

Concept Note

Project/Programme Title: Climate-Resilient Warehousing and Commodities Exchange for Dried Grains in Uasin Gishu, Trans Nzoia and Nakuru Counties

Country(ies): Kenya

National Designated Authority(ies) (NDA): National Treasury

Accredited Entity(ies) (AE): To be determined (FAO? NEMA?)

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Notes

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A. Project/Programme Summary (max. 1 page)			
A.1. Project or programme	<input checked="" type="checkbox"/> Project <input type="checkbox"/> Programme	A.2. Public or private sector	<input checked="" type="checkbox"/> Public sector <input type="checkbox"/> Private sector
A.3. Is the CN submitted in response to an RFP?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If yes, specify the RFP: _____	A.4. Confidentiality¹	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Not confidential
A.5. Indicate the result areas for the project/programme	<p>Mitigation: Reduced emissions from:</p> <input type="checkbox"/> Energy access and power generation <input type="checkbox"/> Low emission transport <input type="checkbox"/> Buildings, cities and industries and appliances <input type="checkbox"/> Forestry and land use <p>Adaptation: Increased resilience of:</p> <input type="checkbox"/> Most vulnerable people and communities <input checked="" type="checkbox"/> Health and well-being, and food and water security <input type="checkbox"/> Infrastructure and built environment <input type="checkbox"/> Ecosystem and ecosystem services		
A.6. Estimated mitigation impact (tCO₂eq over lifespan)	Not Applicable	A.7. Estimated adaptation impact (number of direct beneficiaries and % of population)	Direct: approximately 1,025,749 persons (2.11% of national population).
A.8. Indicative total project cost (GCF + co-finance)	Amount: USD 9.9 million	A.9. Indicative GCF funding requested	Amount: USD 9 million
A.10. Mark the type of financial instrument requested for the GCF funding	<input checked="" type="checkbox"/> Grant <input type="checkbox"/> Reimbursable grant <input type="checkbox"/> Guarantees <input type="checkbox"/> Equity <input type="checkbox"/> Subordinated loan <input type="checkbox"/> Senior Loan <input type="checkbox"/> Other: specify _____		
A.11. Estimated duration of project/ programme:	a) disbursement period: 4 years b) repayment period: N/A	A.12. Estimated project/ Programme lifespan	5 years
A.13. Is funding from the Project Preparation Facility requested?²	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Other support received <input type="checkbox"/> If so, by who: _____	A.14. ESS category³	<input type="checkbox"/> A or I-1 <input type="checkbox"/> B or I-2 <input checked="" type="checkbox"/> C or I-3
A.15. Is the CN aligned with your accreditation standard?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>	A.16. Has the CN been shared with the NDA?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
A.17. AMA signed (if submitted by AE)	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> If no, specify the status of AMA negotiations and expected date of signing: _____	A.18. Is the CN included in the Entity Work Programme?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
A.19. Project/Programme rationale, objectives and approach of programme/project (max 100 words)	<p>Small-holder grain farmers in Kenya's breadbasket suffer significant post-harvest losses due to climatic factors. Provision of improved storage options such as hermetic storage and efficient collection and distribution systems would reduce post-harvest losses, thereby contributing to increased income and food security. A centralised commodities exchange for grain in the region would, in parallel, enable price stability, income predictability, and economic security, which would translate into enhanced capacity to invest in more resilient varieties and improved agricultural practices requiring working capital. Warehouse receipts would strengthen access to credit through financing partners, building socio-economic</p>		

¹ Concept notes (or sections of) not marked as confidential may be published in accordance with the Information Disclosure Policy ([Decision B.12/35](#)) and the Review of the Initial Proposal Approval Process ([Decision B.17/18](#)).

² See [here](#) for access to project preparation support request template and guidelines

³ Refer to the Fund's environmental and social safeguards ([Decision B.07/02](#))

resilience against shocks and stressors (including climate change).

B. Project/Programme Information (max. 8 pages)

B.1. Context and baseline (max. 2 pages)

The project is aimed at three counties located in Kenya's Rift Valley region, an area considered the country's breadbasket (CCAFS CGIAR, 2013). The counties of Uasin Gishu, Tranz Nzoia, and Nakuru produce the majority of Kenya's maize and wheat, two of its biggest staple crops (Food and Agriculture Organisation of the United Nations, 2018).

Uasin Gishu county covers an area of 3,345.2 km² and has an estimated population of 894,179 people at the last official count during the 2009 census (Uasin Gishu County Government, 2017). With a population growth rate of 3.8% per annum, the estimated population projection for 2017 was 1,211,853 (Kaggikah, Kenya County Guide - Uasin Gishu, 2017). Approximately 61% of the county's population lives in rural areas, and its working population is constituted by 56% of its labour force. For the purpose of this concept note, the population engaged in agriculture in rural areas is estimated at 305,452. However, since agriculture supports 80% of the county's rural population in terms of household income and food security (Uasin Gishu County Government, 2017), the project proposed in this concept note could indirectly benefit up to 436,360 people in Uasin Gishu.

Uasin Gishu is situated on a plateau, which makes its climate cool and temperate with temperatures ranging between 8.4°C and 27°C. The wettest months are April-May, while the driest are January-February (Kenya Information Guide, 2015). The county is in a high rainfall region and receives average rainfall ranging from 624.9 mm to 1560.4 mm annually (Kaggikah, Kenya County Guide - Uasin Gishu, 2017).

Maize, wheat, and bean farming account for 96,654 hectares, 18,829 hectares, and 15,992 hectares of land respectively. Uasin Gishu produces (on average) 4,224,741 bags of maize, 488,395 bags of wheat, and 46,023 bags of beans annually (measured in 90 kilogram bags). The average yield is 44 bags per hectare for maize, 26 for wheat, and 3 for beans (HURU Map, n.d.).

Nearly two-thirds of the county's population has had no access to any secondary education (nearly 17% has had no formal education, while 54% has had only primary education) (Kenya National Bureau of Statistics, 2013). This affects farmers' ability to access and interpret agricultural market related information.

According to the Uasin Gishu county government, farmers in the county face several challenges. Input costs are extremely high due to the high cost of seeds, fertilizers, pesticides, and farmer machinery. There are low levels of mechanization and high transport costs. Farmers are unable to access adequate and accurate market information on time, resulting in avoidable losses. Overall, the county is not yet meeting its production potential (Uasin Gishu County Government, 2017).

Trans Nzoia county covers an area of 2,469.9 km² and has an estimated population of 818,757 people at the last official count during the 2009 census (Trans Nzoia County Government, 2018). It has an estimated population growth rate of 4.2% per annum (Kaggikah, Kenya County Guide - Trans Nzoia, 2017). Approximately 80% of the county's population lives in rural areas, and its working population is constituted by 44% of its labour force. For the purpose of this concept note, the population engaged in agriculture in rural areas is estimated at 288,202. However, since subsistence agriculture supports 80% of the county's entire population (Trans Nzoia County Government) the project proposed in this concept note could indirectly benefit up to 655,005 people in Trans Nzoia.

Trans Nzoia is situated on mountain slopes and therefore enjoys cool and temperate climate, with temperatures ranging between 10°C and 27°C (Kenya Information Guide, 2015). The county is in a very high rainfall region and receives average rainfall ranging from 1000 mm to 1200 mm annually, with the wettest months being April to October (Kenya Information Guide, 2015).

Maize, bean, and wheat farming account for 106,778 hectares, 13,740 hectares, and 1,870 hectares of land respectively. Trans Nzoia produces (on average) 5,014,980 bags of maize, 54,867 bags of beans, and 46,078 bags of wheat annually (measured in 90 kilogram bags). The average yield is 48 bags per hectare for maize, 25 for wheat, and 4 for beans (HURU Map, n.d.).

Nearly 80% of the county's population has had no access to any secondary education (nearly 20% has had no formal education, while 59% has had only primary education) (Kenya National Bureau of Statistics, 2013). As noted above in the context of Uasin

Gishu county, these rates of exposure to education have implications for farmers' ability to access and interpret agricultural market related information.

Trans Nzoia farmers face a multitude of challenges including declining soil fertility (due to overapplication of fertilizers) and low income levels (due to low prices, high input costs, and middlemen who market maize) (Ikanda, 2018). This has led to some farmers starting to shift away from maize and diversifying into beans and sugarcane. While this has boosted their income levels, it is regarded by the Kenyan government as a cause for concern in relation to food security (Xinhua, 2018).

Nakuru county covers an area of 7,496.5 km² and has an estimated population of 1,603,325 people at the last official count during the 2009 census (Kaggikah, Kenya County Guide - Nakuru County, 2017). It has an estimated population growth rate of 3.4% per annum (Kaggikah, Kenya County Guide - Nakuru County, 2017). Approximately 55% of the county's population lives in rural areas, and its working population is constituted by 49% of its labour force. For the purpose of this concept note, the population engaged in agriculture in rural areas is estimated at 432,095. However, since 60% of the county's entire population depends on agriculture to some degree (CIAT and CCAFS, 2016) the project proposed in this concept note could indirectly benefit up to 961,995 people in Nakuru.

Nakuru's climate is cool and temperate and fairly consistent year-round, with temperatures ranging between 10°C and 20°C (Kenya Information Guide, 2015). Due to its location and regional climate factors Nakuru receives rainfall twice a year: during the long rains from April to August, and during the short rains from October to December. Its average rainfall ranges from 700 mm to 1200 mm annually (Kenya Information Guide, 2015). Some sources suggest Nakuru's average rainfall is higher, ranging from 1800 – 2000 mm (Kaggikah, Kenya County Guide - Nakuru County, 2017).

Maize, bean, and wheat farming account for 86,504 hectares, 43,946 hectares, and 32,057 hectares of land respectively. Nakuru produces (on average) 1,765,714 bags of maize, 961,083 bags of wheat, and 232,868 bags of beans annually (measured in 90 kilogram bags). The average yield is 21 bags per hectare for maize, 30 for wheat, and 5 for beans (HURU Map, n.d.).

Over two-thirds of the county's population has had no access to any secondary education (nearly 17% has had no formal education, while 55% has had only primary education) (Kenya National Bureau of Statistics, 2013). As noted above in the context of Uasin Gishu and Trans Nzoia counties, such low exposure to secondary education hinder farmers' ability to access and interpret agricultural market related information.

The biggest challenges faced by farmers in Nakuru include skyrocketing input prices or costs, and falling prices for maize and wheat in the market (including due to low-priced imports). Soil fertility is declining, keeping productivity below potential (Langat, 2017). Lack of access to financing and lack of knowledge and information are also significant barriers in Nakuru county's farming communities (Agri Africa Farming Portal, 2016).

Over and above the impediments faced by farmers during production, **post-harvest losses** represent a pressing problem for Kenya. Studies suggest that up to 20% of the maize harvest suffers from post-harvest losses due to pests (such as weevils and rodents), up to 10% of post-harvest loss is due to sub-optimal storage conditions (such as conditions that lead to mold), and up to 5% post-harvest loss is due to diseases (such as aflatoxin). Other estimates indicate that as much as 26% of the maize crop is subject to post-harvest losses due to non-treatment of maize (Macahria, Mutungi, & Affognon, 2012). In 2017, Kenyan maize farmers suffered approximately 29.6 billion Kenyan Shillings of post-harvest losses, even as the country spent 42 billion shillings on imported maize (Omondi, 2018).

Climate change concerns are increasingly exacerbating the difficult conditions farmers grapple with. Climate change studies specific to Uasin Gishu county indicate that farmers are already seeing changes in rainfall levels during the growing season, and also experiencing more episodes of heavy precipitation that can damage crops (CIAT and CCAFS, 2017). There has already been a recent uptick in floods. Changing temperature patterns have also contributed to an increase in crop diseases including Maize Head Smut, Maize Ear Smut, Maize yellowing and Maize Lethal Necrosis disease, as well as insect pests such as the Fall Army Worm (CIAT and CCAFS, 2017). Similarly, in Nakuru county, climate change studies point to key changes in the 2021-2065 period, including prolonged moisture stress in both seasons of the year (which can lead to rot and spoilage). Consecutive days of moisture stress are projected to more than double in the first wet season from approximately 35 days to over 70 days on average. Precipitation is projected to increase by 0.3% in the first wet season, and 6% in the second wet season (CIAT and CCAFS, 2016).

Collectively, the challenges faced by farmers in the three counties – which together represent a major share of Kenya's staple food crop production – result in both **income insecurity and food insecurity**, dual threats that reduce adaptive capacity to climate change. At present, Kenya is unable to meet its own domestic demand for maize, wheat, and rice, consequently relying on imports to fill the deficit (United States Department of Agriculture, 2018). Most of its imported maize comes from other East African Community (EAC) countries; wheat from Russia, Ukraine, Kazakhstan, Pakistan, Brazil, Argentina, and Australia; and rice from Pakistan, Vietnam, Thailand, and India (United States Department of Commerce, 2017).

Interventions that reduce post-harvest losses through improved, climate-resilient storage, stabilize sale prices for farmers, improve income security, and enhance food security are **consistent with Kenya's national priorities**. Food security is one of four key tenets

of Kenya's 'Big Four' agenda, announced in 2018 (Owino, 2018). Agriculture is one of six priority sectors linked to the economic and macro pillar under Kenya's Vision 2030 (Vision 2030 Secretariat, n.d.). Kenya's Nationally Determined Contributions (NDC) identify agriculture as a priority sector for Medium Term Planning (MTP) and affirm the need to "Enhance the resilience of the agriculture, livestock and fisheries value chains by promoting climate smart agriculture and livestock development" (Ministry of Environment and Natural Resources, 2015). Kenya's National Adaptation Plan 2015-2030 identifies agricultural value chains as a major focus area for building resilience (Ministry of Environment and Natural Resources, 2016).

B.2. Project/Programme description (max. 3 pages)

The proposed project is entitled "**Climate-Resilient Warehousing and Commodities Exchange for Dried Grains in Uasin Gishu, Trans Nzoia and Nakuru Counties.**" As the name suggests, the project has two principal components:

1. An improved system of grain storage designed to provide greater protection against changing climatic conditions. Such a climate-resilient system would include more efficient collection, transportation, warehousing, and distribution; and
2. A commodities exchange that would facilitate trading in futures contracts for grain, enabling brokers to provide receipts to farmers who could then access credit against such promissory notes for re-investment as working capital.

Conceptual Background on Commodities Exchanges

Commodities exchanges are organized legal entities that are regulated and that determine and enforce rules and procedures for standardized trading of commodities contracts and related investment products (derivatives). By their very nature, commodities markets create price stability for producers (farmers) and purchasers (industrial buyers). They help create predictability and a level of guaranteed demand and supply for producers and purchasers, respectively. They protect against price volatility in the market that is deleterious to both the farmers' and buyers' business models. The producer (farmer) can lock in the price of her/his harvest before it goes to market, thereby knowing how much money she/he will make. Similarly, the purchaser (industrial buyer) can also lock in the price as well as quality of their purchased stock well before a future date of delivery, thereby knowing what her/his costs will be (Amadeo, 2018).

In traditional commodities exchanges, the exchange facilitates transactions between producers (farmers) and purchasers (industrial buyers or manufacturers needing raw materials as inputs). The interaction in the marketplace enables price discovery, i.e. determination of the commodity price between seller and buyer. Many mercantile or commodities exchanges also act as a centralized clearinghouse to act as counterparties to both parties in a transaction, reducing the risk of default in delivery by a farmer to the buyer (Pines, n.d.).

The complexity of a commodity exchange depends on the nature of the contracts being traded. The most accessible forms of contracts are simply warehouse receipts that indicate transfer of title of the commodity of a specific quality, in a specific quantity, at a specific price, and for a specific delivery date and location. As the receipts represent immediate transfer of title, the transactions are based on current market prices, where the farmer is most often the price taker. Such receipts do not necessarily provide protection from market price volatility. For farmers, the biggest advantage is income stability and the ability to use warehouse receipts to seek financing from financial institutions. Such financing is often used to support input costs or working capital, which in turn encourages sustainable production (Rashid, Winter-Nelson, & Garcia, 2010).

A more complex form of commodities trading, requiring greater sophistication in the actors involved as well as more demanding data management, is a trade in futures contracts. Futures contracts significantly improve price discovery in a transparent manner. This evening out of a commodity price occurs through hedging, i.e. managing risk related to price changes. In many commodity exchanges this risk management takes the form of trading in futures contracts (Amadeo, 2018). In such cases, risk reduction is due to the role of commodities traders who maintain balance sheets of futures contracts. In other words, traders buy futures contracts from farmers and sell to buyers, managing inventory of the actual commodity as needed (Pines, n.d.).

In the development of this project concept for Kenya, both options of commodity trading contracts have been evaluated. Initial due diligence suggests strongly that the commodity exchange proposed for the counties of Uasin Gishu, Trans Nzoia, and Nakuru adopt the simpler model of warehouse receipts. This approach is recommended for several reasons.

- **Scale:** prior attempt at developing and operating an agricultural commodities exchange in Kenya faltered, with the key lesson learnt being that successful commodities exchanges require scale. Such scale is difficult to achieve in Kenya even at the national level, as demonstrated by the now-defunct Kenyan Agricultural Commodities Exchange (KACE) (Karugu, 2011). "Even in developed countries with mature commodity exchanges, most futures contracts fail because they do not attract sufficient market participants. A well-established exchange with a core of widely traded contracts can absorb unsuccessful ones. However, if a nascent exchange fails to offer attractive contracts, it is unlikely to continue to operate" (Rashid, Winter-Nelson, & Garcia, 2010).
- **Cost-effectiveness:** There are multiple types of costs associated with setting up and running commodities exchanges. The costs include physical investments in operational space, warehousing, and communications, as well as the operating costs involved in screening participants and enforcing contracts. Furthermore, there are costs related to service-delivery, i.e. provision of clearinghouse services that allow for the buying and selling of the commodities traded at the stated prices with limited fear of default for participants. These services expose the exchange to both working capital costs and risk. For an exchange to succeed independently, its services must be sufficiently valued by users so that they are willing to pay fees to cover these costs (Rashid, Winter-Nelson, & Garcia, 2010). The estimation of such fees through a pricing model is more reliable for the warehousing receipt approach, given that such models exist in Kenya and are successfully operating, while the futures trading model is a relatively unknown model whose value in the eyes of its users is consequently unknown.
- **Local conditions:** most often, exchanges dealing with futures contracts fail to emerge and stabilize because local conditions do not make their activities privately profitable. Market failures, including inadequacies in physical infrastructure, asymmetry in

information, and inadequate legal and financial institutions, can all impede the formation of futures exchanges. From an institutional perspective, evolution of a system of trading can require growth in the volume of activity to spread the fixed costs of a new exchange. In the presence of an inadequate market scale or pronounced market failures, a commodity exchange that trades futures contracts is more prone to failure (Rashid, Winter-Nelson, & Garcia, 2010). In Kenya, particularly at the county level, such market failures exist and are well documented. While the commodity exchange can play a role in alleviating some of these failures related to market information, adopting a futures contract trading model comes at a higher risk.

- **Price regulation:** futures markets tend to not emerge in jurisdictions where commodity prices are subject in some manner to government regulation. In Kenya, the government often steps in to buy portions of the annual harvest at above-market prices, and also offers subsidies to help stabilize food prices for end-users (Njeru, 2017). This limits the natural growth of futures markets.

Having noted reasons for this project adopting the warehousing receipt model (rather than a futures contract model), it is important to highlight that the three Kenyan counties in question have several characteristics that do support the development of a warehousing receipt-based commodity exchange. For instance, Uasin Gishu, Trans Nzoia, and Nakuru all have an adequate infrastructure base to allow for the necessary collection, transportation, and distribution networks:

- Uasin Gishu has a total of 1,226 km of road network, comprising over 300 km of tarred/bitumen roads, 549 km of gravel roads, and 377 km of dirt roads. It also has 179 km of railway lines with 8 railway stations. In addition, the county has an inland container depot, the Moi International Airport in Eldoret (Uasin Gishu's largest city and administrative capital), and other two airstrips (Kaggikah, Kenya County Guide - Uasin Gishu, 2017). *Eldoret would be an optimal location for the exchange.*
- Trans Nzoia has a total of 500.7 km of road, comprising 59.2 km of tarred/bitumen roads, 135 km of gravel roads, and 306.5 km of dirt roads (Kaggikah, Kenya County Guide - Trans Nzoia, 2017).
- Nakuru County has a total of 9,654.10 km of roads. This includes international and national trunk roads (including the Mobasa-Nairobi highway), primary and secondary roads, special purpose roads and unclassified roads. Nakuru is also located on the Kenya-Uganda railway line (Nakuru County Government, 2017).

Conceptual Background on Climate-Resilient Storage

Post-harvest losses (PHL) of grains, cereals, pulses, nuts, and legumes are a major challenge in all of Sub Saharan Africa (SSA), including Kenya. The World Bank estimates that nearly 4 billion USD of value in grains is lost each year in SSA due to PHL (Affognon, Mutungi, Sanginga, & Borgemeister, 2015). The value of food lost to PHL in SSA exceeds the value of food aid received by the region annually, and the caloric value lost to PHL amounts to what could feed 48 million people (Affognon, Mutungi, Sanginga, & Borgemeister, 2015).

While PHL are already a real concern in Kenya, this is likely to become a more pressing challenge in the face of climate change. Postharvest systems will be affected by changes in temperature, rainfall, humidity, extreme events and the natural and human responses to climate change and variability (Stathers, Lamboll, & Mvuni, 2013). For instance, rising temperatures and humidity alter the range and reproductive cycles of pests and disease-causing pathogens. Temperature and humidity changes can alter post-harvest quality, cause weight-loss, speed up germination, and cause physical damage (Abbas et al., 2018).

In light of this, it is important to increase the resilience of Kenya's farmers to climate change by supporting them in reducing PHL. Additional adaptation benefits include strengthened health and nutrition for local communities through the availability of larger food supplies. While such an intervention would have direct climate adaptation benefits, there may be indirect climate mitigation benefits as well: reducing PHL may reduce the need for food production to clear land (deforestation emissions) or move into more marginal lands in Kenya (where improper soil management results in new emissions), and may reduce the application of nitrogen-based fertilizers (a key source of agricultural emissions) because there may be less need to compensate for PHL through increased on-farm productivity.

A range of approaches are in evidence across SSA and East Africa to reduce post-harvest losses. A review of literature highlights many interventions for the containment of insects and pests including variety selection, biological control, improved storage structures, modified atmosphere facilities, and treatment with chemical insecticides. In some regions of Africa farmers also adopt indigenous technologies such as use of botanicals, vegetable oils, inert dusts (ashes, diatomaceous earths), solar treatment, and underground/pit storage. Roughly 81% of approaches to reduce PHL entail on-farm interventions by farmers. Only 19% of approaches referenced in literature relate to PHL reduction interventions during handling, transportation, and processing. Of all the interventions studied, the ones that performed better had relatively lower initial costs for users, low technical requirements, high scalability, and high re-usability (Affognon, Mutungi, Sanginga, & Borgemeister, 2015). A study by MIT in Uganda also corroborated that the factors influencing success and performance of PHL interventions centre around: impact (level of reduced losses), willingness to pay the costs, supply chain capability to ensure PHL equipment and infrastructure is available, and scalability of adoption. The study also noted the beneficial impact of multi-year donor funding for strengthening supply chains and training (Massachusetts Institute of Technology (MIT), 2016).

Interventions that have been evaluated as cost-effective to reduce PHL in grains and cereals in East Africa include:

- Polypropylene bags
- Hermetic Purdue Improved Crop Storage (PICS) bags
- Super Grain (SG) bags
- Metal silos
- Grain fumigation
- Chemical treatment with Actellic Super
- Chemical treatment with Aluminium Phosphide (for maize)
- Wooden barrels

- Plastic barrels
- Mechanized on-farm transport through wheel-barrow
- Tarpaulins

Of these, farmers and development implementing agencies have reported the most consistently favourable results from hermetic storage, which has the added benefit of reducing the need for chemical application (FINTRAC, 2016). The usage of PICS bags has, in particular, been found to be cost-effective compared to insecticide treatment for periods ranging from 6 to 12 months post-harvest (FINTRAC, 2016).

Existing Models to Adapt and Improve

In terms of agricultural commodities exchanges in Africa, futures contract trading appears to have succeeded only in the Johannesburg Stock Exchange (JSE) in South Africa, and more recently in Rwanda's East African Exchange (EAX), due to operational scale (East Africa Exchange (EAX), n.d.). Kenya has been, in fact, formally part of the EAX since 2014 but does not have any active members as part of the Kenyan EAX (KEAX). The EAX has one certified warehouse in Kenya in Uasin Gishu county, in Eldoret (East Africa Exchange (EAX), n.d.). Both the Ethiopian Commodities Exchange (ECX) (Ethiopian Commodities Exchange, n.d.) and Malawi's Commodity Exchange (AHCX) (African Commodities Exchange, n.d.) do not facilitate futures trading, and only enable spot trading.

However, the more streamlined commodities exchange model of third-party collection, storage, sorting, grading, re-sale, distribution, and delivery – based on the warehousing receipt model – has taken root successfully in several locations. The warehousing receipt approach is the predominant form of contracting for the EAX (Bizimungu, 2018). The East African Grain Council's (EAGC's) G-Soko platform is another prime example of such an aggregation, warehousing, and distribution model (G-Soko, n.d.). Private sector investment in this model has also proven successful, as is the case with Kenya's Twiga Foods, which focuses on perishable foods such as fruits and vegetables (Twiga, n.d.).

In the context of dried grains in Kenya, a system whereby farmers can securely store grains while they wait to sell to the market, and obtain receipts in exchange (that can then be used to access liquidity to invest in the next crop) is already offered by the National Cereals and Produce Board's (NCPB's) Warehouse Receipting System (WRS). However, farmers have criticized the existing system as ineffective as there are allegedly significant delays in payment by the NCPB, arising from government funds not being disbursed to the NCPB in time (BII, 2018).

The second project component of hermetic, climate-resilient storage also has a prior successful intervention to draw lessons from. A pilot project in Rwanda by CCAFS-CGIAR (funded by the International Fund for Agricultural Development IFAD), under the 'Climate Resilient Post Harvest and Agribusiness Support Project' produced 6 pilot climate-resilient drying hangars and 4 climate-resilient warehouses, and received positive evaluations from its intended beneficiaries (small-holder farmers and farmers cooperatives). The project also dispensed and provided training for the use of hermetic storage bags (Rugege & Vermeulen, 2017).

Gender Considerations

Studies show that some interventions that aim to reduce post-harvest losses fail because they are not developed or implemented in a participatory manner, and because the appropriate range of actors are not trained to follow best practice. Both of these observations point to the need for more inclusivity in projects focusing on reducing post-harvest losses and – more broadly – on improved income and food security. A leading study on PHL underscores, "In many SSA countries, postharvest systems underperform because women lack the resources and opportunities they need to access technologies and services to help transform agricultural produce. Women also face more severe constraints than men in accessing productive resources and markets. Large-scale comparative studies have demonstrated that gender inequalities are costly and inefficient and that improving gender equality contributes to food security" (Affognon, Mutungi, Sanginga, & Borgemeister, 2015). In dealing with on-farm reduction of PHL in Kenya, gender is particularly relevant in the case of cereals because most de-husking and drying is done by women, and men play almost no part in these processes (Alliance for a Green Revolution in Africa, 2014).

Given the range of stakeholders and beneficiaries (both direct and indirect) involved throughout the proposed produce value chain, the project presents several opportunities to engage, involve and empower women. With at least 50% of Kenya's smallholder farmers being women (Rapsomanikis, 2015), the success and sustainability of the project largely relies on identifying and overcoming possible barriers to them entering, and actively participating, in the commodities exchange and warehousing facilities. While the project concept inherently tackles several key challenges faced by female farmers, including access to storage, formal marketing channels and climate/weather-related information (SNV, n.d.), a major impediment to them scaling-up operations and participating in formal market value chains is their inability to access loans. The African Development Bank (AfDB) has noted that 48% of micro and small enterprises in Kenya are owned by women, but only 7% of credit is accessible to them (African Development Bank, 2015). The project will therefore seek to pilot innovative mechanisms for financial inclusion linked to the warehouse receipts, with the aim of presenting clear, accessible economic benefits to female farmers who do not possess sufficient collateral to secure bank loans. The project will bear in mind that Kenya's 2010 Constitution mandates that no more than two-thirds of the members of elective or appointive bodies (including cooperatives boards) shall be of the same gender. To ensure women can confidently serve on boards and seek formal employment at the commodities exchange and warehousing facilities, a key short-to-medium term project intervention will therefore focus on providing targeted capacity building to women with a roadmap towards employment at the exchange or within its broader network.

Project Objectives (See Theory of Change Appended as Annex A)

- Increased resilience of most vulnerable people and communities (smallholder farmers): reduction in PHL has been shown to have positive impacts on farmers' income, food security; and socio-economic well-being (Massachusetts Institute of Technology (MIT), 2016);

- Increased resilience of health and well-being, through enhanced food security;
- Increasing the scale of impact: while there have been a large number of interventions in Kenya and across SSA to reduce PHL, evidence suggests that they have not been scalable (Stathers, Lamboll, & Mvuni, 2013). If the proposed commodities exchange and climate-resilient post-harvest storage and processing centre can operate at scale (Hoffman, Ridolfi, & Nwafor, 2017), it could demonstrate paradigm shift potential, and can also offer a knowledge-generation opportunity in terms of a replicable model;
- Contribution to sustainable development (through enhanced food security, and potential livelihoods opportunities for vulnerable groups including women);
- Contribution to achieving the goals of Kenya's Green Economy Strategy and Implementation Plan (GESIP), specifically in relation to "green agricultural infrastructure."

B.3. Expected project results aligned with the GCF investment criteria (max. 3 pages)

Impact Potential

Activity sub-criteria: the project is intended to have adaptation impact through contribution to increased climate-resilient sustainable development.

Activity assessment factors (including indicators):

PMF-A Core-1: Expected total number of direct and indirect beneficiaries (reduced vulnerability or increased resilience); number of beneficiaries relative to total population

The number of direct beneficiaries are estimated as approximately 1,025,749 persons (2.11% of Kenya's national population). This figure has been arrived at by identifying the total populations of Uasin Gishu, Trans Nzoia, and Nakuru counties; calculating the total rural population in each of the counties based on census estimates of percentage of urban and rural residents; and further calculating a sub-set of the working population within the rural population, based on census estimates of the percentage of working population (ages 18-65) in each county. Literature suggests that almost the entire rural population is engaged in agriculture in these counties, with maize and wheat being the predominant food crops. It was therefore extrapolated that the rural working populations of these counties could be used as a proxy (at the stage of concept note development, for further refinement during a pre-feasibility and feasibility study) for the beneficiaries of this project, which targets rural grain farmers in the three districts.

The number of indirect beneficiaries are estimated as approximately 2,053,360 persons (4.23% of Kenya's national population). This figure has been arrived at by calculating 80% of Uasin Gishu's and Trans Nzoia's county populations, plus 60% of Nakuru county's population, on the basis of literature that indicated the percentage of overall population whose livelihoods, food security, and incomes are indirectly linked to agriculture (a greater number than the rural population directly engaged in farming).

Expected reduction in vulnerability by enhancing adaptive capacity and resilience for populations affected by the proposed activity, focusing particularly on the most vulnerable population groups and applying a gender-sensitive approach

The project is cognizant that women play a greater role than men in certain post-harvest processes such as threshing, de-husking, and drying, but that they do not enjoy the same level of access and inclusion in most other stages of the post-harvest value-chain. In particular, women farmers in Kenya have lesser access to markets and to credit. Thus, as described in section B.2 of the concept note, this project will have a special focus on women and will apply a gender-sensitive approach to the design, location, operations, and employment opportunities linked to the commodities exchange and the climate-resilient post-harvest storage and transportation systems.

PMF-A 6.0: Expected increase in generation and use of climate information in decision-making

The proposed project will mainstream climate change considerations into decisions about collection, aggregation, transport, storage, distribution, and delivery, and will integrate climate change factors into designing and operationalizing more climate-responsible and climate-compatible warehousing and logistical networks.

Paradigm Shift Potential

The project has clear potential for scaling up and replication, potential for knowledge-generation and learning, and potential to create or strengthen the enabling environment.

Replicability: key structural elements of the project can be exported and translated to other sectors, regions, communities, or countries. The project brings together complementary elements of prior existing successful models that have delivered results in Kenya (such as Twiga foods) and East Africa (such as G-soko) in terms of warehousing receipt-based commodities exchanges, and the CGIAR-CCAFS-IFAD climate-resilient post-harvest loss reduction initiative in Rwanda. Just as those models can be adapted to grain production at the county level in Kenya, this proposed project, which brings together the synergies of both interventions, can be replicated in other counties, in other countries, and for other crops.

Knowledge and learning: the project offers an important opportunity to understand how and to what extent commodities exchanges, which contribute to price stability and income security for producers, can contribute to climate change resilience.

Agricultural commodities markets have long been viewed as beneficial to countries' economic development, yet experience in Africa shows mixed results. This project will be a concerted effort to learn from other such interventions, adopt best practice and at the same time develop best practice of its own, and will incorporate an element of knowledge-dissemination on the link between climate change, post-harvest losses, and commodity prices, through its partners and networks. The exchange's website, for instance could be a platform for sharing insights, and the project could also develop training materials on climate change and post-harvest loss management for the beneficiaries of its climate-smart warehousing systems.

Contribution to the creation of an enabling environment: the project is innovative in its consolidation of two distinct but highly complementary systems and elements within the agricultural value chain. It could point to a new business model that integrates climate change resilience into improved storage and market access mechanisms. The project also fulfils the sub-criteria of market development and transformation, in that it would change incentives for market participants by reducing costs and risks associated with taking harvested grain to the market. Specifically, it would reduce costs related to safeguarding harvested grain from climate-related post-harvest threats, would de-risk the transactions between producer and buyer, and would help support costs of working capital that the farmer can re-invest in climate-resilient varieties and practices.

Sustainable Development

The proposed project is characterised by environmental, social, economic, and gender-inclusivity co-benefits.

Expected positive environmental impacts: the project's anticipated positive environmental externalities include reduced application of chemical fertilizers (due to reduced need to compensate for low yields and low revenue) and reduced application of chemical fumigants (due to hermetic storage oftentimes being adequate by itself and obviating the need for chemicals).

Expected positive social and health impacts: the project's anticipated positive social and health externalities include improved food security in Kenya due to lower post-harvest losses, including reduced loss of both volume of food and nutritional value of food.

Expected positive economic impacts the project's anticipated positive economic externalities include greater income security for farmers, strengthened access to credit and liquidity that can be re-invested in working capital, particularly into methods and practices that improve yields, and help transition to climate-resilient (drought and flood resilient) varieties etc. Broad-based economic resilience improves households' and communities' ability to respond to shocks and stressors across the board.

Expected positive gender-sensitivity impacts: the project's anticipated positive gender-related impacts include reduced inequalities in post-harvest grain management and in access to markets (simplified through the commodities exchange that will make special provisions for women producers). It will also increase women's participation in contributing to climate-resilience and food security outcomes.

Needs of Recipient

Agriculture plays a dominant role in Kenya's economy, contributing over 60% of total exports. Food crops constitute 32% of agricultural GDP, of which 15% is from Maize (Alliance for a Green Revolution in Africa, 2014). An estimated 60% of Kenya's maize production occurs in the Rift Valley region, by large scale farmers. Much of the remainder is produced by small-holder farmers in the Western province (Macahria, Mutungi, & Affognon, 2012).

Estimation of post-harvest losses for grains in Kenya vary, but conservative figures suggest losses may be as high as 20%. In 2013, postharvest losses as a percent of total annual production were estimated to be almost 18% for maize, 12% for rice, 12% for sorghum, and nearly 10% for millet (FINTRAC, 2016).

This project is tailored to the needs of Kenya's small-holder grain farmers, and to the country's overall food security needs. Kenyans have been vulnerable in the past to rising food prices and low levels of domestic food reserves, which exacerbates climate change vulnerability during times of drought, flood, or famine when harvests are affected. Kenya is ranked 86th in global food security amongst other countries (Global Food Security Index, 2017), and (according to at least one global climate change vulnerability and risk index) Kenya is amongst the top one-third of all countries in terms of its vulnerability to climate change (Kreft, Eckstein, & Melchior, 2017). As an African nation, its adaptive capacity to cope with climate change is limited. Within Kenya, rural small-holder farmers constitute a more vulnerable sub-set of the population.

Country Ownership

The project reflects country ownership by Kenya, as it emerged from a national-driven process led by Kenya's National Environmental Trust Fund (NETFUND) to strengthen climate resilience in Kenya through innovation in the green economy.

Alignment with national climate change strategies, policies, plans, and instruments: The agriculture sector is a priority sector for climate change adaptation in Kenya, per Kenya's Nationally Determined Contributions (NDC), which list agriculture as a key sector for Medium Term Planning (MTP). The NDC articulated the need to "enhance the resilience of the agriculture, livestock and fisheries value chains by promoting climate smart agriculture and livestock development" (Ministry of Environment and Natural

Resources, 2015). Moreover, Kenya's National Climate Change Adaptation Plan (NAP) 2015-2030 identifies agricultural value chains as a major focus area for building resilience (Ministry of Environment and Natural Resources, 2016). Since the adoption of Kenya's NAP, several national initiatives have been launched to help meet adaptation objectives for the agriculture sector, such as the Kenya Climate Smart Agriculture (CSA) Framework Programme, an assessment of institutional barriers to the NAP's implementation in the agriculture sector, and an analysis of the nexus of climate change and sustainable development in the agriculture sector (FAO and UNDP, 2017).

Alignment with national development strategies, policies, plans, and instruments: Kenya's long-term strategic plan Vision 2030 identifies agriculture as one of six priority sectors linked to the vision's economic and macro pillar (Vision 2030 Secretariat, n.d.). Food security is implicit in the Vision's social pillar, under the priority area of health, as reflected in Kenya's current Medium Term Plan (MTP III) (Ministry of Devolution and Planning - The Presidency, 2018). Furthermore, food security is one of four key tenets of Kenya's 'Big Four' agenda, launched by the President in 2018 (Owino, 2018).

Coherence with existing policies: Kenya's National Treasury, the country's National Designated Authority (NDA) has not objected to the proposed project, and supports the submission of this concept note.

Capacity of accredited entity and executing entity: The project proponent (FAO?) in this case demonstrates a consistent track record in the agriculture and food security sector, and has significant experience and expertise in similar projects, in Kenya, in the East African region, and across the world. The executing entities (Ministry of Agriculture and NETFUND) also have demonstrable experience in Kenya in implementing similar assignments in the agriculture and green economy spheres.

Engagement with stakeholders: this concept note has emerged out of a consultative process that involved multiple engagements with relevant stakeholders. Stakeholders included the Ministry of Agriculture, Kenya's National Environmental Management Authority (NEMA), representatives of civil society, the private sector, and the NDA. The engagement process prioritized gender-sensitivity and gender inclusivity, ensuring strong representation and participation by women during all stakeholder workshops and meetings. In terms of accountability, the proposed project is predicated on decision-making responsibility and accountability resting with the national government, particularly the Ministry of Agriculture and NETFUND.

Efficiency and Effectiveness

The proposed project is based on sound economic and financial estimates. The estimates indicated in the concept note have been arrived at based on examination of similar projects in the region, adjusting for scale and intended outcomes in Kenya. The budget is deemed to be adequate for meeting project objectives in the five-year period stipulated. The proposed project's financial feasibility is further strengthened through a 10% level of co-finance from the Government of Kenya.

B.4. Engagement among the NDA, AE, and/or other relevant stakeholders in the country (max ½ page)

Kenya's National Treasury, the NDA, and accredited entities such as NEMA, have been engaged throughout the process of developing this concept, at multiple stages and in multiple meetings between May 2018 and October 2018.

Attendance lists of all workshops organized and convened by NETFUND are appended to this concept note as annex C.

If the GCF endorses the concept note for development into a full funding proposal, NETFUND and the Ministry of Agriculture will organize several further rounds of stakeholder engagements and will undertake the necessary consultations to ensure rigorous development of prefeasibility and feasibility studies, an environmental and social safeguards plan, a monitoring and evaluation plan, structuring of appropriate institutional and financial arrangements, and other key processes. Gender sensitivity will guide the choice of stakeholder workshop locations, timings, and invitees, and further consultations will be held in the spirit of gender inclusivity.

C. Indicative Financing/Cost Information (max. 3 pages)

C.1. Financing by components (max ½ page)

Component/Output	Indicative cost (USD)	GCF financing		Co-financing		
		Amount (USD)	Financial Instrument	Amount (USD)	Financial Instrument	Name of Institutions
Climate resilient warehousing (including infrastructure and logistics for collection, aggregation, transport, hermetic storage, drying, sorting, grading, distribution, and	USD 7.7 million	USD 7 million	Grant	USD 700,000	Grant	Government of Kenya (10% co-finance)

delivery)						
Commodities exchange for spot trades (including issuance of warehousing receipts to be leveraged for credit with financing partners)	USD 2.2 million	USD 2 million	Grant	USD 200,000	Grant	Government of Kenya (10% co-finance)
Indicative total cost (USD)	USD 9.9 million	USD 9 million		USD 900,000 (10% co-finance)		

C.2. Justification of GCF funding request (max. 1 page)

Climate change adaptation investments are unconventional investments. It is therefore extraordinarily rare and highly challenging to secure finance from conventional sources in the market for such resilience-building interventions. The return on investment for such projects is often unattractive for private sector investors, and the element of innovation that often characterises climate adaptation initiatives is viewed by the market as novelty and the absence of a track record of financial soundness. This translates into a high estimation of risk.

In the case of the proposed project, the setting up of a commodities exchange already carries with it a certain level of risk (particularly given the existence of other commodities exchanges in the country and region, which may affect volume of commodities traded at the exchange). By integrating an element of climate change resilience, this raises the “risk premium” that traditional investors would not be willing to pay.

The hybrid and synergistic nature of the proposed project, i.e. a combination of a commodities exchange for grain coupled with a network of climate-resilient collection, aggregation, sorting, grading, storage, distribution, and delivery systems, makes this a project that would not normally have been developed or funded under the Kenyan government’s existing development plans. At the same time, for Kenya to extend finance for the entire project would be exceedingly difficult given its current level of external debt (in 2017 Kenya’s external debt amounted to 30.3% of annual GDP (CEIC, n.d.)). The country’s overall debt reached 4.5 billion Kenyan Shillings at the end of 2017 (Ngugi, 2018), promoting a warning from the International Monetary Fund (IMF) (Mwanza, 2017). In this fiscally constrained climate, Kenya would need support from climate funders such as the GCF to avoid displacing other essential national investments.

In this context, the request for funding is consistent with Kenya’s National Green Climate Fund (GCF) Strategy (National Treasury, 2017), and Kenya’s National Policy on Climate Finance (National Treasury, 2016).

C.3. Sustainability and replicability of the project (exit strategy) (max. 1 page)

The intention behind the funding request to the GCF is to seek support for the project’s first five years, including the physical establishment of project infrastructure, logistics, and necessary systems, and for the project’s operation for five years. It is expected that in this period, the climate-resilient warehousing facility and commodities exchange would mature as a business model, demonstrate strong results, and minimize all potential risks. At the end of the five-year period, it is expected that the project would become self-sustaining through the fees it would collect from various actors (producers and purchasers) who would recognize the value they accrue from such a project. It is also expected that the demonstration of results and financial sustainability would attract private funding that would allow the facility to continue thereafter as a public-private partnership.

D. Supporting documents submitted (OPTIONAL)

- Map indicating the location of the project/programme
- Diagram of the theory of change
- Economic and financial model with key assumptions and potential stressed scenarios
- Pre-feasibility study
- Evaluation report of previous project
- Results of environmental and social risk screening

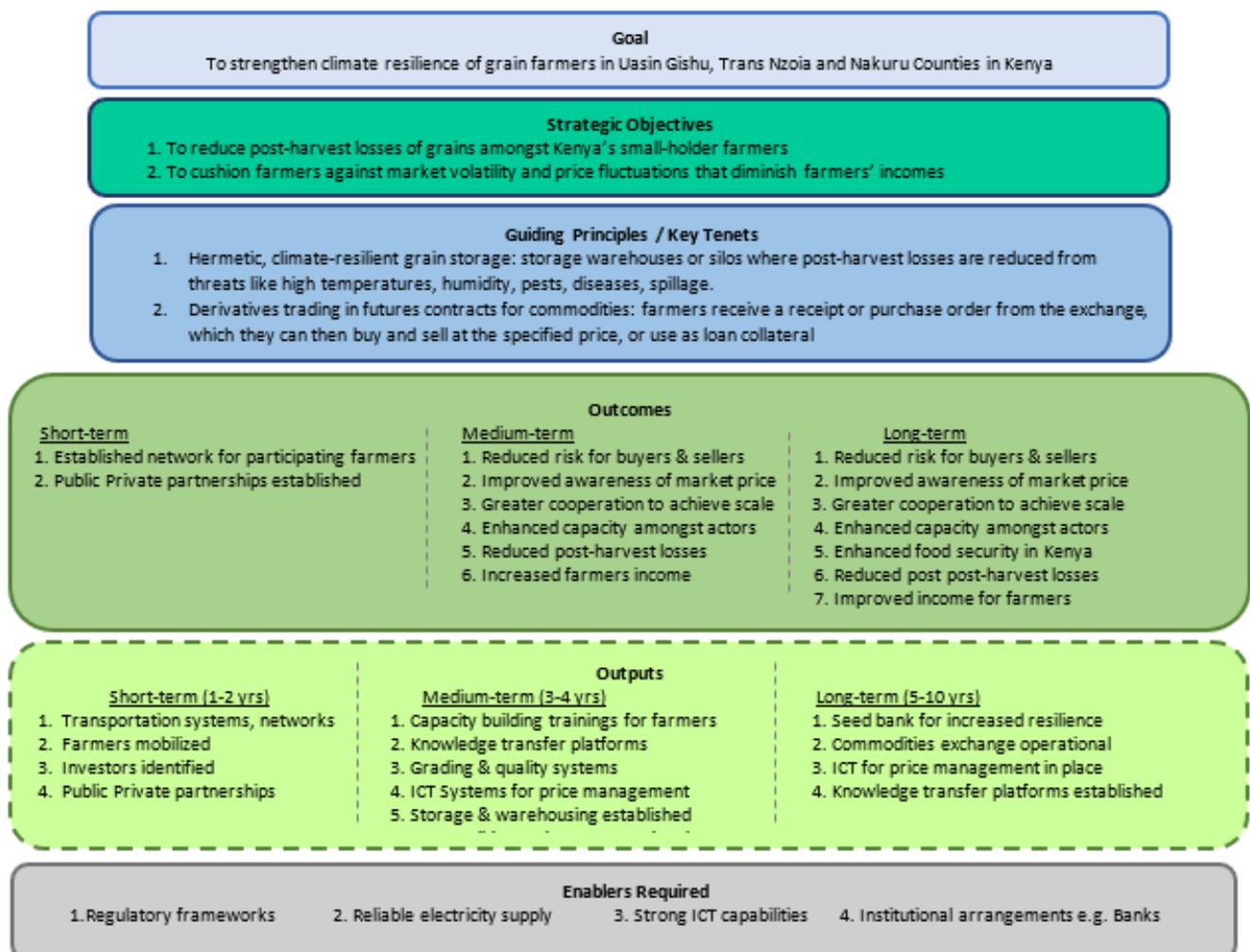
Self-awareness check boxes

Are you aware that the full Funding Proposal and Annexes will require these documents? Yes No

- Feasibility Study
- Environmental and social impact assessment or environmental and social management framework
- Stakeholder consultations at national and project level implementation including with indigenous people if relevant
- Gender assessment and action plan
- Operations and maintenance plan if relevant
- Loan or grant operation manual as appropriate
- Co-financing commitment letters

Are you aware that a funding proposal from an accredited entity without a signed AMA will be reviewed but not sent to the Board for consideration? Yes No

ANNEX A – Theory of Change



ANNEX B – References

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ANNEX C – List of Stakeholder Engagements and Attendance Registers

To be included at conclusion of project