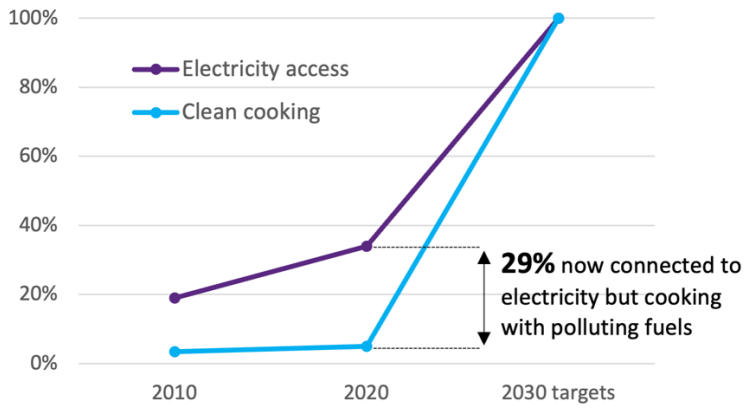
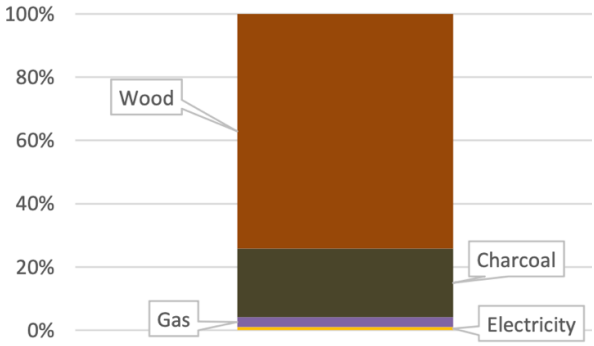
# Modern Energy Cooking Brief: Mozambique

## Current Situation: Electricity Access, Clean Cooking

- 34% have access to electricity[1].
- 22% cook with commercialized polluting cooking fuels (charcoal); and 95% cook with polluting cooking fuels.

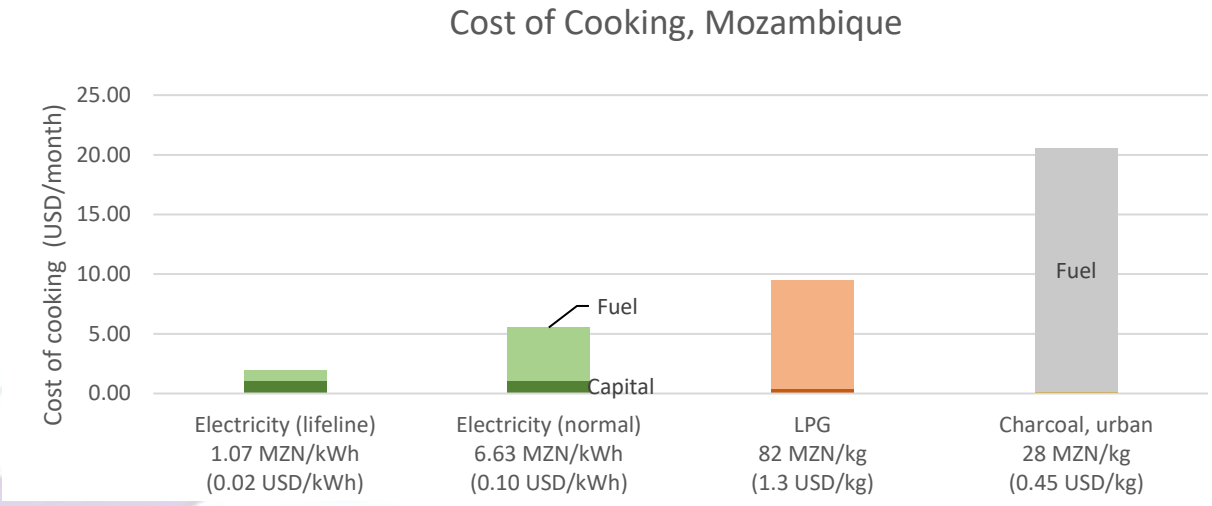



Above left: Electricity and clean cooking access, from Briefing: Renewables in Mozambique 2021, ALER & AMER, World Bank WDI, government targets. Above right: Primary cooking fuel use, from Mozambique eCooking Market Assessment

## Potential for eCooking

- **34% of people are connected to electricity and not cooking with it** – current eCooking population (1.4%) is concentrated in urban areas, where 73% of the urban population are now connected to electricity but only 17% cook using it.[2]
- Electricity is low cost – **cooking with electricity is already the cheapest way to cook** your food in Mozambique. This is true both on the regular tariff ($0.10/kWh) and the lifeline tariff ($0.02/kWh if under 100 kWh/month).




[1] Briefing: Renewables in Mozambique 2021, ALER & AMER
[2] Mozambique, Energy and the Poor. UNDP, 2020.

Cost of cooking over a month, using international averages for cooking energy demand from ESMAP (2020)[3] and local electricity/fuel prices from the Mozambique eCooking Market Assessment (referencing prices in 2018), and including cost of appliance levelized over stove lifetime. Appliance costs estimated using data from surrounding countries, with the electric appliance being an EPC.

- Mini-grids are obliged to charge the same as the national grid, making **eCooking on minigrids very affordable.**
- Over 95% of the menu can be cooked on EPCs according to MECS analysis.
- Electricity access has doubled in the past decade (2009–2019), testament to the Government's commitment to accelerate electricity access.
- 80% of electricity is generated from renewables – so eCooking is cooking with mostly renewable energy[4].
- A strong and ambitious target/commitment by the Government of Mozambique (GoM) to accelerate universal energy access by 2030, as expressed in the 2018 national programme 'Energia Para Todos'. Current policy framework is supportive of electrification, but not clean cooking.
- Mozambique was one of seven new countries to sign up to the African Markets Carbon Initiative (AMCI) launched at COP27.

## MECS programme activity

- MECS and Energising Development Programme (EnDev) market assessments were completed in 2022 for Mozambique.
- MECS partner Nordic Environment Finance Corporation (NEFCO) may be undertaking a results based financing project.
- MECS partner GEAPP is supporting initiatives in Mozambique in response to the AMCI commitments made at COP27.

## Mozambique: 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 Mozambique**. The scenario represents a programme of eCook stove investment, with the capital costs paid by the programme (donor, investor or government funded) and housholds 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 Mozambique.

Scenario modelled: all households connected to the grid in Mozambique 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 Mozambique eCook market assessment. (Note some results are a little different here, due to changes in assumption since the market assessment).

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] Energy Sector Management Assistance Program. 2020. Cooking with Electricity: A Cost Perspective. World Bank, Washington, DC. © World Bank. License: CC BY 3.0 IGO.
[4] Briefing: Renewables in Mozambique 2021, ALER & AMER

*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 | 30.80 | 7.05 | |
| Grid connections, 2020 | 9.70 | 2.22 | |
| Of which, using firewood as main fuel (assume paid for) | 4.27 | 1.00 | |
| Transition from firewood to eCooking | 1.71 | 0.40 | |
| **(costs are -ve, benefits are +ve)** | | | **Monetised Costs & benefits, $/yr** |
| **(B) Total present value (ie net social benefits of the transition)** | | | **84,282,884** |
| **(C) Total costs of transition, programme + household** | | | **53,754,516** |
| **Private cost to housholds: total** | | | **59,274,216** |
| *Stove* | | | *162,581* |
| *Fuel* | | | *59,703,120* |
| *Maintenance* | | | *-591,486* |
| **Costs to programme: total** | | | **-5,519,700** |
| *Stove* | | | *-4,064,520* |
| *Fuel* | | | *0* |
| *Admin* | | | *-1,455,180* |
| **(D) Health, Time, and Environmental Benefits: total** | | **Physical: change/yr** | **30,528,368** |
| **Health impacts total: DALYs avoided** | ***Disability-adjusted Life Years (DALYS)*** | **1,412** | **5,745,797** |
| *Mortality reduction* | *Years of life lost (YLL)* | *968* | *4,099,250* |
| *Mortality reduction* | *Lives* | *86* | |
| *Morbidity reduction* | *Years of healthy life lost (YLD)* | *444* | *1,646,547* |
| *Morbidity reduction* | *Cases* | *2,185* | |
| **Time savings in cooking** | **Hours** | **83,619,739** | **17,205,482** |
| *Time savings per adopting household* | *Hours/HH* | *207* | |
| **Electricity use, additional** | **MWh** | **184,052** | |
| **CO2-eq reduction** (CO2,CH4,N2O) | **Tonnes** | **460,484** | **7,030,984** |
| **Unsustainable wood harvest reduction** | **Tonnes** | **65,918** | **546,105** |

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

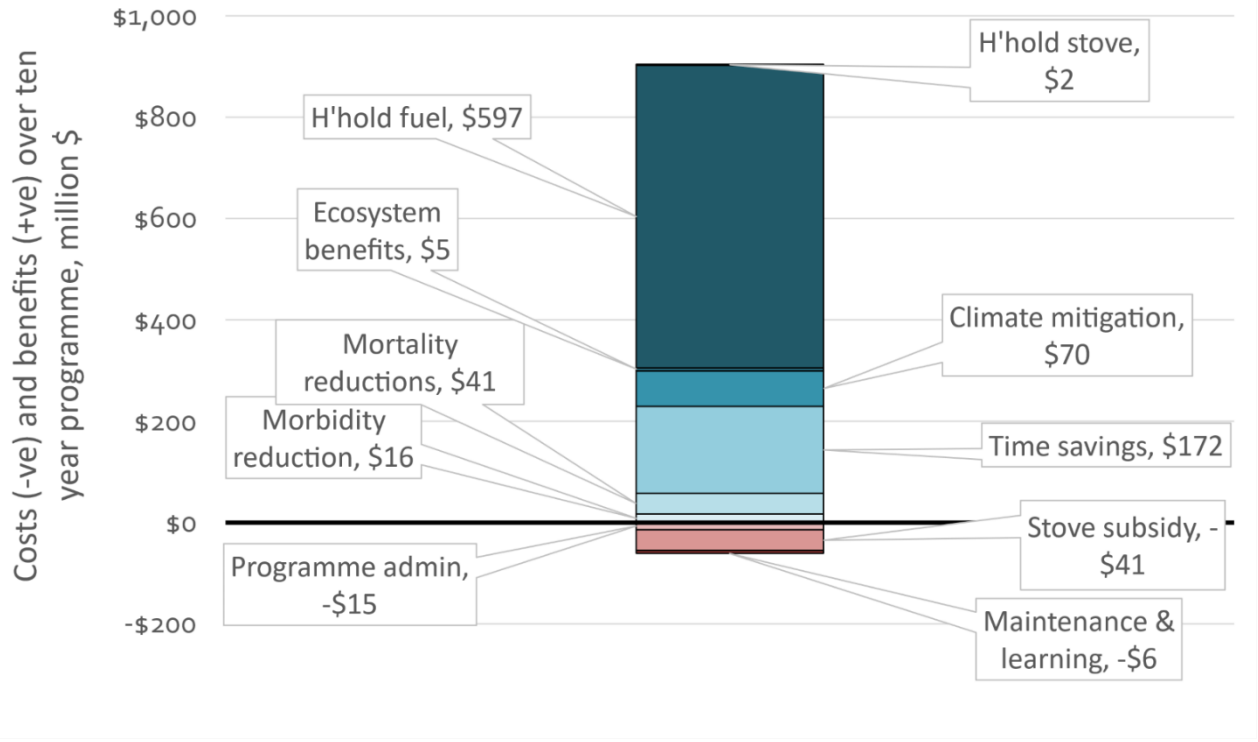



*Table. Explanation of the physical impacts and their monetisation*

| 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 |