

Climate Change Mitigation through Clean Cooking Solutions in the City of Dar es Salaam, Tanzania

Introduction

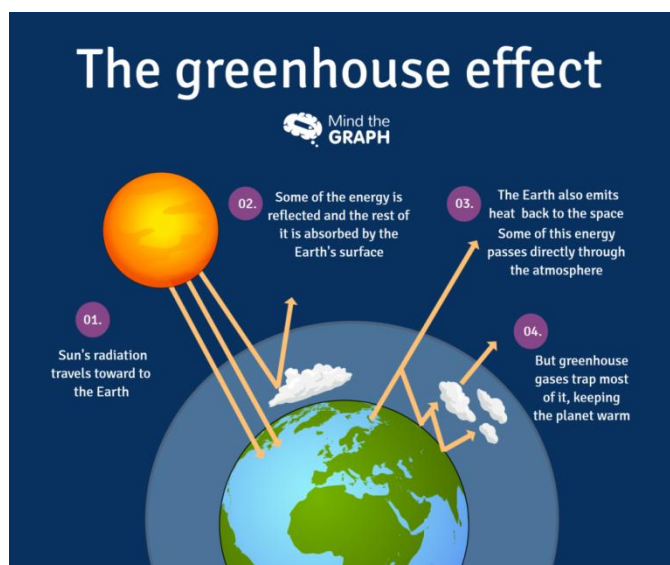
Modern energy cooking services are crucial to human well-being and to Tanzania’s economic development. Cooking remains a central part of energy transition and core to the achievement of the UN Sustainable Development Goal 7 and the Paris Agreement. In Tanzania over 55 million people are living without clean cooking services, that is more than 85 % of the population still depend on solid biomass fuels for cooking with 63.5% of households using firewood, followed by charcoal users 26.2%, Only 5.1% use LPG and 3% uses electricity (REA, NBS 2020). Most of the biomass fuels are burned in inefficient three stone fire places in rural areas and in metal charcoal stoves in urban areas, which in turn affects health and wellbeing of the population through indoor air pollution.

The current unsustainable production and use of biomass fuels contributes to the degradation of the environment and health hazards to the livelihood of people (according to WHO report Indoor Air Pollution document WHO/SDE/PHE/07.01 of 2002 more than 27,500 people die annually in Tanzania due to the inefficient use of solid biomass energy for cooking). Indeed, this is a silent and slow killer, unlike the current COVID 19 pandemic. The situation also contributes to the fast deterioration of natural forests. Degradation of the forests at the rate of 372,871 hectares per year (TFS: 2015). Transforming cooking energy services for Tanzania is therefore critical to the development of the country and a strategic measure for achieving several SDGs and SE4ALL targets.



International Initiative on Modern Energy Cooking Services

Also, we have the Sustainable Energy for All (SE4All), the UN initiative that was launched in 2011 to catalyze major new investments in a bid to accelerate the transformation of the world’s energy systems, pursue the elimination of energy poverty, and enhance prosperity. SE4All calls on all stakeholders to take concrete actions towards ensuring universal access to sustainable energy services; double the global rate of improvement in energy efficiency and double the share of renewable energy in the global energy mix, within the UN timeframe of 2030. Tanzania was among the first countries to



sign a commitment to the SE4ALL Initiative and has since developed a SE4ALL Action Agenda, Investment Prospectus detailing actions that the Government intends to carry out to ensure access to sustainable energy for all.

The Modern Energy Services Programme (MECS) supported by UKaid, ESMAP and managed by the Loughborough University of UK, brings and draws on knowledge and experience from different partners around the world. The programme expects to build on such opportunities and knowledge emerging from the programme to break out of the business as usual approaches and rapidly accelerate the transition from biomass to clean cooking on global scale. We are grateful, TaTEDO is one of the southern partners of this very interesting and promising programme.

Effects of Climate Change in Tanzania

In recent years, Tanzania has witnessed a number of climate related disasters namely, flooding, droughts, widespread crop failures, livestock deaths and intensification of climate sensitive diseases among others. There is no argument today regarding the retreat of Kilimanjaro glacier; the glaciers have been retreating in unprecedented scale in the recent years directly because of climate change. The rural dwellers in Tanzania are more vulnerable to the effects of climate change than urban dwellers partly because of their limited resources, poor exposure to various technologies and their overdependence on natural resources which are threatened by climate change.



The effects of climate change in the country are widespread and significantly interfere with agriculture, while at the same time, reducing the ability of the society to deliver services. Indigenous knowledge such as survival skills and coping mechanisms adopted by different societies in Tanzania. In places where climate change has resulted into repeated agricultural failures, it is now common to find members of typical farming villages doing extra farm activities to maximize survival. Such activities may include, charcoal burning, brick making, fishing, casual labouring depending on the geographical locations and seasons. Climate change has also forced people to move from their villages to urban areas for paid employment. Such coping mechanisms however are overwhelmed by the impacts of climate change on the people. Different institutions including the government have taken some positive steps towards combating climate change; however the efforts done so far are insufficient. In addition, addressing climate change in Tanzania is hindered with inadequate resources, corruption and poor coordination and implementation of combating measures.



Clean Cooking and Its Contribution to Climate Change Efforts

Clean cooking is very important to combat global climate change and reduce environmental degradation. Cooking over polluting open fires or inefficient stoves emits one-quarter of global

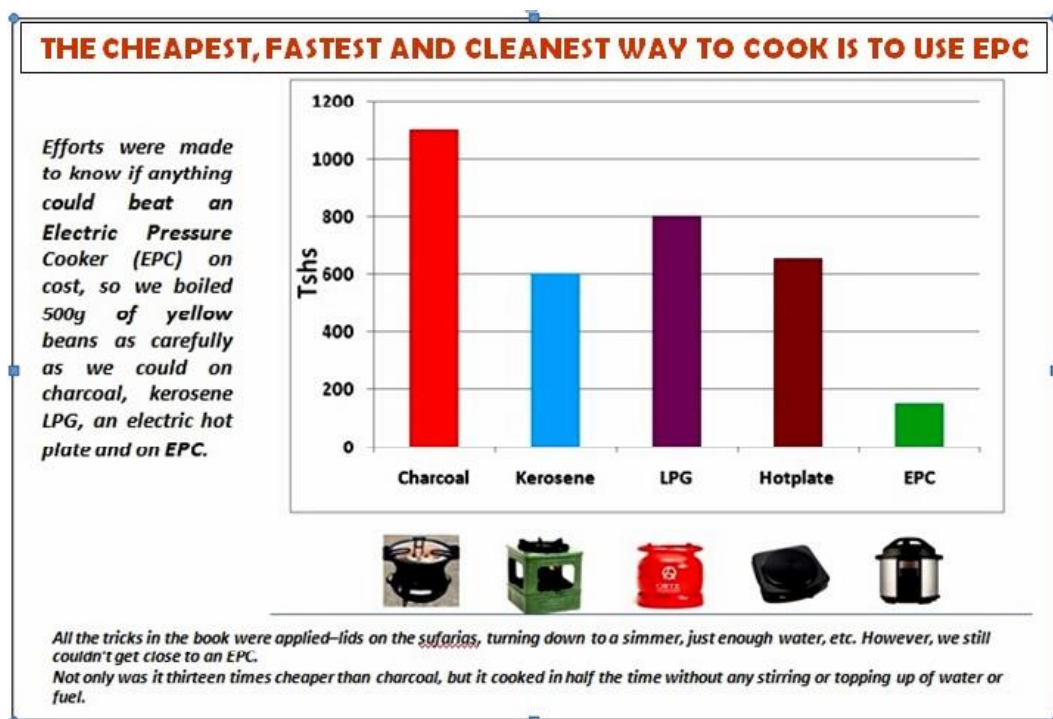
black carbon emissions. This is the second largest contributor to climate change after carbon dioxide (CO₂). Many of today's modern stoves are highly efficient and can reduce fuel use by 30%-60%, resulting in fewer emissions of greenhouse gas and black carbon.

Black carbon, commonly known as soot, refers to tiny carbon particles that form during this incomplete combustion, and is by far the most significant short-lived climate pollutant emitted during cooking. Black carbon particles absorb sunlight, thereby warming the atmosphere, and are estimated to be second only to CO₂ in their warming impact on the climate. The CO₂ emissions from cooking with wood and charcoal are caused by unsustainably harvested woodfuel (harvested at a rate that exceeds re-growth), which leads to forest degradation that reduces the ability of trees and shrubs to absorb emitted carbon from the air (carbon sequestration).

The continued efforts in reducing deforestation and ecosystem restoration across the country will reduce pressure on natural forests. Energy diversification is required in both rural and urban areas in order to reduce pressure on biomass sources. Dissemination and expansion of the cheap and readily available technology like fuel wood serving stoves and continued investment in alternative forms of energy like wind and solar are required at different levels of communities to combat climate change.

Clean Cooking in Dar es Salaam and its Effects to Tanzania

According to electric cooking (eCook) study performed by TaTEDO, GAMOS, University of Surrey and Loughborough University in 2018, it was noted that cooking with electricity by using electric pressure cookers, is competitive, even cheaper than cooking with LPG, kerosene, or charcoal in urban, peri-urban and rural settings.



The rate of deforestation in Tanzania indicates that Tanzania has been losing 372,871 hectares of forest per annum. Tanzanian forests are excessively threatened by increased charcoal production fuelled by increased demand in Dar es Salaam city which consumes nearly 70% of all the charcoal produced in the country.

As the country is making major efforts on electrification, all efforts need to be made to link these efforts with sustainable clean cooking. The current technological developments on highly efficient electric cooking appliances such as electric pressure cooker bring about a huge opportunity to now link electrification, not only for lighting, but also for cooking. Depending on the source of electricity, this is now seen as the long term ultimate solution for clean cooking in Tanzania.

What is an Electric Pressure Cooker?

An Electric Pressure Cooker (multi-cooker) or EPC is simply a highly insulated sealed pot which works on a simple principle, steam pressure. The steam enclosed inside builds up high pressure



and temperature thus helping food to cook faster and stay tasty and nutritious. The timer switch and temperature/pressure sensors switch the power off as soon as it reaches the right point in the cooking cycle. The EPCs can carry out various cooking operations such as frying, boiling, steaming, pressure cooking and baking.

The EPC combines several familiar cooking appliances: fireless cooker (insulator), electric hot plate and pressure cooker.

Advantages of Using Electric Pressure Cookers

- Saves time - Cook food in a fraction of the time and it still tastes good.
- Can boil, fry, steam and bake.
- Retains nutrients – No steam escapes hence nutrients are retained.
- The kitchen is cooler – Since EPCs are insulated retain the heat and steam so that none of it escapes to heat up a kitchen, if allowed to depressurize naturally.
- It is very convenient – An EPC is automated, which means that it is very difficult to burn the food as it switches off the power when the temperature in the pot gets too high. Also, once the time is set everything else is auto-regulated sparing precious time to do some other important things while waiting for delicious the meal.
- Cost saving - Highly energy-efficient, most dishes can be cooked with less than half a unit of electricity.
- Better flavors - Obtained from steam prevented from escaping and locking the flavor inside.
- Cooks from frozen – If you forget to defrost frozen food, just cook directly.
- Consistent results – Once you figure out the time required to cook a certain type of food, you are guaranteed to cook perfect dish every time.
- Improved health – Avoid health problems caused by smoke and other hazardous emissions from combustion of biomass.
- Environmental protection – Saves forests by helping avoid overuse of green natural resource.
- Safety – EPCs have multiple safety features that prevent any unexpected scenarios.

Conclusion

According to the Charcoal Production and Use study in Dar es Salaam of 2011, more than 2.8 million ha of forest are harvested to fulfil the demand of charcoal for the city of Dar es Salaam. Despite all that, the process of producing and using this amount of charcoal has huge impact to the environment as measured by the amount of green house gases which will result and emitted to the atmosphere.

Charcoal production and use will result into about 2.5 tonnes of CO₂ annually. Other gases resulting from production and use of charcoal in Dar es Salaam are 9,830,000, 1,109,000 and 12,478,000 tonnes of NO₂, SO₂ and CH₄, respectively.

The high level of emissions produced calls for appropriate technology for cooking in the city of Dar es Salaam. This should be the highly efficient cooking appliances like electric pressure cookers. The technology if will be used by a large section of population, will reduce pressure on forests and reduce effects to environment as electricity will be used as clean and friendly alternative sources of energy for cooking in the city of Dar es Salaam and other parts of country.