REPUBLIQUE DE COTE D'IVOIRE

Union Discipline Travail

FIGHT AGAINST CLIMATE CHANGE IN COTE D'IVOIRE

PROJECT FOR PLANNING, IMPLEMENTING AND MODELING THE LOW EMISSIONS DEVELOPMENT STRATEGY IN COTE D'IVOIRE

FINAL REPORT

WITH TECHNICAL AND FINANCIAL SUPPORT

UNION EUROPÉENNE

ONU environnement

IN PARTNERSHIP WITH

LEDS GLOBAL PARTNERSHIP

AFRICA LEDS Partnership
Advancing climate-resilient low emission development in Africa

TABLES OF CONTENTS

1. Context

Like all countries in the world, Côte d'Ivoire is committed to the global effort to combat climate change. It focused its NDCs primarily on three (3) sectors: agriculture / forestry, energy and waste. The ambition of the authorities is to reduce its GHG emissions by 28% by 2030.

Achieving this goal requires not only political will, but also technical and financial support from development partners and United Nations system. It is with this in mind that the European Commission, in collaboration with UNEP, the African LEDS Partnership, the LEDS Global Partnershi (LEDS GP) are working with Côte d'Ivoire to implement the LEDS Africa project.

The project involved capacity building of national actors (state and non-state) in modeling, planning and implementation of Côte d'Ivoire's low carbon development strategy. It has two (2) components, one of which deals with demonstration activities in smart agriculture and fuel briquette production in the rice sector in Gagnoa (see its geographical location in **photo-1**) and the other focus on LEDs modeling activities based on two scenarios : (1) To valorize rice straws in biofertilizers and (2) to valorize husks rice in fuel briquettes. This demonstration activities also focused on promoting climate-smart agriculture in peasant environments.

2. Achievement/accomplishments

2.1 Component 1: Demonstration actions

The demonstration activities are taking place in the Gagnoa region in the western forest of Côte d'Ivoire and are organized around two activities. These are: (1) the introduction of eco-innovation in irrigated rice production practices in two villages (Tipatipa and Tiétiékou) and (2) the production of fuel briquettes from rice husks at the level of a local mill.

The coordination of these two field activities is ensured by the National Agency for Agricultural Supervision (ANADER) with which the Ministry of Environment and Sustainable Development (MINEDD) signed a service agreement on June 28, 2018. However, the activities of ANADER started after the launch of the project in 2017.

2.1.1 Initial situation of agricultural practices before the project

The first activity carried out under the project is to assess the initial situation of agricultural practices and the valorization of agricultural waste. The following observations have been recorded:

- ❖ **At the rice fields**
  - ✓ Virtually all of Gagnoa's shallows are used for rice production. Rice growers systematically use chemical fertilizers for the fertilization of the bakeries in order to increase their production. The water in the rice racks remains permanently throughout the production cycle (2 to 3 months) thus causing a constant emission of methane **(photo. 10).**
  - ✓ Rice straws after each harvest are mostly burned in the open air on the fields. Which still causes greenhouse gas emissions **(photo. 5 and 6)**.
- ❖ **At the rice mills**
  - ✓ At the rice mills, the local population is recovering rice husks for animal feed and attempts to produce briquettes. Unfortunately the briquettes produced have a low energy capacity **(photo.16)** and therefore with a low rate of social acceptability.
  - ✓ The mills bleach rice from the farmers' harvest. The rice balls resulting from this activity are left in the open air and no recovery solution is made or envisaged.

2.1.2 Ground demonstration activities

The two main field activities were actually carried out for the benefit of the farmers of the two villages and the local briquette production unit respectively.

Activity -1: Farmer capacity building for climate-smart agriculture

At this level, the following four actions have been conducted:

- **Identification of beneficiary rice farmers and mapping of local stakeholders**

The contact with the producers in the two villages during the March 2017 mission, the meetings with these producers at the launch of the project activities in November 2018, coupled with the awareness sessions continued by the zone's agents in December 2018 at February 2019 **(photo-3, 4 et 4.1)**, a total of around 87 beneficiaries were selected, including 11 women. There were 62 beneficiaries in Tipadipa, including 9 women, 25 beneficiaries in Tiétiékou, including 2 women. We have a total of 4 volunteers for demonstration plots (DP), with 2 per village. Each DP has an area of 0.5ha. In total, 1 ha pilot demonstration site per village.

The selected sites are shown in images 1 and 2 in the appendix.

- **Basic study**

After the identification of the farmers, a basic study was needed, especially on traditional rice cultivation practices, rice production levels, the occupation of the region's bans, climatic data, yields, types and input prices, types and costs of labor. A total of 75 farmers including 16 women rice farmers were interviewed. All of this data was needed to develop the baseline for modeling activities in component 2 of the project in particular for the use of the Ex-Act tool and the LEAP model.

- **Strengthening operational capacity of rice farmers**
    - ***Rehabilitation and strengthening of water management works and infrastructure in rice paddies***

The application of the SRI requires above all a good water management in irrigated rice fields. Thus, the farmers were trained by the ANADER agents in the management of the rice paddocks selected for the demonstration activities. Photos 14 and 15 describe the development training sessions directly on the fields.

- ***Distribution of inputs (manure and seed)***

The diagnostic study in the demonstration project area revealed difficulties in supplying rice seeds and fertilizers. The introduction of innovation (smart farming) in rural areas therefore required the distribution of seed and manure in order to guarantee the beneficiaries' support for the project.Thus, 400 kg of GT11 rice seed was distributed to all beneficiaries and 5.6 tonnes of fertilizer (manure) for the 2 demonstration plots respectively in the two villages.

- **Training, supervision and monitoring of beneficiary farmers on SRI**

In addition, from the training of producers to the development and rehabilitation of Demonstration Areas, ANADER has also carried out a training of these on the SRI application. **Photos 11, 12, 24** show, respectively, an outdoor classroom space and practical on-line rice replication training for the beneficiaries.

This training focused on the following characteristics of the technical rice production route:

(1) meticulous and early transplanting of young rice plants, preferably less than 15 days old;

(2) The large spacing between rice plants, usually 25 x 25 cm or more;

(3) transplanting only one plant per pocket;

(4) The use of organic matter to improve soil fertility, for example rice straw, compost or manure, although the use of mineral fertilizers is not prohibited when these biomasses are not available. Mixtures of organic and inorganic fertilizers are also commonly used;

(5) Intermittent irrigation and maintenance of aerobic soil conditions during the vegetative phase of the plant followed by immersion (less than 5 cm of water) after panicle initiation;

(6) Manual weeding, preferably with the help of a rotary hoe, although the use of herbicides in tandem with manual weeding is not ruled out.

Activity -2: Support for production and trade of fuel briquettes made from rice husks

The advent of the project in Gagnoa also aimed to improve the production process of rice ball briquettes. FAO with the same objective on the same briquette production unit.

The LEDS project involved two levels of investment: support construction of the pyrolysis reactor for carbonization and socio-economic study to assess the social acceptability of the finished product.

- ❖ **Support briquette production**

The pre-project diagnostic study found that rice mills produced huge quantities of unvalued bales. These wastes were cumbersome and attempts to valorize briquettes were inefficient in terms of energy efficiency and nuisance (smoke and ashes). The LEDS project has lent its support to improve the production process in order to improve the energy quality and convenience of the briquettes. Thus, it was necessary, according to specialists, to build a pyrolysis (photo-17 and 18).

- ❖ **Socio-economic study on the social acceptability and profitability of fuel briquettes**

In December 2018, a socio-economic study was conducted to assess the social acceptability of briquettes. A survey of about one hundred households and restaurants took place as well as producers and sellers of traditional fuels (charcoal, firewood and Butane gas) **(photo 26)**.

The results of this study reveal several advantages related to briquettes. The raw material for their production is almost free and the production costs higher. Beyond the comparatively high proportion of smoke and ash, more than half of respondents believe that the briquettes are not messy, have easy ignition and intense fire.

Indeed, according to the results of a briquette / charcoal comparison test, the loss of material when cooked with charcoal is 26% against 15% with briquettes. On average, the specific consumption for cooking a kilo of food on this test is 563.84g of coal for 527.49 g of briquette. The cooking test also shows that the briquettes produced to be effective must be used in specific stoves. The best results for burning briquettes were obtained with the GreenKer Ceramic Charcoal hearth (333 g / kg of food for 2 hours).

2.2 Component 2: LEDS modeling actions

2.2.1 Initial situation of modelling practices before the project

An inventory of climate models used in Côte d'Ivoire reports about twenty models applied by various institutions to measure climate data, GHG or socio-economic impacts (health, income, employment, etc.) or for macroeconomic planning. The fields of application are varied and include agriculture, climate, energy, waste and forests.

However, these modeling activities are siled and sectoral. The innovation brought by the LEDS project is to develop an integrated model based on the existing and involving all stakeholders: researchers, policy makers and development agencies.

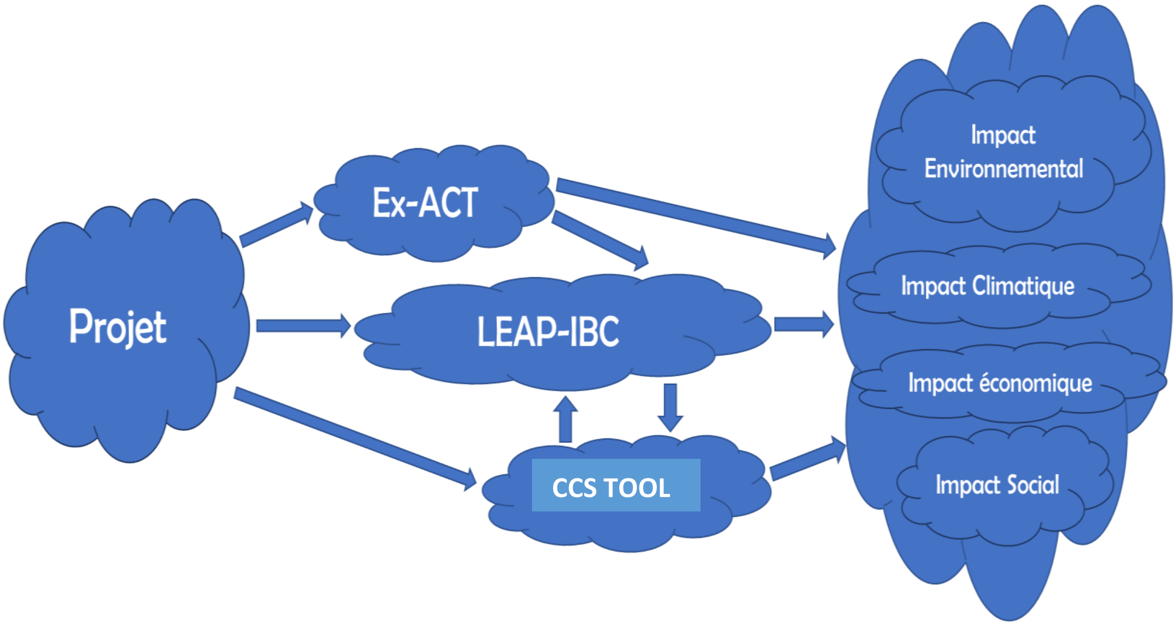
2.2.2 Brief summary of the integrated modeling methodology framework

- ❖ **Link between the sectors selected in the CDN and the axes / dimension of the modeling**

The LEDS project in Côte d'Ivoire aims to put in place a modeled framework for planning actions and initiatives to implement CDNs and measure their climatic and socio-economic impacts. Therefore, the project focuses, in an in-depth manner, on the three most emitting sectors registered in the NDCs, namely: agriculture, waste and energy.

- **Brief description of the tools and models selected and how those tools and models have been integrated to analyze cumulative climate and socio-economic impacts**

The development and evaluation of low-carbon scenario impacts requires a multi-dimensional and integrated model. The integrated model of Côte d'Ivoire's modeling team is based on three models: the LEAP-IBC, the Ex-ACT tool developed by FAO and the CCS tool development by the US Climate Strategy Center. -Dessous).To these three tools and models, the GIS will also be used to assess the spatial evolution of land occupations and the nature of land uses.



The objective of the integrated model is to grasp the complementarities for not only the formulation of the best low carbon scenarios but also to be able to measure the environmental, economic and social co-benefits. The following table specifies for each model and tool, the inputs, the possible outputs, as well as the possible couplings with the other models.

Board- : Description of models and tools used for the integrated modeling of LEDS in Ivory Coast

models	inputs	outputs	Interactions possible with other models
LEAP-IBC ***General planning model***	**For the energy sector :** Energy consumption data of different national activities ; **For non-energy sectors :** Activity data such as : national agricultural production, cultivated rice area, national livestock, municipal and agricultural waste management, production of different industries, national raw material reserves ; **For projections :** Economic, demographic data, national statistics, etc ... **For scenarios** : Activity of alternative scenarios data.	**For the energy sector :** Projection of consumption data until 2050 and calculation of the resulting emissions; **For non-energy sectors :** Projection of activity data up to 2050 and calculation of the resulting emissions ; **For scenarios :** Comparison of the different scenarios on each of the parameters and evaluation of the overall balance of each scenario compared to the basic scenario ; **For the Co-benefits:** Evaluation of the number of deaths due to the emissions of each scenario, the economic cost of this mortality and the climate impact of national emissions in the global change of temperature.	**In inputs :** Use of farm activity emission factor readjusted in EX-ACT, Use of scenario-specific economic data in CCS Tools. **In outputs :** Provision of consumption data and activities exploitable by the other models. providing CCS Tools with the impact on mortality of different scenarios to assess socio-economic impacts. In addition, on the basis of assumptions, projects developed and evaluated in EX-ACT, extrapolated and extended nationally in LEAP-IBC in order to perceive the impact of the generalization of certain practices at the national level.
EXACT ***Agricultural Project Appraisal Tool***	**For the change of land use :** Forest type and size, the deforested area, the type of end use after deforestation, the method used to deforestation and conversion, the type of landuse during the project. **For agricultural production :** The area of land cultivated for each type of crop, methods of crop management, waste management, water system s s before and during the growing period, organic amendments. **For inputs and other investments :** the quantities by type of agricultural inputs, the quantities of electricity and fuel used	**For the change of land use** : Assessment of Emissions from Land-Use Change **For agricultural production :** Evaluation of CO_2, CH_4, N_2O and CO_2-equivalent emissions caused by the project.	**Interaction with LEAP**: EX-Act tool provided 2 entries in LEAP: the emission factor and the level of GHGs avoided because of the project **Interaction with CCS Tools**: EX-Act value Chain tool will be used to determine costs for micro and macro analysis by CCS Tools
CCS Tools *Macroeconomic impact assessment tool*	• Level of GHG reduction due to the project • Level of cumulative GHG reduction (sustainable agriculture and briquette production) • Cost per unit of GHG reduction • Total cost	• Number of jobs created as a result of innovation in the three NDC sectors (agriculture, waste, energy) • Increased producer income • Impact on GDP • Cost-effectiveness of low carbon scenarios	All input are provided by the EX-Act and EX-Act value Chain tools
GIS	• fine resolution of Satellites pictures • SPOT 6 Images / 7 • Digital Terrain Model (DTM) or Digital Surface Model (DSM) with 5 m resolution. • Topographical maps of the square degree of Gagnoa in color at 1/200000 or 1/50000 • Rainfall data from 1960 to 2017 • Temperature data from 1960 to 2017 • Insolation and humidity data	• Thematic maps • Areas occupied by farmers and their evolutionin in time and space • spectral signature of each land-use class • emissivity factor of the different classes of land use • stages of rice growth	**Interaction with EX-Act**: to provide precise information on the areas occupied by farmers as well as their evolution in time and space

❖ **Brief reminder of how the integrated model helps to inform CDN implementation policy decisions**

As mentioned above, the first version of Côte d'Ivoire's CDNs did not include an action plan, nor an LEDS, nor even a monitoring-evaluation and progress measurement framework. The integrated model resulting from the LEDS project will be a working tool of the actors working for the fight against climate change by providing them with information on the long-term decisions to be made today.

The modeling team set up by the project will have to play a pioneering role in this process.

2.2.3 Modelling activities in the project

LEDS modeling in Côte d'Ivoire focuses on the three priority sectors of the NDCs: agriculture / forest, energy and waste. This modeling is based on data provided by the demonstration activities of component-1.

Activity 1: capacity building of modeling team

Based on the inventoried models, three were chosen to establish the integrated model: the Ex-Act tool, LEAP, Ex-Act and T21. For example, a series of workshops were held including a workshop on the Ex-Act tool with FAO experts, a workshop on LEAP and T21 with national experts. At the end of this workshop series, it emerged that it was necessary to use instead of the T21 model the macroeconomic modeling tool developed by CCS (USA) which is free of charge and for which national experts can receive technical support.To do this, two workshops and several webinars were organized for a better understanding of the integration between the Ex-act tool, the LEAP and the CCS Tool.

It should be noted that members of the political task force are systematically invited to these workshops and meetings.

Activity 2: Integrated modeling and results

The work to release the results of the integrated model is still ongoing and will be available in the coming weeks. This is the results below given by each model or tools will then establish the link as presented in the table above.

In addition, three sub-teams were put in place: Ex-Act team, LEAP team and Macroeconomic team (CCS Tool). The team in charge of GIS is involved in field activities with the Ex-Act team. Each team was invited to express their needs taking into account the available budget of the project.

❖ **<u>Results from ex-act tool</u>**

✓ **Context and basic data of works with ex-act**

Climate

Gagnoa area has a forest type climate. The humid tropical climate is characterized by four contrasting seasons: two dry seasons and two rainy seasons. Rainfall ranges from 800 to 1500 mm and is poorly distributed during the year (from November to April) which can cause drought in some years. For the EX-ACT tool, the climate of the zone is humid tropical type with annual temperatures around 25C ° and rainfall ranging from 800 to 1500 mm.

Soils

The dominant soil type in the region is characterized by tropical ferruginous soils (ORSTOM). According to the IPCC simplified classification, the majority soils are LAC soils (Low Activity Clay or 1/1 clay soil).

Duration and scope of the project.

The project has a total duration of 4 years from 2016 to 2020 and a capitalization phase of 16 years will be considered. The scope of the study includes all the localities of the department of Gagnoa. For the study all the dynamics are established by default in linear. The figures in this report are derived from the 2009 interim review and project working papers. Most of the default GHG emission and carbon sequestration coefficients used in EX-ACT are derived from Volume 4 of the 2006 Guidelines. IPCC for national greenhouse gas inventories for agriculture, forestry and other land uses. The different farming practices are based on field observation and discussion with the agronomists of the project.

Presentation of the scenarios without and with the implementation of the project

Act on deforestation

Deforestation is a major problem in Côte d'Ivoire. According to the 7th report of the World Bank Côte d'Ivoire has the fastest rate of deforestation in the world with a rate of plant cover that increased from 37% in 1960 to less than 14% in 2010. This strong deforestation This is due in part to the search for new farmland but also to the felling of trees for charcoal making and also for their use as firewood and this is the aspect that our project is tackling. Charcoal is of particular importance for urban households. It effectively allows the accomplishment of various tasks of daily life: cooking food, ironing, lighting, heating, drying products, fertilization by the use of ashes (Andriamifidy, 2014b). While firewood remains the main fuel for cooking in rural areas, cities have made the transition to charcoal. Woodfuel has a large market, stable demand and relatively stable prices apart from seasonal variations. It meets the permanent needs of urban and village households. If from the economic and social point of view it presents a real benefit, from the environmental point of view, it constitutes a real ordeal for the forests.

According to AIDES, 2012 annual consumption of a person in Africa in wood energy (coal-firewood) is estimated at 100 kg. However, to produce 10 kg of coal it would be necessary to cut 100 kg of wood (Montagne et al., 2010). Moreover, after Andriamifidy, 2014b, 1 Ha of cut wood would contribute to produce 800 to 1300 sacks of 100 kg of coal. This shows the strong deforestation that has been done to meet the needs of a rapidly growing population whose demand for energy is growing.

The department of Gagnoa has an estimated population of over 370 000 habitats, assuming that only half of this population is consuming wood energy then the amount of forest deforested will be

$$\frac{\mathbf{185\ 000 \times 100}}{\mathbf{1300 \times 100}} = \mathbf{142,30\ \mathit{Ha\ of\ forests.}}$$

Thus without the establishment of the project 142.30 ha of forest will be destroyed each year for the satisfaction of the people in charcoal.With the establishment of the project this forest destruction will be halved.In our zone the deforested forests are of the tropical humid type, so in our Ex-Act tool it corresponds to the zone 2 forests.If one considers that there is initially 3000 Ha of forest after 20 years 2846,153846 Ha will be destroyed without the installation of the project whereas only the half is 1423,076923 will be it with the installation of the project.Decreasing deforestation through the use of briquettes as a substitute for charcoal will reduce emissions by about 809,712, 60 tCO2e over 20 years compared to the non-project situation.

Different rice systems

	Without project		**With project**
Water Management	Rice irrigated permanently **(1)**	Irrigated rice intermittently **(2)**	Irrigated rice intermittently **(3)**
Water regime before cultivation	Preseason not flooded <180 days	Preseason not flooded <180 days	Présaison non inondée <180 days
Type of amendment	Burnt straw	Burnt straw	compost
Area	**(1) : 89,5 Ha** **(2) : 61 Ha** **(3) : 0 Ha**	**(1) : 89,5 Ha** **(2) : 61 Ha**	**(3) : 150,5 Ha**

Culture period	150 dayss	150 days	100 days

Fertilization mineral	NPK	200 kg/Ha	0
	Urea	100 kg/Ha	0
Organic fertilization	Compost	0	2 tonne/Ha
Insecticide	deltamethrin	1 l/Ha 15g/l	1 l/Ha 15g/l

Improved rice systems resulted in a reduction of 6,214.13 tCO2e in the project scenario compared to the non-project scenario. This reduction is especially marked by a reduction in methane emissions estimated at -5,965.49 teq CO2 and this is largely due to the switch from permanently flooded irrigation to intermittently flooded type of irrigation, which allows a reduction of anaerobic digestion. The anaerobic decomposition of organic matter in flooded rice plots emits methane (CH4). The latter escapes into the atmosphere mainly by diffusive transport through the rice plants during the rice growing season. And this phenomenon is accentuated when we have a flood constantly.

Inputs: a negligible emission

Table 2 shows the type of input used as well as the quantities with and without the implementation of the project.

Table 2: Input Management

	Parameters	Without project	With project
Mineral fertilization	NPK	200 kg/Ha	0
	Urée	100 kg/Ha	0
Organic fertilization	compost	0	2 t/Ha
Insecticide	Deltaméthrine	1 l/Ha 15g/l	1 l/Ha 15g/l

As part of our project we moved from using mineral fertilizer to using organic fertilizer, in view of the quantities brought the compost will tend to cause an increase in emissions rather than a reduction. However, one of the advantages of using compost is that it prevents the burning of straws. However, in view of the very small amount of input used by the project, the module will have an insignificant impact on the final result with 155.27 t CO2 equivalent.

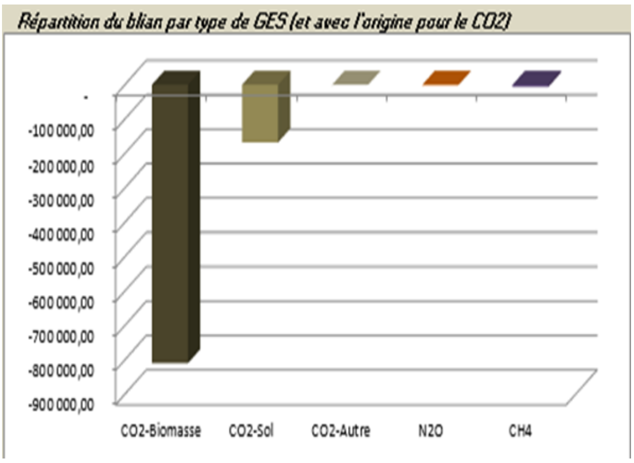
Analysis of the results of the different scenarios

Nom du Projet	*projet Gagnoa*	Zone climatique	*Tropical (Humide)*	Durée du Projet (en années)	*20,00*
Continent	*Afrique*	Type de sol dominant	*Sols à argiles 1:1*	Surface totale (ha)	*3 150,50*

Composantes du projet	Flux bruts Sans	Avec	Bilan	Répartition du blian par type de GES (Tous les GES en tCO2eq) CO2 Biomasse	CO2 Sol	CO2 Autre	N2O	CH4	Résultats par an Sans	Avec	Bilan
	Tous les GES en tCO2eq Positif=émission / négatif=puits										
Changements d'Usage											
Déforestation	#########	#########	##########	#########	- 167 746,98		- 793,47	-	#######	48 912,65	########
Boisement	-	-	-	-	-		-	-	-	-	-
Autres CUT	-	-	-	-	-		-	-	-	-	-
Agriculture											
Annuelle	-	-	-	-	-		-	-	-	-	-
Pérenne	-	-	-	-	-		-	-	-	-	-
Riz	13 227,09	7 012,96	- 6 214,13	-	-		- 248,64	- 5 965,49	661,35	350,65	- 310,71
Patûrage & bétail											
Patûrage	-	-	-	-	-		-	-	-	-	-
Bétail	-	-	-				-	-	-	-	-
Dégradation et gestion	-	-	-	-	-		-	-	-	-	-
Coastal wetlands	-	-	-	-	-		-	-	-	-	-
Intrants & Investissements	20,41	175,67	155,27			- 8,45	163,71	-	1,02	8,78	7,76
Fishery & Aquaculture	-	-	-			-	.	-	-	-	-
Total	#########	985 441,68	########	#########	- 167 746,98	- 8,45	- 878,40	- 5 965,49	#######	49 272,08	########
Par hectare	624,72	312,79	- 311,93	- 257,01	- 53,24	- 0,00	- 0,28	- 1,89			
Par hectare et par an	31,24	15,64	- 15,60	- 12,85	- 2,66	- 0,00	- 0,01	- 0,09	31,24	15,64	- 15,60

Bilan carbone = **-982 724,97 teq CO_2**

Facteur d'émission = **15,60 CO_2**



Répartition du blian par type de GES		
CO2	-977 468	tCO2
N2O	-2,94765	tN2O
CH4	-238,619	tCH4

The project sequesters 982,724.97 tons of carbon. The components that contribute most to this result are the decrease in deforestation compared to the BAU (Bussiness As Usual) scenario and the change in farming practices. The deforestation part represents the indirect effect of the project whereas the agricultural part of the project represents the direct effect of the project.

Socioeconomic impacts of processing rice waste into compost

Compost is the final product after the decomposition of organic materials (manure, garbage, leaves, twigs and other plant organs, waste, etc.) under normal conditions, provided they are not toxic. The composting process is composting.As part of our project the compost will be used as a replacement for mineral fertilizer, so for its manufacture we have obtained an additional job creation of about 24 jobs per year compared to the BAU scenario. From the economic point of view, the use of compost in place of mineral fertilizer will save $ 50,000 per year for 150 ha of rice cultivation.

Aggregated Socio-economic performances	Current	Upgrading	Balance	
Value added	-50	0	50	000 US$
Gross production value	0	0	0	000 US$
Total job generated	54	78	24	Jobs created

At the level of briquette production, 8 additional jobs will be created if each mill of rice is engaged in this business. That is total, 32 jobs created both by the production of biofertilizer for 150 ha of rice and briquettes.

Conclusion of the modeling works with the Ex-act tool

The modeling of the case study carried out with EX-ACT made it possible to show that the implementation of the project could make it possible to avoid the rejection of a quantity of - 982 724.97 tCO2eq of GHGs in the atmosphere and this thanks to the changes in the type of irrigation and the method of fertilization provided by the project. The emission factor of the project is estimated at 15.60. this emission factor can be used by LEAP for its work.

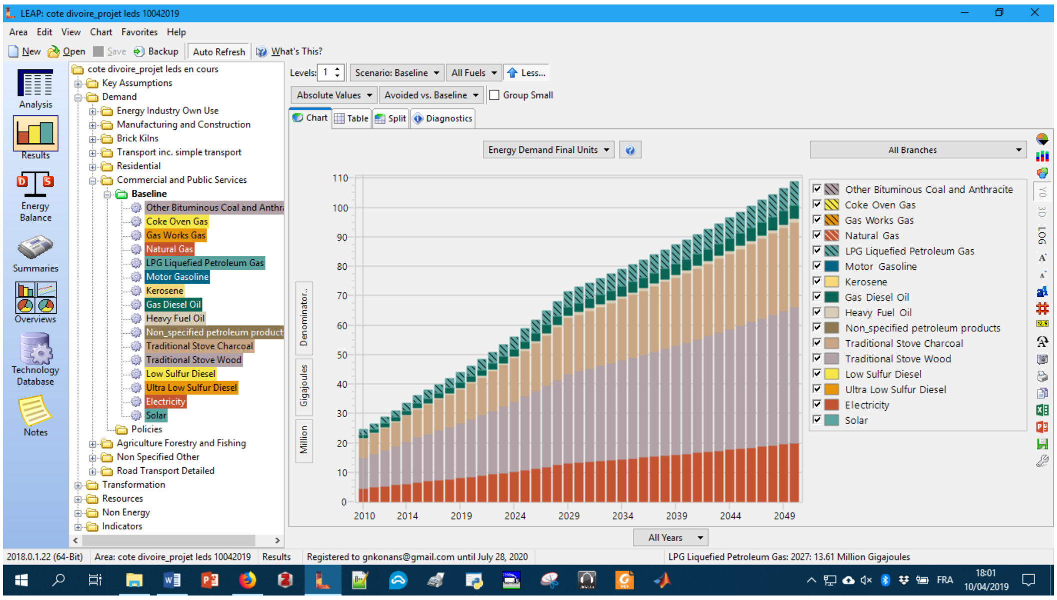
Also the number of jobs generated by composting is estimated at 24 jobs per year and the economic contribution of this production brings a gross value added of 50 000 US Dollars for the whole area of rice.

- <u>**Results from LEAP**</u>

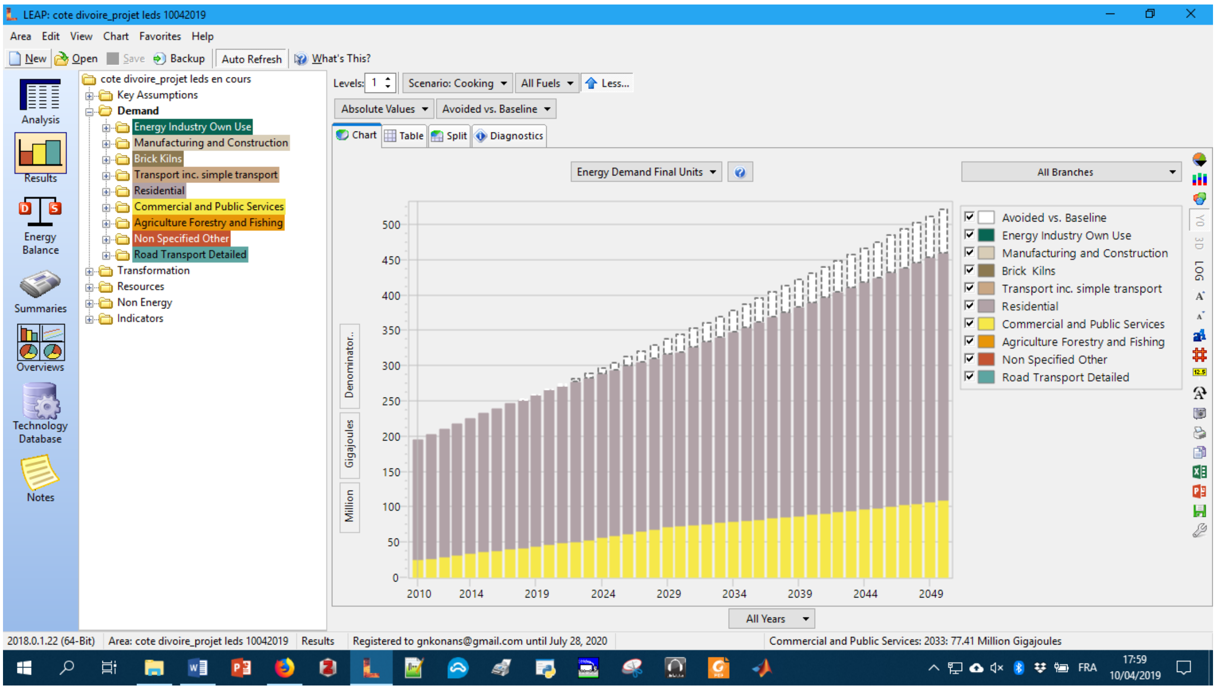
Work with the LEAP model is currently underway and results will be available in the coming weeks. This work is based on the elements below.

Scénario : Baseline

It includes Côte d'Ivoire's 2010 energy demand (base year) for the residential sector, businesses and utilities. The results of the energy demand projection up to 2050. Before moving to the use of agricultural residue-based briquette, it is necessary to make the raw material available, so the scenario Agriculture was, elaborate. The details of the Baseline's fuel share are given in the following figure. Wood and charcoal are the most consumed fuels in households and represent 62k terajoules and 321k terajoules respectively.



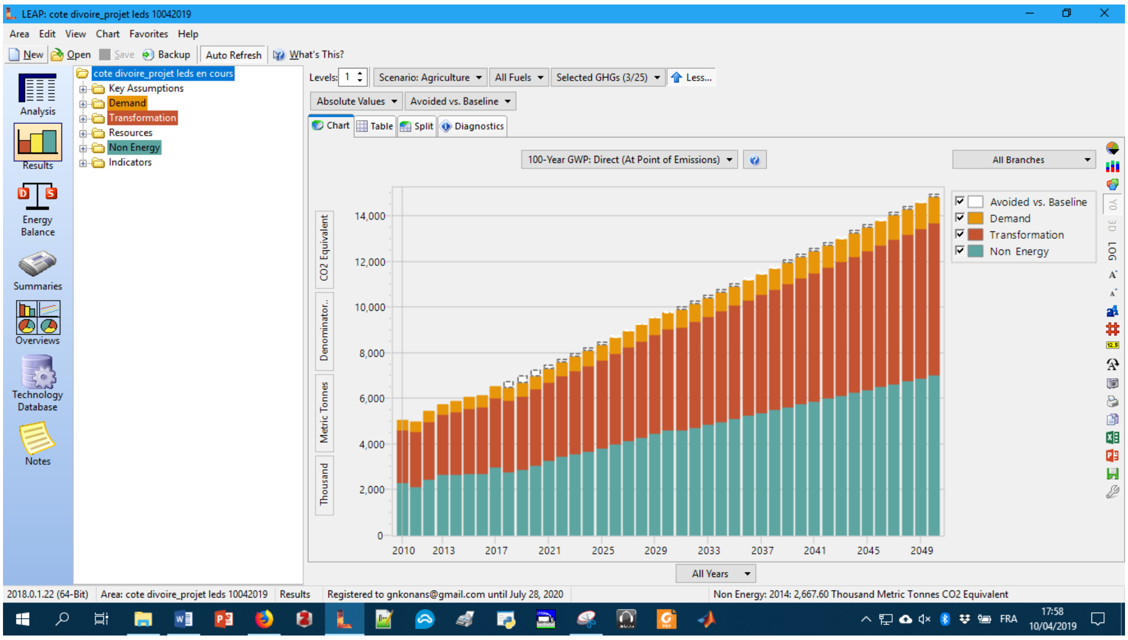
The following figure shows the amount of household energy through the use of briquettes reduced compared to current practices (Baseline). It revealed a 340k terajoule reduction compared to the Baseline by 2050 if this practice is extended to the whole country.



Scenario Agriculture: decrease in burning of agricultural residues.

According to the FAO, 25% of agricultural residues are burned in the fields. The objective of this scenario is to increase it from 25% (in 2019) to 15% (in 2025). Of course it is only a simulation. Further investigation is needed to verify that the quantities of residues released can cover the quantities needed to produce the briquette energy demand of the Cooking scenario. The difference between the annual quantity burned (Baseline scenario) and the annual burned quantity (Scenario Agriculture, Sheet 2) makes it possible to have the quantities made available. Also it should be noted that if 25% are burned then 75% of these agricultural residues do not sound, so can partly be taken into account in the production of briquette.

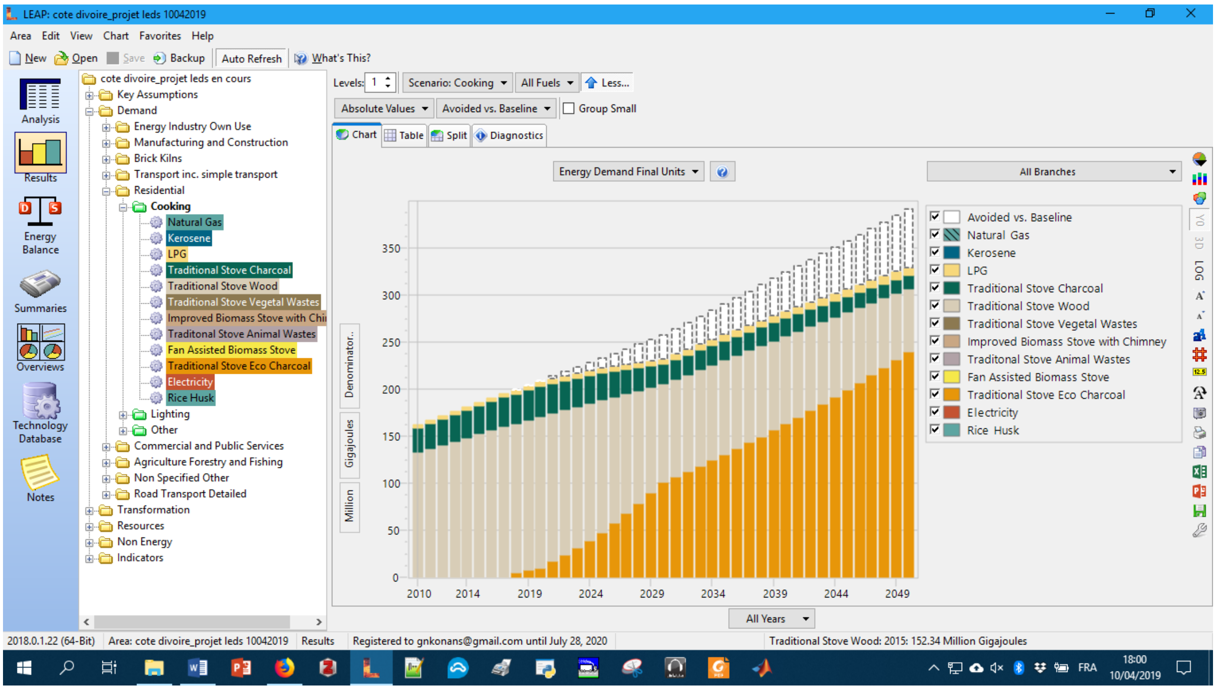
The production of briquettes requiring pyrolysis slightly reduces emissions compared to usual practices as shown in the following image.



Scénario : Cooking (Rice-Husk Briquetting)

In LEAP, to include fuel (briquettes) in energy demand, it must be produced or imported. So, there is an interdependence between household briquette consumption and briquette production. The simulation of the production was carried out after modification of the LEAP tree, since this activity did not exist in basic structure. In this scenario, the proportions of use of the different fuels are defined, and serve as a basis for the projection.

The use of rice husk briquette is a powerful tool for reducing greenhouse gas emissions as shown in the figure below. These emissions are reduced by 63k eq-CO2 by 2050 for households. For all sectors of activity and all the processes that lead to its use, the reduction is 2300k eq-CO2 and those for the whole country.



From the analysis of the models, it appears that at the current state of the modeling, the LEAP and EX-Act tools do not manage to take into account the macro-economic analysis. However, both CSC tools allow for these microeconomic and macroeconomic analyzes using LEAP and EX-Act model outputs as inputs or based on field assumptions and data without the use of the latter two models.

❖ Results from the CCS Tool

Micro-economic costs assessment results

A preliminary analysis of the micro-economic costs resulted from the pilot was conducted using the Center for Climate Strategies' (CCS') Analytical Toolkit. The use of this toolkit in this initial stage of costs analysis was needed to help the modelling team to:

- ensure that all relevant energy, resources and emissions impacts have been identified and accounted for;
- understand the costs components and costs streams to be analyzed
- understand the build-up of key metrics, such as net present value of implementation costs and cost effectiveness;
- trace the derivation of any result in a transparent tool that does not contain any hidden data or worksheets (e.g. as found in EX-ACT).

The modelling team is planning to transition to LEAP and the EX-ACT Value Chain Tool for the costs analysis where possible and use the analysis built-up under the CCS Toolkit to assure quality control.

Two interventions (Scenarios) to the business as usual (BAU) rice production value chain in rural Ivory Coast were anlayzed. The two scenarios were:

- Scenario 1: a pilot project in Gagnoa, Ivory Coast to produce rice husk briquettes and their local use in the residential and commercial cooking fuel markets to displace consumption of kerosene and locally-derived charcoal;
- Scenario 2: improve rice cultivation practices on 150.5 hectares to improve productivity and reduce greenhouse gas emissions.

A third Scenario was also analyzed that integrated the combined impacts from Scenarios 1 and 2.

For all direct impacts and costs, the following general equation is applied to derive the net result for implementing the pilot program:

Net Result = PS – BAU

Where:

Net Result = the change in the metric achieved through pilot implementation; a metric could be an energy, resources, or emissions impact or a direct cost of implementation;

PS = the value of the metric under conditions of the Pilot Program

BAU = the value of the metric under BAU conditions

The following sections provide a summary of the results for each of the three scenarios.

Scenario 1. Pilot: Rice Husk Bio-briquette Production and Use for Households, Businesses and Utilities

Pilot Program Design: Produce bio-briquettes from rice husk produced at the Gagnoa Rice Mill. This mill has a capacity of 1 ton of paddy rice per day which produces 100 kilograms of carbonized briquettes for use by local residential and commercial customers instead of charcoal derived from forest biomass and kerosene.

The Team began its analysis by developing and reviewing causal chains for: energy, resources, and emissions impacts; and net societal costs. This exercise allowed the Team to identify the key inputs needed for analysis of the Scenario. These key inputs are provided below in Attachment 1.

BAU and Pilot Program Scenarios were established first using the key inputs. Summarized results are shown in the screen shots below. In the first, under BAU conditions, the rice husk is stored in a pile, until it is sold for local use as bedding material. In the second, results are shown for the pilot program.

Implementation costs include equipment, labor, electricity, other inputs (water and binders), rice mill operator profit, and avoided kerosene and charcoal use.

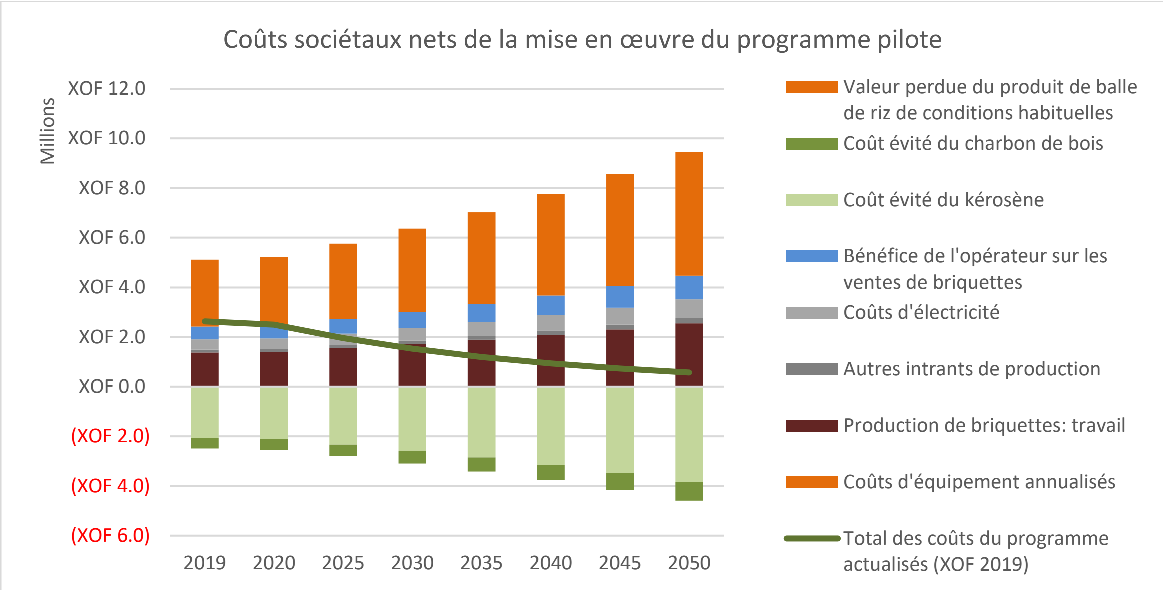
Coûts sociaux nets
Net Societal Costs

Conditions habituelles: coûts directs
BAU Direct Costs

An / Year	Coûts de gestion de la balle de riz / Rice Husk Management Cost (XOF)	Autre coût / Other Cost (XOF)	Autre coût / Other Cost (XOF)
2019	XOF 0	XOF 0	XOF 0
2020	XOF 0	XOF 0	XOF 0
2025	XOF 0	XOF 0	XOF 0
2030	XOF 0	XOF 0	XOF 0
2035	XOF 0	XOF 0	XOF 0
2040	XOF 0	XOF 0	XOF 0
2045	XOF 0	XOF 0	XOF 0
2050	XOF 0	XOF 0	XOF 0
Somme	**XOF 0**	**XOF 0**	**XOF 0**

Scénario du programme pilote: coûts directs
Pilot Program Scenario (PS): Direct Costs

An / Year	Coûts d'équipement de production de briquettes / Briquette Production Equipment Costs (XOF)	Coûts d'équipement annualisés / Annualized Equipment Costs (XOF)	Production de briquettes: travail / Briquette Production Labor (XOF)	Autres intrants de production / Other Production Input Costs (XOF)	Coûts d'électricité / Electricity Cost (XOF)	Bénéfice de l'opérateur d'une rizière sur les ventes de briquettes / Rice Mill Operator Profit on Briquette Sales (XOF)	Coût évité du kérosène / Avoided Cost of Kerosene (XOF)	Coût évité du charbon de bois / Avoided Cost of Charcoal (XOF)	Valeur perdue du produit de balle de riz de conditions habituelles / Lost Value of BAU Rice Husk Product (XOF)	Coûts évités pour la gestion de la balle de riz de conditions habituelles / Avoided BAU Rice Husk Management Cost (XOF)
2019	XOF 0	XOF 0	XOF 1,378,620	XOF 111,250	XOF 412,299	XOF 517,761	(XOF 2,074,637)	(XOF 414,000)	XOF 2,700,000	XOF 0
2020		XOF 0	XOF 1,406,192	XOF 113,475	XOF 420,545	XOF 528,116	(XOF 2,116,130)	(XOF 422,280)	XOF 2,754,000	XOF 0
2025		XOF 0	XOF 1,552,550	XOF 125,286	XOF 464,316	XOF 583,083	(XOF 2,336,378)	(XOF 466,231)	XOF 3,040,639	XOF 0
2030		XOF 0	XOF 1,714,141	XOF 138,325	XOF 512,642	XOF 643,770	(XOF 2,579,550)	(XOF 514,757)	XOF 3,357,111	XOF 0
2035		XOF 0	XOF 1,892,550	XOF 152,723	XOF 565,999	XOF 710,775	(XOF 2,848,032)	(XOF 568,333)	XOF 3,706,521	XOF 0
2040		XOF 0	XOF 2,089,528	XOF 168,618	XOF 624,908	XOF 784,753	(XOF 3,144,457)	(XOF 627,486)	XOF 4,092,299	XOF 0
2045		XOF 0	XOF 2,307,008	XOF 186,168	XOF 689,949	XOF 866,430	(XOF 3,471,735)	(XOF 692,795)	XOF 4,518,229	XOF 0
2050		XOF 0	XOF 2,547,123	XOF 205,544	XOF 761,760	XOF 956,609	(XOF 3,833,076)	(XOF 764,902)	XOF 4,988,490	XOF 0
Somme	**XOF 0**	**XOF 0**	**XOF 60,972,268**	**XOF 4,920,261**	**XOF 18,234,773**	**XOF 22,899,020**	**(XOF 91,755,023)**	**(XOF 18,309,990)**	**XOF 119,412,980**	**XOF 0**



Scenario 2. Smart Irrigated Rice Production Practices

Pilot Program Design: Apply improved rice cultivation practices on 150.5 irrigated hectares by 2020. This includes nursery production of rice seedlings; transplantation of these at reduced spacing in the field; application of biofertilizer (compost/manure); intermittent irrigation; and reduced burning of rice straw.

The key inputs to the direct impacts assessment are provided in Attachment 2. Output summaries for net direct societal costs for Scenario 2 are provided below.

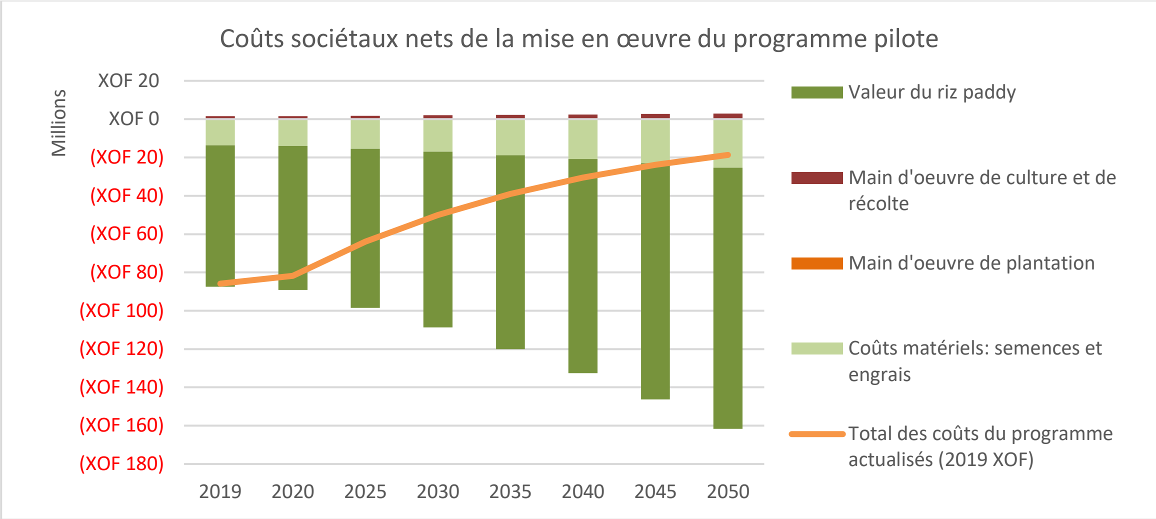
Coûts sociaux nets
Net Societal Costs

Conditions habituelles: coûts directs
BAU Direct Costs

An	Coûts matériels: semences et engrais	Main d'oeuvre de plantation	Main d'oeuvre de culture et de récolte	Autre coût	Autre coût	Valeur du riz paddy
	Material costs: seeds and fertilizer	Planting Labor	Cultivation and harvesting labor	Other Cost	Other Cost	Value of Paddy Rice
Year	XOF	XOF	XOF	XOF	XOF	XOF
2019	XOF 54,661,600	XOF 301,000	XOF 2,257,500	XOF 0	XOF 0	(XOF 73,745,000)
2020	XOF 55,754,832	XOF 307,020	XOF 2,302,650	XOF 0	XOF 0	(XOF 75,219,900)
2025	XOF 61,557,840	XOF 338,975	XOF 2,542,312	XOF 0	XOF 0	(XOF 83,048,848)
2030	XOF 67,964,829	XOF 374,256	XOF 2,806,918	XOF 0	XOF 0	(XOF 91,692,638)
2035	XOF 75,038,663	XOF 413,208	XOF 3,099,064	XOF 0	XOF 0	(XOF 101,236,082)
2040	XOF 82,848,747	XOF 456,216	XOF 3,421,617	XOF 0	XOF 0	(XOF 111,772,815)
2045	XOF 91,471,712	XOF 503,699	XOF 3,777,741	XOF 0	XOF 0	(XOF 123,406,219)
2050	XOF 100,992,161	XOF 556,124	XOF 4,170,932	XOF 0	XOF 0	(XOF 136,250,437)
Somme	**XOF 2,417,520,201**	**XOF 13,312,336**	**XOF 99,842,519**	**XOF 0**	**XOF 0**	**(XOF 3,261,522,298)**

Scénario du programme pilote: coûts directs
Pilot Program Scenario (PS): Direct Costs

An	Coûts d'équipement de production de briquettes	Coûts d'équipement annualisés	Production de briquettes: travail	Autres intrants de production	Coûts d'électricité	Bénéfice de l'opérateur d'une rizière sur les ventes de briquettes	Coût évité du kérosène	Coût évité du charbon de bois	Valeur perdue du produit de balle de riz de conditions habituelles	Coûts évités pour la gestion de la balle de riz de conditions habituelles
	Briquette Production Equipment Costs	Annualized Equipment Costs	Briquette Production Labor	Other Production Input Costs	Electricity Cost	Rice Mill Operator Profit on Briquette Sales	Avoided Cost of Kerosene	Avoided Cost of Charcoal	Lost Value of BAU Rice Husk Product	Avoided BAU Rice Husk Management Cost
Year	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF
2019	XOF 0	XOF 0	XOF 1,378,620	XOF 111,250	XOF 412,299	XOF 517,761	(XOF 2,074,637)	(XOF 414,000)	XOF 2,700,000	XOF 0
2020		XOF 0	XOF 1,406,192	XOF 113,475	XOF 420,545	XOF 528,116	(XOF 2,116,130)	(XOF 422,280)	XOF 2,754,000	XOF 0
2025		XOF 0	XOF 1,552,550	XOF 125,286	XOF 464,316	XOF 583,083	(XOF 2,336,378)	(XOF 466,231)	XOF 3,040,639	XOF 0
2030		XOF 0	XOF 1,714,141	XOF 138,325	XOF 512,642	XOF 643,770	(XOF 2,579,550)	(XOF 514,757)	XOF 3,357,111	XOF 0
2035		XOF 0	XOF 1,892,550	XOF 152,723	XOF 565,999	XOF 710,775	(XOF 2,848,032)	(XOF 568,333)	XOF 3,706,521	XOF 0
2040		XOF 0	XOF 2,089,528	XOF 168,618	XOF 624,908	XOF 784,753	(XOF 3,144,457)	(XOF 627,486)	XOF 4,092,299	XOF 0
2045		XOF 0	XOF 2,307,008	XOF 186,168	XOF 689,949	XOF 866,430	(XOF 3,471,735)	(XOF 692,795)	XOF 4,518,229	XOF 0
2050		XOF 0	XOF 2,547,123	XOF 205,544	XOF 761,760	XOF 956,609	(XOF 3,833,076)	(XOF 764,902)	XOF 4,988,490	XOF 0
Somme	**XOF 0**	**XOF 0**	**XOF 60,972,268**	**XOF 4,920,261**	**XOF 18,234,773**	**XOF 22,899,020**	**(XOF 91,755,023)**	**(XOF 18,309,990)**	**XOF 119,412,980**	**XOF 0**



✓ **Scenario 3. Scenarios 1 and 2 Implemented Together**

Interactions or overlaps identified: The improved cultivation practices carried out in the field do not affect the downstream processing and management of rice husk at the rice mill, except that there is now more paddy rice that needs to be processed at the rice mill. Paddy rice yields are expected to double after implementing Scenario 2. The amount of paddy rice produced per cycle (~517 tonnes) from the Pilot 2 Program is higher than the annual capacity of the Gagnoa rice mill (1 tonne/day), even if it was operated for a single shift every day of the year. But this is may still be within the range of capacity that the mill could accommodate with more hours of operation. For the purposes of this analysis, the Gagnoa rice mill is assumed to handle the additional production of rice achieved from the higher yields of Scenario 2. Hence, this integrated analysis is simply the Scenario 2 costs plus the costs from higher production of bio-briquettes in Scenario 1 impacts (i.e. no additional equipment costs).

Summary output for the direct costs analysis of Scenario 3 is provided below (these reflect updates to Scenario 1 as a result of higher rice production under Scenario 2). Recall that for Scenario 1, the costs to manage rice husk are zero (it is stored until picked up for local sale as animal bedding). Cumulative net direct societal costs for Scenario 3 implementation are expected to result in a savings of almost 1.4 billion 2019 XOF (this is the net present value of implementation costs). Combined with the cumulative GHG reductions presented above, the cost effectiveness for Scenario 3 is -2,245 XOF/tCO_2e.

Coûts sociaux nets
Net Societal Costs

Conditions habituelles de scenario 1: coûts directs
BAU Direct Costs

An Year	Coûts de gestion de la balle de riz Rice Husk Management Cost XOF	Autre coût Other Cost XOF	Autre coût Other Cost XOF
2019	XOF 0.00		
2020	XOF 0.00		
2025	XOF 0.00		
2030	XOF 0.00		
2035	XOF 0.00		
2040	XOF 0.00		
2045	XOF 0.00		
2050	XOF 0.00		
Somme	XOF 0.00		

Scénario du programme pilote de scenario 1: coûts directs
Pilot Program Scenario (PS): Direct Costs

An Year	Coûts d'équipement de production de briquettes Briquette Production Equipment Costs	Coûts d'équipement annualisés Annualized Equipment Costs	Production de briquettes: travail Briquette Production Labor	Autres intrants de production Other Production Input Costs	Coûts d'électricité Electricity Cost	Bénéfice de l'opérateur d'une rizière sur les ventes de briquettes Rice Mill Operator Profit on Briquette Sales	Coût évité du kérosène Avoided Cost of Kerosene	Coût évité du charbon de bois Avoided Cost of Charcoal	Valeur perdue du produit de balle de riz de conditions habituelles Lost Value of BAU Rice Husk Product	Coûts évités pour la gestion de la balle de riz de conditions habituelles Avoided BAU Rice Husk Management Cost
	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF	XOF
2019	XOF 0	XOF 0	XOF 2,757,240	XOF 222,500	XOF 824,599	XOF 1,035,522	(XOF 4,149,274)	(XOF 828,000)	XOF 2,700,000	XOF 0
2020	XOF 0	XOF 0	XOF 2,812,385	XOF 226,950	XOF 841,091	XOF 1,056,232	(XOF 4,232,259)	(XOF 844,560)	XOF 2,754,000	XOF 0
2025	XOF 0	XOF 0	XOF 3,105,100	XOF 250,571	XOF 928,632	XOF 1,166,165	(XOF 4,672,756)	(XOF 932,462)	XOF 3,040,639	XOF 0
2030	XOF 0	XOF 0	XOF 3,428,281	XOF 276,651	XOF 1,025,285	XOF 1,287,541	(XOF 5,159,100)	(XOF 1,029,514)	XOF 3,357,111	XOF 0
2035	XOF 0	XOF 0	XOF 3,785,100	XOF 305,445	XOF 1,131,997	XOF 1,421,549	(XOF 5,696,063)	(XOF 1,136,667)	XOF 3,706,521	XOF 0
2040	XOF 0	XOF 0	XOF 4,179,056	XOF 337,236	XOF 1,249,816	XOF 1,569,505	(XOF 6,288,914)	(XOF 1,254,972)	XOF 4,092,299	XOF 0
2045	XOF 0	XOF 0	XOF 4,614,015	XOF 372,336	XOF 1,379,898	XOF 1,732,860	(XOF 6,943,470)	(XOF 1,385,590)	XOF 4,518,229	XOF 0
2050	XOF 0	XOF 0	XOF 5,094,246	XOF 411,089	XOF 1,523,519	XOF 1,913,218	(XOF 7,666,151)	(XOF 1,529,804)	XOF 4,988,490	XOF 0
Somme	**XOF 0**	**XOF 0**	**XOF 121,944,535**	**XOF 9,840,521**	**XOF 36,469,546**	**XOF 45,798,041**	**(XOF 183,510,046)**	**(XOF 36,619,981)**	**XOF 119,412,980**	**XOF 0**

Coûts sociétaux directs nets
Net Direct Societal Costs

An Year	Scénario 2 Total des coûts du programme actualisés	Scénario 1 Total des coûts du programme	Scénario 1 Total des coûts du programme actualisés	Scénario 3: Les deux scénarios Total des coûts du programme	Les deux scénarios Efficacité des coûts Cost Effectiveness
	XOF 2019	XOF	XOF 2019	XOF 2019	XOF 2019/tCO_2e
2019	(XOF 85,861,774)	(XOF 137,413)	(XOF [illegible]13)	(XOF 85,999,187)	
2020	(XOF 81,740,408)	(XOF 140,162)	(XOF [illegible]18)	(XOF 81,871,226)	
2025	(XOF 63,917,760)	(XOF 154,750)	(XOF 102,294)	(XOF 64,020,054)	
2030	(XOF 49,981,155)	(XOF 170,856)	(XOF 79,990)	(XOF 50,061,145)	
2035	(XOF 39,083,282)	(XOF 188,639)	(XOF 62,549)	(XOF 39,145,831)	
2040	(XOF 30,561,578)	(XOF 208,273)	(XOF 48,911)	(XOF 30,610,489)	
2045	(XOF 23,897,943)	(XOF 229,950)	(XOF 38,246)	(XOF 23,936,189)	
2050	(XOF 18,687,244)	(XOF 253,883)	(XOF 29,907)	(XOF 18,717,151)	
Somme	**(XOF 1,418,156,611)**	**(XOF 6,077,384)**	**(XOF 2,269,621)**	**(XOF 1,420,426,232)**	**(XOF 2,245)**

2.2.2.2 Screening of Costs and Savings for Indicators of Macroeconomic Benefit

The macro-economic assessment of the pilot case (Scenarios 1, 2 and 3) has been conducted using CCS Macroeconomic Indicators Tool.

In line with the micro-economic impact assessment, two interventions (Scenarios) to the business as usual (BAU) rice production value chain in rural Ivory Coast were analyzed. The two scenarios were:

- Scenario 1: a pilot project in Gagnoa, Ivory Coast to produce rice husk briquettes and their local use in the residential and commercial cooking fuel markets to displace consumption of kerosene and locally-derived charcoal;
- Scenario 2: improve rice cultivation practices on 150.5 hectares to improve productivity and reduce greenhouse gas emissions.

A third Scenario was also analyzed that integrated the combined impacts from Scenarios 1 and 2.

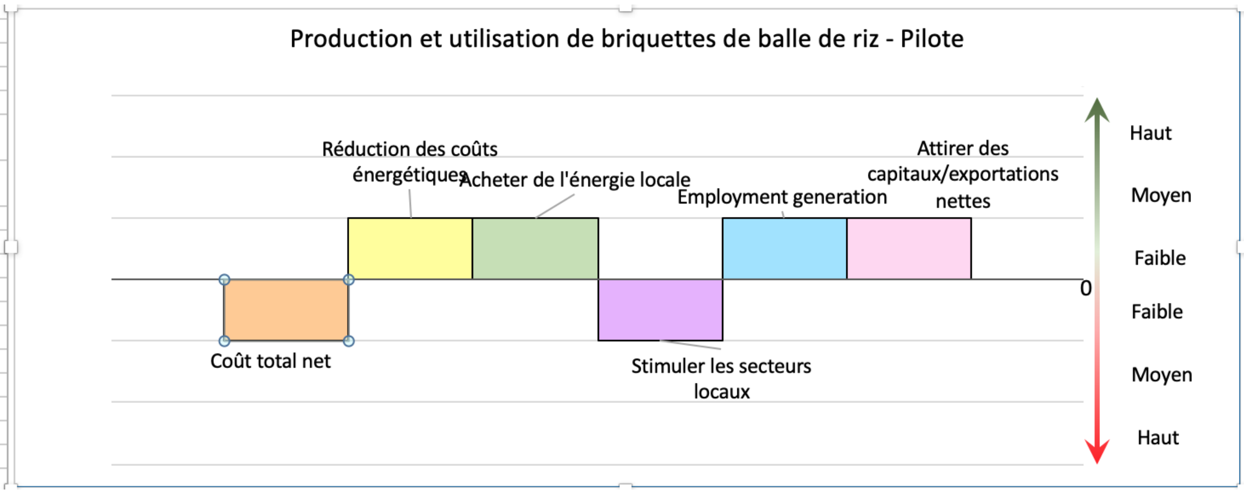
This assessment is based on a statistical analysis of relationships between projected costs and savings from the pilot and the results of macroeconomic modeling work done on other climate-planning efforts using advanced and widely used econometric modeling methods.

The tool used provides visual indictors of optimism and or causes for concern based on the design and direct impact results of a policy option, but does not (via either an input-output methodology or general-equilibrium methodology) actually model economy-wide responses to policy changes. As such, these are not quantified impacts on GDP, jobs, incomes, or the levels of activity in specific sectors of the economy, but rather rating based indicators of impacts.

Scenario 1: Rice-Husk Briquetting

The following screen-shots from CCS Tool shows the key results of the Macroeconomic assessment for Scenario 1:

	Scénario du programme pilote: coûts directs (Différence due à la politique)										
Coûts Directs	valeur perdue du produit en balle de riz	Coûts d'équipement de production de briquettes	Coûts d'équipement annualisés	Production de briquettes: travail	Autres intrants de production	Coûts d'électricité	Bénéfice de l'opérateur d'une rizière sur les ventes de briquettes	Coût évité du kérosène	Coût évité du charbon de bois	Réduction net de coût de l'énergie	Total des coûts du programme
	Lost Sales of Rice Husk for Animal Bedding	Briquette Production Equipment Costs (paid by subsidy from FAO)	Briquette Production Equipment Costs (Annualized)	Briquette Production Labor	Other Production Input Costs (Clay and Cassava starch as binders)	Electricity Cost to run equipment	Rice Mill Operator Profit on Briquette Sales	Avoided Cost of Kerosene (Savings from reduced kerosene purchase)	Avoided Cost of Charcoal (savings from reduced charcoal purchase)	Overall Reduction in Cost of Energy	Overall Net Savings
	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)
2019	(XOF 2,700,000)	(XOF 2,500,000)	(XOF 355,944)	(XOF 1,378,620)	(XOF 111,250)	(XOF 412,299)	(XOF 517,761)	XOF 2,074,637	XOF 414,000	(XOF 2,431,293)	(XOF 1,745,237)
2020	(XOF 2,754,000)	XOF 0	(XOF 355,944)	(XOF 1,406,192)	(XOF 113,475)	(XOF 420,545)	(XOF 528,116)	XOF 2,116,130	XOF 422,280	XOF 70,081	(XOF 1,773,023)
2025	(XOF 3,040,639)	XOF 0	(XOF 355,944)	(XOF 1,552,550)	(XOF 125,286)	(XOF 464,316)	(XOF 583,083)	XOF 2,336,378	XOF 466,231	XOF 77,375	(XOF 1,920,514)
2030	(XOF 3,357,111)	XOF 0	XOF 0	(XOF 1,714,141)	(XOF 138,325)	(XOF 512,642)	(XOF 643,770)	XOF 2,579,550	XOF 514,757	XOF 85,428	(XOF 1,727,412)
2035	(XOF 3,706,521)	XOF 0	XOF 0	(XOF 1,892,550)	(XOF 152,723)	(XOF 565,999)	(XOF 710,775)	XOF 2,848,032	XOF 568,333	XOF 94,320	(XOF 1,907,202)
2040	(XOF 4,092,299)	XOF 0	XOF 0	(XOF 2,089,528)	(XOF 168,618)	(XOF 624,908)	(XOF 784,753)	XOF 3,144,457	XOF 627,486	XOF 104,136	(XOF 2,105,705)
2045	(XOF 4,518,229)	XOF 0	XOF 0	(XOF 2,307,008)	(XOF 186,168)	(XOF 689,949)	(XOF 866,430)	XOF 3,471,735	XOF 692,795	XOF 114,975	(XOF 2,324,869)
2050	(XOF 4,988,490)	XOF 0	XOF 0	(XOF 2,547,123)	(XOF 205,544)	(XOF 761,760)	(XOF 956,609)	XOF 3,833,076	XOF 764,902	XOF 126,942	(XOF 2,566,843)
Valeur cumulée	(XOF 119,412,980)	(XOF 2,500,000)	(XOF 3,559,438)	(XOF 60,972,268)	(XOF 4,920,261)	(XOF 18,234,773)	(XOF 22,899,020)	XOF 91,755,023	XOF 18,309,990	XOF 538,692	(XOF 65,003,755)
Total estimé (à compléter s'il n'y a pas de données détaillées d'année en année)											
Indicateur macroéconomique associé	*Stimuler les secteurs locaux*	*Attirer des capitaux/exportations nettes*	*Choisis un indicateur économique*	*Emploi direct*	*Stimuler les secteurs locaux*	*Stimuler les secteurs locaux*	*Acheter de l'énergie locale*	*Attirer des capitaux/exportations nettes*	*Acheter de l'énergie locale*	*Réduction des coûts énergétiques*	*Coût total net*
Aligné ou opposé à l'indicateur?	*Opposé*	*Aligné ou Opposé?*	*Aligné ou Opposé?*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Opposé*	*Aligné*	*Opposé*



Positive Indicators:

- This pilot project will shift energy supplies from a mix of non-local kerosene and local charcoal to a locally-sourced rice-husk briquette. While it will displace some local charcoal production, most of the energy spending will shift from consumption of more-expensive kerosene. This increase in spending on local, rather than imported, energy sources will stimulate local economic activity, and is positively associated with projections of economic growth.
- This project also requires steady labor and will involve direct employment of workers to carry out the stages of briquetting production. This direct hiring is positively associated with projections of economic growth.
- The reduction in spending on outside kerosene constitutes a reduction in imports. Also, the receipt of briquetting equipment from an outside source (Food and Agriculture Organization) represents in inflow of outside investment in service of new economic productivity. Both characteristics are positively associated with projections of economic growth.
- The overall cost of energy resulting from the pilot – including increased spending on the new briquettes and decreased spending on charcoal and on kerosene – goes down slightly. The factor associated with overall cost of energy falls rather than rises. This reduction in total energy cost to the community buying briquettes instead of other sources is an example of this indicator and is positively associated with projections of economic growth.

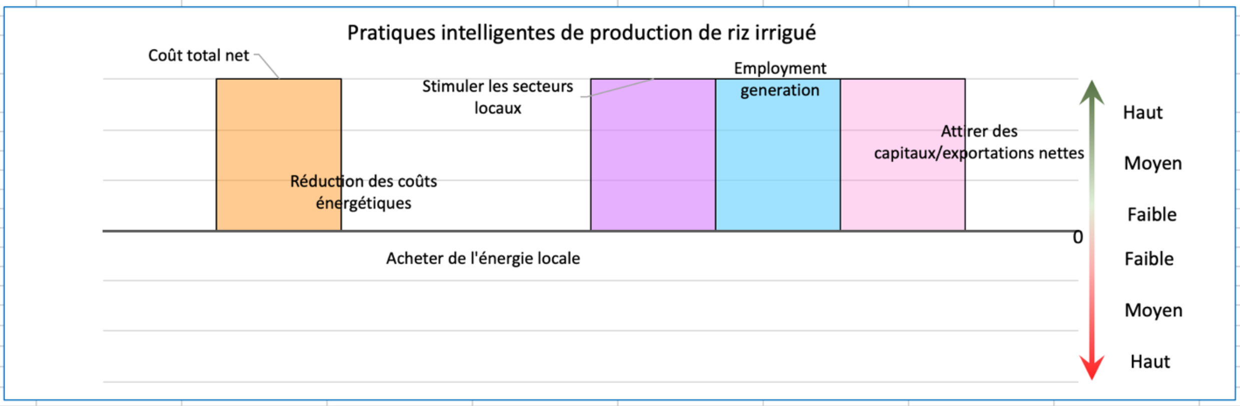
Causes for Concern:

- The overall net cost of the option in comparison to the business-as-usual (BAU) cost scenario. In this case, the reverse of this factor is some cause for concern, though it falls short of being a predictor of economic losses.
- There is a reduction in local economic value by diverting the rice husks away from their current uses (sales to farmers for animal bedding) so that they can become inputs to the production of briquettes. Depending on their worth in current uses, this displacement could be a cause for concern. The factor associated with projections of economic growth is an overall net stimulus to all local economic activity, and care should be taken to ensure that displacing the current use is not reducing a locally valuable economic activity.

<u>Scenario 2: Smart Irrigated Rice Production Practices</u>

The following screen-shots from CCS Tool shows the key results of the Macroeconomic assessment for Scenario 2:

Financial Flow Name (See Micro Analysis)	Coûts matériels: seulement sous-partie semences	Coûts matériels: seulement sous-partie engrais	Main d'oeuvre de plantation	Main d'oeuvre de culture et de récolte	Valeur du riz paddy	Total des économies nettes du programme
	Marterial costs: seeds	Material Costs: fertilizer	Planting Labor	Cultivation and harvesting labor	Value of Paddy Rice	Overall net savings
2019	(XOF 5,418,000)	XOF 19,130,074	(XOF 90,300)	(XOF 1,505,000)	XOF 73,745,000	XOF 85,861,774
2020	(XOF 5,526,360)	XOF 19,512,675	(XOF 92,106)	(XOF 1,535,100)	XOF 75,219,900	XOF 87,579,009
2025	(XOF 6,101,548)	XOF 21,543,570	(XOF 101,692)	(XOF 1,694,874)	XOF 83,048,848	XOF 96,694,303
2030	(XOF 6,736,602)	XOF 23,785,842	(XOF 112,277)	(XOF 1,871,278)	XOF 91,692,638	XOF 106,758,323
2035	(XOF 7,437,753)	XOF 26,261,492	(XOF 123,963)	(XOF 2,066,042)	XOF 101,236,082	XOF 117,869,815
2040	(XOF 8,211,880)	XOF 28,994,809	(XOF 136,865)	(XOF 2,281,078)	XOF 111,772,815	XOF 130,137,800
2045	(XOF 9,066,579)	XOF 32,012,612	(XOF 151,110)	(XOF 2,518,494)	XOF 123,406,219	XOF 143,682,647
2050	(XOF 10,010,236)	XOF 35,344,510	(XOF 166,837)	(XOF 2,780,621)	XOF 136,250,437	XOF 158,637,253
Cumulative Value	(XOF 239,622,046)	XOF 846,066,331	(XOF 3,993,701)	(XOF 66,561,680)	XOF 3,261,522,298	XOF 3,797,411,202
timated total (Fill out if no detailed year-by-year data)						
Associated Factor	*Stimuler les secteurs locaux*	*Attirer des capitaux/exportations nettes*	*Emploi direct*	*Emploi direct*	*Stimuler les secteurs locaux*	*Coût total net*
Is this activity a good sign, or the opposite?	*Opposé*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*



Positive Indicators:

- The overall net cost of the option in comparison to the business-as-usual (BAU) cost scenario. The overall net cost is below BAU, and this is a positive indicator regarding this program's likely effect on the economy.

- This change in practices involves more local spending on seeds, and more local production of rice, both of which are stimuli to local sectors and their productivity. The presence of these stimuli, without contrary reductions in other local sectors, is a finding consistent with projections of stimulated economic growth and a positive indicator regarding this program's likely effect on the economy.
- This strategy involves more labor-intensive planting, cultivation and harvesting work in comparison to the business-as-usual scenario, which will involve direct employment of workers to carry out the stages of rice production. This direct hiring is positively associated with projections of economic growth.
- This strategy also involves a dramatic reduction in demand for chemical nitrogen fertilizers, which are imported, in comparison to the business-as-usual scenario. This constitutes a reduction in imports. Even in the case where the seed supply is imported rather than locally produced, the savings on fertilizer is so large that the net spending on imported inputs would still fall. The factor associated with projections of economic growth is a net attraction of outside capital or reduction in import purchases. This reduction in fertilizer demand represents such a change, and is positively associated with projections of economic growth.

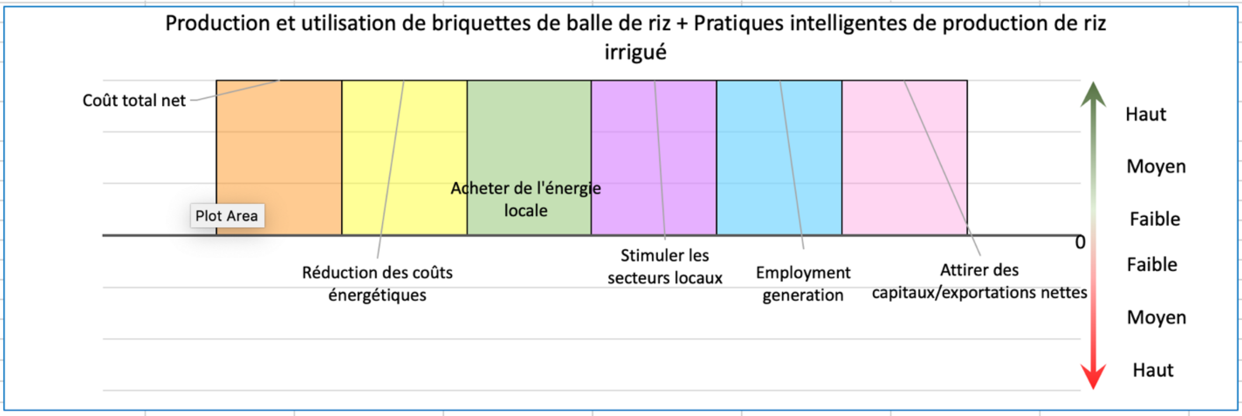
<u>Scenario 3: Combining Smart Rice Production Practices with Rice-Husk Briquetting Pilot</u>

The following screen-shots from CCS Tool shows the key results of the Macroeconomic assessment for Scenario 3:

Différence due à la politique

Financial Flow Name (See Micro Analysis)	valeur perdue du produit en balle de riz (Scen. 1)	Coûts d'équipement de production de briquettes (Scen. 1)	Production de briquettes: travail (Scen. 1 double en taille par Scenario 2)	Autres intrants de production (Scen. 1 double en taille par Scenario 2)	Coûts d'électricité (Scen. 1 double en taille par Scenario 2)	Bénéfice de l'opérateur d'une rizière sur les ventes de briquettes (Scen. 1 double en taille par Scenario 2)	Coût évité du kérosène (Scen. 1 double en taille par Scenario 2)
	Lost Sales of Rice Husk for Animal Bedding	Briquette Production Equipment Costs (Scen. 1 - paid by FAO)	Briquette Production Labor (Scen. 1)	Other Production Input Costs (Scen. 1)	Electricity Cost (Scen. 1)	Rice Mill Operator Profit on Briquette Sales (Scen. 1)	Reduced cost to buy Kerosene (Scen. 1)
	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)
2019	(XOF 2,700,000)	(XOF 3,814,800)	(XOF 2,757,240)	(XOF 222,500)	(XOF 824,599)	(XOF 1,035,522)	XOF 4,149,274
2020	(XOF 2,754,000)	XOF 0	(XOF 2,812,385)	(XOF 226,950)	(XOF 841,091)	(XOF 1,056,232)	XOF 4,232,259
2025	(XOF 3,040,639)	XOF 0	(XOF 3,105,100)	(XOF 250,571)	(XOF 928,632)	(XOF 1,166,165)	XOF 4,672,756
2030	(XOF 3,357,111)	XOF 0	(XOF 3,428,281)	(XOF 276,651)	(XOF 1,025,285)	(XOF 1,287,541)	XOF 5,159,100
2035	(XOF 3,706,521)	XOF 0	(XOF 3,785,100)	(XOF 305,445)	(XOF 1,131,997)	(XOF 1,421,549)	XOF 5,696,063
2040	(XOF 4,092,299)	XOF 0	(XOF 4,179,056)	(XOF 337,236)	(XOF 1,249,816)	(XOF 1,569,505)	XOF 6,288,914
2045	(XOF 4,518,229)	XOF 0	(XOF 4,614,015)	(XOF 372,336)	(XOF 1,379,898)	(XOF 1,732,860)	XOF 6,943,470
2050	(XOF 4,988,490)	XOF 0	(XOF 5,094,246)	(XOF 411,089)	(XOF 1,523,519)	(XOF 1,913,218)	XOF 7,666,151
Cumulative Value	(XOF 119,412,980)	(XOF 3,814,800)	(XOF 121,944,535)	(XOF 9,840,521)	(XOF 36,469,546)	(XOF 45,798,041)	XOF 183,510,046
Estimated total (Fill out if no detailed year-by-year data)							
Associated Factor	*Stimuler les secteurs locaux*	*Attirer des capitaux/exportations nettes*	*Emploi direct*	*Acheter de l'énergie locale*	*Acheter de l'énergie locale*	*Acheter de l'énergie locale*	*Attirer des capitaux/exportations nettes*
Is this activity a good sign, or the opposite?	*Opposé*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*

Financial Flow Name (See Micro Analysis)	Coût évité du charbon de bois (Scen. 1 double en taille par Scenario 2)	Coûts matériels: seulement sous-partie semences (Scen. 2)	Coûts matériels: seulement sous-partie engrais (Scen. 2)	Main d'oeuvre de plantation (Scen. 2)	Main d'oeuvre de culture et de récolte (Scen. 2)	Valeur du riz paddy (Scen. 2)	Total des coûts du programme	Changement net de coût de l'énergie
	Reduced Cost tp buy Charcoal (Scen. 1)	Material costs: seeds (Scen. 2)	Material Costs: fertilizer (Scen. 2)	Planting Labor (Scen. 2)	Cultivation and harvesting labor (Scen. 2)	Value of Additional Paddy Rice (Scen. 2)	Overall net cost	Overall Change in Cost of Energy
	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)	(XOF)
2019	XOF 828,000	(XOF 5,418,000)	XOF 19,130,074	(XOF 90,300)	(XOF 1,505,000)	XOF 73,745,000	XOF 85,861,774	(XOF 3,677,387)
2020	XOF 844,560	(XOF 5,526,360)	XOF 19,512,675	(XOF 92,106)	(XOF 1,535,100)	XOF 75,219,900	XOF 87,579,009	XOF 140,162
2025	XOF 932,462	(XOF 6,101,548)	XOF 21,543,570	(XOF 101,692)	(XOF 1,694,874)	XOF 83,048,848	XOF 96,694,303	XOF 154,750
2030	XOF 1,029,514	(XOF 6,736,602)	XOF 23,785,842	(XOF 112,277)	(XOF 1,871,278)	XOF 91,692,638	XOF 106,758,323	XOF 170,856
2035	XOF 1,136,667	(XOF 7,437,753)	XOF 26,261,492	(XOF 123,963)	(XOF 2,066,042)	XOF 101,236,082	XOF 117,869,815	XOF 188,639
2040	XOF 1,254,972	(XOF 8,211,880)	XOF 28,994,809	(XOF 136,865)	(XOF 2,281,078)	XOF 111,772,815	XOF 130,137,800	XOF 208,273
2045	XOF 1,385,590	(XOF 9,066,579)	XOF 32,012,612	(XOF 151,110)	(XOF 2,518,494)	XOF 123,406,219	XOF 143,682,647	XOF 229,950
2050	XOF 1,529,804	(XOF 10,010,236)	XOF 35,344,510	(XOF 166,837)	(XOF 2,780,621)	XOF 136,250,437	XOF 158,637,253	XOF 253,883
Cumulative Value	XOF 36,619,981	(XOF 239,622,046)	XOF 846,066,331	(XOF 3,993,701)	(XOF 66,561,680)	XOF 3,261,522,298	XOF 3,797,411,202	XOF 2,262,584
Estimated total (Fill out if no detailed year-by-year data)								
Associated Factor	*Acheter de l'énergie locale*	*Stimuler les secteurs locaux*	*Attirer des capitaux/exportations nettes*	*Emploi direct*	*Emploi direct*	*Stimuler les secteurs locaux*	*Coût total net*	*Réduction des coûts énergétiques*
Is this activity a good sign, or the opposite?	*Opposé*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*	*Aligné*



Positive Indicators:

- The overall net cost of the option in comparison to the BAU. This factor is below BAU cost, and this finding is consistent with projections of stimulated economic growth. This is a positive indicator regarding this program's likely effect on the economy.
- This pilot project follows Scenario 1 in shifting energy supplies from a mix of non-local kerosene and local charcoal to a locally-sourced rice-husk briquette. While it will displace some local charcoal production, most of the energy spending will shift from consumption of more-expensive kerosene. This increase in spending on local, rather than imported, energy sources

will stimulate local economic activity, and is positively associated with projections of economic growth.

- This change in practices involves more local spending on seeds, and more local production of rice, in comparison to the business-as-usual scenario. Both of these are stimuli to local sectors and their productivity. The presence of these stimuli, which is only offset to a minor extent by lost activity in sale of rice husks for its current use, is a finding consistent with projections of stimulated economic growth and a positive indicator regarding this program's likely effect on the economy.
- Both changes in rice-cultivation practices and briquetting production require significantly more new labor in comparison to the business-as-usual scenario, as mentioned above. This direct hiring is positively associated with projections of economic growth.
- The combination of the attraction of outside investment by FAO (to provide briquetting equipment) and the reduction in spending on fertilizers represent a positive shift in net capital flows. Such a shift is positively associated with projections of economic growth.
- The overall cost of energy goes down in this scenario. The factor associated with projections of economic growth is an overall cost of energy that falls rather than rises. This reduction in total energy cost to the community buying briquettes instead of other sources is an example of this indicator, and is positively associated with projections of economic growth.

2.3 Activities of the political task force

2.3.1 Contribution to the work of the modeling team

The political task force should be involved in the activities of the modeling team for a better understanding of the planning tool (integrated model) that will be made available to them. For this reason, the chair of this task force and some members from the forestry, waste and energy sectors are associated with all the modeling team meetings. In addition, the members of the political task force provided the necessary data to work with Ex-Act, LEAP and CCS Tool.

2.3.2 Contribution to the development and adoption of the National Strategy for Climate-Smart Agriculture, the development of the Concept Note for the revision of the CDNs and the establishment of the National Commission on Climate of Côte d'Ivoire

In 2018, the Political Task Force contributed to the development and adoption of the National Strategy for Climate-Smart Agriculture. Thus, several of this task force have been asked for this work as well as the ongoing development of the concept note for the revision of the CDN and the establishment of the National Commission on Climate of the Côte d'Ivoire.

3 Conclusions

3.1 Summary of tangible socio-economic benefits from component 1

The LEDS project in Côte d'Ivoire, in these two components, has seen the involvement of key stakeholders to mobilize in the implementation of the NDC in Côte d'Ivoire. These are the Government, researchers, implementing agencies, local authorities, local businesses, NGOs and farmers. The project has clearly identified the central role they must play in the decision-making process, implementation planning and monitoring of LEDS.

In particular, for the component 1, it has been observed that through demonstration projects, farmers are willing to adhere to smart agriculture programs to face climate change, to increase their income and create job at the same time. This component was also an opportunity to tested the SRI technique developed by ANADER a few years ago and had conclusive results for scaling up in the national level. For the demonstration production of briquettes from agricultural residues (rices), the implementation of the LEDS project has revealed that entrepreneurship and business opportunities are important in the country. This waste is of all kinds (rice, cocoa, coffee, coconut, cashew, but, etc.) and accessible, the technologies are also accessible and affordable and finally the market of bioenergy is brought to grow.

Some statistics

- 93 farmers including 11 women trained in intelligent farming practices (SRI) and biofertilizer production (compost),
- Development of 50 ha irrigated rice in SRI with an average yield of 4.3 t / hectare versus 2.9t / hectare in BAU
- 2 management committees for water management facilities in Tipadipa and Tiétiékouo
- 2 rice marketing committees in Tipadipa and Tiétiékouo
- 23 producers trained in the development of rice-growing areas.

3.2 Summary of tangible climate, environment and socio-economic benefits from component 2

The modeling of the case study carried out with EX-ACT made it possible to show that the implementation of the project could make it possible to avoid the rejection of a quantity of -982,724.97 tCO2eq of GHGs in the atmosphere and this thanks to the changes in the type of irrigation, the method of fertilization and briquetting provided by the project. The project emission factor, estimated at 15,60, can be used by LEAP for its work.

The result from LEAP model show that the use of rice husk briquette is a powerful tool for reducing greenhouse gas emissions. These emissions are reduced by 63k eq-CO2 by 2050 for households. For all sectors of activity and all the processes that lead to its use, the reduction is 2300k eq-CO2 and those for the whole country. The amount of household energy through the use of briquettes reduced compared to current practices (Baseline). It revealed a 340k terajoule reduction compared to the Baseline by 2050 if this practice is extended to the whole country.

In terms of socio-economic impacts, two indicators were used: number of jobs created and wealth created in terms of value added. Thus, according to the simulation carried out on the transformation of rice waste into biofertilizer, 24 jobs are created for 150 ha of rice for 50 000 USD per year and 4 080 new jobs created out of the 25 500 ha of irrigated rice growing on the extended territories and 16 000 jobs created if all 100,000 ha of available rice paddy farms are to be exploited.

Similarly, the production of fuel briquettes from rice balls is a business opportunity for the population. Indeed, for a rice mill that invests in such a production, 8 new direct jobs will be created. The financial gain is estimated at US $ 4,713 for an annual production of 17,280 kg per year and per mill of rice.

All the results show that nation-wide investments in the three priority NDCs of Côte d'Ivoire can not only make a significant contribution to the achievement of the national ambition of 28% reduction of GHGs at the national level by 2030, but also to positively impact the national economy and the well-being of the population.

3.3 Integration of lessons learned from field activities into policies

The LEDS project in Côte d'Ivoire has provided lessons that have helped in the development of three major strategies for the implementation of NDCs in Côte d'Ivoire.

• Firstly, the national strategy on climate smart agriculture in which the promotion and popularization of SRI is central to the results of the case study on the rice sector in Gagnoa. This strategy aims to scale up the application of SRI in rice bungalows.

• Côte d'Ivoire is committed to the REDD + mechanism. The process of preparing this mechanism, which has seen the technical and financial support of several donors, including UN REDD, the World Bank and the AfDB, has resulted in the development of a national strategy with five main strategic areas including the domestic cooking energy sector. The results of the LEDS project made it possible to be convinced of the need to take into account bioenergy production based on agricultural waste.

• The World Bank supported Côte d'Ivoire in developing a framework to stimulate private investment in the renewable energy sectors, particularly electric power generation. The results of the LEDS project, particularly on the production of briquettes, made it possible to convince the national actors about the need to integrate the energy cooking aspects from biomass energy in such a framework. The results of the LEDS project made it possible to be convinced of the need to take into account bioenergy production based on agricultural waste. Indeed, as agricultural countries whose deforestation rate is one of the highest in the world due to the cutting of wood for cooking purposes, Côte d’Ivoire must promote the briquette production sector as a real track to significantly reduce this rate. In addition, agricultural waste is abundant, accessible but not sufficiently valued.

Finally, the integrated model developed as part of this project contributes to the drafting of the concept note for the revision of NDCs currently underway as well as the establishment of an MRV system for monitoring our NDC and measuring progress made by compared to our climate ambition.

Appendix

Appendix-1: List of Team Members - Component 1 (ANADER Team)

LEVEL	Name/Forename	QUALITY	ROLE
Siège	Mme GBO D. Amin	Chief Climate Change Division (CDCC) Project focal point	Coordination
	M. EZA E. Mathieu	Chief Cell Climate Change Division (CCDCC)	Coordination assistance
	M. YAPI Martial	National Coordinator of Cereal Subsidiaries (CNFC)	Technical support on the management of rice cultivation
	Mlle COFFI Bathilde	Chief Cell Monitoring Evaluation (CCS / E)	Technical support in Monitoring Evaluation
	M. COULIBALY Daouda	Assistant Chief Rural Engineering Unit (ACCGR)	Technical support in planning
	M. ESMEL M. Elie	Chief Development Research Division (CDR / D)	Technical support to highlight lessons learned from the demonstration project
Direction Régionale	M. BAGROU Guéda	Regional director	Coordination
Formation organisationnelle et rapportage	M. KOUASSI M. Seydou	Zone Manager (CZ)	Coordination
	M. DIARRASSOUBA Kassoum	Specialized Technician in Annual Cultures (TSCA)	Supervision, technical training and reporting
	M. DJEHA Kouassi	Specialized Technician in Annual Cultures (TSCA)	Supervision, technical training and reporting
	M. KALEU K. Georges	Specialized Technician in OPA (TSOPA)	
	M. TIETIE Jean Marie	Rural Development Facilitator (ADR)	Training and post-training follow-up
	M. N'GUESSAN K. Marcel	Rural Development Facilitator (ADR)	Training and post-training follow-up
	M. BAMBA Youssouf	Investigator	Monitoring and evaluation
	M. LOES Essis	Investigator	Monitoring and evaluation

Appendix-2: List of Modeling Team Members

N°	NAME OF FOCAL POINTS	INSTITUTIONS	Role	CONTACTS
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	Dr. KONÉ TIANGOUA			+225 08 88 22 69 / eric_michel_assamoi@yahoo.fr
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24	M. BRIDA Ange B.	Coordonnateur CCAC	Outil LEAP	angebrida@hotmail.com +225 57 13 50 75

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26	M. KONAN BOGUI Nathalie	Agence National d'Appui au Développement Rural (ANADER)	Encadrement rural (Projet de démonstration)	+225 01 09 64 20/ kbnaths@yahoo.fr
28	M. KOFFI KONAN Jean Claude	Société de Développement des Forêts (SODEFOR)	Foresterie	+225 79 29 69 18/ Abidkoffi@gmail.com
COMMUNITY				
30	Dr. BAMOUAN Jean - Pierre	Union des Villes et Communes de Côte d'Ivoire (UVICOCI)	Collectivités	+225 46 17 44 00/ bamouanjp@yahoo.fr
PRIVATE SECTORS				
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NGO				
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33	M. M'BRA KOUASSI Richard	JVE COTE D'IVOIRE	Societé civil	mbrafresco@yahoo.fr
34	Mme KOUAME N'DRI Marie Therese	FEREADD	Société civil	+225 05 46 07 71/ 07 67 31 32 fereadd@yahoo.fr

Annex-3: List of members of the political taskforce

N°	Name/forename	Function	Structure	Contacts E-mail
MINISTRY AND STATE STRUCTURES				
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Total 2		**47654**	**28 592 656**	**30 612**	**18 367 025**	**17042**	**10 225 631**
COORDINATION GENERALE DU PROJET							
	Atelier de lancement du projet	2742	1 645 000	2 742	1 645 000	0	0
	Coordination	17628	10 576 953	10 500	6 300 000	7128	4 276 953 **En attente du dernier transfert)**
Activités de coordination	Fourniture de bureau, internet et communication	8333	5 000 000	6 457	3 873 900	1877	1 126 100 **En attente du dernier transfert)**
	Participation COP 23; 24 et 25	5829	3 497 344	5 829	3 497 344	0	0
	Atelier de clôture du projet	14097	8 458 217	0	0	14097	8 500 000 **En attente du dernier transfert**)
Total 3		**48699**	**48629**	**29 177 514**	**25 528**	**15 316 244**	23102
Coût total		**150 000**	**150 000**	**90 000 000**	**97 465**	**58 478 397**	**52 535**
MONTANT TOTAL TRANSFERE		**105 000**	**105 000**	**63 000 000**	**97 465**	**58 478 397**	**7 535**
SOLDE (RESTE A TRANSFERER)		**45 000**	**45 000**	**27 000 000**			

Annex-5: ANADER progress report for the period 2017 - 2019 (see attached document)

Annexe-6 : vidéo – témoignages (see attached document)

Annex-7 : characteristics and comparative advantages of SRI (see page 10).