The Republic of Sudan

Project Ideas for Climate Change Mitigation

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Disclaimer

This document is an output of the Technology Needs Assessment project, funded by the Global Environment Facility (GEF) and implemented by the United Nations Environment Programme (UNEP) and the UNEP Risoe Centre (URC) in collaboration with the Regional Centre, Environmental Development Action in the Third World **(ENDA)**), for the benefit of the participating countries. The present report is the output of a fully country-led process and the views and information contained herein are products of the National TNA team, led by the Higher Council for the Environment and Natural resources, Ministry of Environment, Forestry and Physical Development.

Foreword

Technology Needs Assessment for Climate Change (TNA) is a project implemented by the Higher Council for Environment and Natural Resources (HCENR) in collaboration with the United Nations Environmental Program (UNEP) Risoe Centre (URC), Denmark, and supported by the Global Environmental Facility (GEF) grant financing. Project execution is assisted by a national team composed of eleven experts representing different government institutions, research centres and universities.

TNA is considered as a prospect for Sudan to prioritize technologies suitable for Sudan conditions and contribute to reducing Greenhouse Gases (GHGs) emissions and to moderate vulnerability to negative impacts of climate change; these technologies will go in line with the national development priorities of the country.

TNA also allows Sudan to come up with ideas for sound projects on appropriate technologies for both adaptation and mitigation. Hence, Sudan is considered as one of the many vulnerable developing countries around the world due to its fragile ecosystem and its livelihood which is directly affected by the impact of climate change. TNA will also contribute to the success of implementation of the United Nations Framework Convention on Climate Change (UNFCCC) as long as the developed countries take a leading role in providing financial assistance and facilitating technology transfer for developing countries.

TNA is a participatory process; it requires consultation of wide range of stakeholders during different steps of the process. Stakeholders participated in the groundwork of these studies will eventually add more to the preparation and success of the TNA as they have different views, background and experiences in climate change. Identified sectors and sub sectors for the TNA would build upon preceding studies conducted earlier such as the National Adaptation Program of Actions and National Communications.

Sudan has set many goals in its Millennium Development Goals (MDGs). Amongst the most important goals identified are eradication of extreme poverty and hunger, combating HIV/AIDS, Malaria and other diseases and ensure environmental sustainability. Conducting TNA will give Sudan a great opportunity in achieving those goals. Technologies identified through the TNA will assist remarkably in overcoming many challenges that face the country in the context of poverty, hunger, human health and environment in general.

Environment and poverty alleviation have also been recognized as the cross-cutting issues in the Five-Years Strategic Plan of the country (2007 – 2011). Sound, environmentally benign technologies are needed to be incorporated in the improvement of the environment and alleviation of poverty. The government exerts great emphasis on the improvement and development of international relations with environmental development partners, and augmenting mechanisms for benefiting from the latest research, expertise and technologies to enable the country for achieving these goals.TNA in Sudan can go beyond prioritizing technologies to practical approach to spread the use of the technologies identified, as Sudan faces many barriers in the technology transfer such as limited resources, lack of training, poor dissemination tools. In conclusion, TNA will help overcome these barriers.

Dr. Hassan Abdelgadir Hilal. 

Chairman of the Higher Council for Environment and Natural Resources.

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Deep sense of gratitude and recognition are go to the national team, who participated actively in the TNA process, without them we could not have been able to achieve this success.

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Particular gratefulness to the Staff of the Higher Council for Environment and Natural Resources specially Ms. Manal Ahmed Abdelgabar, Mr. Algalih Atwa and Mr. Nimairy Wardi, for their assistance, they deserve special recognition in their contribution to this work.

Last but not least, my sincere acknowledgement to those who have not been listed in this humble note of gratitude.

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List of Abbreviations

AFOLU	Agriculture, Forestry and Other Land-uses
CBOs	Community Based Organizations
CFLCFL	Compact Fluorescent Lamps
EB	Efficient Boiler System
ERA	Electricity regulatory Authority
FNC	Forest National Corporation
GHGs	Greenhouse Gases
ICLs	Incandescent lamps
IS	Improved Stoves
NGOs	Non-Governmental Organizations
SSMO	Sudanese Standards and Meteorology Organization
TOR	Terms of Reference

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Executive Summary

This report offers suggestions of some project ideas that could be adopted by the different stakeholders to mitigate GHG emissions while contributing to sustainable development. These ideas were developed in close consultation with the project stakeholders and reflect governmental plans and Sudan's development priorities.

The project ideas were conceptualized to address some of the barriers for the diffusion and deployment of the respective technology as identified in the barrier report (report 2). The barrier report of the TNA project forms the basis for discussion, and ultimately the development of the project idea. Throughout the consultation sessions it emerged clearly that the specific projects are to be executed in strong collaboration with governmental institutions, the private sector and civil societies as lessons learned from previous projects showed that concentrating the support efforts on implementing body did not achieve positive impacts on the sustainability of the project.

The project ideas identified are: `Establishment of quality control Laboratory of Compact Fluorescent Lamps (CFLCFL) for the energy demand subsector, Establishment of cooperative for bus owners in Khartoum for the transportation subsector, Enhancing the diffusion of Improved stoves (IS) through establishing of centre points)`. For the forestry subsector, construction of a factory for production of prefabricated biogas unit accompanied with support program for the livestock subsector, and Promotion of high efficient boilers with dual system (90% efficiency) furnace diesel/LPG for the industry sector. The report is written in a concise style, after the brief introduction of each project idea, a table summarises, among others, objectives, challenges, outputs, relationship to developing priorities, implementing agencies is provided. A list of stakeholders who had participated in preparing these ideas is annexed.

Chapter 1: Project Ideas for the Energy /sector; Electricity consumption subsector

1.1Brief Summary of the Project Idea

This project idea is suggested to support the deployment of the compact fluorescent lamps (CFLCFL) among the consumers of the domestic sector. It is expected to realize significant reduction in electricity consumption (lighting) thus reducing GHG emissions. The project titled 'Establishment of quality control Laboratory of Compact Fluorescent Lamps (CFLCFL)´ aims to fill the gap in regulatory framework found due to absence of local setup for issuing quality assurance certificates for CFLCFL.

1.2 Specific Project Idea

Establishment of quality control laboratory of Compact Fluorescent Lamps (CFLCFL).

The establishment of a laboratory for quality assurance for CFLCFL will encourage consumers to use them thus it enhances technology diffusion and eliminates the use of incandescent lamps (ICLs). The main performance parameters such as lifetime, lighting efficiency, power factor and harmonic disturbance are to be tested and verified before issuing a quality assurance (QA) certificate. The project incorporates two components, firstly, the physical establishment of lab with 3 testing lines capable of test 20 lamp/month thus around 600 lamp/ year: 0.001 % of the targeted quantity oCFf 600,000 lamp/ year. This phase includes provision of the testing equipment. The establishment process is expected to be in three phase, (i) tender document (ii) construction of the buildings and setting the equipment (iii) commissioning phase where by a kind of intensive training for the local staff is expected to take place. The second phase which is expected in take place simultaneously with establishment process involves setting the optimum standards and specifications including threshold values. The project is seen as a first step in the introduction of the labelling system for electrical appliances in Sudan.

1.3 Project overview

Name of Project Idea	**Establishment of quality control Laboratory of Compact Fluorescent Lamps (CFLCFL).**
Introduction	An absence of an assigned laboratory for testing and quality assurances of CFL is one of the major barriers against the diffusion of this technology. This project ensures consumer confidence in the energy efficient label and protects the consumer investment in CFL. The issuing of QA certificate or energy efficiency label requires product testing in a certified laboratory that meets international standards for quality and competency. Additionally, the suitable set of standards and specification should be ascertained considering the local circumstances in Sudan.
Objectives	– To ensure the quality of the CFL in local markets – To enhance diffusion and deployment of CFL – To contribute to efforts paid in establishing labelling systems for electrical appliances.

Outputs	– Support quality control efforts for CFL – Support the establishment of the labelling system for electrical appliances
Relationship to the country's sustainable development priorities	– The project is in line with the declared objectives of MEWR namely: – execute energy labelling system for electric appliances – -reduce electricity consumption on the domestic sector and in government buildings The Demand reduction will provide more capacity in the grid; hence more consumers could be connected to the grid, thus increasing a coverage level for electricity service, – the project will also contribute also to development objectives of poverty alleviation by reducing the electricity bill to consumers – reduce GHG from electricity sector; replacement of 6,000,000 ICLs by CFL will reduce GHG by 251,395 tCO2
Project Deliverables	– Establishing a well-developed laboratory for testing of CFL quality (20 lamp/ month;: lab established – Setting standards and specifications for lighting lamps particularly CFL; booklet of standards produced – Setting conditions for QA certificates (specific instructions and steps)
Project Scope	– Construction of the laboratory including providing the testing equipment – Support the ascertaining process required to identify the suitable set of standards and specifications under Sudanese conditions – Support during the first work phase(commissioning)
Project activities	– Establishment of standard and labelling system for CFL – Setting terms of reference (TOR) for importing the laboratory construction and equipment provision – Preparation of the tender document for lab construction and equipment supply – Execution phase: construct the building and Import the laboratory equipment – Support during first work phase (commissioning phase).
Timeline	The estimated timeline for the project is about 2 years: setting standards and preparing tender documents (one year), construction (six months), commissioning (six months)
Budget	The estimated costs for laboratory equipment for quality testing of CFL will be a 750,000 USD, excluding costs of laboratory land, construction and management cost and the construction expenses are approximately 150,000 USD.
Measurement/evaluation	– Construction of laboratory – Number of QA certificate issued
Possible complications/challenges	– The process of preparing standards and specifications will require some compromises between the stakeholders, which should be carefully tackled – Importing the lab equipment may conflict with the economic sanctions imposed on Sudan. – the current importers of the low quality CFLCFL may set obstacles against quality control effort
Assumptions	The project implementation is expected to increase the confidence among consumers in using CFL.
Responsibilities	– Electricity-Regulatory Authority (ERA):Executing body – Sudanese Standards and Metrology Organization (SSMO): Setting standards and specifications

	– Importers Chambers: contribute to setting of standards, market regulation – Custom authority_ Control for import – Society of consumer protection (NGO): Awareness raising

Chapter 2: Project Ideas for the Energy sector; Transport subsector

2.1 Brief summary of the Project Idea for Transport subsector:

Mass transport vehicles (buses 60+) are vehicles that are able to transport a larger numbers of passengers per trip. Replacing light duty vehicles (7-25 passengers), standard efficiency, with heavy vehicle fleets (buses60+), higher efficiency, is suggested as an option to reduce GHG emissions in the transportation sector. This replacement leads to the reduction of vehicles moving on roads, thus reducing congestion and pollution. The suggested project is targeting the owners of small public transport vehicles. The project aims to support them in shifting to buses by organizing and creating an attractive package to purchase and run a bus. The project is seen as a win-win approach. The small vehicles owners will keep their business, less fuel will be used so saved fuel could be used by the state for other issues, citizen will benefit from better mobility and the micro climate will be less polluted on international level less GHG will be emitted to the atmosphere

2.2 Specific Project Idea:

The project titled 'Establishment of a cooperative for bus owners in Khartoum' is suggested as one way to encourage adoption of bus systems in Sudan. The project aims to encourage small vehicle drivers to come together in a cooperative that will represent them in front of the authorities. Simultaneously a scrapping program should be encouraged, the scrapped vehicles could be used as stationary shops or offices or used on special conditions e.g. tourism. The suggested project activities comprise of two components, firstly, easing and supporting the bus import process. Secondly, it entails establishing mechanical workshop to carry out the required proper maintenance of busses. The project incorporate different activities such as establishing legal and regulatory frame work for the cooperative, cooperation with state government and traffic police to arrange for optimum routes and conducting awareness and promotion campaign to encourage bus riding

2.3 Project overview

Name of Project Idea	**Establishment of a cooperative for bus owners in Khartoum**
Introduction	The capital city Khartoum is suffering from chronic problems in transporting passengers. One of the main issues linked to this problem is the prevalence of small vehicles for public transport. The large numbers of small vehicles are creating different problems such as limiting the mobility of the citizens, pollution and GHG emissions.
Objectives	– Establishing cooperative for bus owners that can act as representative body – Formulating a framework for importing buses – Establishing mechanical workshops that can carry proper maintenance for buses
Outputs	– Reduced congestion and thus contribute to better mobility in streets – Improved air quality levels and reduce GHG emissions – Support public transport system

Relationship to the country's sustainable development priorities	The replacement of small vehicles with large buses is aligned with the government initiatives to provide adequate transportation services. Simultaneously it contribute to improving air quality in cities and reduce pollution
Project Deliverables	– Cooperative formation – Replacement programmes of small vehicles with large buses is formulated – Import 400 buses per year – Establish maintenance and repair workshop.
Project Scope	– Provide technical support in cooperative formation and other issues – Provide financial support to start the cooperative work (import and workshop)
Project activities	– Establish the legal and regulatory frame work for the cooperative – Cooperate with state government and traffic police to arrange for optimum routes – Conduct awareness and promotion campaign to encourage bus riding
Timeline	– Establishing cooperative (six months) – Import of buses (six months). – One year is needed to establish the mechanical workshop
Budget	– Cooperative formation 20,000 $ – Monetary cushion for bus import :500,000$ (value for about 4 buses (10 % of quantity (bus value at about 120, 000 $ including import taxes and customs) – Mechanical workshop (including civil work and land) 300,000 $ -400,000 $ – Promotion program: 50,000 $
Measurement/evaluation	– Number of cooperative members – Number of buses imported – Degree of pollution and GHG reduction
Possible complications/challenges :	– Proper cooperative and workshop management system – High local taxes on buses income – Insufficient hard currency to import buses – Failed promotion programmes
Assumptions	– Cooperative suggestion is positively accepted and Governmental authorities will support the project
Responsibilities	– Khartoum State government: general support and facilities allocation – Small vehicles owners: cooperative formation – Custom authorities: import regulation – Bank and donors: finance

Chapter 3: Project Ideas for the Agriculture Forestry and Other Land Use Sector/Forestry subsector

3.1 Brief Summary of the Project Idea for Forestry

Forest harvest for energy supply was mentioned in the technology and the barrier reports, 1st and 2nd reports of the TNA, as one factor leading to loss of forest, thus increasing net GHG emissions in Sudan. Improving the efficiency of fuel wood consuming appliances is thus an important element to combat deforestation and increase the sink. Improved stoves was identified as technology with high potential to fuel wood consumption, ultimately increasing the sink, an amount of 1-3 tonne of CO_2 is expected be saved/year/stove. Although the introduction of IS started in the eighties, a large-scale adoption of IS has not yet taken place. Extensive and well-organized efforts are needed to address this issue, therefore the project aims to target the different problems mentioned in the barrier report by using a holistic approach. That can tackle the multi face of the IS issue, energy provision, deforestation reduction, indoor health and safety, gender...etc. Extra the holistic approach will respond to the lesson learned from past projects that had concentrate on one activity e.g. awareness or production.

3.2 Specific Project Idea

This project titled ’Enhancing the diffusion of improved stoves through establishing of centre points ’ can play a vital role in the sustainable supply of cooking energy for local communities in addition to conserving forests and reducing GHG emissions. The project involves establishing centre points for the production of improved stoves. These centre points are planned to include production and training workshops and carry out awareness activities. A finance mechanism that can provide low interest loans for producers and small revolving fund for that allow poor households to purchase the stoves will be established. In addition, the project involves strengthening different institutions interrelationship through formation of a coordination committee which is responsible for development and management of the diffusion plans. The coordination committee is suggested to include all the relevant institutions such as FNC, Environment and energy government bodies, research, NGO/CBOs etc. Moreover, the project contributes in developing marketing and outreach resources for other green technologies to the targeted areas. It is suggested that each centre point will serve about 100,000 households. The project is planned to take place for about 3-5 years, as pilot project mode. After the project period the centre points are expected to continue working without external support

3.3 Project over view

Name of Project Idea	Enhancing the diffusion of Improved stoves (IS)
Introduction	Over-reliance of biomass-based fuels and inefficient technologies such as traditional stoves has placed great pressure on local forests. According to FNC the annual clearance of forest areas in Sudan has led to a tangible deficit between the annual consumption of forest products and the growth rate of tree species. Improving the efficiency of fuel wood consuming appliances such as IS, is therefore crucial to combat deforestation and tackle greenhouse gas emissions in Sudan. As a large-scale adoption of IS has not yet taken place, the project aims to increase the diffusion rate of IS by establishing local IS centre points that host the different activities and services that are needed for IS adoption.
Objectives	– Building capacities in different aspects of IS (fabricating, using, financing etc.) – Improving the availability and affordability of IS – Developing local marketing and outreach resources – Sustainable supply of cooking energy for local communities in addition – Reducing greenhouse gas emissions
Outputs	– Increased efficiency of wood and charcoal stoves – Decreased deforestation in the area – Reduction of poverty
Relationship to the country's sustainable development priorities	– The project is in line with preserving forests, – more efficient use of energy technologies – poverty eradication – reduction of fuel costs
Project Deliverables	– Establishment of 6 centre points – Awareness and capacities among local partners (communities, institutions artisans) raised and developed – Distribution channels are settled – Strengthened coordination mechanism between/among relevant stakeholders and institutions – Developed financial mechanisms and provision of loans to producers – Reduction of 1-3 ton of CO/stove/year
Project Scope	Project limits itself to the Central, Eastern and North Darfur regions at household and small institutional level. Expected project duration is about 3- 5 years)
Project activities	– Establish coordination committees in the study areas – Establish finance mechanisms – Identify and form centre points
Timeline	The estimated timeline for supporting the project at the beginning is 3-5 years
Budget	Main budget lines are: – Costs for formation and continuation of coordination committees 120 ,000

	$/year – Costs for finance mechanisms 30,000$ – Costs for establishing Centre points 100,000$
Measurement/evaluation	– No. of production centre points (6 points) – Continuation of the coordination committees formed – No. of improved stoves distributed – Amount of fuel wood consumption regarding the actual use of improved stoves
Possible complications/challenges	– Integrating private utilities to carry out the fabrication and selling activities – Contradictions between local partners responsibilities – Local ownership
Assumptions	Active participation from government agencies IS socially acceptable
Responsibilities	– FNC: Executing body – Financing Sources, private sector: finance mechanism – local committees, NGOs, CBOs: beneficiaries – Energy Research Centre for scientific backup

Chapter 4: Project Ideas for Agriculture, Forestry and Other Land Use sector/Livestock subsector

4.1 Brief Summary of the Project Idea

This project idea is suggested to support the deployment of biogas technologies to reduce GHG emissions from dung fermentation. The project entitled 'Construction of a factory for production of prefabricated biogas unit accompanied with support program' aims to ease the erection process of the biogas units. Moreover, the project will support rural communities to purchase such technologies by initiating appropriate finance mechanism and suitable technical packages to ensure efficient operation of the erected units.

4.2 Specific Project Idea

This project is suggested to be implemented by the National Energy Research Centre with the collaboration of the Ministry of Animal Wealth and Ministry of Social Affairs. The construction of the factory is based on importing raw material and extruding it to the agreed size. A project component is responsible for importing the suitable biogas appliances such as cookers and lamps. The project also collaborates with the private sector and civil societies, including localities, to carry out jobs such as unit construction and operation as well as conducting awareness raising activities. As the unit costs are relatively high, a financial mechanism is recommended e.g. revolving fund or instalment system. Additionally, a technical package that allows accurate sizing and providing proper operation instruction is to be produced. Construction of such factory is seen to reflect on the welfare of rural communities by increasing the level of services provided. The project is seen as a first step in the introduction of holistic concepts in waste management and also enhance the idea of consider non-traditional product in animal husbandry.

4.3 Project overview

Project Name	**Construction of a factory for production of prefabricated biogas units accompanied with support program**
Introduction	Construction of biogas units is a very tedious and time consuming process which requires a specific standard of skilled labour and machineries. The suggested project will produce prefabricated biogas units which are then assembled in site with lower level of technical know-how. Additionally, technical and financial mechanisms that support marketing are to be established, e.g. paying in instalments, as well as production of suitable technical package to efficiently operate the units. Moreover, awareness and promotion program need to accompany the production.
Objectives	– Contribute to better performance of biogas units by reducing the possibility of technical mistakes – Ease the erection process of biogas system to a normal labour level – Lower the costs of biogas units

	– Increase the availability of biogas units in the community
Outputs	– Support adoption of biogas technology – Contribute to rural development – Technical package, promotion booklets and manual training
Relationship to development priority	Biogas system contributes to – Waste management, thus- reducing health hazards – Provision of services through cooking fuel, lighting and electricity – Soil improvement by using bio fertilizers – Livestock economy by selling of biogas
Project deliverables	– Specific number of biogas units – Sound technical package for sizing and operation – Awareness program plot – Manual training – Promotion booklet – Finical mechanism
Scope	Two production lines of 30 and 10 m^3 biogas units ability to produce 5000 units per year each
Activities	– Construction of factory – Production of sizing and operation manuals – Production of Training and awareness manuals – Establishment of finance mechanism
Time line	6 for preparing tender document one year for construction 6 month for commissioning
Budget	Accurate budget was not possible, however the main budget lines include: – Land cost and Factory construction 200,000$ – Production lines (no cost is available) – Support package including lab equipment 100 000 $ – Monetary cushion to start finance mechanism 15 % of expected value of 3000 $ and 5000 unit /year (100, 000 $
Evaluation	– No. of biogas units produced – No. of biogas systems erected
Challenges	– Proper management and administration – Import of raw material – Hard currency fluctuation
Assumption	– Availability of dung – Continuation of service needed in rural areas
Responsibilities	– Energy Research Centre: Implementing body – Localities / CBOs: Beneficiaries – Family bank: Finance mechanism – Private sector: Erection and promotion – Ministry of Animal Wealth: Stakeholder – Ministry of Social Affairs: Stakeholder – Ministry of Environment Stakeholder

Chapter 5: Project Ideas for the Industry Sector

5.1 Brief Summary of the Project Ideas

The majority of boilers used in the food industry are old and inefficient, which results in higher fuel consumption and causes air pollution and GHG emissions. This project idea is suggested to support the deployment of the High Efficient Boilers in food factories in Khartoum State. It is expected to realize significant reduction in energy loss and support clean fuel utilization, thus reducing GHG emissions. The project entitled 'Promotion of High Efficient Boilers (90% efficiency) using dual fuel (Diesel/LPG) in food factories in Khartoum State' aims to support the factory owners replacing their old boilers with high emission by new boilers that reduce emissions.

5.2 Specific Project Ideas

The establishment of the project aims to support factory owners to invest in erecting new efficient boilers. As a pilot project type the project seeks to create an encouraging environment to overcome the set of barriers discussed in the barrier report. The project is composed of three elements:(i) facilitating financial mechanisms and technical support for factory owners to purchase efficient boilers, (ii) raising awareness in the industrial sector for technology utilization, (iii) improving the technical setup in installation and use of efficient boilers. The project is proposed to target the medium and small-scale food industries by erecting 50 efficient boilers with dual fuel in 5 years at a rate of 10 boilers per year. This replacement lead to reductions of the production cost by 30 per cent due to fuel saving.

5.3 Project overview

Name of Project Idea	**Promotion of High Efficient boilers with dual system(90% efficiency: Diesel/LPG**
Introduction	The majority of the industrial boilers in Sudan are characterized by low thermal efficiency and utilization of so called dirty fuels. This situation necessitates replacement of these old boilers with new efficient boilers that have better thermal efficiency, thus reducing fuel and GHG emissions. Different barriers hinder the diffusion of this technology as discussed in the barrier report, such as convincing factory owners and other stakeholder to support the deployment activities of this technology.
Objectives	– Raise awareness within the industrial sector and decision makers – Encourage the factories owners for purchasing efficient boilers through establishing appropriate financial mechanism – Improve the capacity of workers in dealing with EB working conditions – Provide technical support on EB retrofitting, installation and monitoring.
Outputs	– Reduction of GHG – Contribute to reduce air pollution – Contribute to reduce fuel cost at industry
Relationship to the country's sustainable development priorities	The project goes in line with plans set to reduce costs of production by reducing fuel quantity and hence fuel price. This will increase profitability of produced commodities.

Project Deliverables	– Make 50 factories aware of the benefits of using efficient boilers – At least 30 factories get benefits from financial facilities – Support all interested factories to purchase efficient boilers by providing technical support. – Train 80 per cent of workers in dealing with EB working conditions
Project Scope	The target is to replace 10 low efficient boilers in 10 factories by high efficient ones every year for a total of five years for medium and small food industries in Khartoum State.
Project activities	Project activities could be briefed as follows: – Studying the current situation of 50 old boilers in 50 factories – Design awareness programs for using EBs – Establish investment portfolio to finance the importation of EB Conducting training programs for labours and operators – Providing technical support for factories owners.
Timeline	The estimated timeline for the project is 5 years
Budget	– Importation of EBs (1million USD) – Awareness raising, training and technical support:$300000 – Management costs: 200000 USD Total budget 1.5 million USD
Measurement/evaluation	– Drop in fuel bill – Reduction present in air pollution – GHG reduction
Possible complications/challenges	– Smooth coordination between the project stakeholders, Ministry of Industry and Ministry of Energy, banks and Sudanese Industrial Association chamber – The coordination between these different institutions and distributions of roles in establishing financial mechanism will need well organizational system. – Challenging Advocacy work is needed towards fuel distribution policy. – Support programs like awareness, capacity building and providing technical support requires relatively high level managerial skill
Assumptions	The first two factories are expected to achieve the desired results and then function as a demonstration unit
Responsibilities	The project will be developed and managed by the Sudanese Industrial Association Chamber with coordination with Ministry of Industry and Ministry of Energy and financial support of the Industrial Development Bank.

Annex 1: list of stakeholders

Name	Affiliation
Abd Elhafith Fadallah Babiker	Electricity Regulatory Authority
Ibrahim Amin Ahamed	Electricity Regulatory Authority
Mustafa Mohamed Salih Agha	Electricity Regulatory Authority
Nazik Hassan Ali Alawad	Ministry of Water Resources and Electricity
Mohamed Salih Farah,	General Directorate of Energy Affairs, Ministry of Petroleum
Abdelazim Widaa,	General Directorate of Energy Affairs, Ministry of Petroleum
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Nagla Mahagub	Forests National Corporation
Elyamen Fadalla	Freelance consultant
Elwalid Abbas	National Energy Research Centre
Muna khidir	National Energy Research Centre
Yagoub Eldum Hamid	National Energy Research Centre
Elfadil Barima	National Energy Research Centre
Abuobida Bukary	Sudanese Chambers of Industries Association
Alfaith Gorhsi	Sudanese Chambers of Industries Association
Yassir Abd karim	Sudanese Chambers of Industries Association
Osman Taha Alzaki	Technology research Institute
Handi Atta Elfadiel	Ministry of Industry
Amira Alnour	Ministry of Industry
Naima Abd Algader	Industrial Research Centre
IKhlas Abd Alaziz	Industrial research Centre
Abdrahman Altahir	Kenana Sugar Company

Amir Hassan Alam	Salam Cement Company
Farouk Ismail Abd Elgalil	Ministry of Industry
Abdrahman Alamin	EWASCO company
Nouralla Yassin	National Energy Research Centre
Daoud Abbass	Food Industry Chamber
alam saigron	Food Industry Chamber
Mohammed Algak Silman	Industrial Research Centre
Siefdin Abdalmagid	Ministry of Labour