# *Recycling of Organic Waste for Energy and Smallholder Livelihood in The Gambia*

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## *Actors analysis & Action plan (D 5.1 & 5.2)*

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## Content

# 1 Introduction

On one hand firewood and charcoal are still widely used in the Gambia. On the other hand, the resource available for briquette production is abundant and available, especially groundnut shells. This proposal follows the implementation of technical assistance funded by the CTCN. This technical assistance has allowed to survey the firewood and charcoal consumption, as well as the agricultural and forest residues production in the Gambia. It also identified an adapted equipment to produce briquettes and set up a briquette "production and use" strategy which allowed to make the value chain profitable.

The use of biomass energy has many advantages, it comes from familiar and affordable available resources, it creates jobs, ensures diversification and energy security and has a positive effect on the climate. Moreover, it has been shown that biomass energy is and will remain for the next decades an unavoidable energy for domestic cooking in sub-Saharan Africa. In this context, the use of biomasses other than wood (ground nuts shells, coconut nuts shells, corn cobs, savanna straw, rice husk, among others) is often proposed to produce substitutes for charcoal, in the form of briquettes.

However, despite their many advantages (price, length of combustion, environmental sustainability, possibility of standardization ...) these fuels often fail in substituting significantly for charcoal or firewood. Experience shows the implementation strategy is specific to each situation and must consider the opinions of users. A briquette project is indeed part of a social, economic and environmental reality. The use of briquettes requires households to change their habits. In doing so, efforts are needed to learn to use the new fuel which, unlike what is often presented, is very different from the fuels to which households are used to (firewood and charcoal). The briquettes cooking behaviour often requires a change of cooking habits.

In order not to disturb households too much and risk discouraging them, it is important to propose a fuel whose qualities are sufficiently close to those of traditional fuels. For example, briquettes made of non-carbonised material have shown that they do not meet consumer expectations at all. Indeed, they are too powerful and lead to excessive fuel consumption. To be used they should be associated with very expensive stoves that are not available to households. It is therefore necessary to produce briquettes from carbonized material whose combustion behaviour is closer to the fuel already used by households.

The price at which the fuel will be sold is also very important. It depends on the cost of resource supply and production costs. It is in competition with the cost of traditional fuels. This competition must be evaluated in terms of the cooking work that fuels allow, in other words, in terms of the fuel cost of preparing a meal. A fuel offered at a higher price than existing alternatives will struggle to find its market.

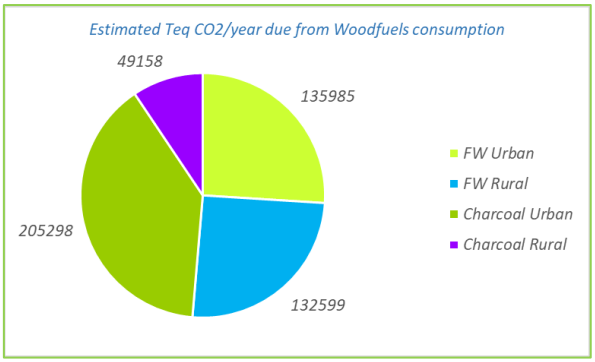
During the CTCN Technical assistance, 15 women groups were identified to benefit of the training proposed by this technical assistance. It also allowed a rigorous analysis of the briquette value chain and the evaluation of several possible scenarios for producing and selling them. The analysis demonstrated that many production strategies are neither viable nor sustainable. Nevertheless, the organization of the production chain in two stages makes it possible to propose a profitable value chain model. On the one hand, women groups produce carbonized material from groundnut shells and mil it before bagging it and selling it to an intermediary (currently WIG) for transport. On the other hand, other women groups buy bags of carbonized powder (and binder) from the same intermediary. The members of the later groups transform the carbonized powder into briquettes thanks to the equipment made available by the technical assistance. It should be noted that the briquettes produced are primarily intended for use by the members who produced them. The sale of briquettes is a secondary aspect.

The CTCN Technical assistance has provided adapted equipment to women groups involved in the TA. The groups whose task consist of producing carbonized powder were equipped with char barrels allowing the pyrolysis of the groundnut shell and a hammermill used to process the groundnuts char. The briquette producer-user groups are equipped with manual presses and all the equipment necessary to produce briquettes. The proposed production model considers the cost of these different equipment and includes their depreciation in the prices fixed at the different stages of the chain.

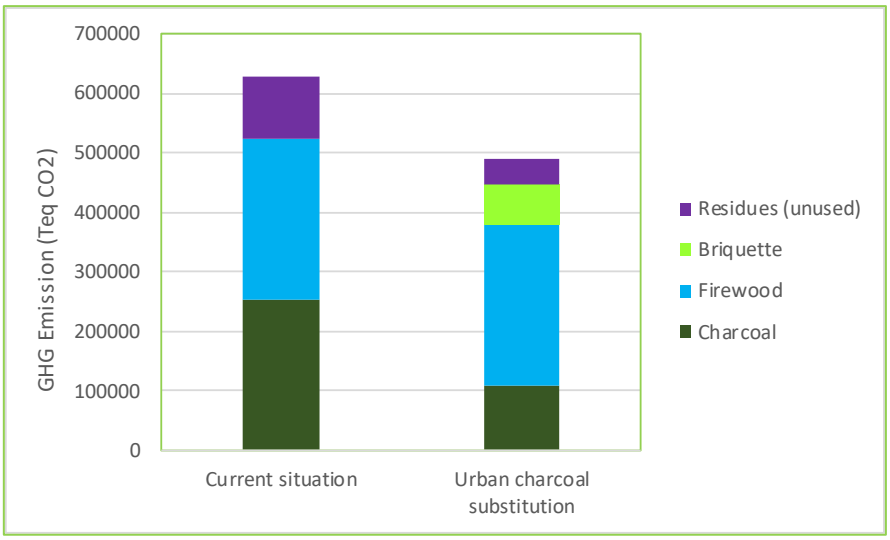
Training adapted to the different groups were organised: Pyrolysis - grinding on the one hand and briquette production - use on the other hand. It should be noted that special attention was paid to training in the use of briquettes. This strategy allowed to produce & use briquettes at a monthly rate of 6 tonnes. At the end of the CTCN Technical Assistance briquettes face a high demand from the users. Indeed WIG (intermediary between powder production site and briquettes production-use communities) receives many requests for more powder (from the already involved women groups) or for joining the project (from non-involved women groups). Moreover, briquette producing communities have many requests for buying briquettes (from interested or curious people). These requests can not be satisfied for time being because of lack of production equipment but indicate the chosen strategy for the briquette value chain setup seems adequate to develop the market. Between December 2018 & January 2019, 12 tonnes briquettes have been produced and used.

According to the estimates made in the CTCN Technical Assistance, the following agricultural residues were found accessible and available for briquetting: groundnut shells, maize cobs, coconut shells, sawdust, wood shavings and charcoal fines. The *yearly available and accessible* amount of these residues is about 45 000 tonnes, representing a briquette production potential of 19 000 tonnes per year, with an energy content of 470 TJ. The estimated quantity of charcoal fines available is 1 884 tonnes per year, which represents a potential briquette production of 2 077 tonnes per year (considering the binder proportion to be added). The energy content of these briquettes is 54 TJ.
The total potential for briquette production from residues in The Gambia is therefore estimated at 21 385 tonnes per year.

Calculation have shown that charcoal in Gambia is only a small share of the mass of the used domestic fuels, about 25 000 tonnes out of 183 000 tonnes. But it has been calculated charcoal is responsible for nearly half of the GHG emissions associated with this sector (250 000 Téq $CO_2$ compared to a total emission of 523 000 Téq $CO_2$).




If 21 385 tonnes of briquettes are produced from the identified residues, this briquette amount may substitute to 14 444 tonnes charcoal in urban areas (considering the conversion factor – 1 kg charcoal needs 1,48 kg briquettes to be substituted) which would lead to a reduction of 71% of the urban charcoal consumption, or 57% of the national charcoal consumption.
The reduction is about 140 413 Téq $CO_2$yearly. This is a 22,3% reduction. This means the emission of 6,5 Téq $CO_2$ is avoided per tonne of used briquette.




# 2 Upscaling Proposal

## 2.1 Actors analysis

The technical assistance results and conclusions were presented during a workshop held on the 18th October 2018 at the GTHI Radio Gambia Road, in Kanifing. Following potential stakeholder were invited to participate to the workshop. Not all of them were represented, but present delegates pointed out the good quality of the work performed by the TA team. The adequacy between the proposed strategy and the actual needs was also underlined. Their potential role in an upscaling is described hereunder.

- Office of the First Lady: can advocate and galvanize support to the course of women for sustainable livelihood and reduce drudgery.
- Ministry of Environment Climate Change & Natural Resources: Develop appropriate Policy guidance on the sustainable management of the country's natural resources, from the threats of anthropogenic activities and Climate Change impacts.
- Ministry of Finance & Economic Affairs: Ensures the efficient and judicious management of donor project funds for the required purpose.
- Ministry of Trade: Develop policies that will promote an enabling environment for investment and trade in local initiatives and innovations.
- Ministry of Agriculture: Provide policy guidance towards sustainable agricultural production to meet the food needs and export while reducing importation of agricultural products.
- The National Food Processing and Marketing Cooperation at (Saro) former GGC with support from the Ministry of Agriculture will ensure a sustainable supply of groundnuts shells for bio-fuel production for the up-scaling project as well as the marketing of the product
- National Environment Agency: Coordinates the efficient utilization and conservation of the country's natural resources on a sustainable basis through legislation and enforcement of environmental laws and regulations that promote sound management.
- Women's Bureau: Advocates against gender disparities and promote equity at all spheres of national development.
- Department of Forestry: Is responsible for the sustainable management, utilization and conservation of the country's forests and forest resources form threats of anthropogenic activities and Climate Change impacts. It provides required legislative framework and enforcement of regulations to enhance the sustainable utilization and conservation of forest resources. The Department of Forestry is the Focal Point for UNCCD and in collaboration with the up-scaling project can attract funding to support the gradual facing out and enforce the ban on the use of charcoal and firewood.

- Department of Water Resources: Is the national Climate Change Focal Office and leads the implementation of the country's national Climate Change Policy in line with international conventions and treaties ratified by the Gambia on Climate Change including the Paris Agreement. A successfully designed up scaling project can attract funding from of the LDC/GCF basket through the national focal point.
- National Assembly Members' Select Committee on Environment: This is legislative arm of government and enacts laws that will enhance the sustainable management of the country's natural resources.
- Youth Empowerment Programme (YEP): This is an umbrella youth organization that promotes youths agenda towards youth participation in national development through employment, entrepreneurship, agriculture and innovative ventures.
- Representative of the European Union in The Gambia: The EU is the major funding partner for the government of the Gambia and has implemented several development projects to improve livelihoods of people.
- UNDP/Global Environmental Facility: Provides capacity and funding support through UN Agencies to meet national (NDP) and international (SDGs) development targets.
- CTCN/ can further provide assistance, if requested through the National Designated Entity (NDE and in line with national priorities

The hereunder organization may also contribute the upscaling implementation

- GTTI:
- UNIDO
- FAO
- GCF project ongoing?
- Beneficiaries representatives?

The hereunder institutions are partner NGOs which have worked with WIG on environment management project related issues as well provide service on innovative technologies.

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- Director Future in our hands (FIOH)
- Director United Purpose
- Swegam provide and further enhance new technology and innovation for the project. Swegam has sold the equipment used in the CTCN pilot project
- GGC

## 2.2 Proposed partnership

The hereunder structure is an organization recommendation which still has to be improved and accepted by the proposed institutions.
The participation of the above institutions is foreseen at two levels:

### 2.2.1 Advisory board

Membership of a support committee whose main role is to inform the key actors (committee members) of the future upscaled project's progress. The results & progress of the project are presented at the meetings of this advisory committee. The opinions of the participants are collected in order to ensure the smooth running of the activities. This helps the project to be better integrated in the country reality. Representatives of the following institutions are being considered for membership on this committee:

- Ministry of Environment Climate Change & Natural Resources
- Ministry of Trade
- Ministry of Agriculture
- Department of Water Resources
- The National Food Processing and Marketing Cooperation at (Saro)
- CTCN NDE

- University of the Gambia UTG

### 2.2.2 *Operational partnership*

The following stakeholders will be involved in the project operational activities:

- ECO-Consult
  - Coordinator of the pilot project
  - Expert in Wood Energy and improved carbonisation techniques & substitution solid biofuels (i.e. briquettes)
  - Roles in this project
    - Coordination
    - Choices, decision and implementation of technical aspects
    - Trainers training
- Women initiative The Gambia (WIG)
  - Main operational stakeholder of the pilot project
  - Involved in substitution solid biofuels (i.e. briquettes) project
    - Before the CTCN pilot project
    - Beneficiary of the CTCN Technical Assistance
    - Foreseen as the main beneficiary of the present upscaling
      - The project will therefore reinforce WIG capacity (capacity building) in order to make it possible for the institution to manage a 5000 tonnes briquettes production chain. To achieve this goal following profiles will be hired to work under the supervision of the WIG team leader
        - Administrative assistant
        - Logistic Unit manager
        - Milling Unit manager
        - Mechanised briquette production unit manager
    - Due to its high training skills in briquette making and use, WIG will also be in charge of the training in briquette production and use aspects. To achieve this, 8 trainers will be hired
- National Environment Agency (NEA)
  - Is the main institutional partner of the project
  - Is responsible for
    - Permits facilitation
    - Marketing activities to promote briquettes
    - Enforcement and coordination are NEA's core mandate
- University of the Gambia UTG
- Department of Forestry (DF)
  - Will facilitate briquette trade and retail by
    - In a first step insuring a tax exemption for the product
    - In a second step propose a law which exempt all charcoal alternative fuel from taxes
- Swegam
  - Is one of the main equipment providers in the Gambia. This society has provided the equipment for the pilot project and has proven the quality of its service
  - Will help to design and provide the equipment for the upscaled project
- Youth Empowerment Programme (YEP)
  - In its second part, the upscaled project will sell briquettes (produced by a mechanical press) to niches markets. The briquettes retail is foreseen to be made by young entrepreneurs to be trained

- Will identify and train young entrepreneurs in the briquettes retail (market studies, marketing, business plans…)

## 2.3 Action plan for scaling up

### 2.3.1 Project Structure

The proposed scaling up structure is based on the collected information and the results achieved by the pilot project "Recycling of Organic Waste for Energy and Smallholder Livelihood in The Gambia", which was funded by the CTCN through a Technical Assistance. Based on the Technical Assistance conclusions, Figure 1 shows in the lower part the value chain to be set up when the pilot project is scaled up, the upper part outlines the main activities to be undertaken as part of this scaling up. The involved partners identified to manage the activities are also shown on the organisation chart.

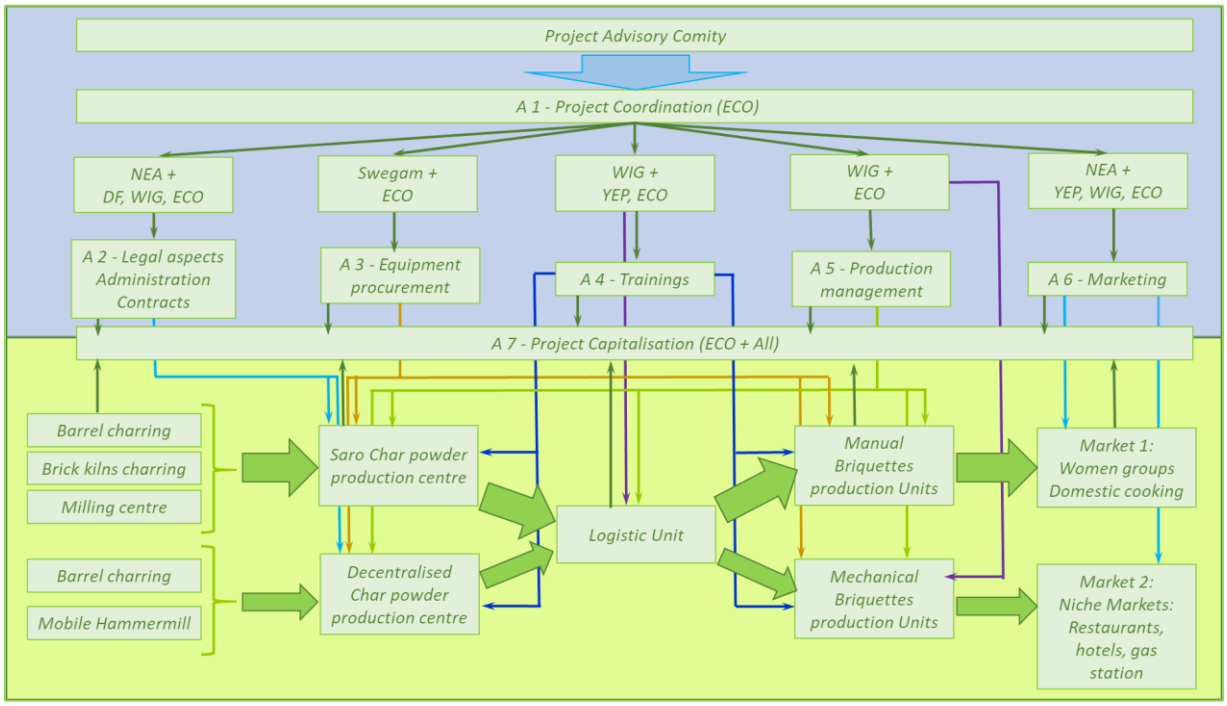


*Figure 1: Project flow chart*

The pilot project has demonstrated the need to divide the briquette production chain into two main stages: carbonized powder production and the production and use of briquettes intended to self-consumption. These two ends of the chain have to be linked by a logistic and transport intermediate. This chain is based on the use of groundnut shell as a raw material, it is available in large amount the Saro groundnut processing plant dumping site. This production line will be scaled up with an annual production target of 4,000 tonnes. To this end, carbonization equipment will be provided in Saro, which at the beginning will consist of carbonization barrels, as for the pilot project. To further improve the environmental performance of the carbonization in brick kilns with thermal gas treatment, will be implemented in second stage. Manual briquette presses will be provided to women groups interested in joining the project. Members of the groups will be trained in the production and use of briquettes. This value chain is scrupulously based on the achievements of the pilot project and makes it possible to considerably develop the briquette market in Gambia.

In addition to this value chain, new raw materials sources will be used (cashew nuts, corn stalks and sawmill residues for example). To this end, carbonization drums will be made available to additional producers and a mobile hammermill system will be set up. The management of this material flow (objective 1000 tons per year) will also be handled by the logistics unit. Downstream of the value chain, a mechanical briquette production unit will be set up. It will be complementary to the manual presses as its main outputs are niches markets. The production of the mechanised unit is mainly

intended for the niche markets (hotels, restaurants, petrol stations, affluent customers...). The niches market development is made in partnership with the YEP NGO, which is specialised in young people training to make them access to entrepreneurship, in this case their activity will be the briquettes retail in restaurants, supermarkets, hotels, gas stations, etc.
To enable these value chains to be set up, various activities are planned (7 activity groups):

- Activity 1: Project Coordination
  - Task leader: ECO
  - Involved partners: All
  - See § 2.3.2 for activity description
- Activity 2: Legal, administrative and contractual aspects.
  - Task leader: NEA
  - Involved partners: DF, WIG, ECO
  - See § 2.3.3 for activity description
- Activity 3: Equipment Procurement
  - Task leader: Swegam
  - Involved partners: ECO
  - See § 2.3.4 for activity description
- Activity 4: Training courses
  - Task leader: WIG
  - Involved partners: YEP, ECO
  - See § 2.3.5 for activity description
- Activity 5: Production management
  - Task leader: WIG
  - Involved partners: ECO
  - See § 2.3.6 for activity description
- Activity 6: Marketing
  - Task leader: NEA
  - Involved partners: YEP, WIG, ECO, UTG-GBoS
  - See § 2.3.7 for activity description
- Activity 7: Capitalization
  - Task leader: ECO
  - Involved partners: NEA, WIG, YEP, DF, UTG-GBoS
  - See § 2.3.8 for activity description

### 2.3.2 Activity 1: Coordination

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| Objective | *A sustainable briquette production chain processing agriculture and forest residues is set up* | | | | | | | | | | | | |
| *Output 1* | *Project coordination: Implementation, planning and detailed budget are prepared* | | | | | | | | | | | | |
| *Activity 1* | *Development of implementation planning and communication documents* | | | | | | | | | | | | |
| Partners: | ***ECO**,* NEA, DF, WIG, Swegam | | | | | | | | | | | | |
| *A 1,1* | *Detailed workplan of all activities, deliveries outputs, deadlines and responsible partner,* | X | | | | | | | | | | | |
| All | The workplan will consider a phasing in at least 3 steps:<br><br>*Phase 1: Setting up the necessary conditions for the successful implementation of the project*<br>Design, order, delivery schedule and implementation for the carbonization centre in Saro and additional sites where residues are produced; for manual presses and ancillary equipment; for hammermills and ancillary equipment. Selection & purchase of transport vehicles (small flatbed trucks);<br>Agreements with the groundnut processing plant (contract writing);<br>Identification of interested women groups;<br>Training planning; Recruitment & Training of trainers;<br>Setting up a project support committee with representatives from this sector of activity<br><br>*Phase 2: Setting up the mechanised briquette production unit for the domestic cooking market as main destination*:<br>The legal, administrative and contractual Activities schedule (Output 2); Equipment purchase planning (Output 3); Training activities schedule (Output 4); Trainers planning; Training frequency (one training cycle = 15 days); Production activities schedule (Output 5); Carbonisation & milling site; Women groups, Production objectives and milestones; Monitoring the women groups briquette consumption; Marketing activities schedule (Output 6); Capitalisation activities schedule (Output 7);<br><br>*Phase 3: Setting up the briquette production for niches market as main destination*:<br>The legal, administrative & contractual Activities schedule (Output 2); Equipment purchase planning (Output 3); Training activities schedule (Output 4); Initial training; Production activities schedule (Output 5); Production increase and perspectives; Briquettes sales | X | | | | | | | | | | | |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| | monitoring; Marketing activities schedule (Output 6); Hotels, restaurants and petrol stations prospecting; Collaboration with charcoal retailers; Packaging design; Capitalisation activities schedule (Output 7); Monitoring the mechanised briquettes production unit | | | | | | | | | | | | |
| *D1,1* | *3 phases detailed working plan* | *D* | | | | | | | | | | | |
| *A 1,2* | *Detailed workplan of all activities, deliveries outputs, deadlines and responsible partner,* | X | | | | | | | | | | | |
| All | Based on the work plan, a monitoring and evaluation plan with specific, measurable, achievable, relevant, and time-bound indicators used to monitor and evaluate the timeliness and appropriateness of the implementation. The indicators generally used to characterize the "briquette" projects are: The amount (mass) of char powder & briquettes produced by implemented production units; The amount (mass) of char powder & briquettes sold by implemented production units; The incomes generated by char powder and briquettes sales; The number of presses installed; The amount of waste treated; The number of users trained; The number of exclusive users (no longer using other fuels); Number of women involved, Number of training courses; Number of participants to the trainings<br>climate change related indicators will be considered as well, such as GHG emission reduction. Also estimation of avoided use/emission from charcoal and wood.<br>Number of people or households benefitting from increased revenues and use of briquettes | X | | | | | | | | | | | |
| *D1,2* | *Monitoring & Evaluation plan* | *D* | | | | | | | | | | | |
| *A 1,3* | *Detailed Budget per period & activities* | X | | | | | | | | | | | |
| All | Within the budget boundaries to be determined in the call, plan expenditures by activity and project phase. Invoice planning (advances, intermediate and final invoices) | X | | | | | | | | | | | |
| *D1,3* | *3 phases detailed Budget* | *D* | | | | | *D* | | | | | | |
| *A 1,4* | *Reporting* | *X* | X | X | X | X | X | X | X | X | X | X | X |
| *ECO* | *Quarterly report* | *X* | X | X | X | X | X | X | X | X | X | X | X |
| *All* | *Half year report (is presented to the Supporting committee)* | | X | | X | | X | | X | | X | | X |
| *All* | *Annual report* | | | | X | | | | X | | | | X |
| *All* | *Final report* | | | | | | | | | | | | X |
| *All* | *Advisory board meeting* | *X* | *X* | | *X* | | *X* | | *X* | | *X* | | *X* |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *D 1,4* | *On time meetings & report delivery* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | *D* |

### *2.3.3 Activity 2: Legal, administrative and contractual aspects*

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *Output 2* | *The legal, administrative & contractual framework required for the project implementation is in place* | | | | | | | | | | | | |
| *Activity 2* | *Set up of the legal, administrative & contractual framework required for the project implementation* | | | | | | | | | | | | |
| Partners | ***NEA***, DF, ECO, WIG | | | | | | | | | | | | |
| *A 2,1* | *Agreement with residues producers* | | *X* | | *X* | | | | *X* | | | | |
| NEA, WIG | Negotiation about the available groundnut amount and contract duration | | | | | | | | | | | | |
| | Sarro | | *X* | | | | | | | | | | |
| | One second industrial residues producer (Sawmill, Corn stover, cashnuts shells…) | | | | *X* | | | | | | | | |
| | One third industrial residues producer (Sawmill, Corn stover, cashnuts shells…) | | | | | | | | *X* | | | | |
| | 8 Smaller producers (including interested women groups) | | | | *X* | | | | *X* | | | | |
| *D 2,1* | *Contract signed between the ground nut processing plant and the group of women managing the carbonisation & milling unit* | | *D* | | *D* | | | | *D* | | | | |
| *A 2,2* | *Agreement with women who are collecting groundnut pieces in the dumped shells* | | *X* | | | | | | | | | | |
| NEA, WIG | During the pilot project, women who collect peanut fragments from landfilled sells were organized into a group. Equipment (charring drum and hammermill) has been made available to them. During upscaling, the agreements concluded with this group of women will be extended and formalized. The group will also be reinforced in terms of equipment and capacity. | | *X* | | | | | | | | | | |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *D 2,2* | *Signed contract between the women group producing the char powder and WIG acting as milling & logistic Unit* | | *D* | | | | | | | | | | |
| *A 2,3* | *Carry out the required administrative procedures to obtain the authorizations to carbonize and mill the groundnut shell in Saro and other decentralised locations* | | *X* | | | | | | | | | | |
| NEA, FD | Environmental authorization for carbonisation (in Saro and decentralised locations);<br>Authorization to build a shed for milling equipment in Saro;<br>Authorization to build a brick charring kiln, in Saro<br>Authorisation for briquettes production (mechanised production Unit, manual presses, if needed) | | *X* | | | | | | | | | | |
| *D 2,3* | *Authorizations to carbonize and crush the groundnut shell in Saro* | | *D* | | | | | | | | | | |
| *A 2,4* | *Identification of a location where the mechanized briquette production unit can be located* | | | | | | X | X | | | | | |
| NEA, WIG, ECO | *A site will be sought to set up the mechanical briquette production unit. Ideally, this site should be close enough to the targeted markets (restaurants, hotels, well-off customers, etc.) but far enough away from homes not to disturb the neighbourhood.* | | | | | | X | X | | | | | |
| *D 2,4* | *Site Rent contract for the mechanized briquette production unit* | | | | | | | D | | | | | |
| *A 2,5* | *Women groups setting up to manage briquette production units* | X | X | X | X | X | X | X | | | | | |
| NEA, WIG | *100 manual briquettes production units will be set up. Women groups already involved by the pilot project will be further monitored andther (new) already established women groups will be involved in the project. If needed new women group will be set up aiming at the briquette production* | X | X | X | X | X | X | X | | | | | |
| *D 2,5* | *At least 100 women's group are involved in the project* | *D* | *D* | *D* | *D* | *D* | *D* | *D* | | | | | |
| *A 2,6* | *Tax exemption for char powder & briquettes* | | X | | | | | | | | X | | |
| NEA, WIG | *Needed authorizations are obtained from the appropriate authority, in order to secure a tax exemption for the production, transport and use of briquettes produced by the project. If possible, this authorization will be written in a law or a decree and extended to any alternative renewable fuel to charcoal and firewood.* | | X | | | | | | | | X | | |
| | *For the project briquette production (authorization)* | | | | | | | | | | | | |
| | *For all alternative solid biofuels to charcoal (law or decree)* | | | | | | | | | | | | |
| *D 2,6* | *Transported fuel produced by the project are tax exempted* | | *D* | | | | | | | | *D* | | |

### 2.3.4 Activity 3: Equipment procurement

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *Output 3* | *The required production units for the briquettes production are implemented* | | | | | | | | | | | | |
| *Activity 3* | *Setting up the necessary units for the briquettes production* | | | | | | | | | | | | |
| Partner | Swegam, ECO | | | | | | | | | | | | |
| *A 3,1* | *Carbonisation units implementation* | | *X* | | *X* | | | | | | | | |
| Swegam, ECO | Equipment selection, supplier selection, delivery scheduling, equipment orders and receipt for centralised carbonisation centre in Saro (700 drums & brick kilns) & 10 decentralised carbonisation units of smaller capacity (1 to 20 drums) intended to agricultural and primary or secondary wood processing industries | | | | | | | | | | | | |
| | Centralised unit in Saro | | *X* | | | | | | | | | | |
| | Brick kilns in Saro | | | | *X* | | | | | | | | |
| | Decentralised equipment | | *X* | | | | | | | | | | |
| *D 3,1* | *Carbonisation units are operational* | | *D* | | *D* | | | | | | | | |
| *A 3,2* | *Milling units implementation* | | *X* | | | | | | | | | | |
| Swegam, ECO | Equipment selection, suppliers selection, delivery scheduling, equipment orders and receipt for centralised milling centre of high capacity in Saro & 1 low capacity mobile milling unit are made available (1 truck mounted Hammermill) | | | | | | | | | | | | |
| | Centralised unit in Saro | | *X* | | | | | | | | | | |
| | Mobile hammermill | | *X* | | | | | | | | | | |
| *D 3,2* | *Milling units are operational* | | *D* | | | | | | | | | | |
| *A 3,3* | *Briquettes production units implementation* | | | *X* | *X* | *X* | *X* | *X* | *X* | | | | |
| Swegam, ECO | Equipment selection, suppliers selection, delivery scheduling, equipment orders and receipt for 150 manual presses & related equipment delivered to supervised women's groups and 1 mechanical press and related equipment delivered to WIG | | | | | | | | | | | | |
| | Manual presses at (at least 100) women groups | | | *X* | *X* | *X* | *X* | *X* | | | | | |
| | Mechanised briquette unit | | | | | *X* | *X* | *X* | *X* | | | | |
| *D 3,3* | *Briquettes production units are operational* | | | | | | | *D* | *D* | | | | |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *A 3,4* | *Logistic Unit implementation* | *X* | *X* | | | | | | | | | | |
| | Equipment selection, suppliers selection, delivery scheduling, equipment orders and receipt for a small flatbed truck and the necessary equipment for logistics unit management (PC, telephone, office) | *X* | *X* | | | | | | | | | | |
| *D 3,4* | *Logistic Unit is operational* | | *D* | | | | | | | | | | |

### 2.3.5 *Activity 4: Trainings*

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *Output 4* | *The relevant trainings for the briquette production and use have been provided* | | | | | | | | | | | | |
| *Activity 4* | *Implementation of the relevant trainings for the briquette production and use* | | | | | | | | | | | | |
| *Partner* | WIG, YEP, ECO | | | | | | | | | | | | |
| *A 4,1* | *Char powder production training* | | | *X* | *X* | *X* | *X* | *X* | *X* | | | | |
| *WIG, ECO* | Char Barrel (safety rules, use & production management) in the centralised unit (Saro) | | | *X* | *X* | | | | | | | | |
| | Brick kilns (safety rules, use & production management) | | | | | *X* | *X* | | | | | | |
| | Char Barrel (safety rules & use) the decentralised unit | | | | *X* | | | | *X* | | | | |
| *D 4,1* | *Charring equipment users are trained* | | | | *D* | | *D* | | *D* | | | | |
| *A 4,2* | *Milling training* | | | *X* | *X* | | *X* | | | | | | |
| *WIG, ECO* | Safety rules, Hammermill operation and maintenance; Management of powder production on the centralized unit (bagging, stock management, etc.); Mobile hammermill operation & maintenance; | | | | | | | | | | | | |
| | Centralised milling unit training | | | *X* | *X* | | | | | | | | |
| | Mobile milling unit training | | | | | | *X* | | | | | | |
| *D 4,2* | *Milling equipment users are trained* | | | *D* | *D* | | *D* | | | | | | |
| *A 4,3* | *Training to the use of briquettes production units* | | | | | | | | | | | | |
| *WIG, ECO* | Safety rules; Briquettes presses operation and maintenance; Based on the pilot project training manual; Mechanised briquette press operation and maintenance | | | | | | | | | | | | |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| | Manual presses at women groups | | | X | X | X | X | X | | | | | |
| | Mechanised briquette unit | | | | | | | | X | X | | | |
| *D 4,3* | *Briquettes production equipment users are trained* | | | | | | | D | | D | | | |
| *A 4,4* | *Training & close follow-up of briquettes producers and users* | | | | | | | | | | | | |
| *WIG, ECO* | Cooking demonstration; Assistance in the use of the produced briquettes; Highlighting the savings achieved; Continuous monitoring of briquette users' consumption; Marketing support for the mechanized briquette production unit; Domestic cooking and follow up | | | X | X | X | X | X | X | X | X | X | |
| *D 4,4* | *Briquettes users are trained to their use and a briquettes consumption monitoring is setup* | | | | | | | | | | | D | |
| *A 4,5* | *Training on the logistic unit management* | | X | X | X | X | X | X | X | X | X | X | X |
| ECO, WIG | Support of a unit manager in the implementation of output 5 | | X | X | X | X | X | X | X | | | | |
| | progressive empowerment of the unit manager | | | | | | | | | X | X | X | X |
| *D 4,5* | *The manager of the logistics unit is trained & autonomous* | | | | | | | | D | | | | D |
| *A 4,6* | *Young entrepreneurs training in Briquettes selling* | | | | | | | X | X | X | X | X | |
| *ECO, WIG* | *1 training on Markets studies, one training on customer targeting, one training on sales management (order, transport, delivery)* | | | | | | | X | X | X | X | X | |
| *D 4.6* | *10 Young entrepreneurs are trained and supported in briquette sales* | | | | | | | | D | | | D | |

### 2.3.6 Activity 5: Production management

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *Output 5* | *5 000 tonnes of briquettes are produced (and used) annually* | | | | | | | | | | | | |
| *Activity 5* | *The necessary conditions to produce 5 000 tonnes briquettes are in place* | | | | | | | | | | | | |
| *Partners* | *ECO, WIG* | | | | | | | | | | | | |
| *A 5,1* | *Char powder production* | | X | X | X | X | X | X | X | X | X | X | X |
| WIG, ECO | The intermediate production objectives of the centralised unit (Saro) are determined and met in collaboration with the char barrel users, brick kilns users & Logistics Unit | | X | X | X | X | X | X | X | X | X | X | X |
| | The intermediate production objectives of the decentralised unit are determined and met in collaboration with the decentralised unit members & Logistics Unit | | | | | | X | X | X | X | X | X | X |
| | For both the centralised and decentralised units, a management system is set up to meet production objectives and ensure the needs for operation costs, maintenance costs & investment renewal. | | X | | | | | X | | | | | |
| *D 5,1* | *Char material production to produce 5000 tonnes briquettes* | | D | | | | | D | | | | | D |
| *A 5,2* | *Milling* | | X | X | X | X | X | X | X | X | X | X | X |
| *WIG, ECO* | The intermediate production objectives of the centralized unit (Saro) are determined and met in collaboration with the milling unit manager, considering the production objectives of char material production units and logistic unit | | X | X | X | X | X | X | X | X | X | X | X |
| | The intermediate production objectives of the decentralized unit are determined and met in collaboration with the decentralized unit and the logistic unit | | | | | | X | X | X | X | X | X | X |
| | For both the centralised and decentralised units, a management system is set up to meet production objectives and ensure the needs for operation costs, maintenance costs & investment renewal. | | X | | | | X | | | | | | |
| *D 5,2* | *Milled material production to produce 5 000 tonnes briquettes* | | D | | | | | D | | | | | D |
| *A 5,3* | *Briquette production* | | X | X | X | X | X | X | X | X | X | X | X |
| *WIG, ECO* | The intermediate production objectives are determined and met in collaboration with the involved women groups and the logistic unit to achieve briquette production objectives by manual presses | | X | X | X | X | X | X | X | X | X | X | X |
| | The intermediate production objectives of the mechanised unit are determined and met in collaboration with the mechanised unit and the logistic unit | | | | | | | | X | X | X | X | X |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *WIG, ECO* | For the manual and mechanised units, a management system is set up to meet production objectives and ensure the needs for operation costs, maintenance costs & investment renewal. | | *X* | | | | | | *X* | | | | |
| *D 5,3* | *5000 tonnes briquettes production* | | *D* | | | | | *D* | | | | | *D* |
| *A 5,4* | *Close follow up of briquettes consumption* | | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* |
| *WIG, ECO* | Implementation of a briquette consumption monitoring system, during the training/follow-up period at the women's groups level | | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* |
| | Implementation of a briquette consumption monitoring system, after the training/follow-up period at the niche market level | | | | | | | | *X* | *X* | *X* | *X* | *X* |
| *D 5,4* | *Briquette consumption monitoring* | | *D* | | | | | | *D* | | | | *D* |
| *A 5,5* | *Logistic Unit management* | | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* |
| *WIG, ECO* | Effective management of the briquette production chain; Link between powder production and briquette producers, Ensure the follow-up & monitoring of the products of the other units, Take the necessary actions to identify additional resources and implement their valorisation; Insures the binder availability | | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* | *X* |
| *D 5,5* | *Logistic unit is autonomous* | | | | | | | | | | | | *D* |

### 2.3.7 Activity 6: Marketing

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *Output 6* | *A marketing strategy is set up to promote briquette consumption* | | | | | | | | | | | | |
| *Activity 6* | *Development of a marketing strategy to promote briquette consumption* | | | | | | | | | | | | |
| *Partner* | ***NEA***, YEP, ECO, WIG, UTG | | | | | | | | | | | | |
| *A 6,1* | *Formal launching with project visibility* | | X | | | | | | | | | | |
| NEA | Press Releases; Project launching with participation of main country authorities | | X | | | | | | | | | | |
| *D 6,1* | *Project is launched* | | D | | | | | | | | | | |
| *A 6,2* | *Information campaign for the newspapers, television and radio about the project implementation* | | | X | X | X | X | X | X | X | | | |
| NEA | Take actions to raise awareness among existing or future women's groups about the possibility of producing briquettes; Inform waste producers on the possibility to recover waste through char production; | | | X | X | X | X | X | X | X | | | |
| UTG GBoS | Surveys,research | | | | | | | | | | | | |
| *D 6,2* | *The information campaign is conducted* | | | | | | | | | D | | | |
| *A 6,3* | *Approach to women's groups* | X | X | X | X | X | X | X | | | | | |
| WIG | Women groups identification or assistance in their establishment, Awareness raising, cooking demonstration | X | X | X | X | X | X | X | | | | | |
| *D 6,3* | *Women groups have been approached* | | | | | | | D | | | | | |
| *A 6,4* | *Launching of the mechanized production unit* | | | | | | | | X | | | | |
| NEA | Press Releases; Project launching with participation of main country authorities; Hotel & restaurant manager invitation | | | | | | | | X | | | | |
| *D 6,4* | *Mechanised briquette production unit is launched* | | | | | | | | D | | | | |
| *A 6,5* | *Packaging* | | | | | | | X | | | | | |
| *YEP* | *An adapted briquette packaging is developed for the mechanised production unit intending to foster sales in the niches markets (size, logo, material…)* | | | | | | | X | | | | | |
| *D 6,5* | *Packaging for briquettes intended to the niche market is available* | | | | | | | D | | | | | |
| *A 6,6* | *Sales campaign by young entrepreneurs* | | | | | | | | X | X | X | X | X |

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Month | 03 | 06 | 09 | 12 | 15 | 18 | 21 | 24 | 27 | 30 | 33 | 36 |
| *YEP* | *Young entrepreneurs develop markets in hotels and restaurant as well as in supermarket or gas stations, they organise the order to the mechanised unit (or women groups if more profitable), the transport and delivery to final customers* | | | | | | | | *X* | *X* | *X* | *X* | *X* |
| *D 6,6* | *Increased sales volumes thanks to young entrepreneurs* | | | | | | | | | | | | *D* |

### *2.3.8 Activity 7 : Capitalisation*

| | Year | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Month** | **03** | **06** | **09** | **12** | **15** | **18** | **21** | **24** | **27** | **30** | **33** | **36** |
| *Output 7* | *The key elements of the project are capitalized for replication under similar conditions* | | | | | | | | | | | | |
| *Activity 7* | *Collection of the information necessary for capitalisation for replication purposes under similar conditions* | | | | | | | | | | | | |
| *Partners* | ***ECO**, NEA, WIG, UTG* | | | | | | | | | | | | |
| A 7,1 | Project socio-economic benefit assessment | | *X* | | | | *X* | | | | | | *X* |
| ECO, NEA, | Base line description | | *X* | | | | | | | | | | |
| WIG | Mid-term assessment | | | | | | *X* | | | | | | |
| | Final assessment | | | | | | | | | | | | *X* |
| D 7,1 | Yearly reports sent to financing institution includes capitalisation aspects | | *D* | | | | *D* | | | | | | *D* |
| A 7,2 | Project environmental benefit assessment | | *X* | | | | *X* | | | | | | *X* |
| ECO, NEA | Base line description | | *X* | | | | | | | | | | |
| WIG | Mid-term assessment | | | | | | *X* | | | | | | |
| | Final assessment | | | | | | | | | | | | *X* |
| D 7,2 | Benefit in terms of employment forests $CO_2$ Report | | *D* | | | | *D* | | | | | | *D* |
| A 7,3 | Communication documents writing | | | | | | | | | | | | *X* |
| ECO, NEA | Lessons learnt | | | | | | | | | | | | *X* |
| WIG, UTG-GBoS | Dissemination of results | | | | | | | | | | | | |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Project strategy summary | | | | | | | | | | | | *X* |
| D 7,3 | | | | | | | | | | | | | *D* |

# 3 GCF Concept note

Based on the actors analysis and the action plan presented here above, a Green Climate Fund concept note has been prepared and is presented in a separate document.