Progress Report November 2021

Supporting coherent policy implementation to catalyse food & livelihood security and unlocking multiple SDGs in Nigeria with lessons to inform countries across Africa

1. CONTEXT

This work focused on supporting Nigeria to enhance cross-sectoral coherence to upscale ecosystem-based adaptation approaches (EBA) and clean energy for food and livelihood security towards unlocking multiple Sustainable Development Goals (SDGs). It also focused on leveraging lessons from Nigeria to induce similar developments in additional countries across Africa. In its climate action priorities, popularly known as Nationally Determined Contributions (NDCs), Nigeria has prioritised clean energy and sustainable agriculture approaches where EBA is a leading technique. The urgency of this intervention cannot be overstated. Nigeria is exposed to multiple threats to the realisation of the SDGs. The country loses 11% of its GDP every year due to child undernutrition. On vulnerability, the country is ranked 160th out of 181. The country has a great need for both investment and innovations to improve readiness and a great urgency for action.

Agriculture stands out as key to diversifying the country's economy and accelerating the realization of the Nigeria Economic Recovery & Growth Plan (ERGP), which underpins inclusive climate-resilient growth. It is among critical sectors needed to underpin the projected 7% growth & employment creation. However, lack of value addition means Nigeria loses significantly. Nigeria losses billions in postharvest losses across different value changes. For example, while the country is the second-largest producer of tomatoes in Africa, it loses up to 60% of its production, averaging over $70 million each year – primarily because of inadequate processing. In 2017, Nigeria lost tomato valued at $15 billion. Tomato is not the only loss. In Cassava, where Nigeria

is the largest producer globally, up to $600 million is lost each year as PHLs. Rice registers up to $155 million in PHLs. And the list goes on. Because of these losses, iconic policies like the cassava bread policy and the tomato production policy – meant to safeguard Nigeria's producers – fail to be meaningfully implemented and realised. Full implementation of these policies can create hundreds of thousands of much-needed jobs. In Nigeria, nearly 25% of the general population is unemployed, 20% is underemployed, and over 50% of youth aged 15 – 35 years are without work.

Climate change impacts, for example, on the tomatoes value chain alone mean a loss of up to 25% per hectare, threatening the livelihoods of over 200,000 farmers and an entire supply chain of enterprises they serve. On the other hand, implementing the country's tomato policy to climate-proof and maximize its productivity can cumulatively unlock 60,000 direct jobs – a significant boost to Nigeria's economic aims – the ERGP.

In addition, Nigeria, the largest producer of charcoal in Africa, has lost up to 96% of its natural forest cover. Nigeria's current deforestation rate is estimated at 3.5% - one of the highest in the world. Up to 90% of wood harvested produces fuelwood, which makes charcoal and firewood used for agro-value addition one of the most critical drivers of ecosystem degradation. In addition, the health hazards of using charcoal are notable, with over 120 million Nigerians facing health risks through exposure to smoke from cooking and adding value to food using firewood and other unclean solid fuels. Decentralisation of clean cooking solutions is, therefore, a critical component of agro-value addition.

This initiative comes in to buttress the country's effort to reverse these losses and realise the promises of the economic development blueprints & the SDGs by leveraging climate action solutions of EBA & clean energy. Most importantly, this work demonstrates how the above can be achieved through leveraging the most significant constituency of ground implementers in Nigeria – the youth and informal sector actions, which contribute up to 80% to Nigeria's livelihoods. This gap has never been addressed – i.e., SDGs implementation impact achieved at the local level by leveraging climate action solutions uptake by the informal sector actions that create most of the livelihoods in Nigeria and the youth who are the majority of Nigeria's population.

Actions were undertaken on three levels to actualise this paradigm of leveraging EBA & clean energy through informal sector actions to enhance the productivity of food systems and unlock multiple SDGs. The first was practical ground actions that empirically showed how cross-sectorial coherent actions are critical to bridging gaps towards upscaling EBA & clean energy. To enhance food system productivity through cutting postharvest losses (PHLs) & clean cooking. This showed how the collaboration of operational actors across different sectors & different skills are needed to apply EBA & clean energy to food systems to reverse PHLs and enhance productivity. The second level was on generating empirical data on the social, economic/market, technical dimensions of developing & applying these climate action solutions to inform coherent policy implementation. The third level was on sharing lessons from work done in Nigeria with additional

actors in non-participating countries to take up coherent cross-sectoral actions to upscale EBA & clean energy for food and livelihood security to unlock multiple SDGs. The Ecosystems Based Adaptation for Food Security Assembly (EBAFOSA) policy action framework structure was leveraged to mobilise ground actors that can take up these climate action solutions and demonstrate their impact on enhancing food systems in a low-risk manner. EBAFOSA was also leveraged to engage the policy and non-policy actors to share results across other countries in Africa.

2. SUMMARY OF RESULTS

The engagement was fostered by working with the local governance structures of the Emirates of Nasarawa. Officials of the Emirates engaged community members in gap analysis towards the uptake of climate action solutions.

The first was guiding youth to retool their skills and develop climate action solutions, including solar dryers and clean cooking fuel briquettes.

The second was the development and testing of climate action solutions in readiness for community uptake. Accordingly, three giant greenhouse community solar dryers were developed – designed & fabricated and tested for suitability for uptake by the community. Over 200kgs of fuel, briquettes were produced and tested in readiness for decentralisation to the community to substitute charcoal use.

The third was the decentralisation of these climate action solutions for community uptake. Accordingly, the local governance structure of the Emirates of Nasarawa was engaged to work with the local communities in taking up the developed climate action solutions. Through the Emirates of Nasarawa, the largest cassava market in Nasarawa – called the shabu market, with large open drying centres was engaged to take up solar dryers. A giant greenhouse solar dryer was developed and decentralised for community use among these farmers. In addition, still through the Emirates of Nasarawa, communities were engaged in awareness-raising, market testing, and uptake of fuel briquettes to substitute charcoal use. A 78% acceptance rate was reported for these briquettes.

The fourth was data generation to inform policy. Data on the effectiveness of solar dryers in dehydrating food items to threshold moisture levels needed to ensure food safety by preventing the growth of aflatoxins, mold, yeast, and other mycotoxins was compiled. This data is made available with the Standards Organisation of Nigeria (SON) to inform the implementation of relevant standards. In addition, this technical data on the efficiency and effectiveness of solar dryers in driving food safety, coupled with data on community acceptability of these value-added solutions, is made available to inform entrepreneurship curriculum expansion of the Nasarawa State University-Keffi (NSUK). Data on the effectiveness of fuel briquettes in substituting charcoal

– by being smokeless, more affordable, better burning among key attributes was also leveraged to inform the entrepreneurship curriculum of the NSUK to include climate action solutions.

Fifth was lessons sharing of actions undertaken in Nigeria, with additional actors in other countries to take up climate action solutions. Accordingly, from work in Nigeria, reports for fuel briquettes and lessons in solar dryer development and decentralisation were used to cross-hybridise lessons from Nigeria with actors in Uganda, DRC, Togo, Kenya to take up the climate action solutions equally.

Specifics on the above actions are expounded in the following sections.

3. MAIN ACHIEVEMENTS

The following was achieved by deliverable:

Deliverable 1: youth engaged under EBAFOSA policy action framework guided to integrate the development of climate action solutions of EBA and clean energy using locally available material

Through the EBAFOSA policy/action framework, young people engaged in different enterprise areas were convened and structurally guided to develop climate action solutions of solar dryers and fuel briquettes. A total of 22 young people were trained in waste recovery techniques. The primary one was waste recovery to fuel briquettes which covered a critical area of need in Nigeria – the use of unclean biomass fuel for cooking and heating exacerbates degradation. Waste recovery to biofertilizer was also engaged. The young people were convened under the patronage of the Emirates of Nasarawa and got trained in developing these climate action solutions in readiness to decentralise them to the community. Through this guidance, the youth compiled manuals and reports to guide the training of fuel briquettes and solar dryers as a sign of their mastery of the skills obtained.

Three giant community greenhouse solar dryers were developed for decentralisation to communities. These climate action solutions were then tested to establish their effectiveness in actualising set food safety thresholds regarding moisture content. The dryers were tested on cassava and tomato – which is among the key value chains of the country – and found the dryer could efficiently and effectively dehydrate tomato and cassava to 10% moisture and below, which is critical to prevent the growth of mycotoxins without diminishing the quality of the dried product. The dryer proved to be a faster, more hygienic method of dehydrating food for long-term preservation than open sun drying, which is the available alternative.

The youth have been guided on fuel briquettes to retool their skills and develop these waste recovery solutions. 500kgs of fuel briquettes was created as a demonstration of skills earned.

Most importantly, the young people engaged were from diverse, non-environment disciplinary backgrounds. Their collaborative actions to complement each other's skills sets & aptitude was a demonstration of much needed cross-sectoral coherence towards upscaling application of climate action solutions. The photos below further illustrate what was done.

***Photo**: Fuel briquettes production in progress*

***Photo**: Biofertilizer production in progress*

Youth Innovative volunteerism actors being trained to fabricate solar dryers

Cassava loaded in the dryer during community test runs

***Photo**: Different solar dryer types under development (greenhouse design & box dryers)*

***Photo**: Solar dryer drying efficiency tested with tomato, a high moisture retention crop and found to be effective*

The attached reports expound further on the above actions.

Report on the production of Fuel Bri

Training guide on the production of Fuel Bri

Climate Action Mechanical Solar Dry

Deliverable 2: youth guided to work with agro-value chain actors engaged in key-value chains of Nigeria – including Cassava, tomato etc., and cluster them into groups and establish their productivity gaps that can be bridged using climate action solutions

The youth were structurally guided to engage the community and establish their productivity gaps in the form of high postharvest losses that could be bridged using solar dryers. They were also guided to establish the community level of unclean cooking solutions of charcoal and firewood. Accordingly, working with the office of the Nasarawa emir, high charcoal users in the study area of Nasarawa were engaged in establishing their level of demand for charcoal. By surveying households and commercial outlets that are users of charcoal and firewood in Nasarawa – mainly eateries, bakeries, roadside vendors, charcoal sellers, and distributors- the area uses over 2 tonnes of charcoal every month. The survey also established that there is potential for uptake of fuel briquettes of over 2000kgs in a month in the immediate term and to expand to over 2-3 tons and offset over 3 tons of charcoal and firewood in the Nasarawa emirate. This would also provide lessons for the entire country to adopt this approach. The photos below illustrate the gaps established in clean cooking.

Photo*: community eatery in Nasarawa with a stockpile of firewood stacked up that is used for cooking*

A gap analysis was also applied to establish the potential for the demand of solar dryers as value-added solutions to cut postharvest losses. It was established that over 90% of people in Nasarawa engage in agriculture, including cassava farming. It was also established that the emir-led local government prioritised agro-value chains, especially cassava farming, as the comparative advantage crop for enhanced food and livelihood security. The survey also revealed that up to 90% of local farmers and processors in Nasarawa practice open sun drying to preserve their harvest. This increases PHLs due to the low efficiency of drying and exposure of drying material to contamination with dust, vermin, and insect/pest infestation. A total of 50 farmers from 4 villages were interviewed using a questionnaire and baseline information collected. The photos below illustrate the gaps established from the ground.

Photo*: Open sun drying of agro-produce*

Photo: *cassava harvest lost because of inefficient drying*

The attached reports expound further on this gap analysis.

Feasibility study assessment of Agricul

Report on the production of Fuel Bri

Deliverable 3: youth decentralise the climate action solutions of EBA and clean energy to agro-value chain actors in an enterprise approach

Following the survey, the young people were guided to cluster communities where gaps were established into groups to decentralise the climate action solutions for their testing. In Nasarawa, biomass accounts for a minimum of 73% of total domestic energy consumption. About 87% of households use firewood or charcoal with 2 kg of charcoal or 4.6 kg of firewood per day. This is a significant gap. Accordingly, on the clean cooking value addition solutions, an exhibition was undertaken where community members were engaged and trained in the use of fuel briquettes to substitute charcoal and the advantages thereof and given samples of briquettes to test. A random sample of 50 persons engaged in different aspects of charcoal & firewood use – i.e., eateries & households – was engaged in the fuel briquettes' training and uptake & testing. Of those engaged, 90% were female, and 10% were male. Up to 78% of them indicated a willingness to shift from charcoal & firewood to fuel briquettes. They also specified the key attributes that render fuel briquettes better. The briquettes burn for long and therefore last longer; briquettes have a high heat Intensity; briquettes are smokeless and do not stain the pots. Hence they can be used inside the house; briquettes are economical and affordable.

They also expressed areas of improvement that were noted by the team for further improvement. The images below capture the community engagement in the training & uptake of fuel briquettes:

Photo: *Youth training community on briquettes development and use*

Photo: *Community testing fuel briquettes to anecdotally gauge performance compared to charcoal and firewood*

The attached report expound on these anecdotal community tests.

Nasarawa Fuel Briquettes Exhibition f

The community was also engaged in testing and uptake of climate action solutions of solar dryers. Two value chains with high moisture retention capacity – Cassava & tomato – and which are leading value chains in Nigeria were tested to demonstrate the efficiency of the solar dryer compared to traditional open sun drying. The community was guided to use the solar dryers. The test results showed that using a solar dryer can dehydrate Cassava to safe moisture levels of 9.8 – 10.7% that are needed to prevent the growth of mycotoxins within 5 hours, while an equivalent sample in the open sun will be at unsafe moisture levels of 15.7-20% within the same period of 5 hours. For tomato, test results showed that using a solar dryer can dehydrate tomato to 10% within 8 hours, while an equivalent sample in the same period left in the open sun would be at unsafe levels of 34%. These tests provided the community with practical proof of the effectiveness of the solar dryers to dehydrate food products to safe levels for long term storage and use while ensuring hygiene. Before this engagement, the respondents did not apply any value addition using solar dryers to preserve their produce due to a lack of information on solar dryers, cost management, and inadequate technical know-how on the use of solar dryers. The images below capture the solar dryer application and testing by the community:

***Photo**: Tomato (left) and Cassava (right) loaded in the dryer during community test runs*

The attached reports further expound on these anecdotal community tests.

Feasibility study assessment of Agricul

Climate Action Mechanical Solar Dry

Deliverable 4: Empirical data of the social, financial, economic & environmental aspects of decentralising climate action solutions of EBA & clean energy compiled for uptake by academia, local governance structures, and national policy experts convened under the SON coordinated "policy harmonisation & coherence committee for implementation" to inform SDGs implementation across different dockets

Data on the application of the climate action solutions in reducing postharvest losses using the solar dryer as well as fuel briquettes for replacing charcoal was recorded. This data is being made available to policy actors for uptake on the efficacy of climate action solutions, including the Standards Organisation of Nigeria (SON) and the Nasarawa State University at Keffi (NSUK) for uptake of the data o. Specifically, the SON was engaged to take up data on the efficacy of solar dryers in actualising the implementation of food safety standards in terms of hygiene and required moisture content. This data is critical to inform the performance of other food safety standards. For NSUK, data on the socio-economic benefits of using the climate action solutions of fuel briquettes & solar dryers to the community was used to inform the revisions of the entrepreneurship curriculum to include climate action as an area of enterprise development. This will help train learners and future entrepreneurs.

The data generated from the fuel briquettes engagement with the community showed that the price for a kilo of briquettes in Nigeria is between N200-300. At the same time, 1 kg of fuelwood goes for about N500-600, equivalent to about 2 litres of kerosene that sells for N710 but produces the same amount of energy. Briquettes are therefore two times cheaper than fuel wood and up to 3 times cheaper than kerosene. This market advantage data is critical to inform entrepreneurship training.

On the solar dryers, data showed that using a solar dryer can dehydrate Cassava to safe moisture levels of 9.8 – 10.7% that are needed to prevent the growth of mycotoxins within 5 hours. At the same time, an equivalent sample in the open sun will be at unsafe moisture levels of 15.7-20% within the same period of 5 hours. For tomato, test results showed that using a solar dryer can dehydrate tomato to 10% within 8 hours, while an equivalent sample in the same period left in the open sun would be at unsafe levels of 34%. These positive results registered for value chains with a high moisture retention capacity showed the efficacy of solar dryers in actualising food safety and can therefore be taken up by SON standards to cover more value chains.

***photo**: Data collection of solar dryer tests*

The attached reports expound further on these actions.


Training guide on the production of Fuel Bri


Climate Action Mechanical Solar Dry

Deliverable 5: Project lessons and experiences in decentralising clean energy solutions in an enterprise dimension and feedback to inform policy across different dockets for SDGs implementation shared with stakeholders in non-participating countries

The data and experiences from the work undertaken in Nigeria were used to engage willing youth from additional countries to integrate the climate action solutions of solar dryers and fuel briquettes into their ongoing work through the EBAFOSA Innovative volunteerism framework. Accordingly, willing youth from DRC, Uganda, Kenya, and Togo were engaged structurally guided to replicate the climate actions solutions development and testing among the community towards actualising cross-sectorial coherence to drive food & livelihood security as was done in Nigeria. The Nigeria team guided their counterparts with UNEP technical backstopping to decentralise the climate action solutions and collect data on impact. The following were the results of these actions by country:

Uganda

- willing young youth of different disciplinary backgrounds – forestry, education, ICT – were guided to work together and retool their skills towards replicating the work done in Nigeria – both waste recovery & solar dryers. The following was achieved during this reporting period.

a) Fuel briquettes / Biofertilizer development and decentralisation to community

Willing youthful actors technically guided to mobilise community members, pool them into groups to co-operate around collecting agro-waste and readying it as raw material for making fuel briquettes. Two waste cooperatives were formed, with each having at least ten members. From these cooperatives, up to 2 tons of waste have been collected and recovered into 500kgs of fuel briquettes to test and substitute charcoal.

- willing youth of different disciplinary backgrounds and levels academic certification, trained and guided to retool their skills and start making fuel briquettes & biofertilizers from agricultural waste. A total of 20 youths trained, and they have made up to 500kgs of fuel briquettes that meet the requisite quality benchmarks as laboratory tested.

- fuel briquettes were developed and decentralized for community uptake. A 60% growth in briquettes users was recorded over a period of 3 months of engagement.

- gender disaggregation of beneficiaries was undertaken, and women who are among the risk group in indoor pollution were the majority of beneficiaries and recorded an up to 50% reduction in energy cost from shifting to fuel briquettes from firewood.

The photos below capture some of the actions undertaken by Uganda youth drawing lessons from Nigeria:

***Photo**: Fuel briquettes made by young people in Uganda using lessons from Nigeria*

Attached are reports on the work done in Uganda on waste recovery to value using lessons from Nigeria.

Production of Fuel Briquettes from Wast

Fuel briquettes gender disaggregatio

Progress report on scaling of climate acti

b) solar dryer development and decentralisation to community

Through the EBAFOSA Innovative volunteerism framework, lessons from Nigeria on development, testing, and decentralisation of solar dryers for community testing were shared for uptake among youth in Uganda. The following were the key elements:

a) Uganda youth leveraged foundational lessons on solar dryer design principles to innovate new designs that can work under highly variable weather conditions. While the Nasarawa area of Nigeria is predominantly hot, the Buganda area where lessons were cross-hybridised experiences variable weather with cold and wet weather that impact solar dryer efficiency being a notable limitation. Accordingly, four young people who took Nigeria lessons innovated a new dryer design with a backup heating system that uses clean cooking fuel briquettes. Below are photos of the new design dryer:

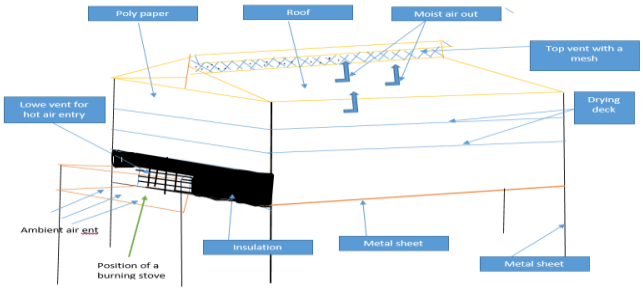


***Photo left**: back-up heater attached to the solar dryer; **figure right**: solar dryer design incorporating a back-up heater*

Solar dryer training and prototyping repoı

b) engagement of the community in testing the new dryer design: a total of 50 farmers engaged in diverse agro-value chains were randomly sampled to test the performance of the backup heated solar dryer in driving value addition and cutting PHLs, in contrast, to open sun drying and using ordinary dryers without auxiliary heating. The results obtained demonstrated that drying efficiency is highly improved when a solar dryer is introduced. In addition, the introduction of a backup heating system proved to enhance the solar dryer efficiency further. On average, introducing the backup heating system increased the drying rate of the solar dryer by 1.5 to 2.5times. Moving from open sun drying to a regular dryer resulted in 1.5 to 2 times faster drying times. This demonstrated to the community the impact of backup heating systems on solar dryers, and all those surveyed responded positively when asked on willingness to adopt these improved solar dryers,

Below are graphs of the dryer tests showing the superiority of the backup heater system dryer.

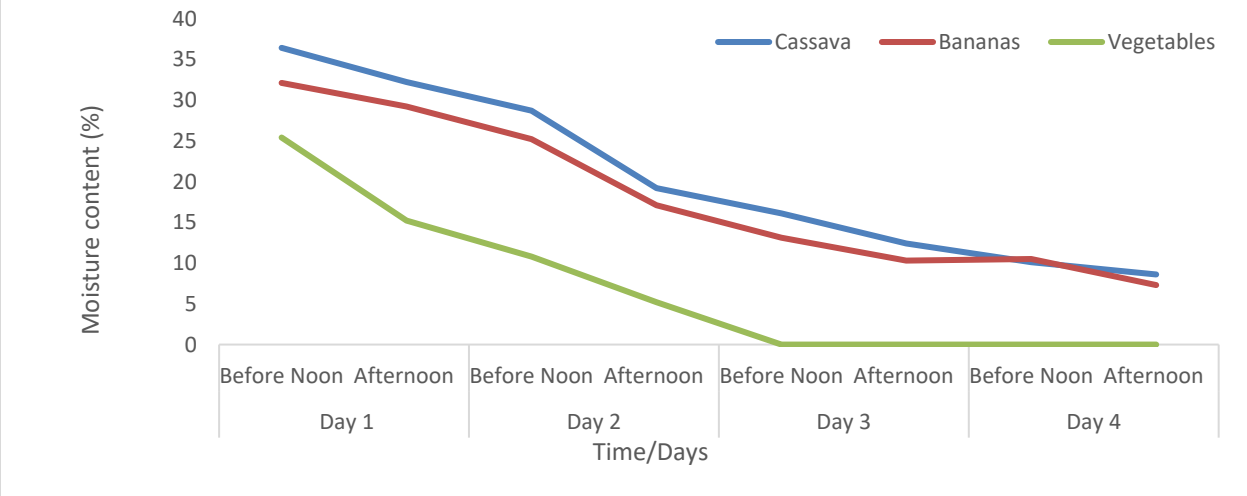


Figure: Line graph showing drying trends for value chains tested in a dryer with a back-up heat system.

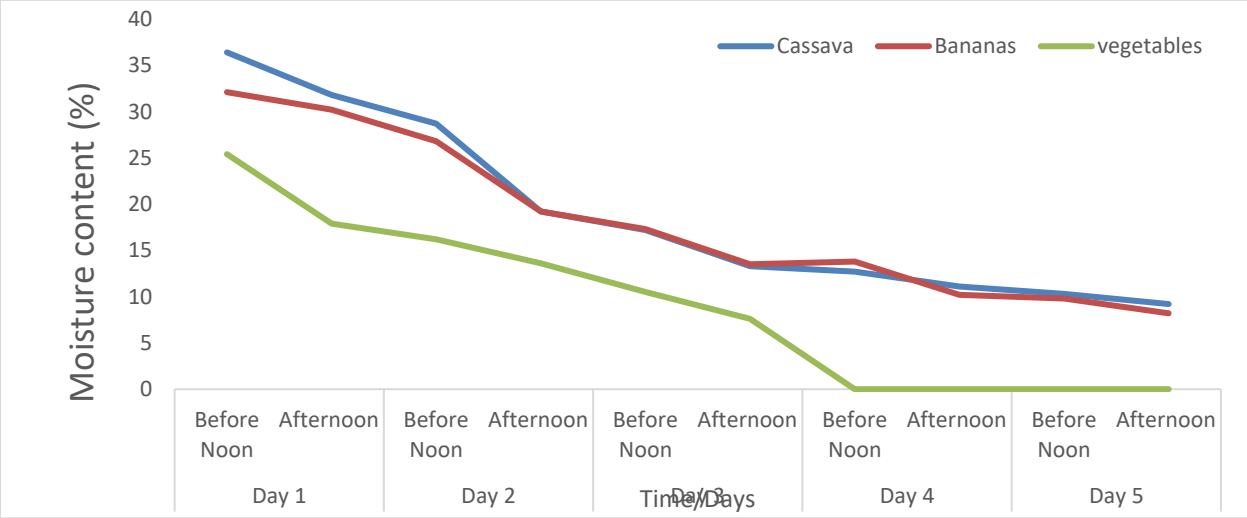


Figure: Line graph showing drying trends for value chains tested with a dryer of a normal blower.

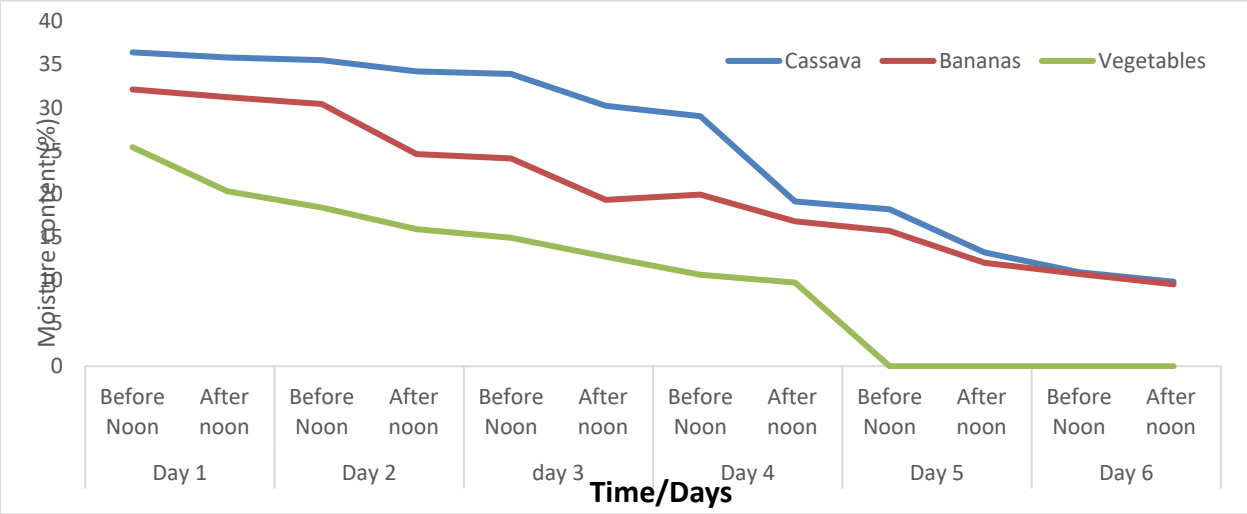


***Figure**: Drying trends for value chains under open drying methods*

The attached report further expounds on these dryer tests.

A report on comparative performa

c) market gap analysis to establish the potential for solar dryer uptake: in the following lessons & guidance from Nigeria actualised through the EBAFOSA framework, the Uganda youth undertook a gap analysis to develop the potential for the demand of solar dryers as value-added solutions to cut postharvest losses. A random sample of 50 farmers engaged in diverse agro-value chains and cropping systems were engaged, and their postharvest handling practices and limitations were studied.

It was established that agriculture is the main economic activity of communities in the Buganda kingdom. The local government prioritized cassava value addition as a strategic dimension to create jobs and enhance food security on the local pullulation. It was also established that open sun drying was the most accessible and mainly used mode of preservation. This was not effective, resulting in low-quality produce due to improper drying and PHLs. All farmers surveyed were optimistic and ready to adopt solar dryers to enable their value addition. This indicated a 100% acceptance rate for climate action solutions of solar dryers. They also demonstrated readiness to engage the use of these dryers in an enterprising approach. The survey also established that subsistence production is still dominant, with most people producing crops on a subsistence basis-production for home consumption and surplus for sale. The study estimated that aggregate postharvest losses stand at 20%, translating into an average of Ugx.1,000,000 per season, translating to $280. These are income & enterprise opportunities that will be recouped with the introduction of solar dryers and will go a long way to implement the Buganda kingdom policy on cassava value addition for livelihoods & food security. The attached photos demonstrate the gaps experienced in value addition that solar dryers will be a timely solution for.

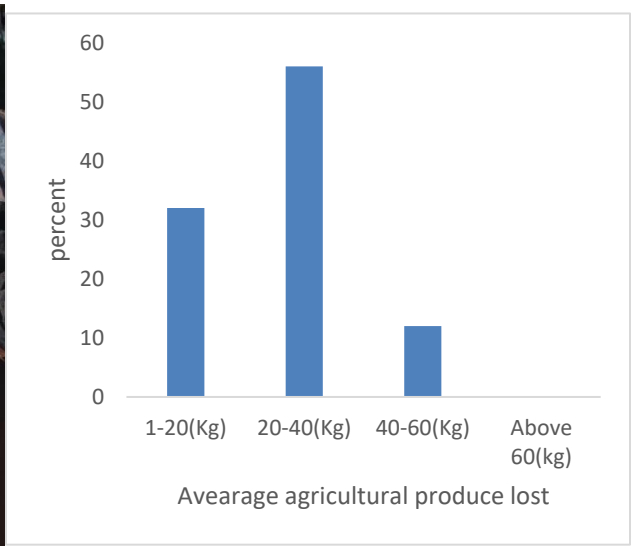


***Photo left**: unhygienic and unhealthy drying of Cassava on rusted iron; **figure right**: postharvest loss trends experienced in the area*

The attached report expands further on this gap analysis indicating the need for climate action solutions to enhance food & livelihood security.

Assessment of
Agricultural post-harv

DRC

Through the EBAFOSA framework, DRC youth actors were guided to take up lessons on waste recovery to fuel briquettes and biofertilizers coming from Nigeria and integrate them into their ongoing work. The following were the key results recorded:

- youthful actors guided to mobilise market traders in 4 key markets of Kinshasa, pool them into groups to become suppliers of agro-waste for making fuel briquettes. Over 2 tons of waste was collected to enhance hygiene in markets, and this was recovered into 1tonne of fuel briquettes to test and substitute charcoal and 90litres of biofertilizer

- willing youth of different disciplinary backgrounds and levels of academic certification, trained and guided to retool their skills and start making fuel briquettes and fertilizer from agricultural waste. A total of 10 youths trained, and they have made up to 1tonne of fuel briquettes and 90 litres of biofertilizer that is now being applied in the community.

- the community was engaged in the uptake of these climate action solutions in Kinshasa, where up to 90% of residents depend on charcoal. In just three months, nearly 5tonnes of charcoal have been displaced with clean cooking fuel briquettes and income opportunities created for the briquette makers. The folioing reports expound further on what was achieved.

Fuel Briquettes
Market Data_EBAFOS

EBAFOSA DRC
Report_on Briquettes

Report_Phase
2_EBAFOSA DRC_Oct

Togo Through the EBAFOSA framework, youthful actors in Togo, were guided to take up lessons on waste recovery to fuel briquettes coming from Nigeria and integrate them into their ongoing work. Accordingly, willing youth of different disciplinary backgrounds and levels of academic certification trained and guided to retool their skills and start making fuel briquettes from agricultural waste. A total of 12 youths were trained, and they have made up to 200kgs of fuel briquettes. In addition, a total of 400kgs of agricultural waste was collected from farmers, households and eateries, and these will now become part of the supply chain of these 12 youth as they make more briquettes. This waste was converted into 200kgs of fuel briquettes that were distributed to the community to test and substitute charcoal.

The following were the key results recorded:

Social impacts: a total of 10 youth previously unemployed were supported to get new skills in offering clean cooking solutions to the community through an enterprising lens. Twenty households and five eateries were engaged to clean cooking to offset indoor pollution that causes up to 3000 premature deaths in Togo each year.

Environmental: a total of 500kgs of charcoal were offset and substituted with clean cooking briquettes. This was a clear and practical demonstration of accessible, alternative livelihood opportunities to relieve economic pressures driving forest encroachment by local informal sector actors. And by this, drive preservation of Togo's forest sinks. In addition, a total of 1 tonne of domestic household waste was recovered through conversion to briquettes to provide a demand-driven waste management approach accessible to the community.

Financial: fuel briquettes made from locally available waste that ensure the lowest raw material costs have been shown capable of up to 560% in profitability. This work in Togo demonstrated how youth & other informal sector actors could tap this enterprise opportunity and employ themselves by delivering on-demand, value solutions to the community. The briquettes made from waste – a freely available raw material and with short production times, had lower production costs compared to conventional charcoal. With low prices and longer burning times, communities can use the same stock of briquettes for longer. In addition, the purchasing price is lower than charcoal means improved household energy cost savings. This meant the market price of briquettes could be pegged lower than charcoal. The fuel domestic energy cost savings, incomes created.

The attached report expounds further on what was done in Togo leveraging lessons from Nigeria.

Cross-hybridising lessons from Waste N

Kenya

Accordingly, from the engagement of the young people, solar dryer prototypes were developed and tested. The test results demonstrated the most effective design. This was developed into a solar dryer manual to be used for knowledge sharing in equipping more youth with skills in developing these climate action solutions. Accordingly, two types of solar dryers were prototyped and tested – one with a backup heating system fired using clean cooking fuel briquettes and another without. The drying efficiency increased incrementally – from open sun drying, the traditional approach, to a dryer without backup heating. The highest efficiency was registered for a dryer with the backup heating system. The ordinary dryer without backup heating proved to be 3.5times more efficient than the open sun drying approach. While the backup heater proved to be up to 2.3times faster than the dryer without backup heating.

***Photo**: community engagement for anecdotal testing of solar dryers*

***Photo:** back-up heater to enhance dryer efficiency*

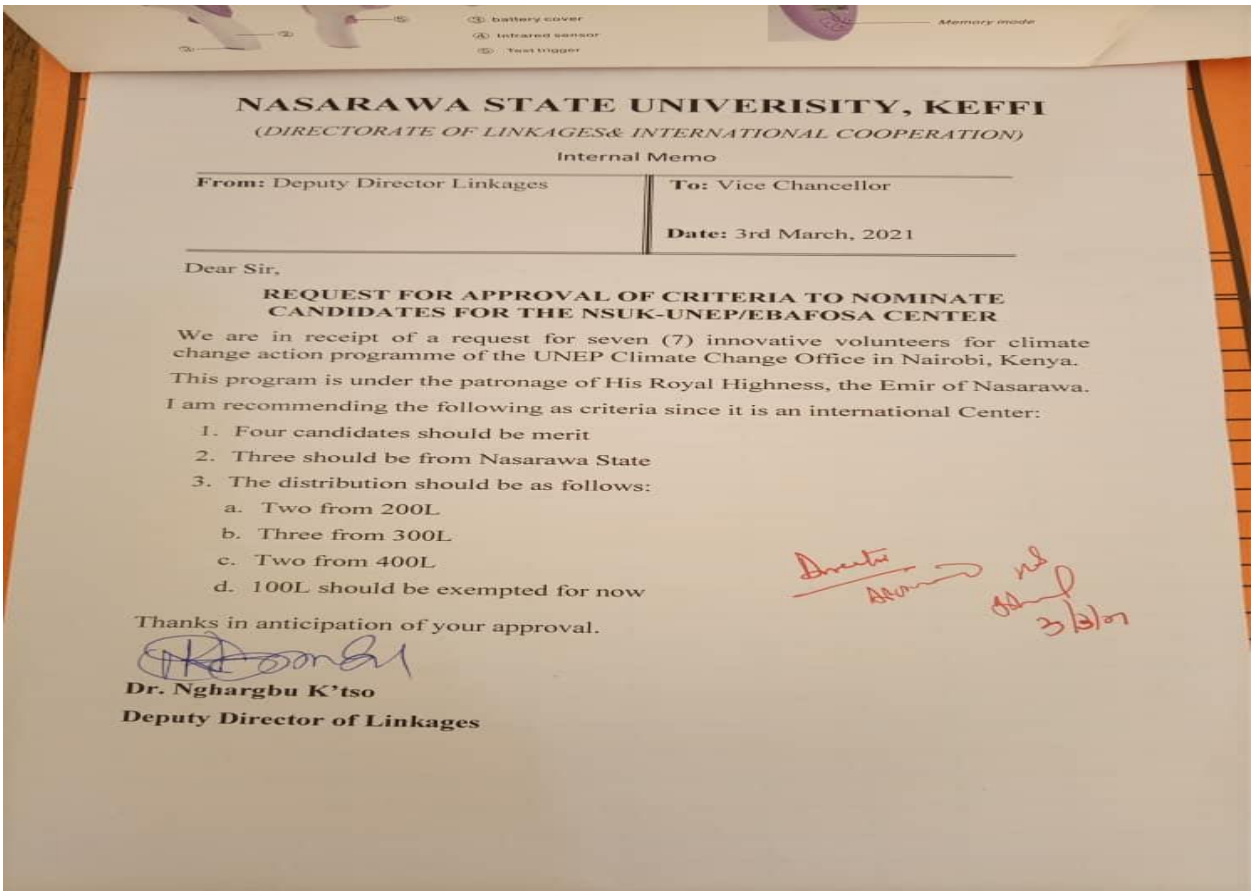
The attached reports expound further on the prototype development process, the manuals and the test results.

SOLAR DRYER FABRICATION MANU... NEW GALVANIZED STEEL SOLAR DRYER SOLAR DRYER HEAT CHAMBER USING CL... SOLAR DRYER HEAT CHAMBER MANUAL.p...

Deliverable 6: Development of climate action entrepreneurship (ClimatePreneurship) curriculum to take up climate action solutions as an enterprise area

The data and lessons on the technical, social, economic, financial impacts of applying climate action solutions of fuel briquettes and solar dryers among local communities in Nasarawa were used to engage with faculty of the Nasarawa State University at Keffi (NSUK) towards taking up climate action as an area of enterprise training. The aim is to equip learners with skills to take up the climate action solutions and devise enterprises. The objective data on impacts already registered resulted in the NSUK setting aside a centre for climate entrepreneurship. This centre is open for willing students from all faculties / disciplinary backgrounds – environmental & non-environmental. It goes a long way to enhance cross-sectoral coherence towards upscaling climate action solutions of EBA & clean energy in a manner that helps local communities close their agro-value chain gaps. From this initial engagement, the NSUK administration opened a climate action entrepreneurship centre and circulated a memorandum inviting interested students to join for lessons. The photos below capture this development.

***Photo**: Signboards indicating the opening of the climate entrepreneurship*



NASARAWA STATE UNIVERISITY, KEFFI

(DIRECTORATE OF LINKAGES& INTERNATIONAL COOPERATION)

Internal Memo

From: Deputy Director Linkages | **To:** Vice Chancellor

Date: 3rd March, 2021

Dear Sir,

REQUEST FOR APPROVAL OF CRITERIA TO NOMINATE CANDIDATES FOR THE NSUK-UNEP/EBAFOSA CENTER

We are in receipt of a request for seven (7) innovative volunteers for climate change action programme of the UNEP Climate Change Office in Nairobi, Kenya.

This program is under the patronage of His Royal Highness, the Emir of Nasarawa.

I am recommending the following as criteria since it is an international Center:

1. Four candidates should be merit
2. Three should be from Nasarawa State
3. The distribution should be as follows:
   a. Two from 200L
   b. Three from 300L
   c. Two from 400L
   d. 100L should be exempted for now

Thanks in anticipation of your approval.

Dr. Nghargbu K'tso

Deputy Director of Linkages

***Photo**: Memorandum to approve / acceptance of students into the climate entrepreneurship centre*

Deliverable 7: **Data and lessons from the development and use of the practical climate action enterprise solutions of solar dryers and fuel briquettes collated, analysed, and made available for uptake to inform NSUK entrepreneurship centre curriculum for pro-SDGs policy implementation**

Based on lessons from Nigeria in decentralising climate action solutions to communities, an initial group of students from different disciplinary backgrounds/areas of trade – tailoring, carpentry, masonry, metalwork etc., have been engaged to start receiving training on the development of climate action solutions. These will be guided to decentralise these solutions to local communities in Keffi, engage them, generate data, and revert to the school. This data, together with that undertaken by the youth in Nasarawa, will then be used by the school to review curriculum. The images below capture this initial class which focused on fuel briquettes.


***photo**: Students wait for introductory explanations on climate action entrepreneurship.*


Photo: *First students engaged in practical lessons in the development of fuel briquettes*

4. MAIN IMPLEMENTATION CHALLENGES

The generally accepted narrative that climate action is a social undertaking and primarily the government's responsibility has led to a mindset of dependency and supply driven-ness as opposed to looking for opportunities. It has made the narrative of looking at climate action as an investment opportunity through which intersectoral collaboration and coherence at the community can be achieved to drive EBA & clean energy for climate-resilient food systems that unlock SDGs opportunities for many a hard sell. This has hindered the full participation of some stakeholders who were reluctant to embrace this market-driven paradigm. To overcome it, the focus was put on early adopters to generate tangible results, which convinced the rest of the actors

5. LESSONS LEARNED AND OPPORTUNITIES

Working through local governance structures that engage the majority of the community proved critical to mobilising community members to participate because the word of local leaders is seen as policy. It has also provided a seamless structure of accountability and traceability of progress.

6. MULTIPLIER EFFECTS

The integration of climate action aspects to be implemented through youth-led enterprise actions and the informal sector that constituted the bulk of ground implementers in Nigeria and who need to build climate resilience has set this work on a trajectory that will be relevant in the long run. Working through local governance institutions is unlocking an approach where accountability and traceability of progress and impact are starting to be accurately established to ensure work builds on successes that have been objectively proved at the ground to be most optimal for impact. In addition, ensuring policy is recalibrated following what has proven to work on the ground ensures that incentives are targeted at the highest potential for success in the long term.

7. PENDING ACTION and WAY FORWARD

As the next steps, the focus will be on expanding the application of climate action solutions of solar dryers and fuel briquettes to generate more data sets by working directly with the community as mobilised through the emir's office of the Emirates of Nasarawa.

The NSUK entrepreneurship inception class will be taken through the solar dryer and fuel briquettes training and guided to decentralise these for uptake by the community in the Keffi area and generate more data sets.

The data generated from the above actions will be leveraged to inform curriculum improvements of the NSUK entrepreneurship classes to include climate action as a critical area for entrepreneurship.

The data will also be used to engage the SON, to further improve on the implementation programmes of standards cutting across different sectors towards integrating climate action solutions as affordable, accessible tools for implementation of different food standards, that majority of stakeholders who are in the informal sector can afford & access.

Lessons will continue to be shared with willing youth across the continent who are already taking up the climate action solutions generated through this work in different countries