

# Energy Transition and Challenges of Bakeries' Cooking Choices in Abidjan, Côte D'Ivoire

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# Abstract

## Background

Heavy dependence on firewood, associated with the demographic factor, logging, agricultural expansion and the repercussions of political instability are presented as factors of deforestation and forest degradation in Côte d'Ivoire. Faced with this situation, the country has been striving for many years to put in place a policy favorable

to the protection of the environment through the promotion of alternative energy sources to firewood. However, observations are emerging in the field of bakery activity and call into question the social logic of the choice of baking energy. The bakery sector is presented as one of the main contributors to the erosion in the capital forest of the country because of its propensity to use firewood for cooking. Despite the policy of using butane and the tendency to promote "clean" energy at State level, fuelwood is by far the most widely used fuel in Abidjan. Until now, the social determinants of the continued use of firewood in these bakeries have rarely been considered.

## Method

This study used a qualitative approach and the main data collection techniques used were semi-structured interviews, observation, and literature. Different interview guides were sent to two types of actors such as state and non-state actors. At the state level, sampled actors was determined through "snowball" sampling technique. Thematic content analysis was the technique used to analyze the data collected from interview guides.

## Result

Energy transition in the subsector of bakery in Abidjan is hindered by the plurality of actors and the lack of clarity in the energy governance led to the higher consumption of firewood and other practices developed around bread production.

## Conclusion

Three elements which structure the adoption of clean energies in bakeries in Abidjan which are the multi-level political willingness of the State and its long-term bilateral and multilateral partners, the immediate social pressure linked to the wood resource and the availability of infrastructures

## 1. Background

Energy issues are increasingly at the forefront of several events and are at the heart of development policies at the beginning of the 21st century. Indeed, recognizing the crucial role that energy plays in sustainable development, the United Nations General Assembly has proclaimed 2012 as the International Year of Sustainable Energy for All by setting targets. This was done in the intention to improv, on the one hand, access to modern energy services and, on the other hand, energy efficiency in all sectors of economic activity and further develop the use of renewable energy. With the International Year of Sustainable Energy for All, new objectives have been defined, including universal access to energy, doubling energy efficiency actions, and doubling the share of renewable energies in the energy mix. While these issues particularly affect developing countries due to the population growth and the use of forest resources which constitute the main source of energy. Most of the population of these countries derives their energy from wood resources [1].

On the researchers' side, the energy issue has given rise to reflections at the international, regional, and national levels. This question crosses the social sciences in general and sociology. It materializes through the organization of conferences on the issue such as the first and second international days of Sociology of Energy. Prior to this, there was the organization of the multidisciplinary colloquium in Nantes by the Société d'Écologie Humaine in August 2007 on the theme "Energy and Society: Science, Governance and Uses". The African Development Bank (ADB) and its partners organized an Energy Week from Monday 14 to Friday 18 September 2015 in Abidjan. In the program were presentations and brainstorming sessions were on

the development of the energy sector in Africa, namely lighting, electricity supply and the development of the huge energy potential of the continent were at the center of discussions. In addition, in 2015, an international conference on the green economy in Francophone Africa was organized in Tunis (Tunisia) around actions in favour of the green economy in West Africa. At the ECOWAS-GFSE High Level Forum on Energy held in October 2012 in Accra, Ghana, the Energy Ministers of the Economic Community of West African States (ECOWAS) adopted two Regional Policies on Renewable Energy and Energy Efficiency and the ECOWAS Bioenergy Strategic Framework. These policies and strategies provide the framework for actions to promote efficiency in the exploitation and use of modern cooking fuels. To make "safe" fuels available to the population in the ECOWAS region by 2030. This objective was the focus of the West African Clean Cooking Alliance (WACCA) regional workshop held in Ouagadougou in 2013 with proposals such as the use of modern biofuels such as ethanol, biogas and briquettes, the supply of energy for safe, sustainable, and affordable cooking. Similarly the study from the Groupe Energies Renouvelables, Environnement et Solidarités (GERES) led by StovePlus in Côte d'Ivoire follows the waves to express challenge of clean cooking energy.

The issue of renewable energy and the preservation of ecosystems related to urban livelihood activities in developing countries is at the heart of the energy transition policy agenda[2]. Sub-Saharan Africa then faces a pronounced energy divide. More than 65% of the population still has no access to electricity and more than 80% use traditional fuels (wood, charcoal) for cooking [3,1] In sub-Saharan African countries, the energy supply of households, artisanal structures and, more generally, processing units promoting economic development, is based on biomass and remains unsecured in the medium term, of low quality, intended for polluting and inefficient equipment [5].

Deforestation accounts for about 20% of global CO<sub>2</sub> emissions. Indeed, forests, especially when trees are growing, can constitute "carbon sinks" eliminating CO<sub>2</sub> from the atmosphere. Their degradation or deforestation contributes to reduce carbon storage while sustainable management, planting and rehabilitation of forests promotes carbon sequestration [1]. Côte d'Ivoire is no exempted to this dynamic with its forest capital declining at an accelerated rate since its independence in 1960. Thus, from 16 million hectares at the beginning of the last century, dense rainforest increased to 9 million hectares in 1965 and 3 million hectares in 1991. This evolution in dense forest shows the extent of deforestation in Côte d'Ivoire where nearly 84% of the forest cover of the 1960s was lost in 2000. Of the 16 million hectares of forest inventoried in 1960, only 2.1 million remain, i.e. 8% of the total area[6] . This translates into a deforestation rate of 250,000 hectares per year, with reforestation estimated at 5,000 hectares per year. In fact, the Ivorian wood resource, more than 600,000 tonnes are consumed annually as firewood, 50% of which is consumed by the city of Abidjan alone[7] . Households use it for cooking with traditional inefficient stoves. Access to energy for productive uses remains limited. According to a study conducted by StovePlus in 2015, final energy consumption shows a predominance of biomass with 73%, followed by petroleum products 21%, electricity 5.3% and gas 1.7%. Previous studies have addressed the issue of energy at the household level and do not shed enough light on the logics of the different actors. Particularly, no mention is made of bakeries, which are major consumers of energy.

Thus, research on combustible energies is justified by their importance and by the topicality of the phenomenon in Côte d'Ivoire where the question of the environment is acutely raised by the degradation of the state of the Ivorian forest cover. This study is part of an exploration of the energy question in general and the determinants of the choice of baking energy, mainly in the so-called modern bakeries in Abidjan. It is of interest to the various players involved, their practices and their representations. Such an angle of study finds all its relevance in the very fact that the environment is a social issue; to better understand environmental problems, they must be treated as social problems [8].

## 1.1 Study specific introduction

Regard to the increased deforestation, the Ivorian government has initiated a policy of promoting butane gas to substitute wood energy for consumer fuel in urban areas, particularly in Abidjan. This policy of "butanization" has been intensified since 1993 by the National Oil Company of Côte d'Ivoire (PETROCI) and targets all actors who use wood energy in the exercise of their various activities. The objective of this policy is to gradually replace wood and charcoal by butane gas and to improve the use of clean cookings techniques. Thus, research on fuel energy is justified by its importance and the topicality of the

phenomenon in Côte d'Ivoire where the question of the environment is acutely raised by the degradation of the state of the Ivorian forest cover. This study starts by exploring of the energy issue in general and the determinants of the choice of baking energy, mainly in the so-called modern bakeries of Abidjan. To this end, the first observation is linked to the use of fuelwood as the main source of combustible energy in the city of Abidjan despite the initiatives of the State on the risk forest capital faced. In 2010, the FAO pointed out that bakeries consume a significant amount of firewood for baking bread, with a daily average of 157 kg of firewood per bakery per day[4].

In addition, there are different choices of baking energy at the communal level and in the classifications of bakery activity, particularly in the category of "modern" bakeries in Abidjan. Although policies were made to reduce pressure on forest cover by encouraging the use of alternative forms of energy, it appears that many bakeries continue to use firewood for baking bread. Despite public policies to switch from so-called traditional energy sources (firewood) to so-called "modern" ones, there are differentiated choices within these bakeries, a majority of which still use firewood. We observe a reproduction of informal practices in the bakeries despite the official policy in place which favors an energy transition in Côte d'Ivoire. In this respect, what are the factors that determine the choice of bakery energy in Abidjan?

The main objective of this study is to analyze the determinants of the choice of baking energies in bakeries in Abidjan.

The research question is relied on the political ecology approach[9] which has been adopted as a theoretical framework to identify the political, economic and environmental factors that influence the adoption of non-wood energy. In this respect, three elements appear to be structuring the adoption of clean energy by bread-making units in Abidjan. The first element concerns a political will at several levels on the part of the State and its bilateral and multilateral partners over the long term. The second element is social pressure in relation to wood resources and the third element is the availability of infrastructure, including guaranteed access to alternative energies and their installations in the public domain. This approach highlights how poverty, inequality and access to resources are constraints on the energy consumption of Abidjan's bakers.

## **2. Methodology**

### **2.1 Setting and characteristics of study participants**

This study conducted in Abidjan (Côte d'Ivoire) on qualitative approach. The main data collection techniques used are semi-directive interviews and observation and literature. Documentary research was of great importance in this study as it allowed the indexing of reports and energy policies both at the national and international levels. Thus, secondary data was mainly derived from the analysis and review of relevant articles and books, national newspapers that have repeatedly raised the issues of deforestation and cooking energy, reports of previous studies, reports of ministries' activities (laws, decrees, and orders).

The various interview guides were sent to two types of actors. These are the state actors, namely the Ministry of Trade, the Ministry of Water and Forestry, the Ministry of Mines and Energy, SODEFOR and the municipal authorities. These different choices were motivated by the place and role that each institution has played or continues to play in public energy policies and in the choice of fuels in bakeries.

The Ministry of Commerce, Handicrafts and SME Promotion was chosen because the bakery sector is part of the SME sector. To this end, the sector is organized and supervise by this ministry. It is this ministry that elaborates the different texts concerning the sector.

The Ministry of Water and Forests was chosen because it oversees all that concerns the preservation of forest covering and the issuing of permission for forest products exploitation. Permission for the exploitation of secondary forest products is issued by its service in charge of secondary products.

As far as the Ministry of Mines and Energy is concerned, principally the Energy Department, it is this department that oversees energy in general and of combustible energy in particular that is the subject of this study.

As for SODEFOR, its role is to enrich and enhance the national forest heritage, to develop forestry production, to add value to forest products and to safeguard forest areas and their ecosystems. It is also in charge of marketing secondary products including fuelwood which is one of the fuels used for baking bread in bakeries. For the Town Hall, the choice of the Hygiene and Environment Department is linked to its role of controlling the bakeries in the commune.

Then the non-state actors composed of bakers, bakery owners, bakery managers and bakery employees. This category is composed of three sub-groups which are the bakers' union, the bakers, and the bakery chain. The first subgroup is the bakers' unions while.

The second subgroup is composed of the bakers themselves. At this level, they are bakers, bakery owners, bakery managers, and bakery clerks. And the third is the bakery chain.

## 2.2 Participant selection criteria

The sample of state level actors was determined by using the "snowball" sampling technique, which is based on a reasoned choice. Snowball sampling is a non-probabilistic sampling method in which first selects a (specific) person, then - through this person - one obtains a list of people who have the same characteristics as the people initially selected, and so on. Respondent-based sampling uses a modified snowball sampling method to recruit research participants[10]. Snowball sampling, also known as reputation sampling, relies on the personal relationships of respondents to gather information about other potential respondents[11]. Interviews were conducted either with those directly responsible for the facilities or with individuals designated by the facilities. Entry into these structures was by way of academic letters (letters signed by the research director). The interest of snowball sampling is that it makes it possible to determine the first level of contacts which then make it possible to reveal and follow other actors. Often reserved for special populations composed of experts more generally individuals whose identification is difficult and/or who possess particularly rare characteristics. Populations that are often small, specialized engineers, artisans. This method consists of having the sample constructed by the individuals themselves. It is sufficient to identify a small number of them, one may suffice and ask them to bring in other individuals with the same knowledge and/or characteristics as themselves. As for the trade unions, the first leaders were interviewed. These were the presidents of the two unions. As for the bakery chain, the person in charge of baking energy and quality was the appropriate actor to answer the various questions. In addition, the single-case sampling technique of micro social units was used for the bakers.

In the context of this study, the appropriate sampling is the "single case" sampling. This is the construction of the sample from a geographic or institutional setting. This type of sample is best suited for this research. Thus, the environmental, geographic, or institutional sample was selected. A "milieu" was chosen as the working universe for the constitution of the empirical corpus, for example: an area of the city[12], a psychiatric hospital, a suburb, and so on. The universe of work presents itself to the analyst in a non-split manner and as being susceptible to apprehension. The milieu sample does not necessarily require that all observations be made in a single location, but simply that they be treated as relating globally to the same milieu[13]. The universe chosen is the city of Abidjan. The bakeries visited are all modern bakeries in the different communes of Abidjan. Thus, the bakery owners, bakers, clerks, and bakery managers were the ones interviewed because they were in the best position to provide information on the mechanisms for using baking energy in the bakeries, perceptions of the activity, and the meaning given to the use of these fuels.

## 3. Results And Discussion

### 3.1 Governance of energy in Côte d'Ivoire: a fragmented regulatory space

Côte d'Ivoire try to cope with global and local standards in energy governance. International initiatives thus provide the impetus for the deployment of national governance. The scaling up renewable energy initiative in West Africa is an example[14].

Public policies of energy are embedded in different regulatory frameworks, including forestry, climate or environmental policies. Each policy is driven by groups of actors with different objectives. For instance, formal energy governance in Côte d'Ivoire involves six ministries. These ministries are directly or indirectly involved in biomass management, promotion of energy and renewable energy.

There is also the Ministry of Petroleum, Energy and Renewable Energies and its separate procedures. This Ministry is responsible for the implementation and monitoring of the Government's policy on mining, oil, and energy. This ministry implements the Government policy of energy saving and promotion of renewable energies in link with the Minister in charge of Environment and the Minister of Water and Forestry.

Moreover, there are four types of energy fuels for bakery ovens, namely wood energy, gas, diesel and electricity. But the different energy sources used in bakeries in Côte d'Ivoire are wood energy, gas and diesel. None of the bakeries visited use electric ovens as shown in the following table.

Energy	Number of bakery	Frequency %
Electricity	0	0
Firewood	98	49
Gas	89	45,5
Diesel fuel	13	6,5
Total	200	100

## Proportion of fuel energy used by bakers in four districts of Abidjan

The Minister of Commerce is responsible for the implementation and monitoring of the Government's trade policy with commercial logic and integration. The bakery sector is regulated by the Ministry of Commerce. The decree N ° 619 / MCAPME / MSLS / MINESUDD of December 17, 2014 declaration required the opening, the installation and the extension of bakeries. Here are some provisions of this decree:

*Article 1: The installation, opening and extension of bakeries in Côte d'Ivoire are subject to prior declaration to the Ministry of Commerce.*

*Article 2: The provisions of this decree apply to artisan bakeries, modern bakeries and bakeries in Côte d'Ivoire.*

In the process of opening the bakery, there are two phases of acquiring authorization. According to the head of the bakery sector of the Ministry of Commerce: *"For the realization of a bakery, there are two phases. The first phase which is the installation request. There are certain conditions to get installation authorization. It is about not being less than 200m from another bakery and the environment is taking into account. You cannot install a bakery next to the gutters. After that there is an application from for the opening authorization. After all, we send agents to check whether there is hygiene, all equipment, toilets, medical certificates for workers because they will be in contact with the bread that is a food that is not washed before consumption. For required equipment, modern bakeries should not use firewood. These are part of the installation criteria of a bakery. Then our agents do regular checks in collaboration with the district of Abidjan and municipal agents"*

According to the classification of the Ministry of Commerce, there are three types of bakeries in Côte d'Ivoire. The modern bakery which is any unit whose main purpose is the production of bread, from wheat flour, types 55, and other flour. This unit

must have and production equipment at least one kneader, a scale, a modern oven, and a divider. Then the artisan bakery, which is any unit run by a qualified craftsman, who from flour makes the bread dough, kneads mechanically, makes breads of all kinds and cooks in a traditional oven, sometimes over a wood fire and ensures selling directly to the consumer. Finally, the specialized bakery, it is any unit of bread production starting from the wheat flour of types 55 or any other going into the confection of specific dishes (Lebanese chawarma, American hamburger, etc.) and having an adequate equipment.

The Ministry of Health carries out health inspections, draws up guidelines and standards for the nutrition issues. The purpose of this service is to control the working environment of bakeries.

*"Our job is to check the working environment of bakers. Agents go regularly to see if the work equipment is clean, if there is no dirty water running in or around bakeries, are workers clean if there is 'interview...)' ". (the head of Hygiene department of Abobo)*

The Ministry of Agriculture controls part of the wood and charcoal sector. In addition, the Agricultural Water Control and Farm Modernization Department plays a role in the management of agricultural residues. The institutional framework relating to the environment in general and energy issues in Côte d'Ivoire is characterized by a multiplicity of stakeholders and by frequent restructuring. This situation causes overlap, skills gaps and confusion with roles and responsibilities. Recurrent restructuring of institutions reduces the effectiveness of actions and prevents program monitoring.

For this state structures added private structures and NGOs for them to work together on energy issues and the preservation of the environment. The Ivorian Association of Renewable Energies (AIENIR) created in April 2013, is responsible for promoting and developing renewable energies and energy efficiency in Côte d'Ivoire, and to contribute to the fight against climate change. To this end, the AIENR raises awareness, informs, advises, and assists professionals and project developers. AIENR currently has 24 companies as members and collaborates with organizations such as the Regional Center for Renewable Energy and Energy Efficiency of ECOWAS. Of all these initiatives, none really put specific emphasis on cooking energies to push for a transition as intended by official policy.

## 3.2 Social representations related to the choice of cooking energies

The results show that there is a selection of wood that can be used for feeding the oven for baking bread. For this purpose, two types of wood are identified including "red" wood and "white" wood[1]. All woods are not used for baking bread in bakeries, with a preference for "red" wood considered to be harder and stronger. For this purpose, the most popular wood used by these bakers to produce bread is commonly called the "red wood". Thermally, this type of wood gives off more heat than others and it lasts much longer in its combustion. In practice too, it produces less smoke.

*"You have to use good wood to avoid smoke. And then there is a chimney through which the smoke comes out. The wood that is commonly used is commonly called red wood. When the wood makes a lot of smoke, it not only clogs the chimney, and then it dirty the oven and every time we have to maintain the oven" (A bakery manager at Yopougon).*

The species most often used for feeding the oven are "Manan, Bété[2], Makore[3], Teck[4]". Moreover, the amount of fire, heat and sparks very often depend on the type of wood used. For these bakers interviewed, the more the wood is heavy and quality, the more it gives heat.

## 3.3 Choice of fuel energies and economic constraint

The price of fuels is one of the determinants that guides the choice of cooking energies. The economic conditions of access to "modern" combustible energies lead these bakers to turn to firewood. In fact, these bakeries are very often faced with increases in energy prices that threaten their profitability. The average energy expenditure of a bakery is about 200,000 FCFA for those who use firewood, while those using modern energy are around 900,000 FCFA. *"The average expenditure per month*

*of a bakery" average "are about 200 000FCFA if it consumes wood. This same bakery, if it consumes gas or diesel, could end up with more than 900,000 CFA francs a month." (A manager of a chain of bakeries)*

The structuring of the firewood trade around these bakeries is based on a network of actors ranging from villagers who own the wood cutting areas, loggers, wholesalers, and retailers of timber sales. In fact, bakers who use firewood get their supplies from wholesalers. Interviewed bakers using firewood reported that they always buy on credit.

*"There are bakeries who buy their wood in cash, but they are not many huh. In any case all those with whom I collaborate buy the wood on credit. When I started, I bought cash two or three times. After we negotiated and I take credit" (A baker in Yopougon).*

### **3.4 The infrastructures drivers of cooking energies in bakeries in Abidjan**

The fuel gas is in two forms including butane conditioning and butane bulk. The butane conditioning is intended for domestic use and comes in the form of gas cylinders of 6kg (B6), 12.5kg (B12) and 28kg (B28). As for bulk butane gas, it is intended for industries, services and public establishments with tanks. At bakeries, gas conservation is done in a bottle outside the bakery. This maid must not be installed inside the bakery and must be protected to prevent leaks.

*"You see how the bottle is placed; it should not be in the bakery. You need a specific place to store the gas. So, you see that if the bakery does not have a good space it is difficult to use the gas. It's not like wood that can be dropped anywhere." (A bakery manager in Marcory).*

Domestic diesel is intended for hospitals, supermarkets, bakeries, and heating industries. In bakeries, storage is done in a tank for gas oil. Diesel in bakeries is most often stored in barrels.

As for wood, packaging does not require device requirements. Just find a storage area either inside or outside the bakery. As for bakeries that use gas or gas oil for baking bread, there is a special device depending on the fuel. It is stored either in front of the bakery or inside the bakery depending on the space of the bakery. From this point of view, the wood meets these requirements more because it does not require a sophisticated equipment installation other than the installation of the oven.

*"You see in front of the bakery, that's where the wood is stored when the truck arrives. Often even one can keep up to three truckloads. With wood, you only need a place to keep the wood. It's not a problem. But if it's gas we cannot put it outside like that." (A bakery manager in Yopougon)*

### **3.5 Competences constrains and coping strategies**

Modern furnaces require skills and availability of materials. For this purpose, it assumes that the bakery activity requires theoretical and practical training. Without these skills, the Bakers prefer using wood. They adapt the oven to use wood instead of gas or gas oil. The operation of the equipment for the use of conventional energies carries risks according to the bakers.

*"The gas connection must be done by a qualified professional who will ensure the proper gas supply and a good adjustment of burner combustion. These installation operations that you see there, are very delicate and essential for the oven to work without too much trouble." (A baker in Koumassi).*

### **3.6 Discussion**

According to [15], all the solutions recommended or implemented in the energy sector are characterised by an almost total absence of interaction between them. Indeed, each of these approaches is often implemented separately from the others with their own data and methodology. [16] echo this by mentioning a multiplicity of actors with multiple interests. To this end, the studies of [17] show that the legal arsenal in terms of the environment in Côte d'Ivoire is well developed. However, the resulting rules are not operational. In doing so, environmental law faces real difficulties of application.

The results of this work answer or reinforce certain presuppositions of the sociology of energies. In fact, the practices of choice of energies that emerge from the Abidjan experience join a set of logics of actions, that is to say, actions were motivations driver that individuals try to pursue but which are related to the constraints of daily life. These constraints are related to housing, income levels, life phases, available technologies, incentives and opportunities (energy prices, existence of tariff offers, etc.).

In a context of rising energy prices, reducing the budget devoted to energy, whether you are an individual in your home or a business owner, is an important concern and has multiple benefits. It is present but in a minority way in both experiments. It is the main driving force behind the action of these families regarding energy management practices. Previous research, notably that of [18,19], has revealed that economic constraint, well-being and comfort in housing are much more structuring than ecological sensitivity, but without looking into the possibility of a spatial constraint that would influence the "energy" skills developed by bakeries. [20,21] did highlight the expression of specific inhabitant knowledge that she calls "energy intelligence", but without necessarily linking it or measuring the influence of inhabited space on this knowledge. Physical accessibility to different energy sources is a determining factor in the choice of bakers. The increase in wood consumption in bakeries is also due to the lower price of wood compared to gas or oil.

According to [21], technology plays a central role in the construction of social heating practices. Regardless of the logics or motivations for action, practices are carried out in socio-technical spaces that determine the conditions under which they are carried out. At this level, the results have shown that the installation of gas and diesel furnaces requires a heavy investment to avoid energy leaks. This aspect is a factor in the choice of wood-burning ovens that do not require a connection.

[22] analyzed daily routines and energy-consuming appliances, developing a theory that underlines the importance of the development and growth of consumption that is taken for granted. She emphasizes the influence of the built environment, housing, and equipment as bearers of the "scripts" that determine the conventions, norms, and current values that inhibit behavioral change.

The results show that bakeries' behavior and choice of baking energy vary according to the municipality in which the bakery is located. Indeed, gas is the most widely used energy in modern bakeries in the commune of Cocody. On the other hand, when we look at the other communes, we discovered that most of these modern bakeries use firewood.

## 4. Conclusion

The choice of cooking energies in bakeries in Abidjan was analyzed here through the approach of political ecology aimed at identifying the political, economic, and environmental factors that influence it. Under this base, three elements appear as structuring an adoption of clean energies of bread making units in Abidjan. The first element relates to a multi-level political will on the part of the State and its bilateral and multilateral partners in the long term. The second element is the immediate social pressure in link to the wood resource and the third element is the availability of infrastructures, which includes guaranteed access to alternative energies and their installations in the public domain. This approach makes it possible to highlight how poverty, inequalities and access to resources are constraints for the energy consumption of bakers in Abidjan. This draws the attention and challenges of international, sub-regional and national governance to local practices for the preservation of shared forest resources and energy efficiency. Thus, several ministries and departments play a role in the management of biomass and cooking energies in Côte d'Ivoire. However, there are difficulties in achieving the energy

transition and the mastery of energy. These difficulties are related to the juxtaposition of roles distributed by ministries and institutions and the lack of follow-up. The insufficiency of a precise legal framework regarding the use of cooking energies for these bakeries. It will be interesting to study the strategies for the diffusion of renewable energies in Ivory Coast, by also extending on the social representations that the populations of the renewable energies and the factors of acceptability of these.

## **Abbreviations**

ADB : African Development Bank (ADB)

ECOWAS : Economic Community of West African States

IEA : International Energy Agency

NGOs : non-government organizations

SODEFOR : Société de développement des forêts

WACCA : West African Clean Cooking Alliance

## **Declarations**

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## **Authors' contributions**

All authors contributed to the development, revision, and finalization of the article. All authors read and approved the final manuscript.

## **Competing interests**

The authors declare that they have no competing interests.

## **Consent for publication**

Not applicable

## **Ethics approval and consent to participate**

Not applicable

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