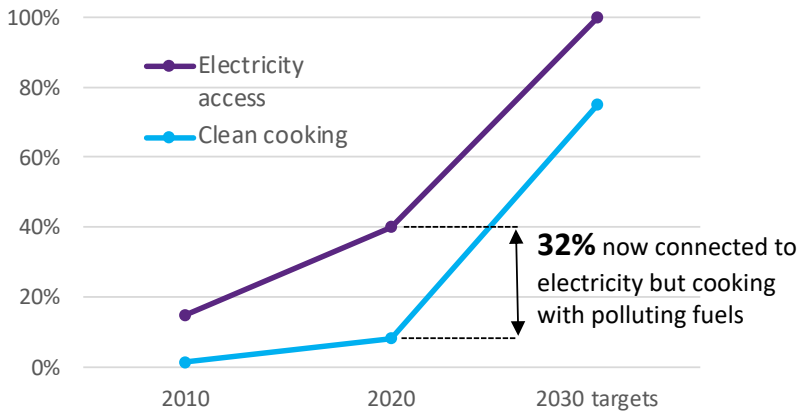
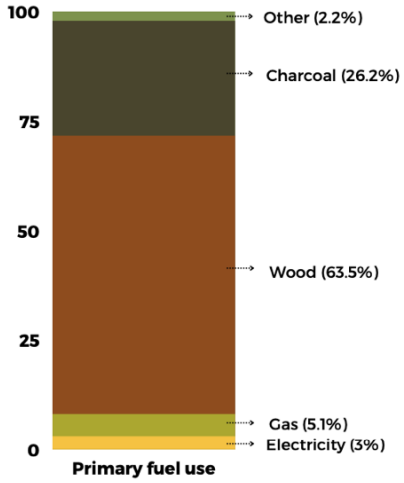
# Modern Energy Cooking Brief: Tanzania

## Current Situation: Electricity Access, Clean Cooking

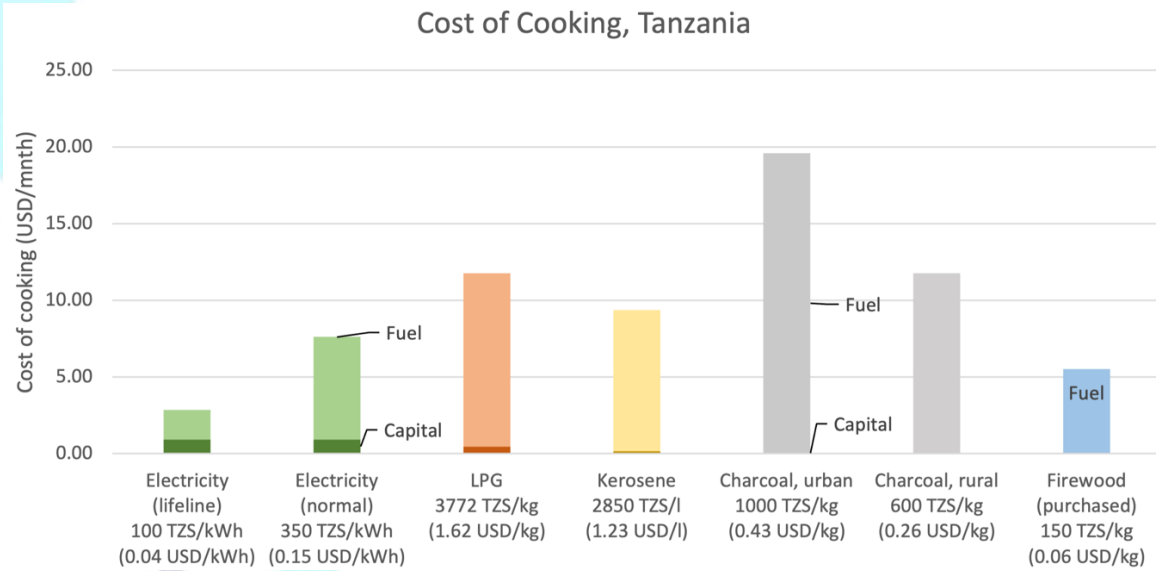
- 40% have access to electricity.
- 26% cook with charcoal, and a further 64% cook with wood, such that 90% cook with biomass fuels which are harmful to health and environmentally damaging.




Above: Electricity and clean cooking access. Right: Primary cooking fuel use. Both: Tanzania eCooking Market Assessment

## Potential for eCooking




Cost of cooking over a month, using international averages for cooking energy demand from ESMAP (2020)[1] and local electricity/fuel prices from price surveys conducted in April 2022, and including cost of appliance levelized over stove lifetime (electrical appliance: EPC).

- **It is cheaper to cook with Electric Pressure Cookers**: 5 times cheaper to cook beans on an EPC compared to charcoal, 4 times cheaper compared to LPG[2].

[1] Energy Sector Management Assistance Program. 2020. Cooking with Electricity: A Cost Perspective. World Bank, Washington, DC. © World Bank. License: CC BY 3.0 IGO.
[2] TaTEDO, 2020, Tanzania eCookbook.

- **32% of people are connected to electricity and not cooking with it** – urban centres can be easily targeted where people have electricity access, it is reliable enough to cook with most of the time, but most people are cooking with expensive charcoal (75% charcoal is used in urban centres[3]).
- 92% of Tanzanian dishes can be cooked on electric pressure cookers according to the eCookbook.
- There is a large expansion in electricity generation coming on board – 2115 MW over the next few years will create generation surplus, and demand stimulation is a government priority.
- Clean cooking is a government priority with eCooking part of that future, and TANESCO have received a directive to promote eCooking.

## MECS programme activity

- Working with TaTEDO since 2018 to do the feasibility research for eCook, finding eCooking is affordable, convenient, compatible with the menu.
- Working with TaTEDO and SESCOM to develop a thriving market for eCooking, put in after sales repair and maintenance services, support service centres, raise awareness, reduce taxes, and explore institutional eCook.
- Discussions with TANESCO to explore and promote eCooking.
- Collaboration with FCDO Dar es Salaam on topics of institutional eCooking and household eCooking.

This material has been funded by UKAid from the UK government; however the views expressed do not necessarily reflect the UK government's official policies.

[3] Biomass Energy Strategy Tanzania, 2014.

# Tanzania: Socio-economic and environmental costs and benefits

Using the World Health Organisation's (WHO's) revised "Benefits of Action to Reduce Household Air Pollution" (BAR-HAP) tool, we **quantify the expected economic, social and environmental benefits of a simple scenario of uptake at scale of electric cooking for Tanzania**. The scenario represents a programme of eCook stove investment, with the capital costs paid by the programme (donor, investor or government funded) and households making savings in fuel costs and avoidance of buying replacement traditional stoves. In addition, the wider set of economic, social and environmental impacts can be calculated, and the sum of all costs and benefits, which is the overall 'social net-benefit' of this transition for Tanzania.

Scenario modelled: 40% of households connected to the grid in Tanzania in 2020 but using charcoal as their primary cooking fuel transition to using an EPC by 2030.

**The overall result is a very large economic benefit of the eCooking transition, with benefits shared between households and the wider society or country.**

Details of the scenario assumptions and discussion of results are in the MECS Tanzania eCook market assessment. (Note some results are a little different here, due to changes in assumption since the market assessment).

*Table. (A) households transitioning in the scenario; (B) Net social benefit of the transition per year; (C) financial costs of equipment, fuel and programme admin; (D) social and environmental benefits (in both physical units and then monetised)*

| **(A) Grid connections projections and eCook target** | Population (million) | Housholds (million) | |
|---|---|---|---|
| National population, 2020 | 59.40 | 12.24 | |
| Grid connections, 2020 | 21.30 | 4.39 | |
| Of which, using charcoal as main fuel | 14.98 | 3.09 | |
| Transition from charcoal to eCooking | 5.99 | 1.24 | |
| **(costs are -ve, benefits are +ve)** | | | **Monetised Costs & benefits, $/yr** |
| **(B) Total present value (ie net social benefits of the transition)** | | | **178,313,958** |
| **(C) Total costs of transition, programme + household** | | | **108,852,353** |
| **Private cost to housholds: total** | | | **130,908,865** |
| *Stove* | | | *552,500* |
| *Fuel* | | | *132,366,417* |
| *Maintenance* | | | *-2,010,052* |
| **Costs to programme: total** | | | **-22,056,512** |
| *Stove* | | | *-18,992,190* |
| *Fuel* | | | *0* |
| *Admin* | | | *-3,064,322* |
| **(D) Health, Time, and Environmental Benefits: total** | | **Physical: change/yr** | **69,461,605** |
| **Health impacts total: DALYs avoided** | ***Disability-adjusted Life Years (DALYS)*** | **2,691** | **33,022,755** |
| *Mortality reduction* | *Years of life lost (YLL)* | *1,392* | *29,555,736* |
| *Mortality reduction* | *Lives* | *120* | |
| *Morbidity reduction* | *Years of healthy life lost (YLD)* | *1,300* | *3,467,019* |
| *Morbidity reduction* | *Cases* | *6,654* | |
| **Time savings in cooking** | **Hours** | **343,394,288** | **22,218,400** |
| *Time savings per adopting household* | *Hours/HH* | *276* | |
| **Electricity use, additional** | **MWh** | **425,174** | |
| **CO2-eq reduction** (CO2,CH4,N2O) | **Tonnes** | **1,065,855** | **13,467,234** |
| **Unsustainable wood harvest reduction** | **Tonnes** | **109,868** | **753,216** |

*Figure. Monetized costs and benefits from the table, and how these stack to a net social outcome over ten years.*

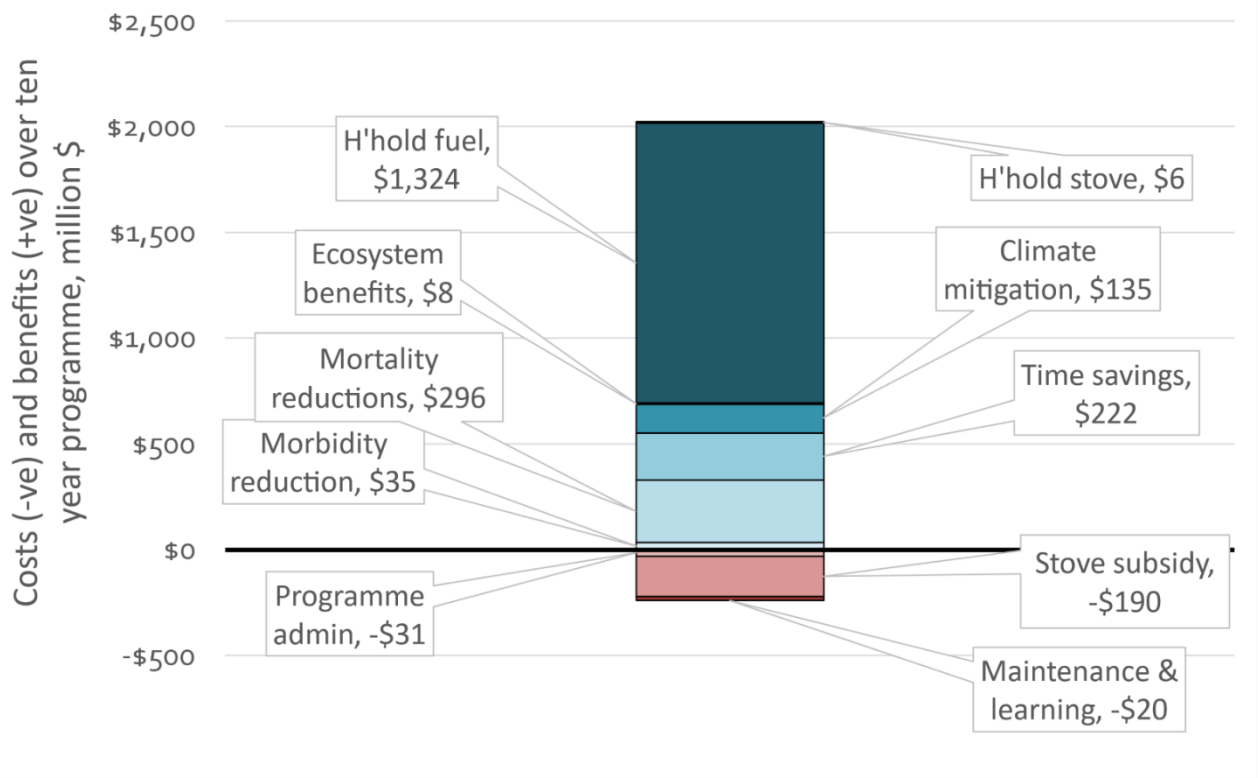



*Table. Explanation of the physical impacts and their monetisation*

| Costs and Benefits | Physical effects | Monetisation of benefits |
|---|---|---|
| Morbidity (ill-health) reduction | Morbidity reductions of: chronic obstructive pulmonary disease (COPD); acute lower respiratory infections (ALRI); ischemic heart disease (IHD); lung cancer (LC); stroke (x) | The 'Value of statistical life' puts a monetary benefit to a year of life. Time lags are added to account for the time to develop illness, and a social discount rate is applied so the present value of these future health benefits are discounted. "Spillover" health benefits are also added, reflecting the improvements in outdoor air quality |
| Mortality reductions | Mortality reductions of: COPD, ALRI, IHD, LC, x | Multiplied by value of statistical life, and adding time lags and adding spillover benefits, as for morbidity |
| Time savings | Change in time spent cooking | Valued at a fraction of the unskilled market wage, to reflect the lower opportunity cost for time spent cooking relative to work time |
| Climate mitigation | Change in Kyoto protocol greenhouse gases (i.e. CO2, CH4 and N2O) plus three additional pollutants (BC, OC and CO) | Valued using a social cost of carbon |
| Ecosystem benefits | Change in unsustainably harvested firewood | Cost of timber farming multiplied by change in renewably harvested biomass |
| Household fuel | Electricity use and traditional fuel displaced | Fuel and electricity prices |
| Household stove | Avoided traditional stove replacements | Cost of traditional stove which is saved |
| Programme admin | Programme planning & implementation effort | Using local wage rates |
| Stove subsidy | eCook equipment required | Price of eCook stove |
| Maintenance & learning | eCook appliance maintenance + time for householders to learn eCooking | Maintenance costed using local wage rates; learning time costed using a fraction of the unskilled market wage |