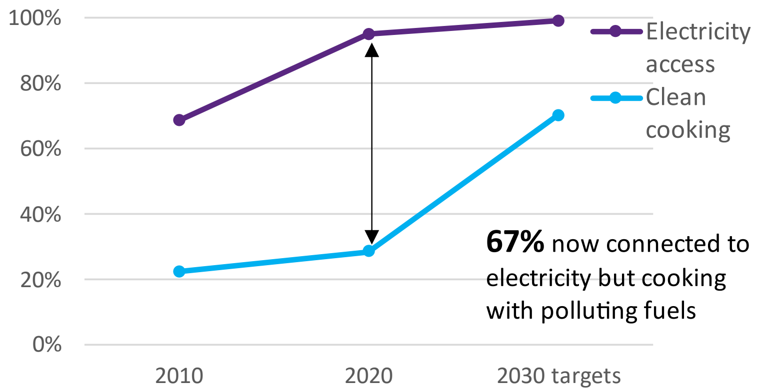
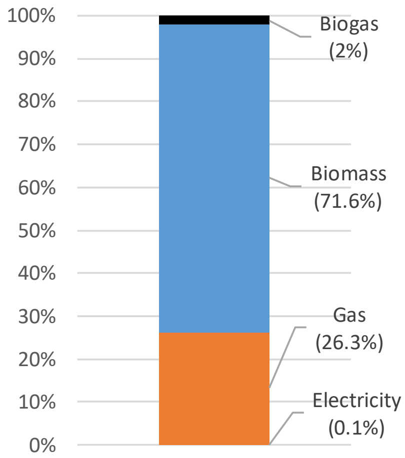
Modern Energy Cooking Brief: Nepal

Current Situation: Electricity Access, Clean Cooking

- 95% have access to electricity (of which 23% use off-grid solutions).
- 72% cook with polluting cooking fuels. 26% cook with increasingly expensive imported LPG.
- Huge scope for renewable energy powered eCooking as almost 100% of electricity generated in Nepal comes from hydropower.





Above: Electricity and clean cooking access: ESMAP (2019)[1]

Right: Primary cooking fuel use: ESMAP (2019)

Potential for eCooking

- **67% of people are connected to electricity and not cooking with it.** Urban areas have most potential: eCooking as a primary mode of cooking is feasible in many urban centres.
- **It is cheaper to cook with Electric Pressure Cookers**: 53% cheaper to cook rice, daal, and meat on an EPC compared to purchased firewood, 63% cheaper compared to LPG[2].

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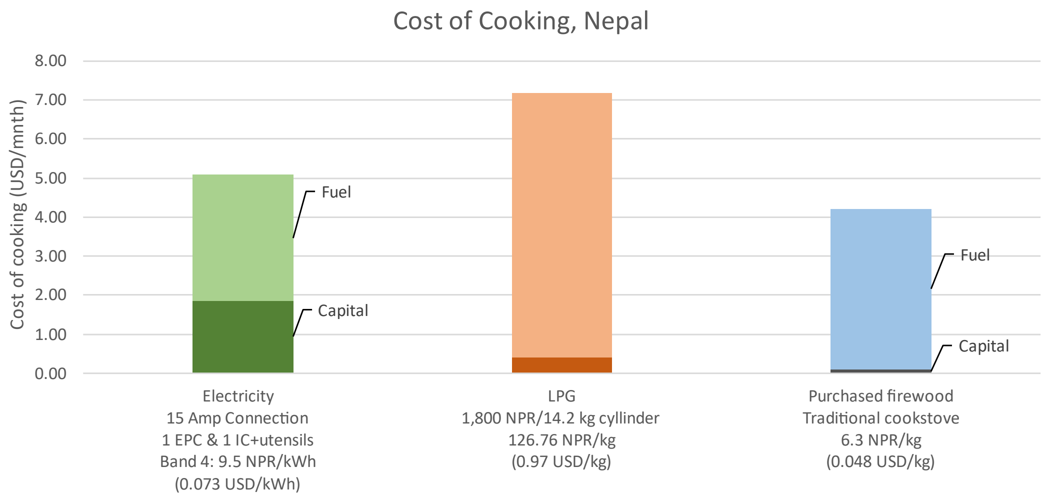
[1] Updated primary cooking fuel use data is forthcoming from the Central Bureau of Statistics (CBS) 'Census Nepal 2021'. eCooking use is likely increase: a [2021 GoN study](#) reports 6% of HHs using electricity as a primary cooking fuel.

[2] [MECS Nepal eCookbook (2022)](#) with [updated LPG data](#) to reflect 2022 price hikes.



Cost of cooking over a month, using international averages for cooking energy demand from ESMAP (2020) and a review of local electricity/fuel prices conducted in March 2023, including cost of appliance levelized over stove lifetime.

- 96% of the menu can be cooked on electricity[3]. The highly efficient EPC is well suited to Nepali staples such as rice and daal.
- eCooking is a key government priority. Nepal's 2020 Nationally Determined Contributions plan targets 25% of all households using electricity as their primary fuel for cooking by 2030.
- Huge expansion of domestic hydropower generation from current 2400 MW to targeted 5000 MW by 2024 and 15000 MW by 2030[4]. The Government of Nepal is heavily promoting eCooking to stimulate demand for the expected surplus capacity of renewable electricity.

MECS programme activity

- Collaborations with Integrated Research & Action for Development (IRADe), People, Energy & Environment Development Association (PEEDA), Practical Action Consulting, Practical Action Nepal, and Winrock International on the Electric Cooking Outreach (ECO) challenge fund, which found people from various cultural and socio-economic groups in both grid and off-grid locations were willing to use and pay for electric cooking on a sustained basis.
- Collaboration with PEEDA to support eCooking transitions on micro-hydropower mini-grids.
- Ongoing 'MECS Jigsaw' research to identify missing elements needed to enable eCooking scale up, which has highlighted opportunities for stakeholders (including MECS) to act.
- Currently working with ten organisations on 17 projects in Nepal across the following seven themes: eCooking supply chains; eCooking on mini-grids; eCooking appliance repair and end of life, enterprise level eCooking, eCooking appliance subsidy impact analysis; implications of 100% eCooking; and ECO follow up studies.

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[3] MECS & EnDev (2022) Nepal Market Assessment
[4] Ministry of Energy, Water Resources & Irrigation (2018) Current Status and the Roadmap for the Future (White Paper), MyRepublica (2023)

Nepal: 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 Nepal**. 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 Nepal.
Scenario modelled: all households connected to the grid in Nepal 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 Nepal 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	28.61	6.75	
Grid connections, 2020	5.08	1.20	
Of which, using firewood as main fuel (assume paid for)	2.79	0.66	
Transition from firewood to eCooking	2.79	0.66	
(costs are -ve, benefits are +ve)			**Monetised Costs & benefits, $/yr**
(B) Total present value (ie net social benefits of the transition)			**237,815,441**
(C) Total costs of transition, programme + household			**75,941,835**
Private cost to housholds: total			**85,235,381**
Stove			*0*
Fuel			*86,190,694*
Maintenance			*-955,313*
Costs to programme: total			**-9,293,546**
Stove			*-6,564,637*
Fuel			*0*
Admin			*-2,728,908*
(D) Health, Time, and Environmental Benefits: total		**Physical: change/yr**	**161,873,606**
Health impacts total: DALYs avoided	***Disability-adjusted Life Years (DALYS)***	**11,881**	**81,432,209**
Mortality reduction	*Years of life lost (YLL)*	*7,776*	*78,995,567*
Mortality reduction	*Lives*	*772*	
Morbidity reduction	*Years of healthy life lost (YLD)*	*4,105*	*2,436,642*
Morbidity reduction	*Cases*	*22,258*	
Time savings in cooking	**Hours**	**228,978,451**	**50,573,825**
Time savings per adopting household	*Hours/HH*	*350*	
Electricity use, additional	**MWh**	**457,329**	
CO2-eq reduction (CO2,CH4,N2O)	**Tonnes**	**1,493,733**	**22,807,319**
Unsustainable wood harvest reduction	**Tonnes**	**852,215**	**7,060,253**

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

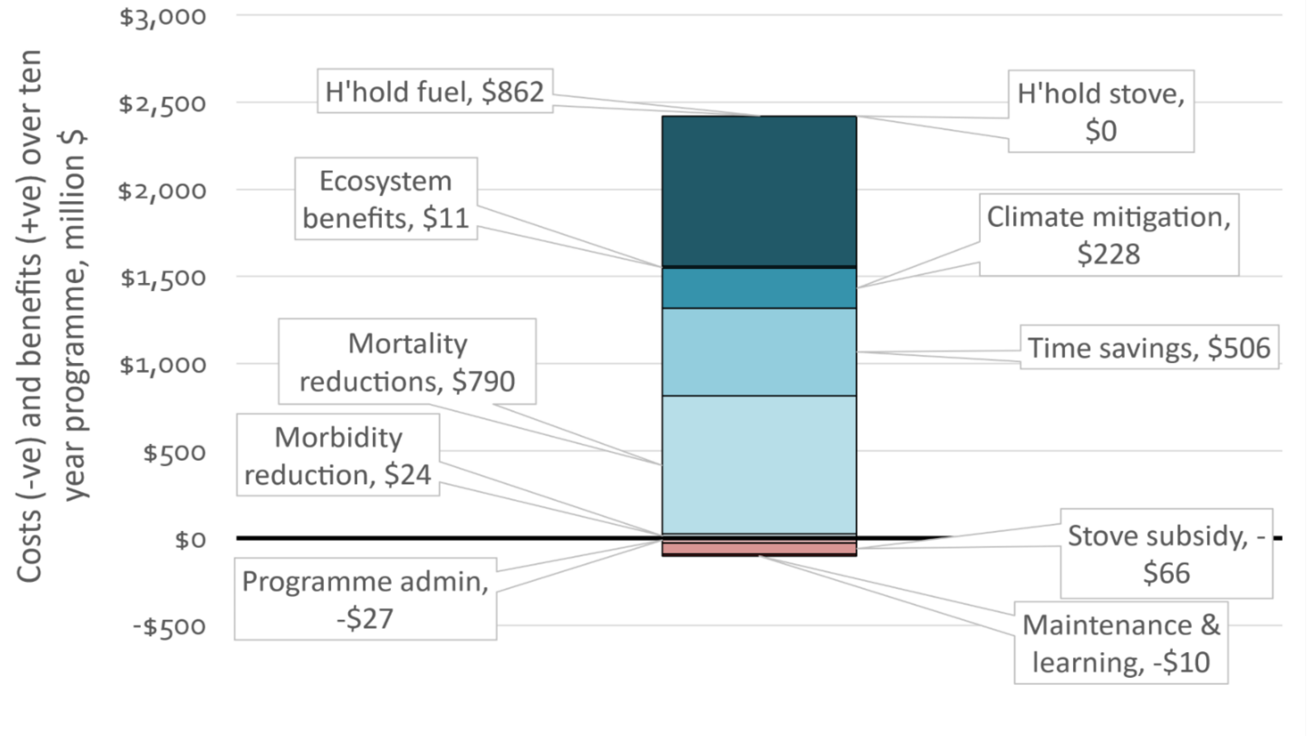

Table. Explanation of the physical impacts and their monetisation

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