



stove+

A PROGRAM BY geres



CLEAN COOKING ENERGY IN COTE D'IVOIRE – *SITUATION & OUTLOOKS*

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Conduit par: StovePlus (www.stoveplus.org)

Elisha MOORE DELATE, Anne CALVEL, Olivier MUNOS, Simon BINEY,

Julien JACQUOT et Judith BEL (relecture)

Avec l'appui d'EMC

Alhi NGUESSAN

EXECUTIVE SUMMARY

1. Objective and methodology of the study

Following the profoundly troubled periods it has gone through over the last decade, Côte D'Ivoire has stepped up its efforts to revive economic development and provide its population with basic public services. It is now the second richest country in West Africa. The National Investment Programme for Access to Energy Services in Côte d'Ivoire (PNIASE-CI), drawn up in 2012, sets out the country's energy priorities: access to electricity, modern energy sources for cooking and, finally, diesel.

GERES (Group For the Environment, Renewable Energy and Solidarity) and ECREEE (ECOWAS Centre for Renewable Energy and Energy Efficiency), along with the WACCA (West African Clean Cooking Alliance) initiative, intend this study as a contribution to the PNIASE-CI. The aim is to give an overview of the current picture of supply and consumption of fuels and cooking appliances in Côte d'Ivoire. The study's findings and recommendations may be used to design measures to facilitate people's access to more modern products, as well as to reduce the negative impact of current practices on the environment and especially on forests, as well as household health.

This report is addressed to all players involved in supporting and developing the supply chains which produce and distribute cooking appliances and fuels in Côte d'Ivoire.

754 households were surveyed, in rural and urban areas, as well as 349 stakeholders in the sector: formal and informal entrepreneurs, institutions and CSOs/ISOs (95 qualitative interviews and 254 quantitative interviews).

With financial support from the French Global Environment Facility (FFEM) and ECREEE, this study was conducted by the programme team from StovePlus, a GERES initiative, in partnership with the ECREEE's WACCA initiative and CARE International. The EMC consultancy contributed to implementation of the study through collection and primary analysis of data and organization of feedback.

2. Detailed background

a. Agro-ecological and Environmental Profile

Côte d'Ivoire is located in the inter-tropical region and borders on the Gulf of Guinea. With a surface area of 320,462 km², the country is divided into three zones¹ : **Guinean** in the South, formerly covered by dense humid forest which is now seriously degraded, **Sudano-Guinean** transition in the centre and **Sudanian** in the North, with woody savannah and gallery forests, on relatively degraded land.

All the agro-ecological zones of Côte d'Ivoire are affected by significant environmental degradation. Deforestation not only makes agro-ecological systems more vulnerable, it also has a negative impact on the economic position, food security and health of rural households, as well as on people's access to energy.

b. Socio-economic profile

Côte d'Ivoire is the leading world exporter of cocoa, but oil has become the main export earner since 2006, accounting for 37% of total export revenue. With GDP per capita of US\$1646 in 2014², growth of around 9% per year since 2012 has helped to reduce poverty, but the rate is still high, especially in rural areas, currently standing at 46.3%³.

Côte d'Ivoire has 22.8 million inhabitants, 24.2% of whom are immigrants⁴. This multi-cultural mix is reflected in varied habits in terms of culinary practices, cooking utensils and the fuels used. Life expectancy is 51 years⁵, lower than in the other countries in the sub-region. Indoor air pollution due to the use of inefficient cooking appliances is the third most important risk factor for premature death⁶, causing more than 22,000 deaths per year⁷, mainly from respiratory infections.

c. Energy policies and institutions

Côte d'Ivoire has abundant energy potential, including hydropower, biomass, solar, oil, gas, etc. Biomass nevertheless remains the country's principal energy source, accounting for 73% of final

¹ HALLE & BRUZON (2006)

² World Development Indicators (data.worldbank.org)

³ Ibid.

⁴ PRSP 2009

⁵ World Development Indicators (data.worldbank.org)

⁶ GBD 2010 - <http://www.healthdata.org/>

⁷ <http://cleancookstoves.org/country-profiles/13-c-te-d-ivoire.html>

energy consumption.

Ivorian energy policy is based on three guiding principles: 1/ energy security, meeting growing demand and exporting energy as part of the regional integration process; 2/ guaranteed access to modern forms of energy for disadvantaged groups; and 3/ environmental preservation and the promotion of new and renewable energy sources and energy efficiency.

The lack of co-ordination between the various ministries involved, together with the shortage of financial and technical resources in the field of energy management, nevertheless makes for inefficient management of national energy resources. Institutional players have only relatively recently taken interest in the theme of cooking and they are few in number. Despite this, a genuinely dynamic process is under way, boosted by a favourable regional and international context.

3. Findings - Supply

a. The supply of cooking energy

A wide variety of fuels is used for cooking in Côte d'Ivoire: wood, charcoal, gas and electricity, as well as various organic residues, although this latter source is not yet exploited to any great extent. Urban waste that can be used to generate energy also plays an important part, with more than 600,000 tonnes of waste produced per year in Abidjan. The use of electricity as cooking energy so far remains marginal.

The Ivorian National Statistical Office, INS, estimates firewood consumption at 4.439 thousand tonnes for the year 2012. The firewood distribution chain is well organized, with producers (who cut and saw the wood), wholesalers (who take the wood to urban areas where they sell it wholesale) and retailers who sell the wood to individuals. Most firewood producers come under the informal sector and combine several activities, including agriculture.

Charcoal is one of the principal sources of domestic energy in Côte d'Ivoire, mainly in urban areas, and there are many links in the supply chain. It is primarily produced in the central and northern regions of the country. Because the vast majority of charcoal producers work on an informal or even illegal basis, it is more difficult to support the sector and encourage the adoption of techniques that are more efficient but require investment.

Due to the scarcity of literature and available statistics concerning the wood energy value chain (wood and charcoal), it is hard to estimate the environmental impact of gathering wood and felling trees to provide wood energy. Logging for export or timber represents a very large share of the use of wood in Côte d'Ivoire, while wood energy is often a by-product of clearance for agriculture or building.

There are several suppliers on the gas market, with similar distribution models: gas arrives by boat in Port Bouet, is transported by lorry or rail to the depots in Bouaké, bottled in returnable bottles at filling centres and then transported by road to the distributors and on to the wholesalers and retailers. The government subsidizes gas for domestic use (in the smallest containers) at a rate of around 50%, as well as transport costs, with a view to standardizing the price throughout the territory. Gas use is **rising sharply in urban areas** (it appears to be the main fuel used by almost 80% of the households surveyed in Abidjan and 28% of provincial urban households surveyed).

Exploitation of organic residues is still marginal, with the exception of the experience of a few agro-industries and the company **Tassouma briquettes**, which produces and markets sawdust-based briquettes.

The supply of energy services is still hampered by **transport problems**, especially the poor state of the roads and the informal taxes and other tolls collected along the way. This situation is acknowledged by the Ministry of Transport and mentioned in the NAMA (Nationally Appropriate Mitigation Actions)⁸ of Côte d'Ivoire.

b. The supply of cooking appliances

A range of hand-crafted stoves, enhanced with the products of initiatives in the sub-region and imported manufactured stoves

A wide range of stoves can be seen in Côte d'Ivoire, of uneven quality and durability.

Electric cooking appliances and gas cookers or hobs are mostly imported from Europe and Asia (China, transiting through Dubai).

The many different models of hand-crafted stoves, available as a result of the immigration of artisans from diverse traditions and the influence of successive projects and programmes, are produced by blacksmiths or metalworkers organized into small informal enterprises. Their products are sold locally to retailers or wholesalers and, to a lesser extent, street sellers or directly to households, at prices that usually vary between FCFA 1000 and 5000.

Enterprises such as **Sutra Fourneaux**, or more recently **Green Ker**, target larger scale production of metal stoves with ceramic inserts, alongside promotion/awareness-raising activities. The sale of imported, so-called "advanced", stoves gets no more than a passing mention.

⁸ 2014, Courtney Blodgett., UNDP, *Étude NAMA sur le charbon de bois durable en Côte d'Ivoire*, p.40

Identifying initiatives promoting/disseminating economical stoves

The study identified several initiatives aimed at disseminating low-energy stoves or ovens in Côte d'Ivoire. These include subsidized local initiatives, such as those launched by **CAPF** (*Centre d'Alphabétisation pour la Promotion de la Femme* [a centre for women's development and literacy]), **PEDF** (*Programme et Echo du Développement de la Femme* [a women's development programme]) or **CMATPHA** (*Coopérative des Mareyeuses et de Transformation des Produits Halieutique d'Abidjan* [a co-operative of women fish wholesalers and fishery products and processes in Abidjan]) in partnership with the **FAO** and the Ivorian **Ministry of Animal and Fishery Resources**.

MicroFEM (the Small Initiatives Programme of the French Global Environment Facility) has encouraged this kind of project, funding the work of 80 NGOs in disseminating improved stoves over the last 20 years.

The research community, through the **CNRA** (*Centre National de Recherche Agronomique* [Ivorian Agronomic Research Centre]), is also involved in this sector and carrying out performance testing of cooking stoves.

4. Findings in respect of demand

a. Analysis of household cooking practices

Although household size varies according to area (rural or urban) and socio-economic status, the majority of households (63%) have between four and 10 members, with an average of 7.5 people per household in urban areas and 9.5 in rural areas.

Whilst almost all the households in the survey sample have access to electricity in Abidjan, the rate of access falls in provincial towns and comes close to 50% on average in rural areas (a little lower in Daloa). Regarding access to running water, there are sharp variations according to social class in urban areas and weak access to water in rural areas, although the situation is better in the region of Bouaké.

Description of practices

Households use a variety of cooking techniques: boiling, frying, steaming, braising and roasting, to prepare **a wide variety of dishes**.

The dish most often cooked is **rice**, followed by dishes based on cassava or maize (*congodé*, *kabato*, *placali*, *attiéké*), and yams/bananas (*foutous* and *foufou*). The diet is more varied in towns and, generally speaking, diversity increases with socio-economic status.

In rural areas, it can be seen that most households do their cooking outside. The trend is

reversed in urban areas, although a not inconsiderable proportion of households, essentially from the less well-off social classes, cook outside.

Varied appliances and fuels with a sharp urban/rural divide

Widespread adoption of gas as the main fuel source can be seen in Abidjan, irrespective of social class, as opposed to the predominant use of wood in rural areas, with provincial urban areas in a state of transition as better-off households turn to gas. The chosen energy mix is based on three main fuels, wood, charcoal and gas (more than 80% of the households surveyed in Abidjan use at least two fuels).

Four main types of cooking appliances are seen, with the majority of households having two or three. The charcoal-burning **square popote** is found everywhere, especially urban areas. The **3-stone stove** is also found everywhere except Abidjan. It predominates in rural areas. In Bouaké, on the other hand, the most popular appliance is the **traditional earthen stove**. Although frequently found, the **burner with skirt** fixed onto gas bottles is used daily by only one third of users, except in Abidjan, where it is the appliance most commonly used on a daily basis.

Household expenditure on fuel purchases is heavily dependent on area (rural or urban), socio-economic status and the fuels used. The highest income earners spend the most on fuel (half of all households earning more than FCFA 350,000 per month spend more than FCFA 15,000 per month). Expenditure is much lower for poorer households (earning less than FCFA 50,000 per month), but takes up an average of one third of their income.

Perception of impacts on health and factors influencing purchasing decisions

Two-thirds of respondents feel safe with the stoves they use. The negative impacts tend to be attributed to fuels, by 70% of wood users, 50% of charcoal users and one third of gas users. A link can indeed be seen between the allergies and respiratory problems reported and the use of wood and charcoal.

Households are noticeably keen on turning to gas and electricity. The choice of cooking appliance is guided in every case first and foremost by quality and durability. In terms of marketing, word-of-mouth or advice from a friend or relative seem to be a major factor in decision-making, especially in the provinces, whereas households in Abidjan appear to be more influenced by advertising campaigns.

b. Analysis of productive and institutional users' practices

An informal productive environment with a preference for use of a single fuel

The 132 major consumers questioned are representative of the great variety of productive and institutional users, in terms of both activity and size. The type of activity has a strong influence on the fuels used. Wood is the main fuel used to smoke fish and prepare *attiéké*, although some processors in Abidjan now use gas. It is also widely used in institutional catering and bakeries. Amongst street food sellers, the mix of fuels is more varied, with a significant proportion using charcoal as their main fuel, whereas formal restaurant owners mainly use gas. The micro-industries surveyed (soap-makers and dyers) stand out in making significant use of agricultural residues or plastic waste. As in the case of households, gas rather than wood is most commonly used in Abidjan.

A clear desire to change fuel and above all save energy

Users of wood (institutional catering, micro-businesses) are keen to change fuel, with the exception of women engaged in smoking fish, who feel they need the wood-smoke. Current gas and electricity users are very satisfied with their main fuel.

It is noticeable that fuel purchases by the smallest businesses (production costs below FCFA 100,000/month) account for a significantly higher percentage (around 30% on average) of their production costs. The rate goes down to 10% for very large businesses. The need to save fuel is a common concern.

Varied cooking appliances, method of acquisition and selection criteria

According to the surveys, the majority of formal catering outlets have specialist equipment, usually gas-fired (stoves, gas cookers, ovens, etc.). For activities requiring large volume pots, such as canteens, soap production, preparation of *attiéké* or dyeing, there is not much specific modern equipment and users generally really rely on 3-stone stoves or basic trivets.

Smaller users, particularly street food sellers, use a great variety of appliances, mostly metal *popotes* or self-built portable stoves (metal pans, etc.).

The great majority of cooking appliances are purchased for cash or self-built (3-stone stoves and barbecues). The only ones purchased on credit are bakery ovens or charcoal grills. For the great majority of respondents, durability and quality are the prime factor in choosing appliances.

Perceived impacts on health

Overall, there seem to be very few efficient stoves available that are suited to productive and institutional activities, although some large users have begun to cook with gas.

This situation has an extremely negative effect on health in certain sectors, especially fish smoking and institutional catering, where the great majority of operators say they burn

themselves frequently and/or suffer from respiratory problems, allergies or asthma.

5. Conclusions and Recommendations

a. Fuels

Increase wood energy resources, by promoting reforestation activities, especially with fast-growing species such as acacia, through replanting and set-aside. Pilot replanting and sustainable forest management projects could be set up in priority areas..

Improve the efficiency of carbonization techniques

As regards charcoal production, priority should be given to improving carbonization techniques through the adoption of efficient kilns. The quantity of charcoal produced from the same quantity of wood can in fact be increased by 20 to 30%. Technical training in the construction and use of these improved techniques will be needed, but real change will only be possible if support is provided throughout the value chain, as has been done by the GIZ project in the San Pedro region. To put artisans in a position to invest in improved techniques, charcoal production needs to be a recognized activity and put on a secure footing, as well as subject to appropriate regulation. These recommendations overlap to a large extent with those of the NAMA Charcoal study, which may be consulted for further details.

Foster better understanding and use of the potential of organic residues

An important precondition for rational planning of the use of organic residues is an in-depth study which 1/ describes all the organic residues available; 2/ evaluates and maps sources in farming areas as well as from the food-processing sector; 3/ studies their current agricultural use (composting, soil improvement, etc.) and likely competition with the energy sector; and 4/ examines the opportunities for compacting and standardization to make optimum use of the energy.

Facilitate access to gas

The high initial cost of bottles of gas is a barrier to household adoption of gas. Lowering the price of the bottles, for example by lowering import duty or offering smaller containers, could help to increase take-up by low-income households, especially in rural areas. Wider dissemination of information on the system of returnable bottles, which can be taken back to the depot and therefore considered as a saving, could also facilitate purchase.

To ensure safe use of natural gas, the introduction of standardized, efficient, safe burners is

recommended. ECREEE is working on the adoption of standards at ECOWAS level.

d. Appliances

In rural areas, it will take at least another generation before households move over to gas, due to the cost of gas in comparison with wood, gas supply difficulties in isolated places and long-standing habits of cooking with wood. We suggest working in areas where earthen stoves predominate, providing support for self-building to improve those stoves. At the same time, in these areas and those where hand-crafted metal stoves are more common, rocket-type wood-burning stoves should be introduced. Charcoal-burning stoves of the Tika or Soutra type could still make much more headway in the market, amongst urban households as well as street food sellers. Gasifiers, very clean but expensive biomass-fuelled stoves, could also be an attractive solution for upper-class rural households, provincial urban households and the middle and lower classes in Abidjan, although the availability of appropriate fuel (dry and graded) would have to be checked.

In urban areas and Abidjan in particular, households mostly use gas. Work on the safety, security and accessibility of gas still needs to be done. Meanwhile, huge quantities of wood and charcoal are presently being consumed by productive users, especially in activities such as fish smoking; the production of *attiéké* and soap; dyeing; and charcoal grilling of meat. Very few efficient and affordable appliances suited to these activities are available, whereas their introduction could have a very significant impact. Specific studies of each study should be conducted, in order to measure their consumption and identify appropriate technology and ways of facilitating its dissemination.