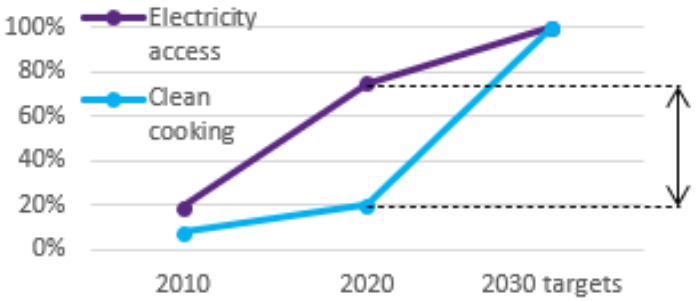
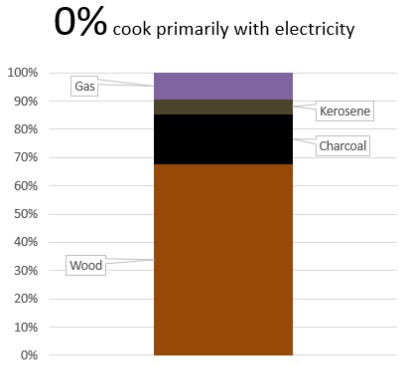
# Modern Energy Cooking Brief: Kenya

## Current Situation: Electricity Access, Clean Cooking

- 75% have access to electricity.
- 22% cook with commercialized polluting cooking fuels (charcoal & kerosene); and 91% cook with polluting cooking fuels.



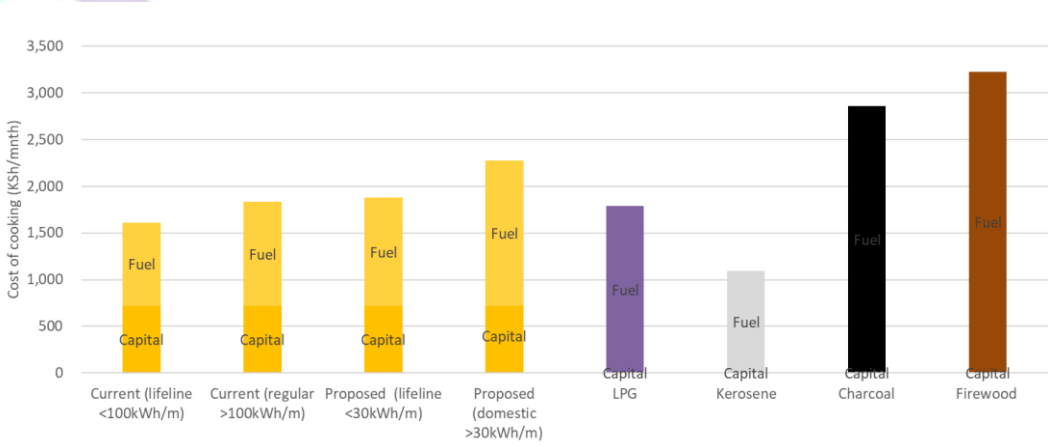

**55%** now connected to electricity, but still primarily cooking with polluting fuels




Above: Electricity and clean cooking access
Right: Primary cooking fuel use
MECS & EnDev (2021) Kenya eCooking Market Assessment[1]

## Potential for eCooking

- **75% of people are connected to electricity and not cooking primarily with it** – urban centres can be easily targeted as supply chains are strongest and fuel prices are highest.
- **It is cheaper to cook with Electric Pressure Cookers (EPCs)**: 5x cheaper to cook beans on an EPC than charcoal, kerosene or LPG[2].




Cost of cooking over a month, using international averages for cooking energy demand from ESMAP (2020)[3]; current and proposed electricity tariffs[4] and fuel prices from price surveys conducted in Nairobi in March 2023, and including cost of appliance levelized over cooking device lifetime.

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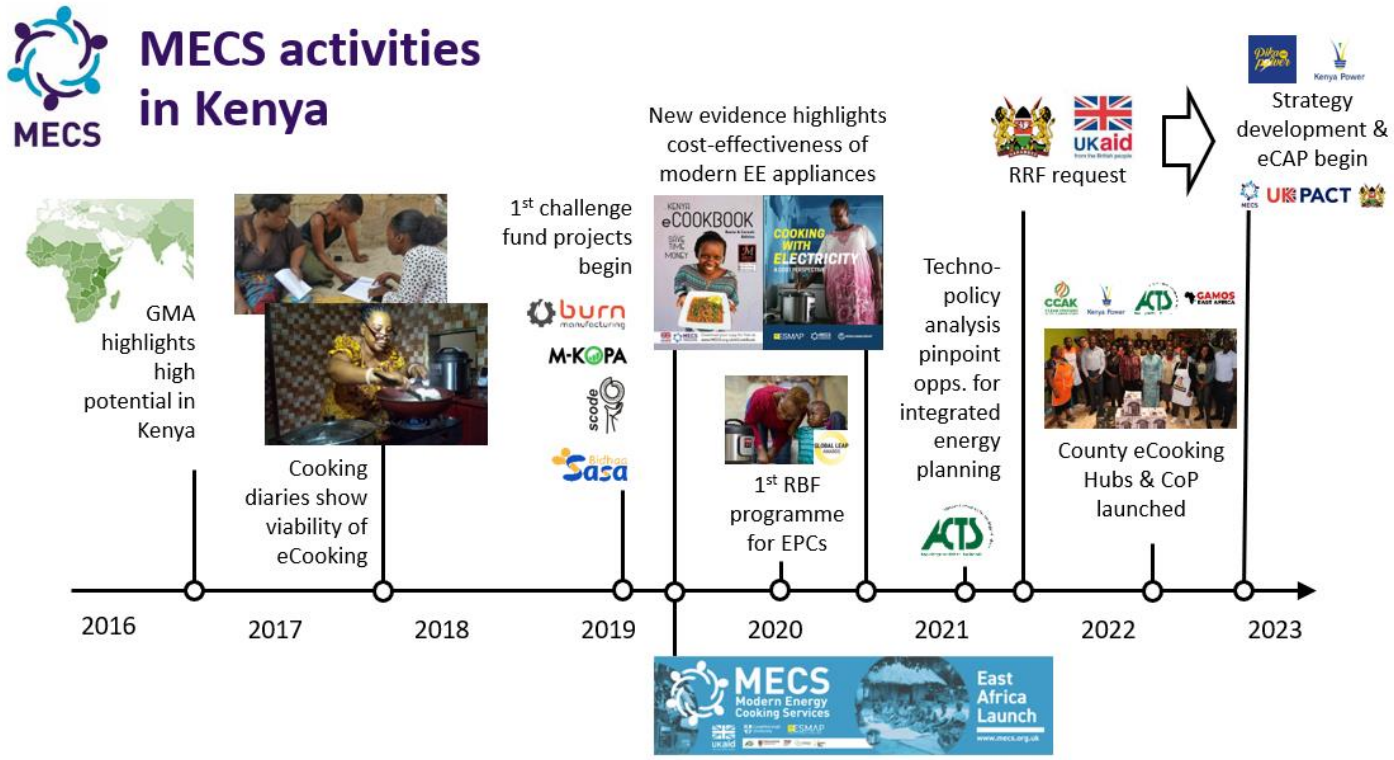
[1] MECS & EnDev (2021) https://mecs.org.uk/wp-content/uploads/2022/02/MECS-EnDev-Kenya-eCooking-Market-Assessment.pdf
[2] The Kenya eCookBook - https://mecs.org.uk/the-kenya-ecookbook/
[3] https://esmap.org/cooking_with_electricity_a_cost_perspective
[4] KPLC (2023) https://drive.google.com/file/d/1D2jPMz4ag0QDhaLSIfWe7pSScAWpnp9e/view

Loughborough University
ESMAP Energy Sector Management Assistance Program
UKaid from the British people

- Approximately 90% of a typical urban Kenyan menu can be cooked with EPCs[5].
- Kenya Power's Pika na Power programme has been promoting eCooking to stimulate demand for electricity since 2017.
- The Ministry of Energy & Petroleum are developing the continent's first eCooking Strategy to accelerate the electrification of cooking in Kenya as part of their goal of universal access to modern energy cooking by 2028.

**MECS programme activity**

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## Kenya: 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 Kenya**. 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 Kenya.

Scenario modelled: all households connected to the grid in Kenya in 2020 but using charcoal as their primary cooking fuel transition to using an Electric Pressure Cooker 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.**

[5] MECS & EnDev (2021) https://mecs.org.uk/wp-content/uploads/2022/02/MECS-EnDev-Kenya-eCooking-Market-Assessment.pdf

Details of the scenario assumptions and discussion of results are in the MECS Kenya 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 | 53.60 | 14.73 | |
| Grid connections, 2020 | 38.80 | 10.66 | |
| Of which, using charcoal as main fuel | 6.60 | 1.81 | |
| Transition from charcoal to eCooking | 2.64 | 0.73 | |
| **(costs are -ve, benefits are +ve)** | | | **Monetised Costs & benefits, $/yr** |
| **(B) Total present value (ie net social benefits of the transition)** | | | **109,017,098** |
| **(C) Total costs of transition, programme + household** | | | **53,864,254** |
| **Private cost to housholds: total** | | | **63,723,874** |
| *Stove* | | | *298,533* |
| *Fuel* | | | *64,511,435* |
| *Maintenance* | | | *-1,086,094* |
| **Costs to programme: total** | | | **-9,859,620** |
| *Stove* | | | *-7,463,329* |
| *Fuel* | | | *0* |
| *Admin* | | | *-2,396,291* |
| **(D) Health, Time, and Environmental Benefits: total** | | **Physical: change/yr** | **55,152,845** |
| **Health impacts total: DALYs avoided** | ***Disability-adjusted Life Years (DALYS)*** | **1,203** | **17,843,232** |
| *Mortality reduction* | *Years of life lost (YLL)* | *622* | *15,969,893* |
| *Mortality reduction* | *Lives* | *54* | |
| *Morbidity reduction* | *Years of healthy life lost (YLD)* | *581* | *1,873,339* |
| *Morbidity reduction* | *Cases* | *2,975* | |
| **Time savings in cooking** | **Hours** | **153,543,744** | **12,005,300** |
| *Time savings per adopting household* | *Hours/HH* | *207* | |
| **Electricity use, additional** | **MWh** | **337,959** | |
| **CO2-eq reduction** (CO2,CH4,N2O) | **Tonnes** | **1,502,934** | **22,947,813** |
| **Unsustainable wood harvest reduction** | **Tonnes** | **284,444** | **2,356,500** |

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

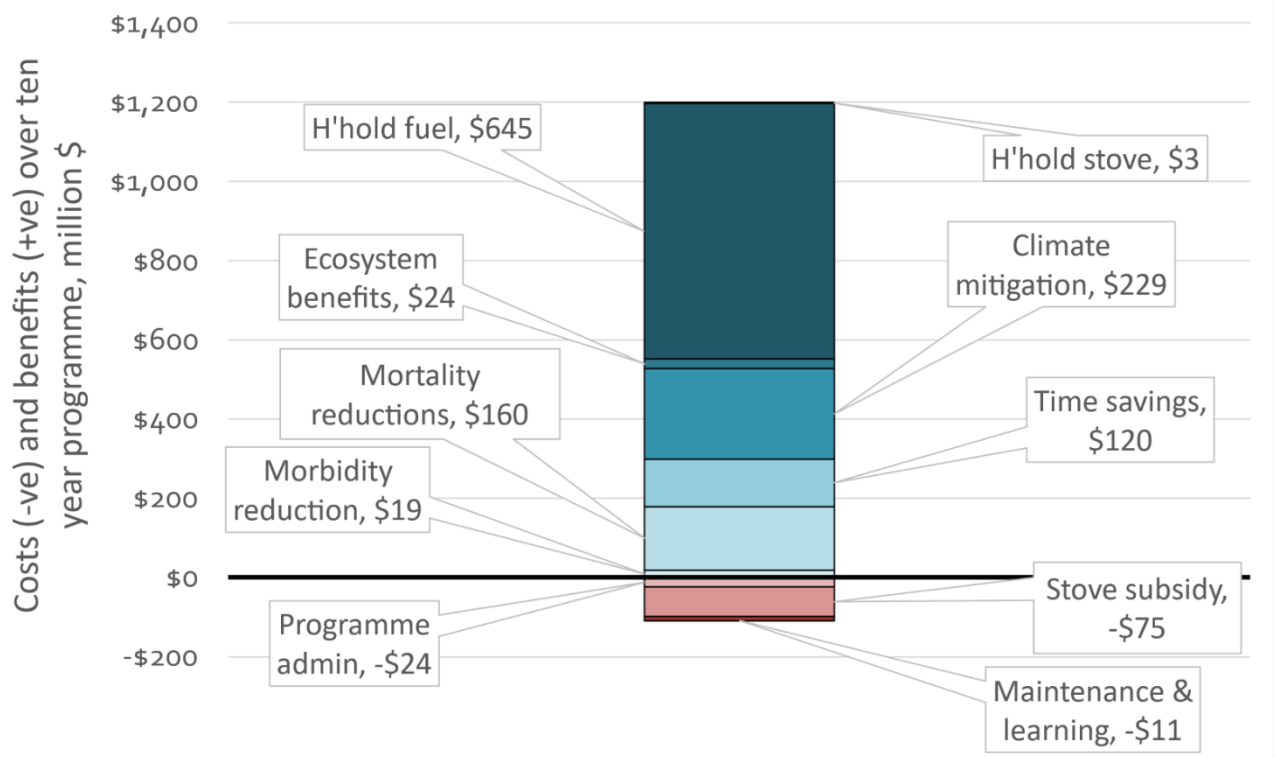


*Table. Explanation of the physical impacts and their monetisation*

| **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 |