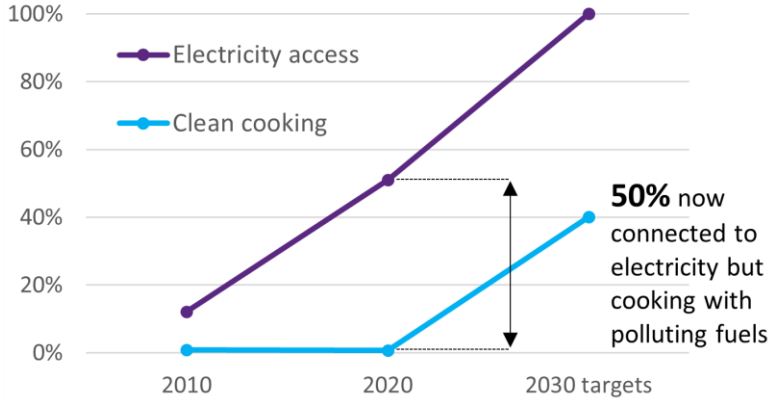
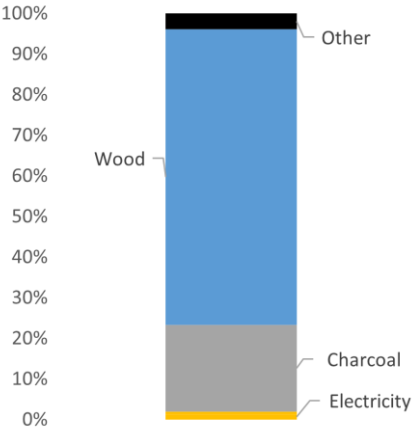
Modern Energy Cooking Brief: Uganda

Current Situation: Electricity Access, Clean Cooking

- 51% have access to electricity.
- 26% cook with commercialized polluting cooking fuels (charcoal); and 99% cook with polluting cooking fuels.

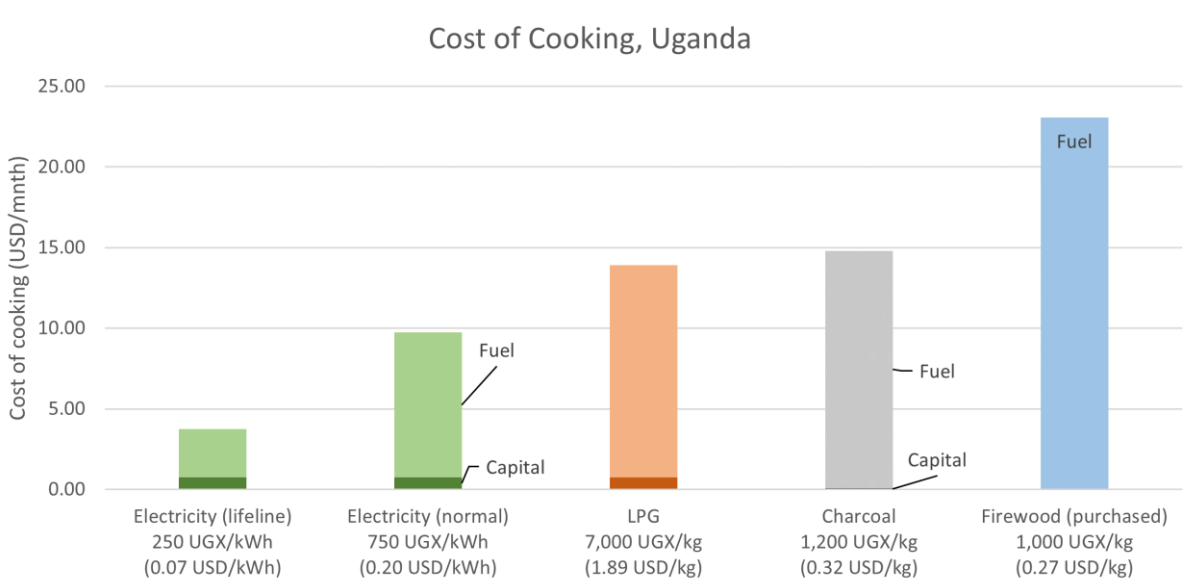




Above: Electricity and clean cooking access, Uganda eCooking Market Assessment
Right: Primary cooking fuel use, Uganda National Household Survey 19/20

Potential for eCooking

- **50% of people are connected to electricity and not cooking with it** – urban centres can be easily targeted. In urban areas, 4% of households use electricity as their primary cooking fuel, yet 74% of have access to electricity.
- **It is cheaper to cook with Electric Pressure Cookers**: 50% cheaper to cook beans in an EPC compared to charcoal, and up to 10 times cheaper compared to LPG[1].



Cost of cooking over a month, using international averages for cooking energy demand from ESMAP (2020)[1] and local electricity/fuel prices from the Uganda eCooking Market Assessment, and including cost of appliance (electrical appliance: EPC) levelized over stove lifetime.

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.

Loughborough University
ESMAP Energy Sector Management Assistance Program
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- 82% of the menu can be cooked on EPCs[2].
- **Ugandan's can cook with renewable energy** by eCooking: 92% of the on-grid generation mix is renewable energy.
- There is already a significant **generation surplus of electricity** (532MW in 2020[3]). More generation is coming on board – the Karuma (600MW) and Achwa (49MW) dams are expected to take total capacity to over 2,000 MW this year. Demand stimulation using eCook is a priority for the electricity sector and government, to achieve a financially sustainable sector.
- The government are working on a **National eCooking Strategy**.

MECS programme activity

- Working with CREEC since 2018 to do the feasibility research for eCook, finding eCooking is affordable, convenient, compatible with the menu.
- Collaboration with Umeme to enable the utility to become a successful distributor of eCooking devices, moving towards integrating eCooking into modern energy planning and enabling utility-led financing for eCooking.
- Working with MEMD to reduce taxes and develop a national eCooking strategy through CIRCODU.
- Working with UNACC to raise awareness of eCooking through cooking exhibitions.

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.

[2] Uganda eCookbook
[3] ERA, Annual Report FY 2020-21.

Uganda: 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 Uganda**. 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 Uganda.

Scenario modelled: all households connected to the grid in Uganda 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 Uganda 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	45.50	10.03	
Grid connections, 2020	19.50	4.30	
Of which, using charcoal as main fuel	19.50	4.30	
Transition from charcoal to eCooking	7.80	1.72	
(costs are -ve, benefits are +ve)			**Monetised Costs & benefits, $/yr**
(B) Total present value (ie net social benefits of the transition)			**217,542,600**
(C) Total costs of transition, programme + household			**-12,753,829**
Private cost to housholds: total			**8,998,846**
Stove			*705,303*
Fuel			*10,859,509*
Maintenance			*-2,565,966*
Costs to programme: total			**-21,752,675**
Stove			*-17,632,580*
Fuel			*0*
Admin			*-4,120,094*
(D) Health, Time, and Environmental Benefits: total		**Physical: change/yr**	**230,296,429**
Health impacts total: DALYs avoided	***Disability-adjusted Life Years (DALYS)***	**6,115**	**30,912,351**
Mortality reduction	*Years of life lost (YLL)*	*3,394*	*25,218,759*
Mortality reduction	*Lives*	*287*	
Morbidity reduction	*Years of healthy life lost (YLD)*	*2,721*	*5,693,592*
Morbidity reduction	*Cases*	*13,370*	
Time savings in cooking	**Hours**	**832,965,991**	**114,831,255**
Time savings per adopting household	*Hours/HH*	*475*	
Electricity use, additional	**MWh**	**1,228,382**	
CO2-eq reduction (CO2,CH4,N2O)	**Tonnes**	**7,516,983**	**76,898,815**
Unsustainable wood harvest reduction	**Tonnes**	**1,378,933**	**7,654,008**

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

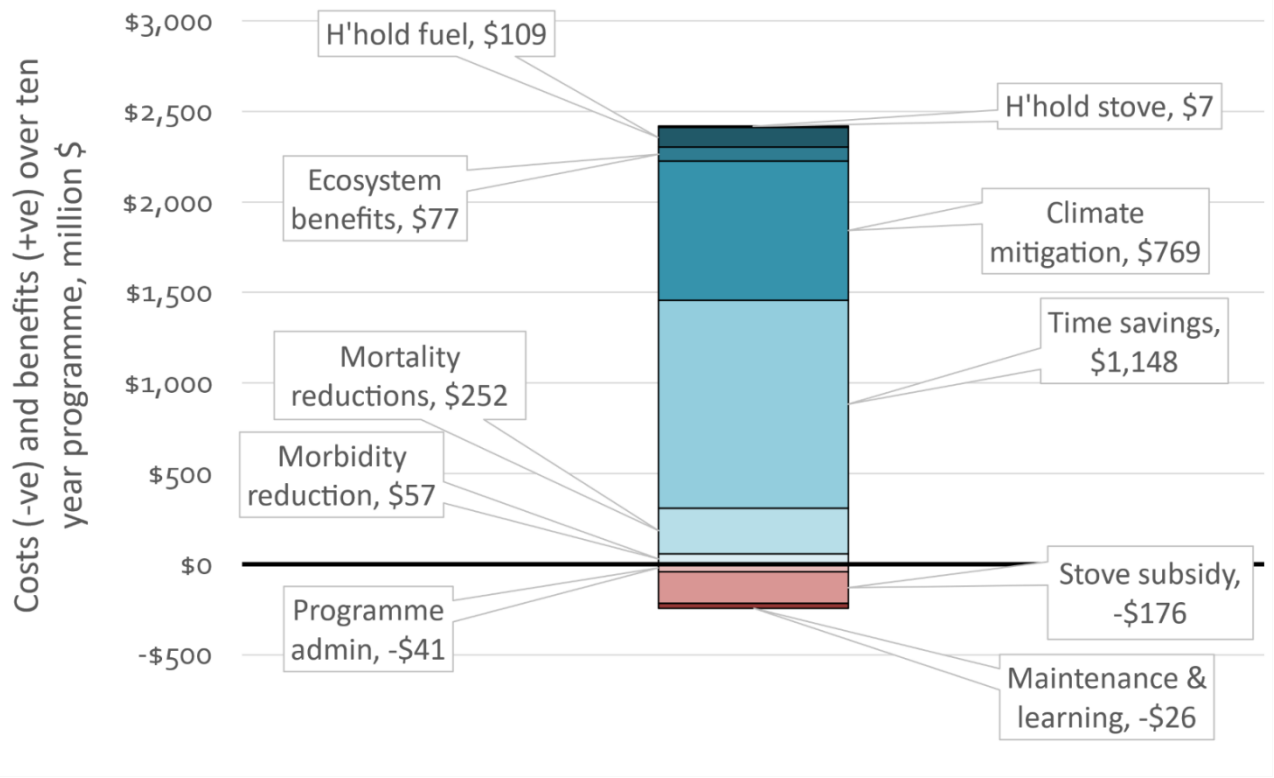

Table. Explanation of the physical impacts and their monetisation

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