



-  **Country:** Ghana
-  **Sector:** Agriculture
-  **Project:** Improved Institutional Biomass Cook stoves and Ovens for Small and Medium Scale Agro-Processing Industries in Ghana.
-  **Grantee:** Association of Ghana Industries (AGI)
-  **Partner:** Ghana National Cleaner Production Centre, Solarland Company Limited and Energy Foundation

Acknowledgements

The SWITCH Africa Green programme was developed by the European Commission to support African countries in their transition to an inclusive green economy, the main objective being to promote sustainable development. This is based on sustainable consumption and production (SCP) patterns, while generating growth, creating decent jobs and reducing poverty.

This impact sheet on Improved Institutional Biomass Cook stoves and Ovens for Small and Medium Scale Agro-Processing Industries in Ghana provides a snapshot of results and achievements of the project under the Green Business Development Component of Phase I (2014-2019) of the SWITCH Africa Green Programme. This component supported micro, small and medium-sized enterprises (MSMEs) to apply and adopt SCP practices in their business operations.

The project was implemented by Association of Ghana Industries (AGI) in partnership with Ghana National Cleaner Production Centre (GNCPC), Solarland Company Limited and Energy Foundation with the support of the SWITCH Africa Green National Focal Point Lambert Faabeluon, Environmental Protection Agency (EPA), Ghana; GNCPC and National Coordinator Kingsley Bekoe Ansah, United Nations Development Programme (UNDP), Ghana. The grants were managed by United Nations Office for Project Services (UNOPS) and coordinated by Celia Marquez with support from Mercy Gatobu.

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BACKGROUND

In Ghana, food processing is traditionally done using the three-stone stove (tripod)¹ which makes use of firewood. Wood fuel accounts for more than 60 per cent of the total energy used in Ghana, with around 25 - 28 million cubic meters of firewood consumed annually between 2000 and 2004². This has resulted in high production cost, unhealthy working environments and environmental degradation. Additionally, in 2015 the price of Liquefied Petroleum Gas (LPG) increased by 9 per cent forcing those involved in food processing to use firewood as a source of energy.

The Association of Ghana Industries (AGI) received funding to implement a 2-year project in promoting and installing biomass improved cook stoves. The Project funded by the SWITCH Africa Green Programme addressed processing of three types of food namely: '*gari*' (cassava flour), '*pito*' (local beer made from fermented millet or sorghum) and fish smoking. The Project supported installation of 54 improved institutional cook stoves.

Baseline Survey: The survey was carried out in the central

¹ <http://www.switchafricagreen.org/GH/index.php/k2/itemlist/category/97-agi>

² <http://energycom.gov.gh/files/snep/WOOD%20FUEL%20final%20PD.pdf>

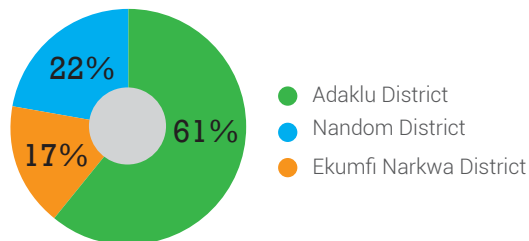


and upper West region of Ghana where a total of 2,075 people involved in food processing were mapped out. The results of the survey showed that there were 900 traditional stoves and 5 improved cook stoves. From the findings of the survey, 99 per cent of those involved in

OBJECTIVES

The main aim of the project was to promote improved institutional biomass cook stoves and ovens for small and medium scale agro-processing industries in Ghana. This was expected to lead to improved fuel efficiency,

Project Baseline Survey:



food processing were using the traditional stoves and only 1 per cent were using the improved cook stoves. The figure below shows an illustration of survey findings.

healthy working conditions for food processors, and creation of green jobs.

The specific objectives of the project were to:

- Promote sustainable processing of *gari* production in Adaklu district, *pito* brewing in Nandom district and *fish smoking* in Ekumfi Narkwa district in Ghana.
- Reduce the production cost and processing time.
- Promote awareness on improved institutional biomass cook stoves in the three districts.





BENEFICIARIES

26 MSMEs with a total of 300 members in three regions in Ghana namely Adaklu, Nandom and Ekumfi Narkwa Districts. Beneficiary MSMEs are involved in gari production, pito brewing and fish smoking. About 99 per cent of the food processors engaged by the project were women.

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OUTPUTS

Improved capacities of workers in green sectors

Skills development in green business

Skills development was provided to 59 local artisans who were trained on how to identify suitable sites for constructing improved



cooked stoves, appropriate types of construction materials and mixing ratios of the construction materials as well as maintenance and repair works.

The project provided training to 100 people involved in food processing on the concept and design of the improved cook stoves. This involved creating awareness on the benefits of switching from the traditional stoves to the improved cook stoves, building their capacity on the maintenance to ensure sustainability.

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Increased networking among green businesses

Networking events organized

Through the SWITCH Africa Green Programme, two workshops aimed at promoting adoption of improved cook stoves were organized and a total of 680 participants from the 3 regions participated. About 98 per cent of the participants were female.

The beneficiaries of the project also attended the SWITCH Africa Green Programme Regional Networking Forum that was held in Uganda in 2016 during which they showcased their new model of the improved cook stoves. After the Forum, eight delegations from Nigeria, Niger Delta women empowerment team visited AGI in Ghana and were trained on how to construct and use of the improved cook stoves.

Replication: Results of this Project were replicated where two additional improved cook stoves were constructed with support from the West Africa Power Pool (WAPP) Program funded by the World Bank. The additional cook stoves cater for additional demand for gari on market days.

Improved capacities of workers in green sectors

Training toolkits and manual developed

The Project developed toolkits and manuals to build the capacity of MSMEs on the new improved cook stoves and equipment that they could use at the processing centers to speed up food

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production. The following manuals and toolkits were developed:

- Workshop training toolkit on awareness creation and stove construction
- Job safety analysis manual
- Standard training manual on constructing the cook stoves
- Training manual for *gari* processors in Adaklu district in the Volta region

Additionally, the members were trained on record keeping and good housekeeping.

OUTCOMES

Uptake of SCP practices by MSMEs

Installation of improved cook stoves

Through the SWITCH Africa Green Programme, 54 improved cook stoves were successfully installed in the three districts in Ghana. The new cook stoves made use of “*kaowool*”, an installation material between the combustion inner walls of the stove which reduce heat radiation. Improved shredders and mechanical pressers were used in the gari processor which increased the rate of production. The improved stoves were also installed with

54 improved cook stoves were successfully installed in the three districts.

smokestacks which reduced the levels of particulate matter during food processing and controlled heat.

Improved resource efficiency

The Council for Scientific and Industrial Research Institute conducted an energy audit to evaluate the performance between the traditional cook stove and the improved institutional cook stove in terms of the smoke emission,

Improved cook stove showed an increase in energy efficiency from 19% to 37% fuel consumption.

particulate matter produced and the cooking time. The improved institutional cook stove proved to be more efficient than the traditional cook stove.



Energy efficiency: The results for the improved cook stove showed an increase in energy efficiency from 19 per cent to 37 per cent fuel consumption.

Time efficiency: Processing time for 150kg of *gari* took four hours which is a significant improvement from the two days it takes using a conventional cook stove. It now takes less than two

Cooking time was reduced by 95% following the use of the improved cook stove.

days to process 10 baskets of fish which were being processed for 5 days. Cooking time was reduced by 95 per cent following the use of the improved cook stove.

IMPACTS

Environmental Impacts

Reduction in CO₂ emissions

Following project implementation, carbon dioxide emissions were reduced by 43 per cent. There has been a reduction in the number of trees cut down to provide as source of fuel because the improved cook stoves have been designed to use tree branches instead of the tree stumps as used in the conventional cook stoves. The new improved cook stoves are energy efficient and therefore consume less fuel (tree branches). The wood fuel

Carbon dioxide emissions were reduced by 43%. The wood fuel consumption was saved by 143%.

consumption was saved by 143 per cent where 1kg of *gari* is produced using 0.4g of firewood which was previously being produced using 1kg of firewood.

Economic Impacts

Increased turnover

There was a 27 per cent reduction in the cost of production where the cost of producing one bag of *gari* moved from USD 64.12 to USD 46.77. The turnover from the sale of *gari* increased by 185 per cent where the profit to MSMEs increased from USD 28.18 to USD 80.26 for every bag produced.

Social impacts

Reduced negative impacts on human health

There was a reduction in particulate matter by 16 per cent. The working environment is much safer for food processors

There was a 27% reduction in the cost of production turnover from the sale of *gari* increased by 185%

and their families from reduced smoke emissions and heat radiation. About 90 per cent of those involved in food processing reported a reduction in health hazards caused by smoke emissions such as eye irritation and lung-related-diseases.

LESSONS LEARNED

- Novel ideas which are also easy to use have higher likelihood of uptake by beneficiaries. The improved cook stoves were easy to construct and use and the community learnt how to construct, use and maintain them with ease. This averts the risk of them reverting back to their conventional ways of doing things after project closure.
- Demonstrating short term gains intended to provide long term positive outcomes motivates beneficiaries to take up SCP practices and enhances their willingness to recommend the same to others. When the MSMEs noted a reduction in cooking time and increased production rate, they were motivated to continue using the improved cook stoves and recommended their use to other community members.
- Simple alterations can contribute to a significant change in enhancing efficiency. Change in design of the cook stove made the use of tree branches instead of tree stumps possible which resulted in reduced fuel consumption.
- Innovative mechanisms are needed to enhance project sustainability as demonstrated by the decision to use a bowl of *Gari* as a measure of payment for using the improved stove. Proceeds from selling the *Gari* are used to maintain the cook stoves.



"I am very happy because the improved cook stoves, are safe, convenient to use and saves time and resources. In the past, I used to process 10 baskets of fish in 5 days using the traditional cook stove, but with the improved fish stove I spend less than 2 days to process the same amount".

Ama Afedziwah,
A fish smoker in the Ekumfi Narkwa District in the central region.



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