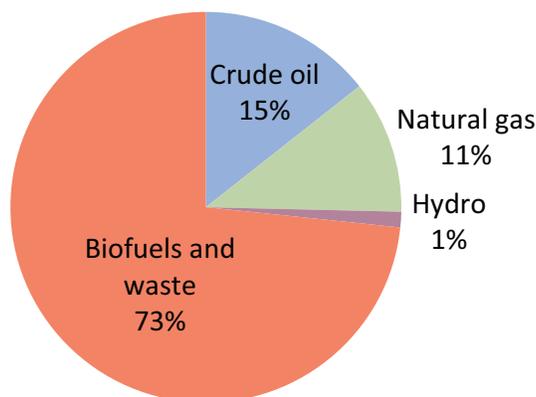
Table 3. Côte d'Ivoire Total Primary Energy Supply, 2011

Supply	Total (ktoe)
Production	11,885
Imports	2,475
Exports	-3,102
International Marine Bunkers	-12
International Aviation Bunkers	-48
Stock changes	34
TPES	11,233

Source: International Energy Agency, 2014.

The nationally produced energy supply comes from four sources: biofuels and waste, crude oil, natural gas and hydropower. Biofuels and waste is a strongly dominant source of energy in Côte d'Ivoire, providing 73 percent of the country's energy, mainly in the form of wood fuel and charcoal. Figure 5 provides an overview of the country's domestic energy sources.

Figure 5. Domestic energy sources, 2011



Source: International Energy Agency, 2014.

A relatively high proportion of the population, 58.9 percent, has access to electricity (World Energy Council, 2014). This relatively high level of electricity connection leads to the residential sector being the largest consumer of electricity, followed by the industrial sector. Of the electricity produced domestically, 71 percent is produced from fossil fuels and 29 percent is produced through hydropower (UNFCCC, 2012).

Charcoal production has been increasing in the last 10 years, rising by 22 percent from 400,850 tonnes in 2003 to 488,128 tonnes in 2012, in order to meet the demands of a growing, and increasingly urbanized, population. The production of wood fuel has also been increasing, although at a slower rate over the last ten years, from 8,699,979 cubic meters (m³) to 9,034,617 m³, almost a 4 percent rise.

Charcoal is typically a fuel used in urban areas as it is seen as having fewer of the negative side effects of cooking with wood (i.e. dangerous, smoky) while being more cost-efficient than petroleum products (Girard, 2002). The increasing urbanization rate—an average increase of 1.49 percent per year (World Bank, 2014)—may help to explain why charcoal production is increasing at a far faster rate than wood fuel production.

The country faces a number of energy-related challenges (World Bank, 2012). Exploration for new oil and gas reserves has been neglected, and current oil and gas reserves will last only 5-6 years more. The alternative energy sources include biomass, which may result in deforestation if not properly managed, and liquid petroleum gas (LPG), which has high import costs. The national refinery (Société Ivoirienne de Raffinage) is financially vulnerable because petroleum product prices are regulated and there is intense regional competition. Finally, there are significant challenges within the electricity sector. Current infrastructure has not been well maintained and political instability has kept away new investors. Technical and commercial losses are 24 percent, almost five times the industry norm. Gas costs are high, while consumers pay low tariffs. These problems, combined with other factors, have resulted in growing deficits in the electricity sector. Taken together, these challenges may lead to exports drying up, major power shortages and increased costs.

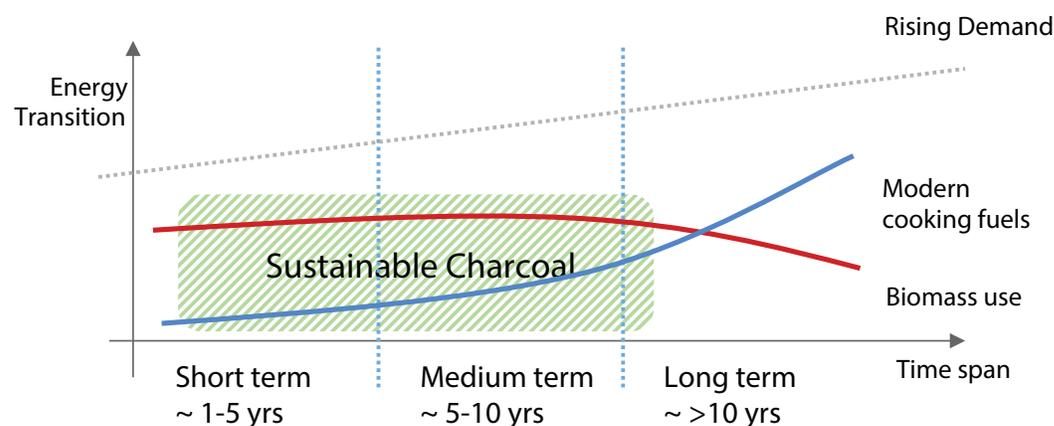
In general, per capita energy consumption in rural areas of Côte d'Ivoire is still low and is limited almost exclusively to wood fuel. However, energy consumption and the type of fuel used by households are evolving as Côte d'Ivoire strives to become an emerging economy.

Like many countries, Côte d'Ivoire aspires to provide modern cooking fuels, such as butane gas and electricity. It has so far been successful in increasing the use of butane gas. The penetration of LPG, or butane, for cooking has increased to 20 percent (Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and Sustainable Energy for All, 2012) since 1993 when the government began to encourage the use of butane. Until recently, this policy included subsidies for butane. Bottles of natural gas are sold for domestic purposes in three sizes: 6kg (B6), 12.5kg (B12) and 28kg (B28) (National Petroleum Operations Company of Côte d'Ivoire, 2012a). As part of its economic reforms, the government decided to reduce subsidies for liquid petroleum products, resulting in a price increase of up to CFAF15 per litre⁴ (or around 2 percent) beginning December 2012, and simultaneously to limit the butane gas subsidy to only 6 and 12 kg bottles (Republic of Côte d'Ivoire Ministry of Economy and Finance, 2012). The sales price of a bottle of B6 gas was raised from CFAF1,800 to CFAF2,000 and for a bottle of B12 from CFAF4,000 to CFAF5,200 (Republic of Côte d'Ivoire Ministry of Economy and Finance, 2013).

Although the use of butane in the country is relatively high, the increase in prices, along with the energy sector challenges outlined above, is expected to affect consumption patterns. The cost of butane is prohibitively high for the majority of the population, with or without subsidies, making the fuel inaccessible. Additionally, as seen in the National Development Plan, the production of butane is still modest (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013). Therefore, high upfront costs and supply problems mean that it will take time for the country to complete the transition from biomass-based fuels to modern cooking fuels.

In this transition period to modern cooking energy sources, sustainable charcoal can play an important role. The production and use of sustainable charcoal helps to decrease pressure on national resources and, through the use of improved cookstoves at the end of the value chain, helps to provide economic and health relief to users. During the short to medium term, technologies such as domestic biogas and bio-char can also play a role in facilitating the energy transition. A graphic depiction of the gradual energy transition can be seen in Figure 6.

Figure 6. The transition from wood-based fuels to modern cooking energy sources



⁴ The exchange rate, as of 20 May 2014, was US\$1=CFAF479.

Charcoal Consumption—Scenario Analysis

The 2002 National Household Standard of Living Survey (Republic of Côte d'Ivoire National Institute of Statistics, 2002), demonstrates the stark difference in fuel usage between urban and rural areas. Almost half (47 percent) of all urban dwellers use charcoal for cooking purposes, while only 4 percent of rural dwellers use charcoal for cooking. In rural areas, wood fuel is by far the most dominant fuel type (95 percent) with only 35 percent of urban area residents using this source. The fuel types used in rural/urban areas can be seen in detail in Table 4.

Table 4. Fuel consumption type by area, 2002

	Urban	Rural	Total
Wood	35%	95%	73%
Charcoal	47%	4%	20%
Butane	18%	1%	7%
TOTAL	100%	100%	100%

Source: Republic of Côte d'Ivoire National Institute of Statistics, 2002

As urbanization has increased from 44.9 percent in 2002 to 52 percent in 2012 (World Bank, 2014) and subsidies on butane have decreased, it is expected that charcoal use as a percentage of total national fuel consumption will have increased well above the 20 percent at which it stood in 2002.

In 1996, households consumed on average approximately 2 kg of charcoal and 4.6 kg of wood fuel per day (Côte d'Ivoire Ministry of Environment and Sustainable Development, 1997). This level of charcoal consumption is equivalent to 0.73 of a tonne of charcoal per household per year. In order to cross-check this figure and update it, an annual charcoal consumption figure was calculated, using FAO annual charcoal consumption estimates. The result of this calculation was an estimated level of annual consumption per household of 0.71 of a tonne, which is close to the earlier figure of 0.73 of a tonne. In order to allow comparison with the FAO's worldwide data, the FAO estimate of 0.7 of a tonne of charcoal per household per year will be applied in the following baseline scenario assessment.

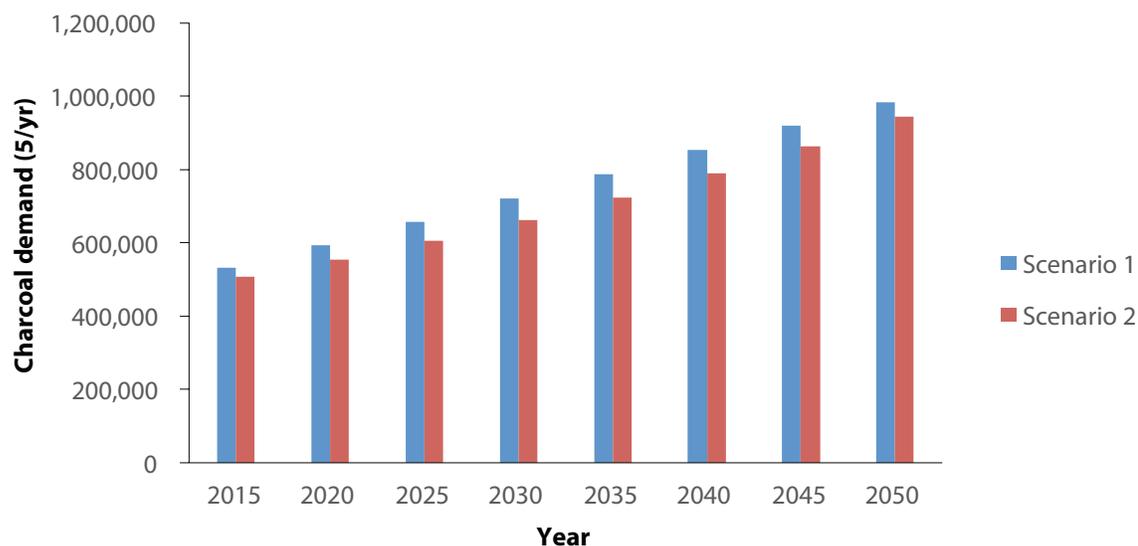
There are limited details available but it can be assumed that the majority of people who use cookstoves cook on unimproved equipment. In the past, there were some interventions aimed at promoting improved cookstoves; however, they had very limited success (FCPF and UN-REDD, 2013).

Scenarios for Baseline Assessment

The baseline scenario assessment is based on population projections up to 2050 with per capita charcoal consumption held stable at historic levels. Two population scenarios have been considered, the first based on World Bank population projections (Scenario 1) and the second based on an extrapolation of an historic annual average population growth rate of 1.8 percent (Scenario 2). Population increase is not the only aspect that determines charcoal consumption; there are several other factors which need to be taken into consideration when modelling changes to household demand for charcoal. One of the other key factors is the rate of urbanization; 52 percent of the population

of Côte d'Ivoire is located in urban areas and this percentage steadily increased by an annual average of 1.5 percent between 2002 and 2012 (World Bank, 2014). This rate of growth of urbanization has been incorporated into the model. Figure 7 provides a comparison of the impact on total charcoal consumption under the two population scenarios.

Figure 7. Future charcoal consumption under two population scenarios (tonnes/year)



As can be seen, charcoal consumption is expected to increase continuously, almost doubling by 2050.

Another factor to consider when estimating charcoal consumption is general economic prosperity; GDP has increased an average annual percentage growth rate of GDP of 2.7 percent over the last ten years (2004-2013) despite the recent political crises. A higher GDP would result in more available income for the purchase of charcoal. Other factors affecting charcoal consumption include: increased usage of fossil fuels including cooking gas and kerosene; literacy rates (education increases awareness of the impact of burning wood and charcoal on health); and access to healthcare. Modelling of the potential impact of such factors on charcoal consumption patterns is beyond the scope of this study.

Stakeholders and Policies in the Context of Sustainable Charcoal NAMA

Having set the national context as regards the overall economy and the forest and energy sectors, this report will now move to a discussion of a Nationally Appropriate Mitigation Action (NAMA) for sustainable charcoal in Côte d'Ivoire. The NAMA discussion will begin with the stakeholders who will need to be taken into account in the design of the NAMA. Stakeholder engagement is 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 several sectors, including energy, forestry, land rights and finance, and also, though less obviously, involves other sectors, such as health.

After stakeholders relevant to the NAMA are described, policies and regulations which may influence the NAMA or which may be affected by it are listed.

Box 1. NAMA information

What is a NAMA?⁵

The concept of a NAMA is a recent creation. NAMAs were first introduced in 2007 in the Bali Action Plan which came out of the 13th Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC). NAMAs are understood to be vehicles to support voluntary climate change actions in developing countries; international support facilitates NAMA implementation through financing, technology and capacity-building.

While the definition and the structure of NAMAs are still evolving, it is understood that NAMAs should be flexible. Therefore, the type of climate change activities undertaken can vary greatly, including developing national policies and strategies, applying sector-focused policy approaches and implementing specific programmes or projects.

The key differentiators between stand-alone Clean Development Mechanism (CDM) projects or Programmes of Activities (PoA) and NAMAs are that NAMAs should be sector-wide, be coordinated by the government and have a strong focus on sustainable development benefits. The sustainable development benefits refer to the overall social, environmental and economic sustainable development ambitions of a NAMA.

There are three key differences between traditional Official Development Assistance (ODA) projects/programmes and NAMAs. First, the NAMA must have an emissions reductions focus, along with a sustainable development focus. Second, NAMAs should result in wide-scale, transformational change. Third, NAMAs should be designed in a way that they leverage private sector investment.

Given the widespread use of wood fuel and charcoal in Côte d'Ivoire and its direct impact on several sections of society, stakeholders that should be included in the NAMA development process include (but are not limited to):

- Relevant ministries and government agencies (policy development and policy implementation stakeholders);
- Research and academic institutions with an interest in charcoal, forestry, energy and related fields;
- Multilateral institutions working in the charcoal/wood fuel sector in Côte d'Ivoire;
- Private sector actors (e.g. charcoal producers, transporters, middle-men and other stakeholders in the charcoal value chain);
- Civil Society Organizations (CSOs).

The following sections will provide information about key stakeholders in the above mentioned categories, which are identified in Figure 8.

⁵ For additional information on NAMAs, see About MDG Carbon at http://www.undp.org/content/undp/en/home/ourwork/environmental-energy/projects_and_initiatives/mdg-carbon/about/

Figure 8. Stakeholders in the sustainable charcoal value chain

Policy Development Stakeholders

- **Ministry of Water and Forests (MINEF):** responsible for overseeing the management of the forest and water sectors and has a strong focus on reforestation.
- **Ministry of Environment, Urban Sanitation and Sustainable Development (MINESUDD):** responsible for the implementation and monitoring of government policy on environmental protection, urban safety, improving the quality of life and sustainable development.
- **Ministry of Mines, Petroleum and Energy:** responsible for the implementation and monitoring of government policy on mining, petroleum and energy.
- **Ministry of Economy and Finance:** responsible for financial management of the public sector, with a focus on poverty reduction and growth.

Government Policy Implementation Stakeholders

- **Society for the Development of Forests in Côte d'Ivoire (SODEFOR):** a state company whose mandate includes the evaluation and proposal of government measures aimed at ensuring the implementation of the development plans for forest production and related industries, either by direct intervention or by coordinating, directing and controlling the activities of various government agencies or private actors.
- **Ivorian Office of Parks and Reserves (OIPR):** a state entity charged with managing the country's national parks and nature reserves. OIPR is also in charge of promoting ecotourism and developing areas peripheral to the national parks and nature reserves.
- **National Petroleum Operations Company of Côte d'Ivoire (PETROCI):** has as its main objective the building an integrated and diversified oil economy, optimizing research efforts and exploiting hydrocarbon resources.

- **National Environmental Agency (ANDE):** has the main objective of execution of environmental programmes and projects in Côte d'Ivoire. ANDE coordinates the implementation of environmental development projects and the inclusion of environmental concerns into development projects and programmes. ANDE implements the procedures for impact assessment and also the assessment of the environmental impact of macroeconomic policies.
- **National Office for Technical Studies and Development (BNETD):** aims to assist in the development of Côte d'Ivoire through the provision of technical advice, conceptualization of studies, undertaking of studies of public interest and monitoring and quality control.
- **Forest Police:** has as its main mission the monitoring and control of state-owned the forest areas, and those belonging to communities and individuals, as well as preventing illegal logging.

Academic and Research Institutions

- **Institute of Renewable Energy, University of Nangui Abrogoua:** focuses on conducting project-based renewable energy and energy efficiency research.
- **National Agronomic Research Centre:** conducts research, inter alia, on cassea siamea (the kassod tree) and its use in charcoal production.
- **Centre for Development of Industrial Technology (CPTI):** conducts research on industrial equipment, including charcoal kilns.

Multilateral Institutions

- **United Nations Development Programme (UNDP):** an active supporter of the energy and environment sector in Côte d'Ivoire. From 2009 to 2013, UNDP financed a project on management and sustainable protection of the environment. Engagement in activities surrounding the project is ongoing. The project focused on three main objectives (UNDP, 2012):
 - Developing/revising policies, mechanisms and legal instruments adapted to sustainable environmental management, and forest and water resources;
 - Strengthening the partnership for the protection and sustainable management of the environment;
 - Improving the understanding of the government, civil society and local communities of issues related to biotechnology, climate change, and natural and technological risks.

Activities in this project have included funding/co-funding:

- Revision of the Forestry Code;
- A sustainable development road map;
- A sustainable development indicator study.

UNDP is also involved in the following projects:

- A rural energy access study as part of the Sustainable Energy for All (SE4All) initiative;
- Small grant programmes for reforestation;
- Climate change adaptation in marine ecosystems;
- Small pilot briquette programmes with youth.

Private Sector

At an implementation level, the informal private sector plays the largest role in the charcoal value chain. In many sub-Saharan African countries, charcoal production contributes a significant share of the economy: \$650 million annually in Tanzania (World Bank, 2009) and 1.0-1.5 percent of Rwanda's GDP (Falzon, 2010). Private sector actors lead the charcoal value chain from start to finish, as can be seen in Table 5.

Table 5. Private-sector actors in the charcoal value chain

Actor	Role
Private forest owners	<ul style="list-style-type: none"> • Owners of land with trees for charcoal • Waste from logging is to be given to charcoal producers
Logger	<ul style="list-style-type: none"> • Paid to cut and transport wood
Charcoal producer	<ul style="list-style-type: none"> • Produces charcoal, typically through the use of a traditional kiln
Charcoal kiln equipment producer	<ul style="list-style-type: none"> • Produces efficient kilns, chimneys, etc
Transporter	<ul style="list-style-type: none"> • Transports charcoal from production site to distributor
Distributor	<ul style="list-style-type: none"> • Receives charcoal in urban areas • Sells charcoal to retailers
Retailer	<ul style="list-style-type: none"> • Sells charcoal at shops or markets to consumers
Middlemen	<ul style="list-style-type: none"> • Connector at any two points along the value chain

Civil Society Organizations

There are a limited number of CSOs which are relevant to the charcoal value chain. These include co-operatives of charcoal producers and sellers, as well as other associations working in the sector. One such association is the Ivorian Association for Renewable Energy (AIENR). Further details about AIENR are provided in Box 2.

Box 2: AIENR case study

AIENR was created in April 2013 to promote and develop renewable energy and energy efficiency in Côte d'Ivoire, in order to assist in the fight against climate change. AIENR aims to sensitize, inform, advise and assist professionals and project developers working in the domain of renewable energy and energy efficiency. AIENR also provides input in the elaboration of national policies and assists organizations in energy policy development. AIENR currently has 24 member-companies and collaborates with organizations such as the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). (For more information, refer to <http://aienr.org/>.)

Policies, Regulations and Programmes in the Context of the NAMA

Côte d'Ivoire's vision for economic growth and poverty reduction is elaborated in the 2012-2015 National Development Plan. The country's goal, in the short term, is to reduce poverty rates significantly by 2015 and, in the longer term, to be an emerging country by 2020 (Republic of Côte d'Ivoire Ministry of Planning and Development, 2013). The National Development Plan, coupled with sector-specific strategies, provides the country's broader policy setting.

This section will detail Côte d'Ivoire's energy, environment, land and forestry policies, programmes and plans which are relevant to the NAMA.

Environment and Sustainable Development

Environment Code

Law No. 96-766 of 3 October 1996 promulgated the Environment Code, setting the overarching regulatory framework for environmental issues in Côte d'Ivoire. The objectives of the Code are (Republic of Côte d'Ivoire, 1996):

- Protect the soil, subsoil, sites, landscapes and national monuments, vegetation, the flora and fauna, especially classified areas, national parks and existing reserves;
- Establish the basic principles for managing and protecting the environment against all forms of degradation to develop natural resources and to fight against all kinds of pollution and nuisances;
- Improve the living conditions of different types of people in respect of the balance with the surrounding environment;
- Create conditions for a rational and sustainable use of natural resources for present and future generations;
- Guarantee all citizens a framework for an environmentally healthy and balanced life;
- Ensure the restoration of the degraded environment.

National Environment Action Plan (PNAE-CI)

The National Environment Action Plan was put in place to provide a framework for environmental management for the period of 1996-2010. PNAE-CI recognizes that rapid deforestation is one of the main environmental problems in the country and that this is caused by: intensive agriculture and the use of slash-and-burn techniques; forest exploitation associated with mining; the extraction of wood for cooking purposes; population pressure; and illegal wood extraction in classified forests.

The ten programmes of PNAE-CI are (Republic of Côte d'Ivoire Ministry of Environment and Tourism, 1995):

1. Development of sustainable agriculture;
2. Preservation of biodiversity;
3. Management of human settlements;

4. Management of the coastal zone;
5. Combating industrial pollution;
6. Integrated management of water;
7. Improvement of energy resources;
8. Research, education, training and awareness;
9. Management of integrated and coordinated environmental information;
10. Improvement of the institutional and regulatory framework.

Programme 7 includes:

- Production and diffusion of improved cookstoves, with a focus on the main cities of the country;
- Charcoal sector support focusing on improved yields and professionalization of the sector. The actions of this component include: testing different techniques for improved carbonization, establishing programmes to apply improved techniques, training of trainers in efficient carbonization techniques and training of charcoal producers.

National Study on the Opportunities and Strategies for a Transition to a Green Economy in Côte d'Ivoire

The National Study on the Opportunities and Strategies for a Transition to a Green Economy in Côte d'Ivoire, or the Green Economy Roadmap, presents a comprehensive overview and plan of how Côte d'Ivoire can transition to a green economy. It provides an analysis of the strengths, weaknesses, threats and opportunities in sectors (i.e. agriculture, forestry, energy, industry and waste) that are key to creating a green economy. The Road Map then presents two phases comprising a series of actions required to transition the country to a green economy. These actions are listed in Table 6.

Table 6. Phases and actions on the Roadmap to a Green Economy

Phase	Actions
1	<ol style="list-style-type: none"> 1. Establishment of the Green Economy Inter-ministerial Steering Committee 2. Consultation for updating of the national strategy for sustainable development and a green economy 3. Development of a directory of stakeholders 4. Gathering of best practices and business models 5. Development of a directory of laws and regulations
2	<ol style="list-style-type: none"> 1. Formalization of a national platform on the green economy 2. Establishment of communities of practice 3. Development of indicators and establishment of a system of monitoring and evaluation 4. Organization of sectoral workshops (on taxation, environmental, sustainable procurement, etc.)

Source: Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and United Nations (2012)

National Climate Change Programme (NCCP)

The NCCP aims to complete the following activities (Republic of Côte d'Ivoire, United Nations Framework Convention on Climate Change, United Nations Environment Programme, and Global Environment Facility, 2013):

- Complete a national greenhouse gas (GHG) emissions inventory by sector;
- Evaluate the vulnerability of different sectors to climatic change;
- Propose climate change mitigation measures;
- Propose measures for adapting to climatic change;
- Educate, train and raise awareness on climate change;
- Mobilize financial resources for the fight against climatic change.

The NCCP revolves around seven strategic objectives:

1. Promote the integration of climate change into policies and sectoral strategies as well as in the planning of development at the national level;
2. Improve knowledge about, the promotion of scientific research into, and the production and dissemination of information on climate change;
3. Develop and promote climate change mitigation activities (REDD+ and NAMA) in all sectors;
4. Strengthen and promote climate change adaptation activities;
5. Promote research and development at the national level and the transfer of technologies for climate change;
6. Prevent and manage the risk of natural disasters;
7. Promote and strengthen international cooperation and the mobilization of funding for the implementation of the NCCP.

Included under objective 4 are activities such as use of biochar and biomass, energy efficiency, reforestation and fighting deforestation.

Rural Land

Law No. 98-750 of 23 December 1998 on Rural Land

According to the land law in effect from 1963 to 1998, the government had the exclusive right of ownership to all the land in Côte d'Ivoire. The government could give people partial rights to land and its use (Kadi, Republic of Côte d'Ivoire Ministry of Water and Forests, and International Tropical Timber Organization, 2009).

Law No. 98-750 of 23 December 1998 on Rural Land significantly changed the land ownership situation and gave the population the right to own land. Ownership rights gave rise to challenges, and further orders and decrees were subsequently passed, amending the law to clarify ownership rights. If right to the land is not claimed, the land is considered the property of the Government. However, even with the passage of the amendments, the legislation is still not in conformity with reality, and many rural people consider land their property even though their rights to it have not been properly established. This law is relevant to the NAMA in so far as it bears on the rights that people have to log their land.

Forestry

Forestry Code

Law No. 65-425 of 1965 is the Forestry Code which provides the overarching regulatory framework for Côte d'Ivoire's forestry sector. The Code defines forest types in the country. The Code also defines the right to use the forests and to extract fruits and forest products from them, both for own use and for commercial purposes. In protected areas, there is free use of fruits and natural forest products and certain products can be exploited for commercial purposes, as long as the plants producing them are not destroyed in the collection process. Exploitation of wood is allowed in classified forest areas that are not protected areas or reserves. In unclassified forests, usage rights for fruits and forest product are reserved for local populations. Wood extraction is limited to use for timber for construction of local houses or collection of dead wood. In private and community forests, owners can exercise their legal rights.

The Code requires that in forest reserves products produced for commercial purposes (e.g. charcoal) are subject to issuance of a permit (Republic of Côte d'Ivoire, 1965).

Since 2002, the government has been in the process of revising its Forestry Code. However, as of June 2014, a new draft Forestry Code has been drafted but has not yet been approved and is not publicly available.

Decree Establishing the Modalities of Management of State Forests

Law No, 78-231 of 1978 defines the modalities for managing forests classified as state forests. The decree also lists the specific locations and area (in hectares) of permanent forests classified as zones of forestry and savannah, as well as rural forests in forest zones.

Forestry Master Plan (1988-2015)

The Forestry Master Plan spans the years 1988-2015. The Plan has five major objectives (Republic of Côte d'Ivoire Ministry of Water and Forests, 1988):

- Maintain the productive exploitable potential of the Ivorian natural forest;
- Restore the forest cover, first by proceeding to the reforestation of woodland and savannah areas, and protect national parks;
- Develop and reforest the classified forests;
- Sustainably increase yields of forestry;
- Improve the processing and commercialization of forestry resources.

The Master Plan includes the following quantitative targets (Republic of Côte d'Ivoire Ministry of Water and Forests, 1988):

- Implement policies required to return to a level of log production of at least 4 million m³ a year;
- Manage 2.5 million ha of forest⁶;

⁶ Comprising 990,000 ha established before 1988 and 1.5 million that were to be gazetted in 1995.

- Establish 150,000 ha of plantation of varying types;
- Upkeep 77,000 ha of existing industrial plantations;
- Protect the 1.6 million ha of national parks and reserves;
- Stabilize the country's forest cover at 14 percent and reach an optimal forest cover of 20 percent by the end of the plan period.

The plan envisages involving all citizens by encouraging villages to plant in their surroundings 0.1 ha of forest per inhabitant.

Law Regarding the Creation, Management and Financing of National Parks and Natural Reserves

Law No. 2002-102 of 11 February 2002 governs the creation of the eight national parks and five natural reserves, as well as their management and financing. This is relevant for the NAMA because logging in the national parks and reserves is forbidden; enforcement of this ban is important for conserving the protected areas.

Decree Regulating Timber Extraction, Woodworking, Wood Fuel and Charcoal

Decree No. 94-368 of 1 July 1994 modifies decree No. 66-421 of 15 September 1966 and regulates timber extraction, woodworking, wood fuel and charcoal. The law provides information about the types of permits which can be granted for wood extraction and by whom. The 1994 decree also stipulates that land is divided into zones of exploitation, with the minimum zone area being 25,000 ha.

In order to acquire a permit to produce charcoal from plantations, the following documentation is required (Republic Côte d'Ivoire Ministry of Water and Forests, 2012a):

- A request to the Minister of Water and Forests;
- A judicial record dating back less than three months*;
- A certificate of nationality*;
- A complete list of employees of the operator;
- A certificate of registration in the trade register;
- A taxpayer account number;
- The status of the plot to be logged*;
- Precise indication of the location of the place of business;
- A contract or memorandum of agreement between the owner of the plot and the exploiter of the secondary forest products;
- A written and legalized commitment to adhere to forest law and preserve the environment
- The original of a previous licence (if applicable);
- A receipt attesting payment of CFAF200,000 to the relevant body (Régie des Avances et des Recettes des Eaux et Forêts) for approval as an operator of charcoal;

- A receipt of payment of the annual fee of CFAF50,000 for individuals and CFAF100,000 for groups.

*Requirements for individual producers.

Permits for charcoal production from wood in forested areas, require similar documents along with (Côte d'Ivoire Ministry of Water and Forests, 2012b):

- A contract between the person with the forest rights and the charcoal producer;
- A written and legalized commitment to adhere to forestry law, including ensuring the use of the wood waste; preserving the environment and soil by limiting the number of kilns to two per site and not changing the kiln placement; and reforestation of a hectare of land per permit;
- A certificate issued by the local Forest Service for obtaining a site for the compensatory one hectare for reforestation;
- A certificate of reforestation issued by the head of the municipality.

Decree Establishing the Inter-Ministerial Steering Committee on Forestry Policy (CICCPF)

Decree No.2001-381 of 27 June 2001 establishes an Inter-Ministerial Steering Committee on Forestry Policy.

Agreement of Voluntary Partnership (APV), Forest Law Enforcement, Governance and Trade (FLEGT)

APV is a bilateral trade agreement between the European Union (EU) and Côte d'Ivoire, a producer and exporter of wood. The agreement aims to improve forest governance in the country and to ensure that timber and/or wood products imported into the EU meet all the regulatory requirements of Côte d'Ivoire (Côte d'Ivoire Ministry of Water and Forests, 2012c). FLEGT helps to enforce forest regulation in Côte d'Ivoire by legally committing Côte d'Ivoire and the EU to trade only timber products whose legality has been verified, using a system developed by Côte d'Ivoire as part of the APV.

Protected Areas Management Framework Project (PAMFP)

The aim of PAMFP is to improve the capacity of the OIPR to ensure better management of the national parks with strong park community involvement. PAMFP has four components (Côte d'Ivoire Office of Parks and Reserves, 2008):

- Component 1: Institutional, Financial and Technical Strengthening for Protected Area Management and Oversight;
- Component 2: Participatory Management of the Comoé National Park;
- Component 3: Support to Park Communities (Biodiversity and Livelihood Education for Park Communities);
- Component 4: Project Management and Monitoring for Results.

Decree Forbidding the Export of Unprocessed Wood Products

The Decree No. 95-682 of 6 September 1995 forbids the export of unprocessed wood products. The processing of wood in Côte d'Ivoire results in wood waste which can be processed into pellets, briquettes or other products that can be used to replace charcoal for cooking.

Integrated Management of Protected Areas in Côte d'Ivoire

The Integrated Management of Protected Areas Project is a five-year (2012-2015) Global Environment Facility (GEF) project. The project is implemented by the Ivorian Office of Parks and Reserves, with co-ordination by the United Nations Environment Programme (UNEP). The project aims for five main outcomes (GEF, 2012):

- Improved management effectiveness in existing and new protected areas;
- Increased revenue for protected area systems to meet total expenditures required for their management;
- Increases in sustainably managed landscapes and seascapes that integrate biodiversity conservation;
- Increased resources to integrated natural resource management and other land uses from diverse sources;
- Good management practices in existing forests.

In order to achieve these outcomes, the project will result in the implementation of a number of activities such as:

- Modified sectoral policies at local/regional level (agriculture, non-timber forest products, wood fuel);
- Income-generating activities in the vicinity of Banco National Park; 3,000 ha of forest and non-forest ecosystems put under sustainable management.

United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries

Côte d'Ivoire became a partner country in the REDD+ programme in June 2011. In mid-2013, Côte d'Ivoire was selected as a priority country and the development of a Readiness Preparation Proposal (R-PP) proposal began. The proposal, developed by MINESUDD, was completed in November 2013.

The REDD+ preparation project will run from June 2014 to December 2017 and is receiving funding from the Forest Carbon Partnership Facility, the UN REDD+ programme and the French Development Agency (AFD). The aim of the preparatory project is to implement enabling activities which will lead to a decrease in net greenhouse gas (GHG) emissions from forestry. The enabling activities include (FCPF and UN-REDD, 2013):

- The strengthening of national institutions to enable them to pilot REDD+ effectively;
- The formation of stakeholder groups, who will be informed and consulted on the strategy for the National REDD+;
- The clear identification of the underlying causes and direct drivers of pressure on forests;
- The establishment of institutional arrangements that will allow the national REDD+ strategy to be implemented;
- Completion of a study on socio-environmental impacts and the establishment of a functioning framework for ad hoc management;

- Development of a national baseline in a credible and transparent manner; and
- The establishment of a functioning system of measuring, reporting and verifying (MRV) of greenhouses gases (GHG).

Energy

Energy Strategic Development Plan 2011-2030

The four strategic areas of activity in the Energy Strategic Development plan are (Republic of Côte d'Ivoire, Ministry of Mines, Petroleum Resources and Energy, 2012):

1. Matching supply and demand for conventional electricity;
2. Sustainable energy through developing renewable and other new energy sources;
3. Institutional framework, capacity-building and organization;
4. Financial viability.

The Plan focus is on both on- and off-grid electricity generation, and envisages increasing the capacity of thermal energy, hydropower, energy from waste, biomass energy and solar energy.

Programme for Investment in Energy Access Services (PNIASE-CI)

The PNIASE-CI was established in 2012 and has three components (Republic of Côte d'Ivoire, Ministry of Mines, Petroleum Resources and Energy, 2012):

- Component 1: access to electricity;
- Component 2: access to modern cooking energy;
- Component 3: access to diesel energy.

The second component, access to modern cooking energy, comprises two activities. The first is to provide school kitchens with improved cookstoves which utilize butane, solar energy or biogas. Over the course of 2013-2015, 500 butane stoves will be installed, as well as 200 solar stoves and 50 biogas stoves. The second is to expand the use of improved cookstoves in rural areas, resulting in 550,000 improved cookstoves being distributed.

The components consist of five sectoral sub-programmes: agriculture, education, energy, water and health.

Investment

Investment Code

Ordinance No. 2012-487 of 7 June 2012 established the Investment Code. This Code aims to foster and promote green and socially-responsible investment in the country. It also encourages activities such as processing local raw

materials, protecting the environment, improving the quality of life, and promoting a green economy (Republic of Côte d'Ivoire, 2012).

The Investment Code also provides details on topics such as:

- The guarantees given to investors;
- The obligations of investors;
- Incentive schemes for investments.

Conclusion of Country and Sector Review

Since independence, Côte d'Ivoire's economy has had a volatile history. There have been periods of significant growth punctuated by falling prices for international cash crops and political crises. Turbulence from these crises, along with logging, population pressure and the clearing of land for agricultural purposes are the main factors which have led to a decrease in Côte d'Ivoire's forested area from 16 million ha at the time of independence to 10 million ha today, 55 years later.

In rural areas, the vast majority of people use wood fuel for cooking purposes. In urban areas, although government promotion of butane gas has led to an increase in butane use, almost half of urban residents still cook on charcoal. With the decrease in butane subsidies, an ever increasing population, and rising urbanization, it is expected that the volume of charcoal needed to meet the country's demand will steadily increase.

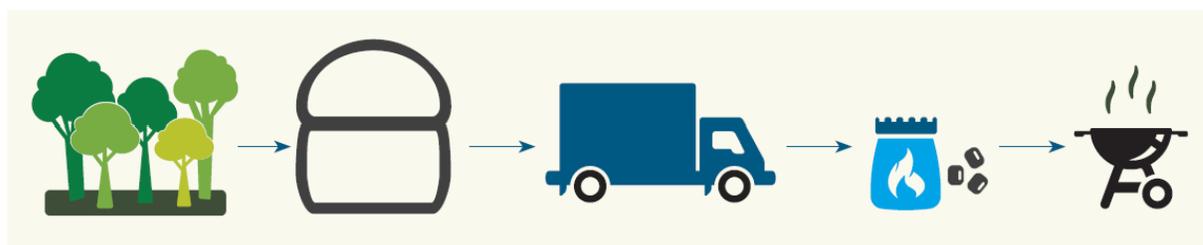
The country has established, or is in the process of establishing, a number of policies and programmes which begin to address the issue of the loss of forest. However, the policies and programmes have yet to be successful, whether as a result of inadequate policies, weak implementation/enforcement, lack of policy coherence or poor communication among stakeholders. If further action is not taken, the forested area will continue to decrease. Part 2 of this sustainable charcoal NAMA study will assess the value chain step by step, indicating the most relevant policies and discussing information and policy gaps. Part 3 will propose measures to improve the charcoal value chain, in ways that will help to decrease the deforestation which is plaguing the country. Part 4 will present a small-scale, short-term "Phase I" NAMA.

Part 2: Charcoal Value Chain Steps: Policies/Regulations and Policy & Information Gaps

The Charcoal Value Chain

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 7, these steps include both supply and demand components: forest management; carbonization; transport, distribution (including storage) and retail; and consumption.

Figure 9. Charcoal value chain



Having an unsustainable charcoal value chain is a problem faced not only by Côte d'Ivoire. Countries have tried different ways to address the chain or components of the value chain through initiatives such as banning charcoal production, as was done for a time in Mauritania and Kenya. However, for a number of reasons, an example of a fully sustainable charcoal value chain has yet to emerge. These factors, which apply to the majority of sub-Saharan African countries, including Côte d'Ivoire, are (Sepp, 2008b):

- 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 underpriced energy resource.

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

Sustainable Development Aspects of a Sustainable Charcoal NAMA

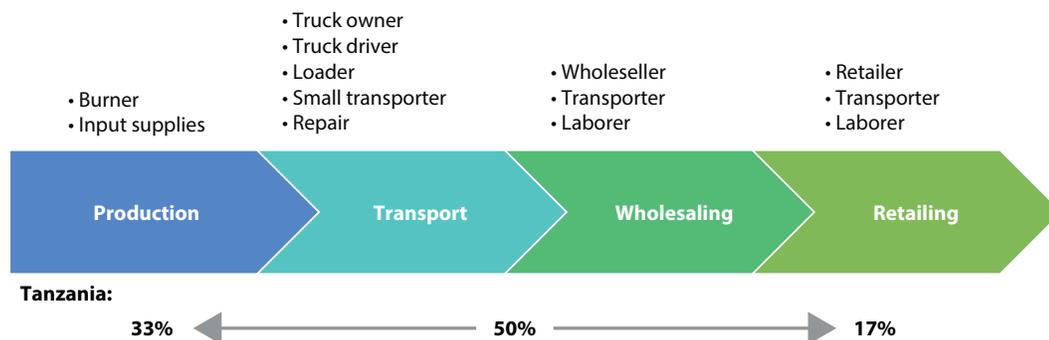
A sustainable charcoal NAMA will result in a number of sustainable development benefits, as mentioned below and depicted in Figure 10.

Economic Development

As was previously mentioned, charcoal production plays a significant role in the economy of most sub-Saharan African countries, including Côte d'Ivoire. The value chain provides numerous jobs at each step along the chain.

Although jobs are provided throughout the value chain, currently a large amount of the revenue goes to the value chain step connectors—middle-men, transporters and wholesalers—with very little going to charcoal producers. Figure 8 below shows the percentage of profits in each step of the charcoal value chain of another sub-Saharan country, Tanzania. A mere 33 percent of the profits accrued through the sale of charcoal go to the charcoal producers and suppliers of wood.

Figure 10. Profit Distribution along the 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 profit distribution. Furthermore, it will 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 income generating activities.

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 in society.

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

Aspects of the charcoal NAMA will also produce significant health benefits. Improved cookstoves and some efficient kilns generate 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 disease. A reduction in smoke generated will therefore improve the health of those exposed to the smoke.

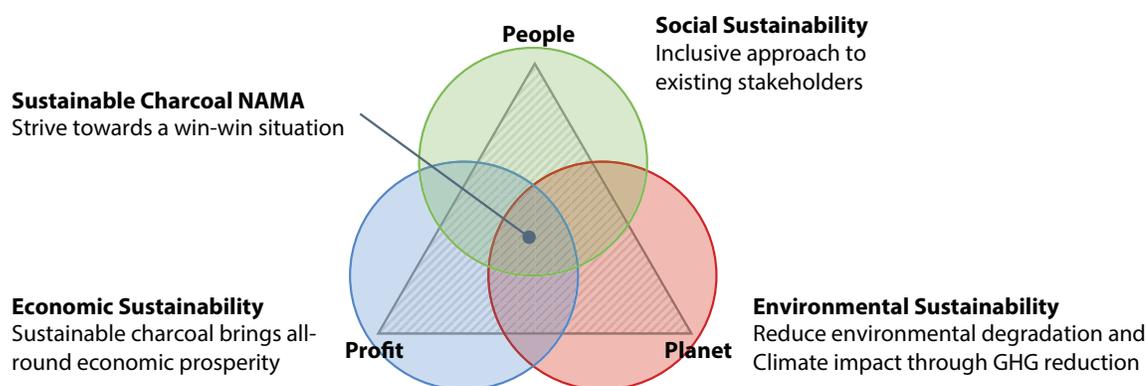
Environmental Development

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.

Emissions reductions

Reduction of deforestation, forest degradation, land degradation and soil erosion leads to a reduction of greenhouse gas (GHG) emissions through increased carbon storage in biomass and soils.

Figure 11. Sustainable development triangle arising from a sustainable charcoal NAMA



Charcoal Value Chain – Sectors

As with any economic activity, the charcoal value chain consists of the supply side and the demand side. The charcoal value chain consists of the following set of activities or steps:

- Supply side:
 - Procurement of biomass;
 - Carbonization of biomass;
 - Charcoal transportation, distribution and retail.
- Demand side:
 - Charcoal consumption.

The terms, “Procurement”, “Carbonization”, “Transportation, Distribution and Retail” and “Demand-side” are used to denote the individual charcoal value chain steps in the subsequent sections of this NAMA study. First, cross-sectoral issues will be mentioned. Second, each step will be detailed in an individual section. Within these stepwise sections, there will be a presentation of the relevant components of the policies, regulations and programmes which relate to this step; a gap analysis of gaps in information and policies; and policy recommendations.

Cross-sectoral issues

Cross-cutting activities can be divided into two main categories: formalization and decentralization.

Formalization

One of the key characteristics of the charcoal value chain is its informal nature. This informality is the result of a number of factors, the most important being either a lack of regulation in the value chain steps or regulation that lacks coherence, often giving rise to illegal activities. Illegal activities may be due to a lack of coherence, poor understanding or awareness of policies/regulations, to weak enforcement of regulations and/or to poor governance.

Producers have few incentives to comply with regulations and many disincentives not to comply with them, including the cost of obtaining a permit, the time it takes to gather the information for a permit; and time spent traveling to administrative offices to request permits. Furthermore, corruption is commonly present in charcoal value chains, hindering adequate governance and enforcement (Sepp, 2008a). Moreover, actors cannot be sure that obtaining an official permit will bring them less “unofficial tax levying” along the road and many officials do not have the desire to stop this profitable practice (Schure and others).

As will be seen throughout Part 2, Côte d’Ivoire has established or drafted many policies, regulations and programmes which address some of the issues surrounding the value chain. However, there clearly are pieces of the puzzle missing, preventing the value chain from functioning in an efficient and effective way:

- One of the missing pieces is the lack of a holistic viewpoint.
- Another is that the rights and obligations of all parties are either not clearly defined or, if they are defined, awareness is low. Information about rights and obligations of the value chain actors is not easily available but is scattered throughout various legal and policy documents⁷.
- The third missing piece is that enforcement remains a major issue, partly due to lack of motivation and lack of funds/capacity and partly due to corruption.

These issues are highlighted in a number of documents which have been written since the installation of the new government in 2011 and which aim at reforming the charcoal value chain steps. For example:

“Weaknesses/insufficiencies of the institutional framework at the forest and fauna sectoral level: lack of coordination and supervision of forestry policy; dysfunction of the general administration; loss of authority of the State; conflict of interest among administrative authorities” (Republic of Côte d’Ivoire Ministry of Water and Forests, 2012d).

⁷ The inaccessibility of documents was also a challenge in compiling this document. For that reason, the information it contains on policy and regulation may not be complete.

“Besides the direct drivers of deforestation, the indirect drivers are mostly due to poor governance (lack of clear legal structure, lack of enforcement, corruption and lack of transparency in resource allocation)” (FCPF and UN-REDD, 2013).

The transport sector has come to be characterized by “an evolution into informality, disorder, total anarchy and violence; a strong amplification of racketeering and corruption” (Republic of Côte d’Ivoire Ministry of Transport, 2014).

It is therefore widely acknowledged that a decade of political unrest resulted in a wealth of governance challenges across many sectors. The government recognizes that the elimination of corruption and the enforcement of good governance across all steps of the charcoal value chain are crucial.

Decentralization

Decentralization in Côte d’Ivoire began in earnest with the passing of a series of laws in 2001-2002, which provide the necessary framework to decentralize government activities to a department level. Municipal elections were held in 2002, enabling implementation of government activities to begin at a local, decentralized level. In 2003, further laws to facilitate the decentralization of activities were passed. Subsequently, further decrees in 2005 and 2006 increased the number of departments and municipalities.

Although laws and decrees on decentralization have been passed, the process of decentralization in Côte d’Ivoire still remains far from complete. Full transfer of power in accordance with the new laws has not occurred. Furthermore, financial and capacity resources at a local level are insufficient to deal with the transfer of powers which has nominally occurred (Aka, n.d.).

Procurement

As with any manufacturing process, the charcoal value chain starts with the procurement of raw materials, namely woody biomass and/or agricultural residues/waste. In Côte d’Ivoire, the majority of biomass used is obtained directly from the natural forest. The process of collecting raw material is carried out by the rural poor collecting fallen biomass from the forest, cutting off parts of trees or cutting down full trees.

The country also offers a significant volume of agriculture waste which could be used to produce charcoal or briquettes. On an annual basis, the country produces 120,000 toe from bagasse; 30,000 toe from sugar cane washing; 100,000 toe from palm fibre and shells; and 74,000 toe from coffee husks and shells and cocoa (Republic of Côte d’Ivoire Ministry of Environment and Sustainable Development and United Nations, 2012). A significant volume of waste from logging and carpentry is also available. Finally, waste from rice, coconuts, and the fish and meat industries is available (NOVIS GmbH, 2011). Further information about increased use of agricultural waste is provided in Part 3 of this study.

Figure 12: Clearing trees

Source: Chris de Bode / Panos Pictures

Relevance of Existing Policies, Regulations and Programmes

The most relevant policies, regulations and programmes covering the procurement of biomass were described in Part 1. The components of the policies, regulations and programmes which are most relevant for the procurement step of the charcoal value chain can be seen in Table 7.

Table 7. Policies, regulations and programmes relevant to the forestry step of the charcoal value chain

Policy/regulation/programme	Relevant components
Forestry Code	<ul style="list-style-type: none"> • Defines forest types • Defines rights of use of the different types of forest • State forests can be used to meet the country's wood needs for industrial and traditional use • In private and community forests, wood extraction is allowed for personal purposes and permits must be requested for commercial purposes • Defines fines for breaking the Forestry Code
Forestry Master Plan (1988-2015)	<p>Aims to:</p> <ul style="list-style-type: none"> • Ban logging above the 8th parallel • Increase the yield of forests • Develop and reforest classified forests • Address forest protection in rural areas

Policy/regulation/ programme	Relevant components
1st Forestry Sectoral Plan (1991-1996)	<p>Aims to:</p> <ul style="list-style-type: none"> • Maintain the productive exploitable potential of the Ivorian natural forest • Restore the forest cover, first by proceeding to the reforestation of woodland and savannah areas, and protect national parks • Develop and reforest the classified forests • Sustainably increase forestry yields • Improve the processing and commercialization of forestry resources.
Protected Areas Management Framework Project (PCGAP)	<ul style="list-style-type: none"> • Strengthens management of protected areas • Facilitates improved monitoring of protected areas
FLEGT	<ul style="list-style-type: none"> • Encourages enforcement of regulation
Decree Forbidding the Exportation of Unprocessed Wood Products	<ul style="list-style-type: none"> • Provides for the processing of wood locally which results in the production of wood residues for use in e.g. briquette production • May cause domestic timber prices to decrease, which often leads to decreased processing efficiency and increased deforestation (Geist and Lambin, 2001)
1966 Decree, amended in 1994, Regulating Timber Extraction, Woodworking, Wood Fuel and Charcoal	<ul style="list-style-type: none"> • States that logging permits are only granted to: wood factories, CSO groups of loggers, reputable individual loggers • Defines exploitation zones with a minimum of 25,000 ha
Integrated Management of Protected Areas in Côte d'Ivoire	<ul style="list-style-type: none"> • Aims to improve forest management practices allowing for more productive and better regulated forests
Law No. 98-750 of 23 December 1998 on Rural Land	<ul style="list-style-type: none"> • Allows for land ownership by individuals • Further decrees established procedures for claiming land and established that if rural forest land is not claimed, it is by default owned by the government
REDD+ Preparation	<ul style="list-style-type: none"> • Identifies causes and drivers of pressure on forests • Aims to establish a national forest baseline • Plans to develop a MRV system

Policy/regulation/ programme	Relevant components
Environment Code	Provides a legal basis to: <ul style="list-style-type: none"> • Protect soils, subsoils, landscapes, vegetation, fauna and flora, and especially classified areas, national parks and existing reserves • Create conditions for a rational and sustainable use of natural resources for present and future generations • Ensure the restoration of the degraded environment
National Environment Action Plan	Includes a programme of: <ul style="list-style-type: none"> • Diffusion of improved cookstoves • Promotion of formalization of the charcoal sector and improvement of charcoal production efficiency yields
National Study on the Opportunities and Strategies for a Transition to a Green Economy in Côte d'Ivoire	<ul style="list-style-type: none"> • Identifies opportunities of action to improve the forestry sector • Identifies opportunities for use of agricultural waste in cooking
Investment Code	<ul style="list-style-type: none"> • Promotes investment which encourages the green economy • Provides benefits such as reduction in import duties and value added tax for investments in energy production, protection of the environment, and the forestry sector

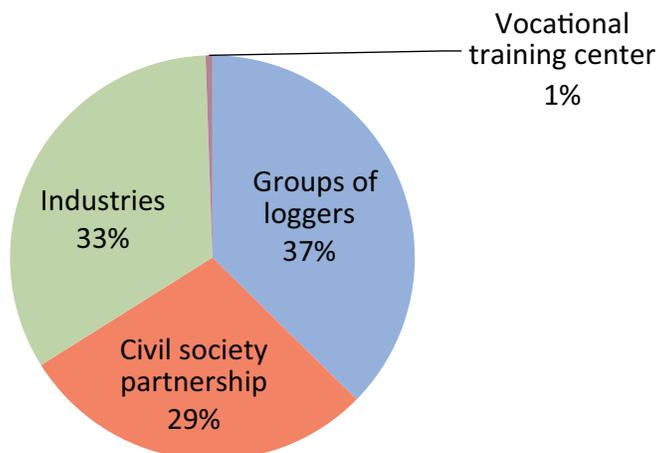
Although it is clear that there are many relevant policies and regulations, it is acknowledged that these policies do not adequately address the forestry component of the charcoal value chain: “The lack of state control over logging, the poorly understood and disorganized market for non-timber resources, inadequate investment in the forestry sector, the incomplete legal framework and unstable institutional framework are all obstacles that seriously hinder the effectiveness of...[the forestry] pillar of the green economy” (Republic of Côte d'Ivoire Ministry of Environment and Sustainable Development and United Nations, 2012). The Forest Police have oversight of the classified forests, while the OIPR oversees the national parks and forest reserves. Activities include monitoring of land clearing, forest fires, illegal logging and animal poaching. Although the Forest Police and OIPR are functioning bodies, they are faced with issues such as (Republic of Côte d'Ivoire Ministry of Water and Forests, 2012d):

- Lack of clarity about institutional structure;
- A disproportionate focus on enforcing the rules on logging at the expense of enforcing the rules on forest fires and reforestation;
- Weak penalties for illegal activities;
- Disregard of laws by some police officers, due to poor training and/or poor information flow; Inadequacy of resources.

Permits Required and Taxes and Fees to be Paid

There are four types of groups of forest operators permitted to log in the 384 forest concession areas. Figure 11 below shows the distribution of the logging permits granted to these four groups.

Figure 13. Distribution of Logging Permits by Type of Group



Source: Republic of Côte d'Ivoire Ministry of Water and Forests, 2011.

Decree No.94-368 of 1 July 1994, which modified Decree No. 66-421 of 15 September 1966, details what is required of a group or company requesting renewal of an annual logging permit. Among the documents required are (Republic of Côte d'Ivoire Ministry of Water and Forests, 2012e):

- Administrative documents of the logging group or company, including a tax payment receipt;
- Information about employees involved in logging;
- Approval document from the local government forest agency confirming that the wood factory operates properly and in compliance with the regulations;
- Details about the logging plot and the planned logging process approved by the local government forest agency;
- Certificate of reforestation;
- Report detailing the perimeters of the forest plot, as well as the species to be harvested.

If trees are to be logged in plantations, a different set of documents must be provided to register as a logger. These include (Republic of Côte d'Ivoire Ministry of Water and Forests, 2012a):

- Details about the plantation owner, confirmed in a letter from the local authorities;
- A contract between the owner and logger;
- The location and status of the plot;
- A technical study;
- A simple forest management plan;
- A letter from SODEFOR asserting that the plantation is outside a classified forest area.

If trees are logged for commercial purposes, further documentation and a fee are required for a commercial permit. Loggers must pay the taxes set out in Table 8:

Table 8. Forest taxes

Tax description	Unit	Tax (CFAF)	Paid to	Beneficiary
Attribution	ha	300	Directorate General of Taxes	State budget
Surface	ha	100	Directorate General of Taxes	State budget
General interest	ha	80	Treasury	70 percent is allocated to the municipality, 20 percent to the Ministry of Water and Forests and 10 percent to the committee monitoring the forest concessions
Reforestation (forest zone) for commercial wood only	m ³	1,200	Customs	State budget
Reforestation (pre-forest zone) for commercial wood only	m ³	2,000	Customs	State budget
Logging (category 1) ^a	m ³	2,500	SODEFOR	State budget
Logging (category 1)	m ³	1,700	SODEFOR	State budget
Logging (category 1)	m ³	400	SODEFOR	State budget

Source: ABCD Consulting, 2013

Gap analysis

Information gaps

In the procurement step of the charcoal value chain, there are crucial information gaps. First and foremost is the lack of consistent data about the forested area remaining in the country, as was previously mentioned, due to a lack of a clear definition of forest and the fact that the forest inventory has not been updated. Furthermore, as much biomass extraction is done clandestinely, there is no reliable information about the volume or rate of extraction.

There are also data gaps in regard to the amount of agricultural waste and wood residue. General estimates are available but better information will facilitate the use of the waste and residues as a feedstock.

Policy gaps

As was previously detailed, there are various policies addressing forest management, rights to extract wood and the procedures for issuing permits. However, these policies are not comprehensive, holistic or, in the light of continuing deforestation, effective. Weak enforcement of policies and poor governance are acknowledged as indirect causes of deforestation in Côte d'Ivoire (FCPF and UN-REDD, 2013).

A 2013 study on fiscal and para-fiscal measures in the forestry sector in Côte d'Ivoire describes the taxation-related problems in the sector (ABCD Consulting, 2013). The study highlights the lack of coordination among the various organizations involved in forest taxation (i.e. the Ministry of Water and Forests, the Directorate General of Taxation, and the Treasury). This poor coordination results in the three institutions not being aware of the taxes charged by their colleagues and, in at least one case, one tax being known by two different names. Therefore, coordination and alignment of policies and regulations are key problems within the forestry sector.

Carbonization

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

- **Preparation of the wood:** Once the wood has been cut and collected, it is often laid out in the open sun for drying and reducing the wood moisture content.
- **Preparation of the traditional earth pit or earth mound kiln:** The most common methods used for the carbonization process are the traditional earth mound or pit kiln. For an earth pit kiln, the process involves digging a pit, stacking the dried wood inside the pit and covering the wood with a layer of soil and grass to prevent direct contact with the air, and lighting the wood at one end. An earth mound made of wood stacked in a polygonal shape is covered with grass and soil and is lit.
- **Carbonization:** The wood is allowed to burn slowly (carbonize) under controlled conditions (i.e. lack of oxygen) allowing the wood to be converted to charcoal without getting burnt completely. This process can take 3-15 days (GIZ, 2014), depending on the moisture content of the wood and the evenness of the gas circulation (Food and Agriculture Organization, 1987). However the use of traditional earth mounds gives efficiencies as low as 8-15 percent (i.e. 85-92 percent of the wood gets burnt to ashes).
- **Cooling Period:** Once the combustion is complete, the kilns are allowed to cool down naturally or are cooled down with water before the charcoal can be placed in bags for transportation.

Existing Policy Overview

Existing carbonization related policies and their relevant components can be seen in Table 9.

Table 9. Policies, regulations and programmes relevant to the carbonization step of the charcoal value chain

Policy, regulation or programme	Relevant component
Decree No. 83-455 of 27 May 1983	<ul style="list-style-type: none"> • Provides details about the cutting of wood for charcoal production • Details requirements for charcoal production permits
Forestry Code	<ul style="list-style-type: none"> • Provides details about the use rights for different forest types
Investment code	<ul style="list-style-type: none"> • Promotes investment which encourages green economy • Provides benefits such as reduction in import duties and value added tax for investments in energy production, environmental protection, or in the forestry sector
Forestry Master Plan (1988-2015)	<ul style="list-style-type: none"> • Encourages the use of wood waste for charcoal production • Improves the on-the-ground monitoring of activities in forests • Encourages study of measures to supply charcoal from the forest area at a lower cost

Permits Required and Taxes and Fees to be Paid

In order to receive a permit to produce charcoal, producers must bring a folder of 10-13 documents to the Ministry of Water and Forests' headquarters in Abidjan. The folder's contents depend on whether charcoal is being produced within plantations or non-plantation forests. Decree No. 83-455 of 27 May 1983 establishes that, along with the required documents, charcoal producers must pay CFAF200,000. An additional fee of CFAF50,000 for an individual or CFAF100,000 for a company, enterprise or association is also required.

In addition to the fees required to acquire a charcoal production permit, a tax per bag of charcoal produced is sometimes required by the forest owners. This tax depends on the region but is approximately CFAF200-300 per bag produced.

Gap Analysis

Information gap

Due to its clandestine and informal nature, there is a large gap in information about charcoal production. Little is known about the number of charcoal producers. Furthermore, importantly, reliable information about the volume of charcoal produced is not available. The Ministry of Water and Forests' official statistics for legal charcoal production in 2011 is 77,920 tonnes. For the same year, the FAO estimates total (i.e. legal and illegal) charcoal production to have been 478,744 tonnes, a very large difference of 400,824 tonnes. Furthermore, the 1988 Forestry Master Plan estimated charcoal consumption at 256,000 tonnes (Côte d'Ivoire Ministry of Water and Forests, 1988), triple the Ministry's 2011 estimate of charcoal production. In order to properly address the issues surrounding charcoal production, better information about the producers and production is necessary. Information about the carbonization process is also lacking. There is an estimate of the average efficiency of the process (13 percent) but this number is 15 years old and may not reflect present reality.

Policy gap

Policy information about carbonization remains unclear. On the Ministry of Water and Forests website, the documents required for permits to cut wood for carbonization and to produce charcoal are clearly presented. However, the policy documents related to these permits are unclear, outdated and somewhat contradictory. In addition, although many of the forestry sector documents on the site mention charcoal production, these mentions are often brief and insignificant.

Charcoal Transportation, Distribution and Retail

The transport system in Côte d'Ivoire faces many challenges. It is known to face problems with disorder, delays in providing licences and permits, inefficiency, and corruption (Côte d'Ivoire Ministry of Transport, 2014). Therefore, eliminating these challenges is crucial to having a functioning transport component in the charcoal value chain.

Required Permits and Fees

In order to transport charcoal, a regular transport permit is required. No official fees are required. However, many unofficial "fees" are collected by enforcement officials on the route along which the charcoal is transported. These unofficial fees significantly increase the cost of transporting charcoal.

Gap Analysis

Information Gaps

Very little is known about the transportation of charcoal. As most charcoal is produced and transported illegally, there is a lack of systematic information about methods of charcoal transport. It is not known how much charcoal is transported in bulk, how much is mixed in with other cargo or how much is transported in small amounts.

Furthermore, it is not known how much in unofficial "fees" are paid along the charcoal's journey.

Policy Gaps

As was previously mentioned, there are many challenges within the transport sector. This is due to ineffective and incoherent policies and laws, as well as inefficient enforcement. These issues are then exacerbated by corruption and disregard for existing policies and laws.

Charcoal Consumption

Existing Charcoal Consumption Policies

The government's focus with regard to cooking fuels has been to promote the use of butane. However, a number of policies, regulations and programmes, summarized in Table 10 below, address the issue of charcoal consumption.

Table 10. Policies, regulations and programmes relating to charcoal consumption

Policy, regulation and programme	Relevant component
National Environment Action Plan	<ul style="list-style-type: none"> • Production and diffusion of improved cookstoves with a focus on the main cities of the country
National Study on the Opportunities and Strategies for a Transition to a Green Economy in Côte d'Ivoire	<ul style="list-style-type: none"> • Highlights the production and use of improved cookstoves as a way to generate green jobs and reduce biomass consumption
National Climate Change Programme	<ul style="list-style-type: none"> • Involves the completion of a sector GHG emissions inventory which should include residential emissions • Proposes the development of mitigation projects such as the energy-efficient use of biomass and the production of biochar
REDD+	<ul style="list-style-type: none"> • Promotes use of domestic and commercial (e.g. for smoking or baking bread) improved cookstoves
Programme for Investment in Energy Access Services	<ul style="list-style-type: none"> • Access to modern energy sources for cooking is one of the three main components • Provides quantitative targets for improved access to modern energy sources for cooking
Investment Code	<ul style="list-style-type: none"> • Promotes investment which encourages a green economy • Provides benefits such as reduction in import duties and value added tax for investments in energy production and environmental protection

Gap analysis

Information gaps

Information about charcoal consumption in Côte d'Ivoire remains limited. Sectoral mapping, such as that conducted under the Global Alliance for Clean Cookstoves (GACC) which sets out the following information, has not been carried out recently in Côte d'Ivoire:

- Cooking habits;
- Types of stoves 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.

Policy gaps

One significant policy gap is that cooking energy is not included in the Energy Strategic Development Plan 2011-2030. The Development Plan focuses exclusively on electricity production. This is a problematic oversight as cooking is a major energy need and 70 percent of households continue to depend on biomass for cooking.

Another gap is a lack of quantitative targets in the cooking sector. The Programme for Investment in Energy Access Services provides concrete targets, but targets have not been incorporated into government policies for the sector.

Part 3: Creating a Sustainable Charcoal Value Chain

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

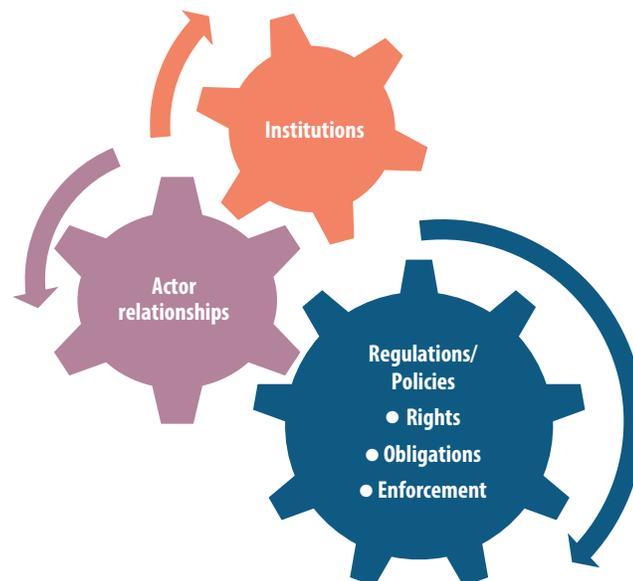
Cross-sectoral activities

Addressing cross-cutting issues is one of the defining elements of this NAMA study on a sustainable charcoal value chain. In Côte d'Ivoire, there are many 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

Formalization of the charcoal value chain requires establishing institutions, creating 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 Figure 12.

Figure 14. Components of formalizing the value chain

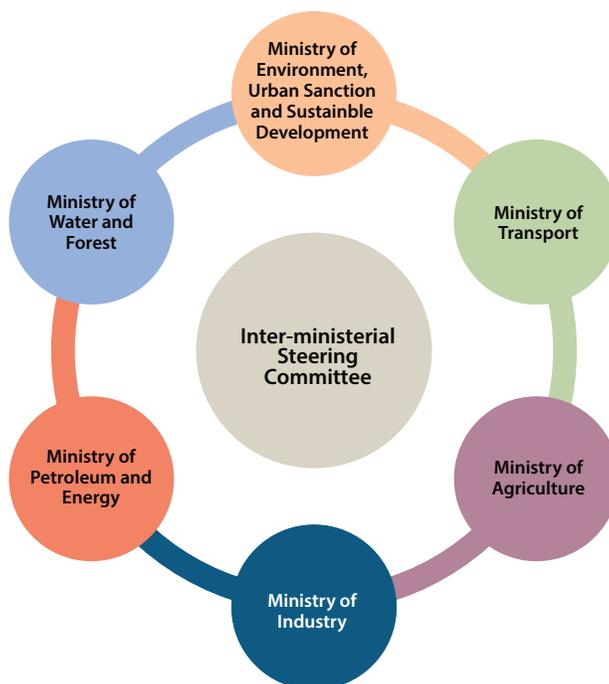


Institutions

Inter-ministerial Steering Committee

The establishment of an inter-ministerial steering committee to discuss coherent actions and strategies, leading to improvement of the charcoal value chain is of utmost importance for effective coordination. Forestry management is influenced by issues which fall under a number of ministries—the Ministry of Water and Forests; the Ministry of Environment and Sustainable Development; the Ministry of Petroleum and Energy; the Ministry of Agriculture; the Ministry of Industry; and the Ministry of Planning and Development—as well as their implementing agencies. 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 reconcile the ministries' different priorities is an essential first step to improved policy design and implementation. Under discussion within the Sustainable Development and a Green Economy Directorate, is the establishment of the Green Economy Inter-ministerial Steering Committee as seen in Figure 13. If established, this committee may serve as an appropriate forum for coordinating a sustainable charcoal value chain.

Figure 15: Possible Ministries included in an inter-ministerial steering committee



The Charcoal Unit

A Charcoal Unit is an institution whose creation is crucial to the holistic implementation of a charcoal NAMA. The unit could be based in the cross-sectoral Directorate of Green Economy⁸ under the Ministry of Environment, Urban Sanitation and Sustainable Development and should work in close coordination with the REDD+ team⁹, in the same

8 The Directorate of Green Economy is under the Directorate of Sustainable Development, which is within the Ministry of Environment, Urban Sanitation and Sustainable Development.

9 The REDD+ team is part of the National Climate Change Programme which is under the Directorate of the Environment, within the Ministry of Environment, Urban Sanitation and Sustainable Development.

ministry, as well as with the Ministry of Water and Forests. The Charcoal Unit will be responsible for coordinating and facilitating charcoal-related activities in the country, including acting as the NAMA coordinator, providing assistance, and managing the NAMA-related MRV. This unit will play the key role in ensuring that the sustainable charcoal value chain is looked at holistically. This will be done through a number of activities, as seen below.

- 1. 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 retains a compilation of information about the sector. This information will include quantitative data (e.g. area of forest, amount of charcoal produced, number of producers, amount and type of cookstoves used) as well as qualitative data (e.g. a mapping of all stakeholders in the value chain and their roles).
- 2. Promotion and awareness-raising:** The Charcoal Unit should promote the benefits of legal charcoal production and of green charcoal production among a variety of stakeholders including ministry employees; local government; charcoal producers; and transporters and consumers.

Promotional activities should include promoting the benefits of improving forest management; using improved kilns; improving 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 thoroughly understand all 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.

- 3. Eco-labelling:** The unit will be responsible for establishing and promoting an eco-labelling programme for black (conventional) and green (sustainable) charcoal. Thus:
 - i) The unit will develop standards for eco-labelling. The standards will set the levels of biomass management and carbonization efficiency necessary for charcoal to be considered “green”.
 - ii) The unit will establish an accreditation process to accredit auditors to verify the charcoal.
 - iii) The unit will also need to 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 labeled bags. A fixed number of these bags will be allocated to local governments. The local governments will then encourage existing private-sector stakeholders such as middle-men to bulk purchase these bags and sell them to charcoal producers. Pre-selling the bags by the local administration will mean that the charcoal revenue 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 transition these actors into a legal charcoal value chain. The type of bag used by producers will give a clear indication as to whether the charcoal has been 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.

- 4. MRV:** The Charcoal Unit will establish a MRV system to ensure that the bags are filled with the appropriate type of charcoal. Establishing and coordinating a thorough MRV system will constitute 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 the Forest Police and OIPR 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 as legal has actually been produced legally and that, for charcoal labelled as green, sustainable forest management is implemented at the biomass source and efficient kilns were used in its production.

5. **Market intelligence:** The Charcoal Unit can play a key role in improving the trade of charcoal 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.
6. **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.
7. **Stakeholder engagement:** The Charcoal Unit should help to organize stakeholder consultations and meetings at two levels, national and local. The national level stakeholders should include policymakers who should be brought together to discuss the problems and solutions regarding the charcoal value chain. The Charcoal Unit can help to coordinate meetings of the above-mentioned inter-governmental steering committee. At a local level, stakeholder engagement should include 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 to facilitate 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 effectively and will help to ensure coherence and alignment. It is expected that the Charcoal Unit’s activities will be partially funded through the national budget and partially funded by NAMA financing. A graphic summarizing the Charcoal Unit’s tasks can be seen in Figure 16.

Figure 16. The Charcoal Unit’s key tasks



The Charcoal Fund

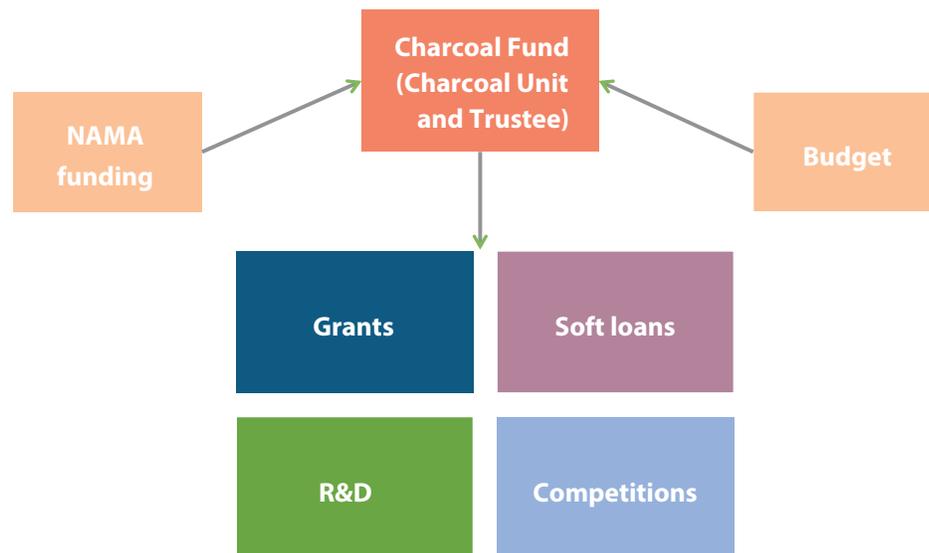
Financing for the Charcoal Unit's activities will come from the Charcoal Unit budget and a Charcoal Fund. The Charcoal Fund will receive significant NAMA funding. In conjunction with the NAMA funding, another, more sustainable source of funding can be taxes on illegal charcoal. This tax collection will be done by the Forest Police and OIPR, as will be detailed later in this section. Other para-fiscal taxes may also be allocated to the Charcoal Fund. The Charcoal Unit will play the role of fund coordinator and collaborate with a financial institution who will be the trustee of the Charcoal Fund. This trustee institution could be the state-owned Banque Nationale d'Investissement which manages national funds. Decisions regarding funding will be made by a board comprising representatives of the Charcoal Unit and the trustee.

The Charcoal Fund can provide various sources of financing in the sustainable charcoal sector. These may include:

- Grants to organizations, such as CSOs and private sector units, working on sustainable charcoal. These could be small seed grants, e.g. for one-time equipment purchase, or larger project grants, e.g. for helping fund CSO activities throughout the grant lifetime;
- Competitions such as for the best design of eco-labels;
- R&D in areas such as efficient kilns and forest management methods;
- Soft loans which provide benefits such as reduced interest rates, and extended grace periods and payback periods.

In the following sections, examples of activities that the Charcoal Fund could finance are mentioned. The design of the Charcoal Fund can be seen in Figure 15.

Figure 17. The Charcoal Fund: funding and outputs



Sectoral cooperatives

The majority of private-sector actors in the value chain work independently of each other. The formation of cooperatives 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, 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 situation on the ground and therefore has a higher chance of being successfully implemented and enforced.

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

Inter-actor relationships

Once institutions such as the Inter-ministerial Steering Committee, the Charcoal Unit and sectoral cooperatives are established, maintaining good relationships within and between the 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.

Governance

Good governance and proper enforcement are particularly important if a taxation system 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. The Forest Police and the OIPR are two actors who are crucial to improving enforcement. Ensuring good governance and giving an adequate mandate to these two organizations can significantly improve enforcement within classified forests, national parks and national reserves.

Together with improved enforcement and good governance, policies and regulations 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 simplified.

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. There is some evidence that formalization of the value chain is more likely to improve the situation for urban actors involved in the later steps of the value chain, such as transport and distribution (Schure and others). This should be kept in mind throughout the formalization process and initiatives should be put in place to assist rural actors.

Decentralization

In order to facilitate the formalization of a charcoal value chain, government services should be decentralized and brought down to an accessible local level. SODEFOR has established nine management centres, which allow for decentralization of the management of classified forests (SODEFOR, 2014a). The Ministry of Water and Forests

has devolved many activities to regional and departmental agencies, as well as limited activities to a municipality level. However, certain major activities are still centralized including the granting permits for logging and charcoal production, for which producers must travel to Abidjan. This requires actors to journey to Abidjan at least twice: once to request the permit and once to pick it up. Issuing permits locally will remove a challenge which may be discouraging actors who live in rural areas from requesting permits. Decentralizing the steps of the charcoal value chain will facilitate the formalization of the involvement of actors in the value chain.

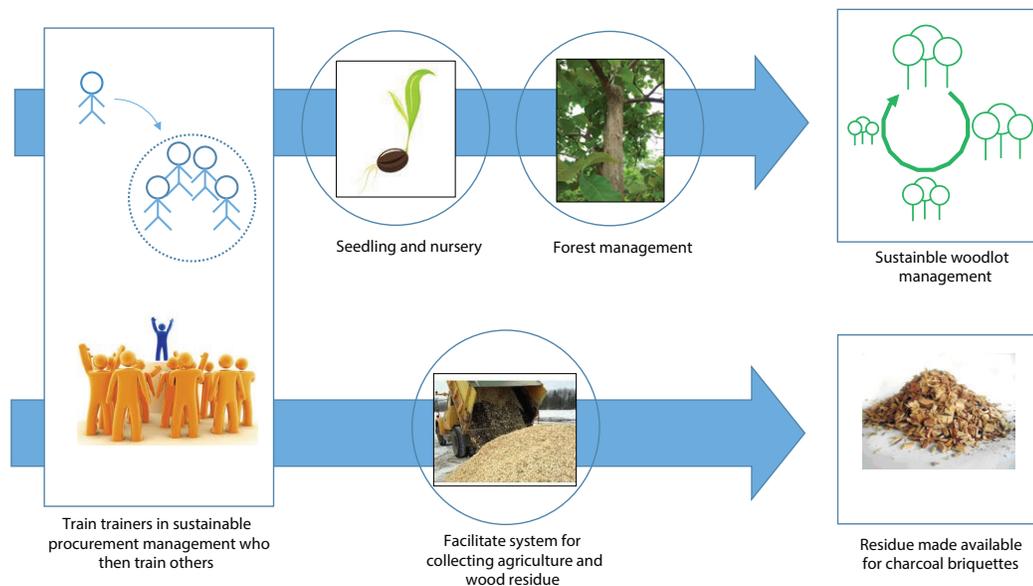
The charcoal value chain: ideal scenarios and required activities

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 is followed by the activities required to achieve these scenarios. These activities are divided into information-related activities, policy activities and capacity-building and technology transfer.

Procurement

The ideal procurement scenario is presented in Figure 18. The following sections will provide details about the activities in the scenario.

Figure 18. Ideal procurement scenario



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 properly evaluate the amount of forest and the amount of biomass waste available in the country for production of sustainable charcoal or briquettes, the following steps must be taken.

1. 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.
2. A **thorough forest inventory** will need to be completed; the last national inventory was done in 1979. The new inventory should clearly define the area of forests of all types in Côte d'Ivoire. This inventory will then serve as the baseline for all future forest activities in the country.
3. 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 successive years of using tools such as aerial photography, remote sensing and local biomass surveys will provide a fairly accurate picture of the rate of deforestation and degradation.
4. 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 various waste producers in various districts and by extrapolation.

Policy actions

Once the information gaps are filled, policies to ensure sustainable biomass management need to be established. The actions listed below are suggested to improve forestry policies in Côte d'Ivoire. Funding can come from NAMA funding or ministry budgets.

1. As previously mentioned, the establishment of a functional inter-ministerial committee is extremely important for coordination of the value chain. The CICPPF should be revitalized or the Green Economy Inter-ministerial Steering Committee established; the steering committee should then develop a clear strategy for charcoal policy coordination and management. A schedule of regular meetings should be established, with coordination assistance offered by the Charcoal Unit.
2. Forest management and issues in the country have evolved significantly since the 1965 Forestry Code was drafted. Therefore, the passing of a new Forestry Code is of the utmost importance, probably the top priority action that should be taken. This importance is understood at a national level, where a new Forestry Code has been drafted. However, at the time of writing of this report, the draft is not publicly available or approved, even after years of development. This new code should reflect the current forestry situation and issues in Côte d'Ivoire and clearly define matters such as:
 - What constitutes each type of forest in the country;
 - The definition of national forest;
 - Rules for the use of each forest type;
 - Rights and obligations of relevant stakeholders;
 - Management plans or procedures to establish management plans;
 - How sustainable forest management is to be incentivized/promoted;
 - The rules surrounding the extraction/production of both primary and secondary forest products;
 - Clear and appropriate punishments for violation of the code.
3. **Strengthening the Forest Police and the OIPR** will improve the enforcement and success of the new Forestry Code. Suggestions for strengthening these enforcement actors include (Republic of Côte d'Ivoire Ministry of Water and Forests, 2012d):

- Clarification of the institutional framework and schedule of interventions;
 - Capacity re-enforcement regarding both information and equipment;
 - Establishing an independent observer body;
 - Toughening the penalties for illegal forest activities.
4. **Forest taxation needs to be consolidated and aligned** within the relevant institutions charging the tax. This will require close coordination between the Ministry of Water and Forests, the Directorate General of Taxes and the Treasury. 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 clearly communicated to local level.
 5. 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 by SODEFOR or Ministry representatives. As previously mentioned, tax incentives can be provided for forest owners who develop and follow management plans.

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 the productivity of forests, providing more cubic metres of wood per hectare. A national level training programme for local officials of the Ministry of Water and Forests and SODEFOR or private-sector representatives** should be developed. This can be funded by the Ministry of Water and Forests, 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 pass on their knowledge at local level. Government employees should hold free training sessions, but private sector trainers can charge a fee for training other private-sector foresters, if there is demand for the training. The training will include aspects such as:

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

After 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.

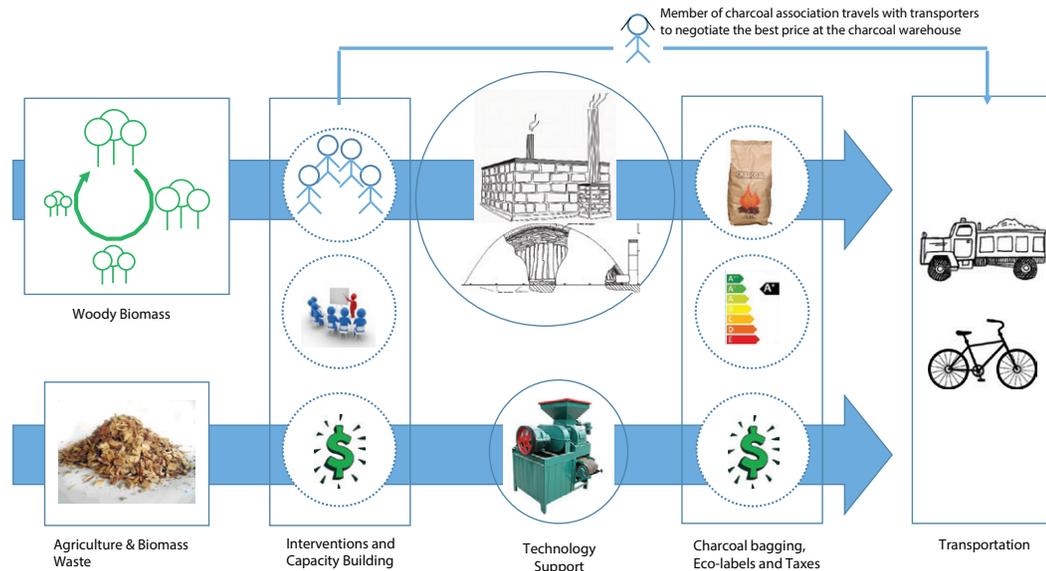
Training in the **acquisition and use of biomass waste**, such as agriculture and wood residues, should also be offered to entrepreneurs interested in the production of briquettes. This training will include:

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

Carbonization

Figure 19 depicts the ideal carbonization scenario and the following paragraphs detail the activities necessary to realize it.

Figure 19. Ideal carbonization scenario



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 (kg) of wood need 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;
- Volume of potential briquette market;
- Type of waste used in briquettes;
- Most appropriate briquette technology for the available waste;
- Institutions conducting research on the best composition of briquettes.

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, such as the Forestry Code, National Forestry Plan, 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.***

The ***Investment Code*** provides a number of incentives for investment in sectors that produce energy and secure and protect the environment. The effect of these incentives will be enhanced if a ***specific list of technologies to receive incentives is provided in an annex to the Investment Code.*** This list could, for instance, include chimneys (i.e. for Casamance kilns), material for biogas digesters, and equipment for briquette production.

Another ***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, checking labeled charcoal will need to be pursued vigorously by the Forest Police and OIPR.

As more charcoal producers acquire permits for charcoal production, a greater amount of tax will be provided to the municipalities. This ***tax should partially 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 lessen the amount of income tax paid by charcoal producers who produce charcoal 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 face 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.

Technology transfer and capacity-building

MRV by the Forest Police and OIPR 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 charcoalers and should be trained to use and be provided with the necessary equipment, such as Global Positioning System (GPS) devices which facilitate tracking.

Charcoal production has been and is still an informal sector, where charcoal is produced in rudimentary kilns. As already noted, the wood to charcoal conversion rate is highly inefficient. This could be improved through drying wood and the use of efficient kilns. Therefore, a nationwide programme to sensitize and train charcoal producers about how to improve the efficiency of carbonization should be established. Furthermore, training on 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 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 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 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 trialed 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. Table 11 provides a comparison of the main characteristics of charcoal kilns.

Table 11. Comparison of the main characteristics of charcoal kilns

Kiln Type	Capacity	Efficiency (%)	Unit Cost (\$)
Traditional earth mound kiln	Variable	10-25	Manual labour
Casamance kiln	Variable	25-30	200
Pit type kiln	3-30 m ³	30-35	Manual labour
Metal kiln—Mark V	300-400 kg	20-25	2,000-5,000
Metal kiln—Oil Drum (Portable)	12-15 kg	23-28	Low
Brick kiln	10-50 m ³	25-35	150 – 5,000
Masonry ‘Katugo’ kiln	70 m ³	25-30	8,000
Retort Kiln—Cornell	1-3 tonnes	22-33	40,000
Retort Kiln—Adam	1 tonne/week	30-35	1,000
Retort Kiln—Lambiotte	3,000-20,000 tonnes/y	30-35	0.5-2 million

Source: Nturanabo, Byamugisha and Preti, 2011.

There exists significant experience with the use of Casamance kilns in sub-Saharan Africa, particularly in West Africa and, to a lesser extent, with the use of 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 Côte d'Ivoire has an agriculture-based economy, it generates a significant volume of agriculture waste, as well as wood waste. Technologies which utilize biomass waste reduce emissions in two ways: 1) through a reduction in the use of wood and 2) through a reduction in the release of methane produced from inorganic decomposition. Further information about briquettes and a case study of Tassouma SARL is provided in Box 3.

Box 3. Tassouma briquettes case study

Briquette production: the case of Tassouma SARL

Briquettes are a wood or charcoal replacement which can be made directly from wood waste or agricultural waste. The waste is dried and then pressed into briquettes. The briquettes can be made into different sizes, depending on the type of use (i.e. industrial or residential).

Tassouma SARL

In Abidjan, Tassouma SARL, began producing briquettes in December 2013. The facility is making briquettes from wood waste and agricultural waste collected in the area. The facility has the capacity to produce 80,000 tonnes of briquettes per year, supplying both industrial and residential consumers. When running at full capacity, the facility will produce enough briquettes to preserve 4,800 ha of forest per year and reduce CO₂ emissions by over 100,000 tonnes per year (Tassouma Briquettes, 2014).



Briquettes ready for consumption

Source: Courtney Blodgett



Briquettes

Source: Courtney Blodgett

For more information, see <http://tassoumabriquettes.com/>

Charcoal Transportation, Distribution and Retail

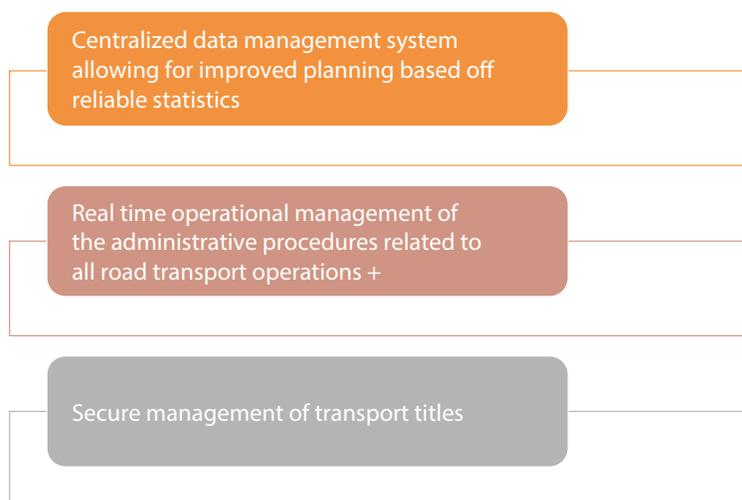
Information measures

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

Policy actions

The Ivorian Ministry of Transport has recognized that there is a need to reform the transport sector, to improve the transportation of all goods, including charcoal. Figure 18 below shows the three pillars of the proposed transport sector reform.

Figure 20. Pillars of transport sector reform



Source: Republic of Côte d'Ivoire Ministry of Transport, 2014.

To achieve these pillars, a number of actions need to be taken. They include (Republic of Côte d'Ivoire Ministry of Transport, 2014):

- *Revising policies* [to make them more coherent and enforceable];
- *Reforming the institutional framework*;
- Establishing a *database* in the Ministry of Transport;
- Constructing *new roads*;
- Facilitating the *professionalization* of transport-sector actors;
- Creating a *High Council of Transport Enterprises*;
- Creating a *transporters' association*;
- Creating a *National Authority for Regulation of Road Transport*.

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

- Professionalization of transport actors, increasing their 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.

Technology transfer and capacity-building

Technology transfer can occur in the cases of vehicles and charcoal depots. Currently, charcoal is often purchased by middle-men who then rent trucks, or use their own 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 regarding transportation and eliminate the need for middle-men. 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, middle-men 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 receive 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.

Charcoal Consumption

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

Information Measures

Sectoral mapping has been completed for a number of countries through the Global Alliance for Clean Cookstoves (GACC). Mapping of the cooking baseline could be done through the GACC or the West Africa Clean Cooking

Alliance (WACCA). This mapping will provide the baseline information for the NAMA (previously mentioned but repeated below for ease of reading) on:

- Cooking habits;
- Types of stoves 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 cost of available cookstoves.

Further in-depth baseline information will need to be collected. A baseline survey of 180 households was conducted in 2011 in Abobo, Abidjan for the Côte d'Ivoire and Cameroon Efficient Cookstoves Programme PoA (Envirofit International, Ltd, 2012). This **baseline household survey** could be expanded to include other areas.

Policy actions

In October 2012, the West Africa Clean Cooking Alliance (WACCA) was launched under the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). Côte d'Ivoire is an engaged member of the WACCA. The Alliance provides 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 Ivorian Bureau of Standards, which is a joint government and private sector led company.

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

The Investment Code provides a number of incentives for investment in sectors that produce energy and secure and protect the environment. As was previously mentioned, it will do even more for the sector if a specific list of technologies were provided in an annex to the Investment Code. The list could, for instance, include technologies such as improved cookstoves.

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 relevant sectors, in order to improve coordination and efficiency along the charcoal value chain in Côte d'Ivoire. Crucial to the success of the identified 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 activities can be financed at least partially 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: Sustainable Charcoal NAMA Phase I

Introduction

Part 3 of this report described the activities required to achieve a completely sustainable charcoal value chain. However, the cost of transforming the entire Ivorian 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, smaller-scale Phase I sustainable charcoal NAMA.

Phase I NAMA Activities

The Phase I NAMA is designed to have a short start-up period and low costs. The NAMA will consist of three components:

- Government activities;
- Private sector and CSO grant provision;
- Expanding the activities of a model CSO.

Government activities

As part of Phase I of the NAMA, the Charcoal Unit will be established. This unit can begin to implement the activities detailed in Part 3. The Charcoal Unit will serve as the coordinating entity for the NAMA. This will entail setting up an MRV system and coordinating national and international stakeholders involved in the NAMA. This includes coordinating the private sector and CSOs.

The Charcoal Unit should organize training for the private sector and the CSOs in sustainable charcoal. The training should be on topics such as: improved forest management; use of efficient kilns; how to set up cooperatives; and the sale of improved cookstoves. The Charcoal Unit can also help organizations to write business plans for sustainable charcoal operations. The Charcoal Unit should also design the guidelines of a grant programme to provide financing to private sector and CSOs (see next section).

In addition to encouraging private sector and CSO involvement, the Charcoal Unit will begin coordinating government entities. This includes initiating the movement to establish the inter-ministerial steering committee and arranging committee meetings. The Charcoal Unit will present the NAMA, as well as the guidelines to provide financing to the private sector and CSOs. Among the steering committee members, the Unit can facilitate discussions about the problems and potential solutions relevant to the charcoal value chain, particularly at a policy level. The Charcoal Unit can also use the committee meetings to explore how NAMA financing can assist at a policy level.

The Charcoal Unit will also begin the task of establishing baselines. This includes identifying and collecting available data, as well as identifying clear data gaps.

Phase I of the NAMA will include the recruitment of an international expert to build the capacity of the Charcoal Unit. The expert will be well-versed in NAMAs, as well as in the charcoal sector.

Grant provision to the private sector and CSOs

In Phase I, the Charcoal Fund will not yet be designed and implemented. Therefore, to facilitate private sector and CSO involvement in the sustainable charcoal value chain during Phase I, the Charcoal Unit will design an interim process to provide NAMA funds to the private sector and CSOs. The Charcoal Unit will create financing guidelines including information such as:

- Types of activities to be funded (priority should be given to organizations working on the charcoal value chain in a holistic manner);
- Criteria for organizations to be eligible to receive funds;
- Amount of funding available and disbursement schedules; MRV system requirements.

The guidelines should be made publicly available and a workshop to present the guidelines should be held. Following the workshop, a call for proposals should be made. The Charcoal Unit should then select organizations to receive funding. The funding can then be transferred directly from the NAMA financier to the selected organization, with the Charcoal Unit being kept up to date about the transfer. The Charcoal Unit will oversee the MRV of the grant funds and activities implemented with the funds, as reported by the grant recipient.

Expanding the activities of a model CSO

In Phase I of the NAMA, the engagement of private sector and CSOs is crucial for success. The engagement therefore must be facilitated in a number of ways. As mentioned previously, the Charcoal Unit should provide the private sector and CSOs with capacity-building and access to grants. The goal of the capacity-building and funding is to encourage the private sector and CSOs to establish sustainable charcoal businesses.

These businesses should be holistic: working in sustainable forest management; efficient charcoal production; efficient transport; and consumption of the charcoal in energy-saving stoves. In Côte d'Ivoire, there already exists one CSO, MALEBI, which produces sustainable charcoal in a holistic manner. At the start of Phase I, NAMA funds should be provided to MALEBI to enable it to further improve the efficiency of its value chain, scale-up activities and add the sale of improved cookstoves to its activities. MALEBI can then be used as a model organization, demonstrating the possibility of creating a sustainable charcoal organization. Further information about MALEBI can be seen in Box 4.

Box 4. MALEBI¹⁰ case study

MALEBI is a women's CSO which was established in 2004 and whose goal is to promote sustainable forest products, with a focus on charcoal. MALEBI is engaged in the entire charcoal value chain, promoting sustainability and job creation for women along every step. The chain starts with MALEBI having an agreement¹¹ with SODEFOR to assist in the forest management of the 4,500-ha Ahua Forest Reserve in Dimbokro; the partnership between MALEBI and SODEFOR was established in late 2011. MALEBI is able to use wood for charcoal production in exchange for reforesting 5 ha annually; MALEBI undertakes the reforestation with the engagement of community members. To produce charcoal, MALEBI uses four efficient industrial kilns which were designed by the Center of Development for Industrial Technolog (CPTI) in 2008. The carbonization and cooling process takes approximately five days. Following the cooling, MALEBI enlists community members to help with the removal of the charcoal from the kilns and the bagging of the charcoal. MALEBI then pays for the transport of the charcoal to its depot where it employs women to sell the charcoal.



Kissi Gnima Pélagie, Vice President of MALEBI, reforesting with cassia siamea



Delphine Logbochi Ahoussi, President of MALEBI, preparing sticks to support seedlings

¹⁰ MALEBI means "charcoal" in the local Adjoukrou language.

¹¹ MALEBI pays an annual fee for the logging permit.



Demonstration of an efficient industrial kiln



Retailing sustainable charcoal at MALEBI charcoal depot



Bagging of sustainable charcoal for transportation

Source: Courtney Blodgett

A summary of the activities of the Phase I NAMA can be seen in Figure 21. As seen below, NAMA finance will be distributed at three main points, the Charcoal Unit budget, grants to CSOs and the private sector, and to MALEBI, to fund activities which begin the transition to a sustainable charcoal value chain.

Figure 21. Phase I NAMA activities

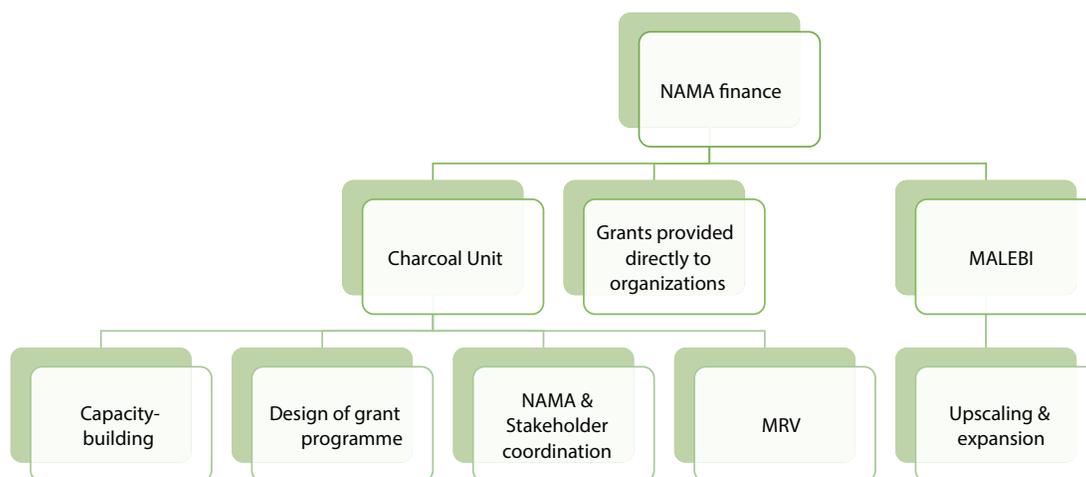


Table 12 provides a breakdown of costs by the three main components of the Phase I NAMA. All costs are rough estimates.

Table 12. Indicative Estimated Phase I NAMA costs

Budget component 1: Charcoal Unit	Total cost (US\$)	Year 1	Year 2	Year 3
NAMA Personnel				
Charcoal Unit				
Charcoal unit staff (2)	120,000	40,000	40,000	40,000
International expert	240,000	80,000	80,000	80,000
Capacity-building activities	40,000	20,000	10,000	10,000
Training for private sector/CSOs				
Charcoal Unit				
Technical training	70,000	30,000	20,000	20,000
Business management training	20,000	15,000	5,000	0

Budget component 1: Charcoal Unit	Total cost (US\$)	Year 1	Year 2	Year 3
Equipment				
Charcoal Unit				
Office IT equipment	6,000	4,000	1,000	1,000
Office supplies	7,500	2,500	2,500	2,500
Communication Costs	4,500	1,500	1,500	1,500
Travel				
Charcoal Uni				
International Missions	12,000	4,000	4,000	4,000
Miscellaneous				
Charcoal Unit				
Sundries	10,000	5,000	3,000	2,000
Total component 1				
Total	530,000	202,000	167,000	161,000

Budget component 2: Private sector/CSO grants	Total cost (US\$)	Year 1	Year 2	Year 3
Grants for private sector/CSOs				
Provided directly to organizations				
Grants for private sector/CSOs	275,000	75,000	100,000	100,000
Total component 1				
Total	275,000	75,000	100,000	100,000

Budget component 3: MALEBI	Total cost (US\$)	Year 1	Year 2	Year 3
NAMA Personnel				
MALEBI				
Leader salary	60,000	20,000	20,000	20,000
Staff 1 salary	15,000	5,000	5,000	5,000
Trainings				
MALEBI				
Improved logistics	10,000	5,000	5,000	0
Business management	15,000	5,000	5,000	5,000
Equipment				
MALEBI				
Kilns	24,000	18,000	6,000	0
Depots	20,000	12,500	5,000	2,500
Subsidy for improved	70,000	40,000	20,000	10,000
Travel				
MALEBI				
Transportation costs	12,000	4,000	4,000	4,000
International training missions	12,000	4,000	4,000	4,000
Car rental	6,000	2,000	2,000	2,000
Total component 1				
Total	244,000	115,500	76,000	52,500
Total Phase I NAMA costs				
Total component 1	530,000	202,000	167,000	161,000
Total component 2	275,000	75,000	100,000	100,000
Total component 3	244,000	115,500	76,000	52,500
Total Phase I NAMA costs	1,049,000	392,500	343,000	313,500

Conclusion

Côte d'Ivoire is a country that has been plagued by deforestation challenges since its independence in 1960. Commercial logging, extraction of biomass for household energy use and clearing of land for agricultural purposes, coupled with periods of political instability, have all contributed to the rapid rate of deforestation in the country. In a piecemeal and incoherent manner, policies, regulations and plans have been designed to attempt to alleviate the pressure on the nation's forests. Charcoal, one of the main fuel sources in the country, has often been overlooked in the country's deforestation prevention strategies due to the focus on 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 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 has considered not only the various steps of the charcoal value chain—procurement; carbonization; transportation, distribution and retail; and consumption—but also cross-sectoral issues such as formalization and decentralization. Existing national policies, regulations and plans were summarized and both the policy and information gaps were identified. Ideal scenarios for each stage 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 NAMA Phase I which is realistic and feasible to develop in the short term was presented.

Establishing a sustainable charcoal value chain is a daunting task. However, with a clear vision, efficient coordination and the encouragement that will come from the successful implementation of a NAMA Phase I, Côte d'Ivoire is capable of transforming its charcoal sector. This will decrease the pressure on the country's forest stock, thereby contributing to emissions reductions and the sustainable development of the country.

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