



# Findings from the MECS Research: an In-depth Exploration of the Implications of Households Cooking Entirely with Electricity

**MECS Nepal 2023 Dissemination Event**

**Friday 7<sup>th</sup> April 2023, Kathmandu**





# MECS Project Partners

- i. Ajummary Bikas Foundation (ABF)
- ii. Kathmandu Alternative Power and Energy Group (KAPEG)
- iii. National Mini/Micro Hydropower Users Society Nepal (NAMHUS)
- iv. People, Energy and Environment Development Association (PEEDA)
- v. Women Awareness Centre Nepal (WACN)

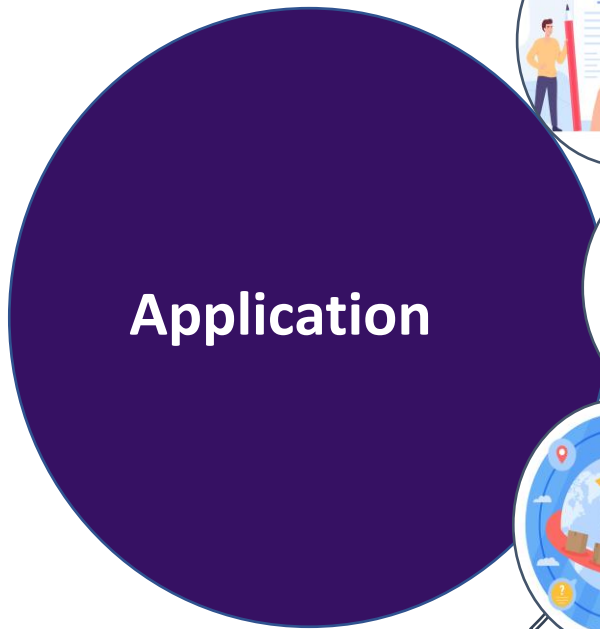




# In-depth Exploration of the Implications of Households Cooking Entirely with Electricity

## Aims and Objectives

To gain an understanding of the energy implications at the household level of cooking entirely with electricity.



Supporting policy making



Evidence of energy use for carbon credit market

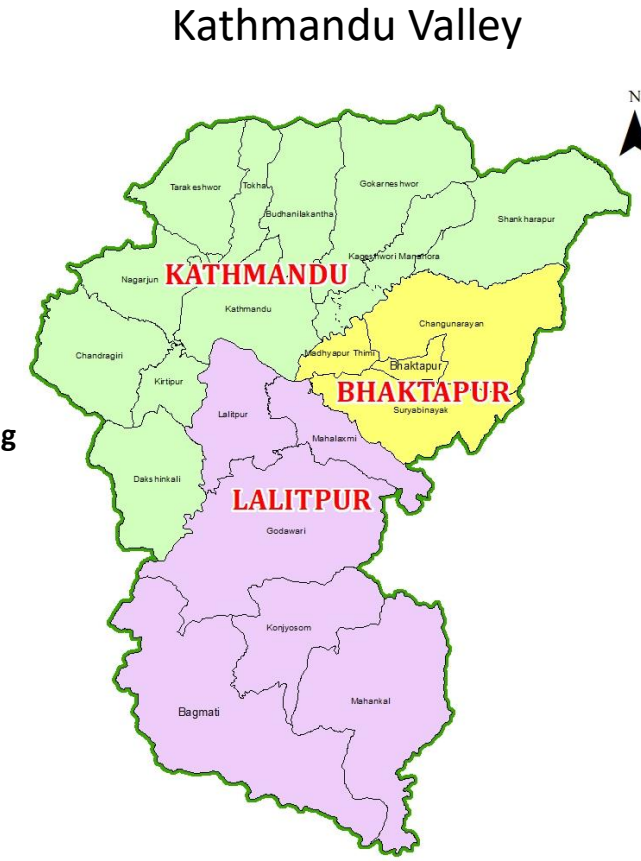
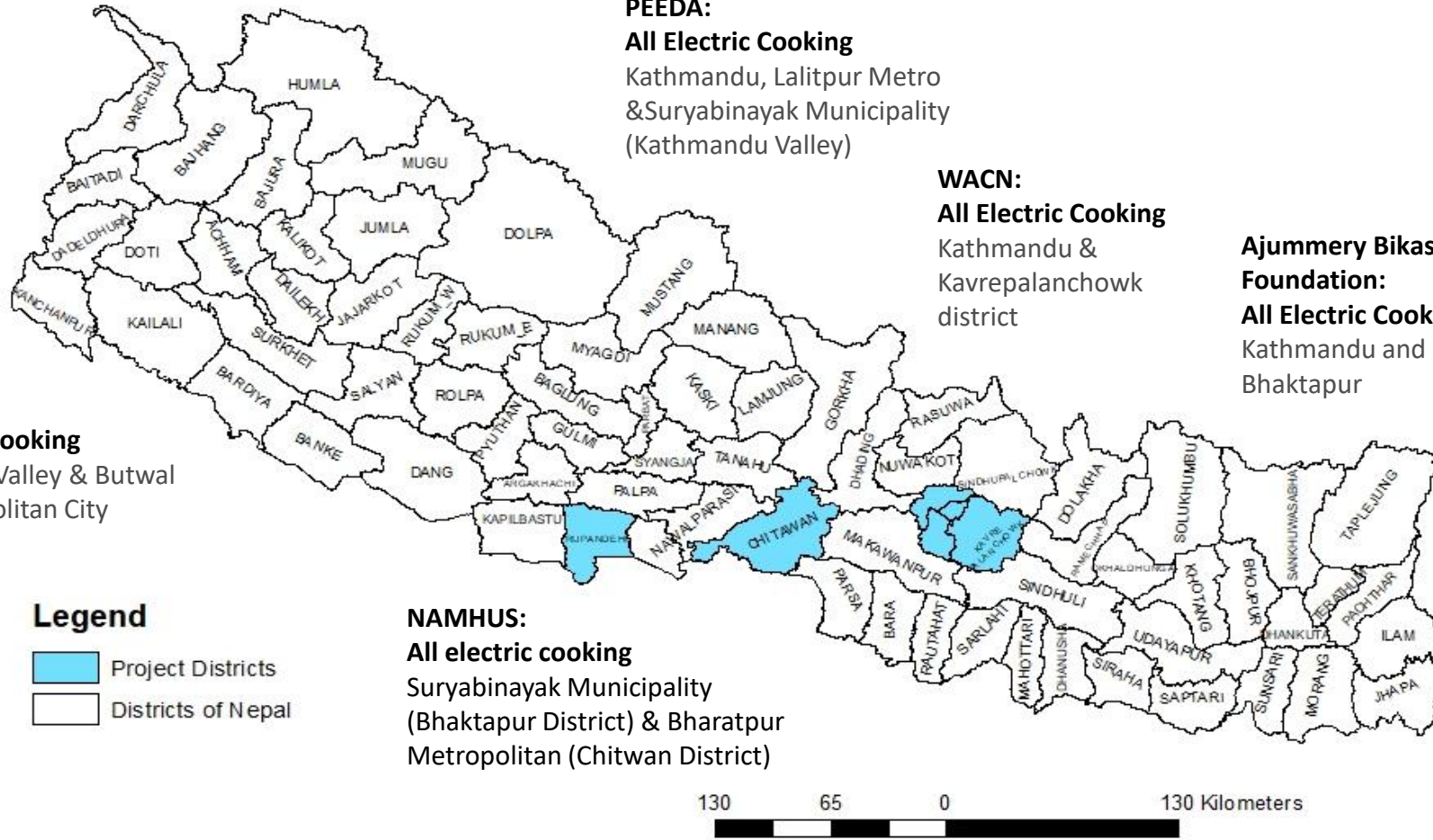


Device supply chain: supporting manufacturers to understand the appliances consumer want



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# Project locations





# Research methods used

## Household Selection

- Average family size 4.2
- High, medium and low-income
- Willingness to co-operate
- Registration Survey

## Market assessment

- Exploration of electric stoves available



## Cooking Diaries

- Baseline Phase: Participant cooked as normal
- Transition Phase: Participant cooked much possible with electricity
- Exit Survey



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# Why use this research approach?

## Cooking behaviors

- Number of dishes and meals
- Stoves and utensils preferences
- Duration of cooking

## Energy

- Electricity consumption
- Traditional energy saved while transition

## Cost of cooking

- Actual cost of cooking with different fuels
- Money saving after transition

## Users experience

- Electrical devices preferences
- Adaptation capacities

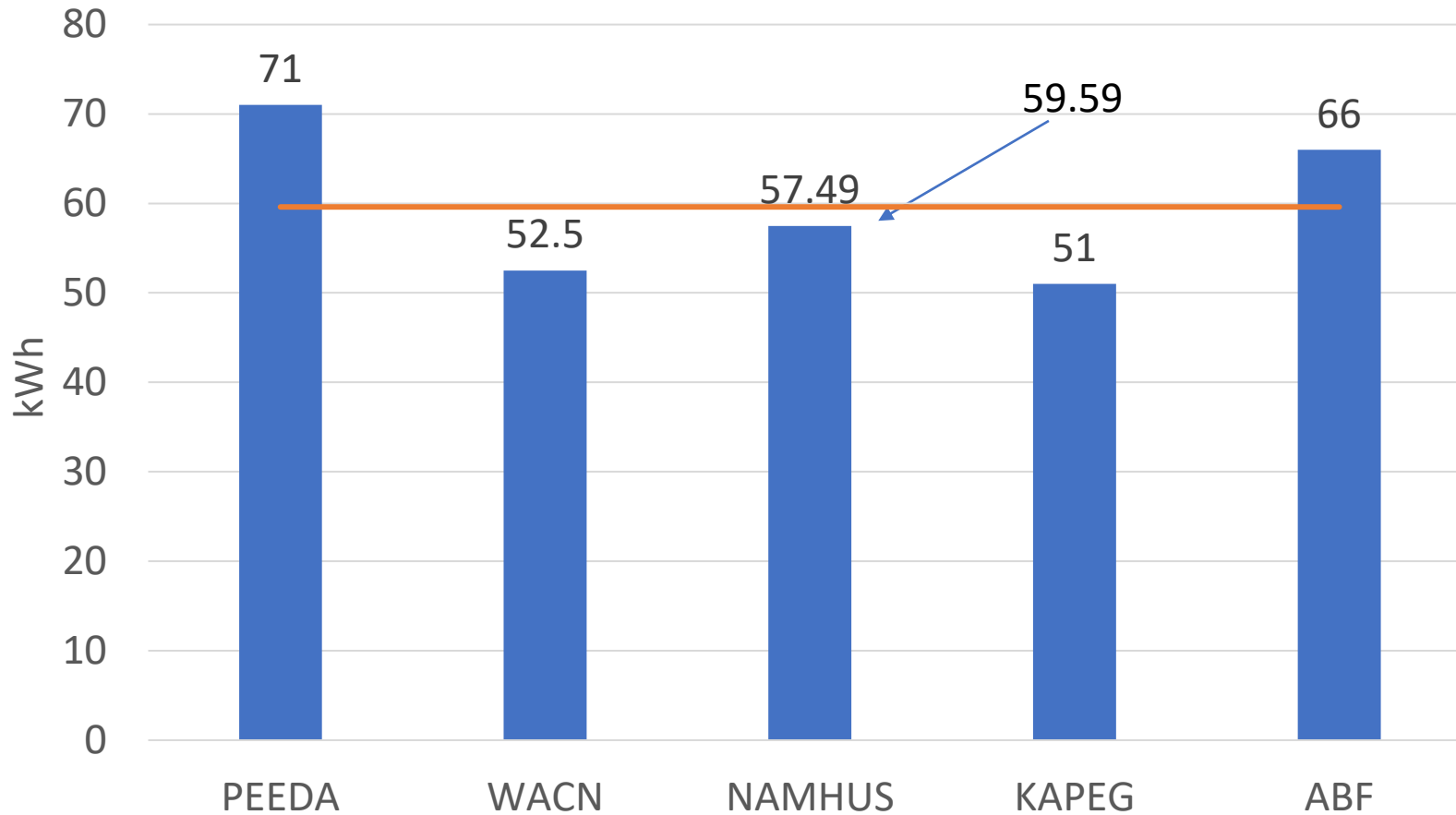
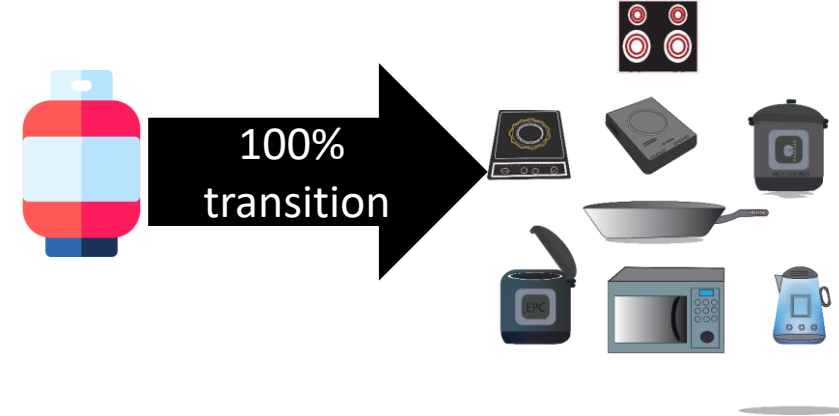


## Key research findings from the Five MECS Nepal Research Consultancies



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# 1. How much energy is required to cook entirely with electricity?



Across the five projects in urban cities, an average of 59.59 kWh per household per month was required to cook entirely with electricity.

Average Electricity Consumption per HH per month

Grand Average



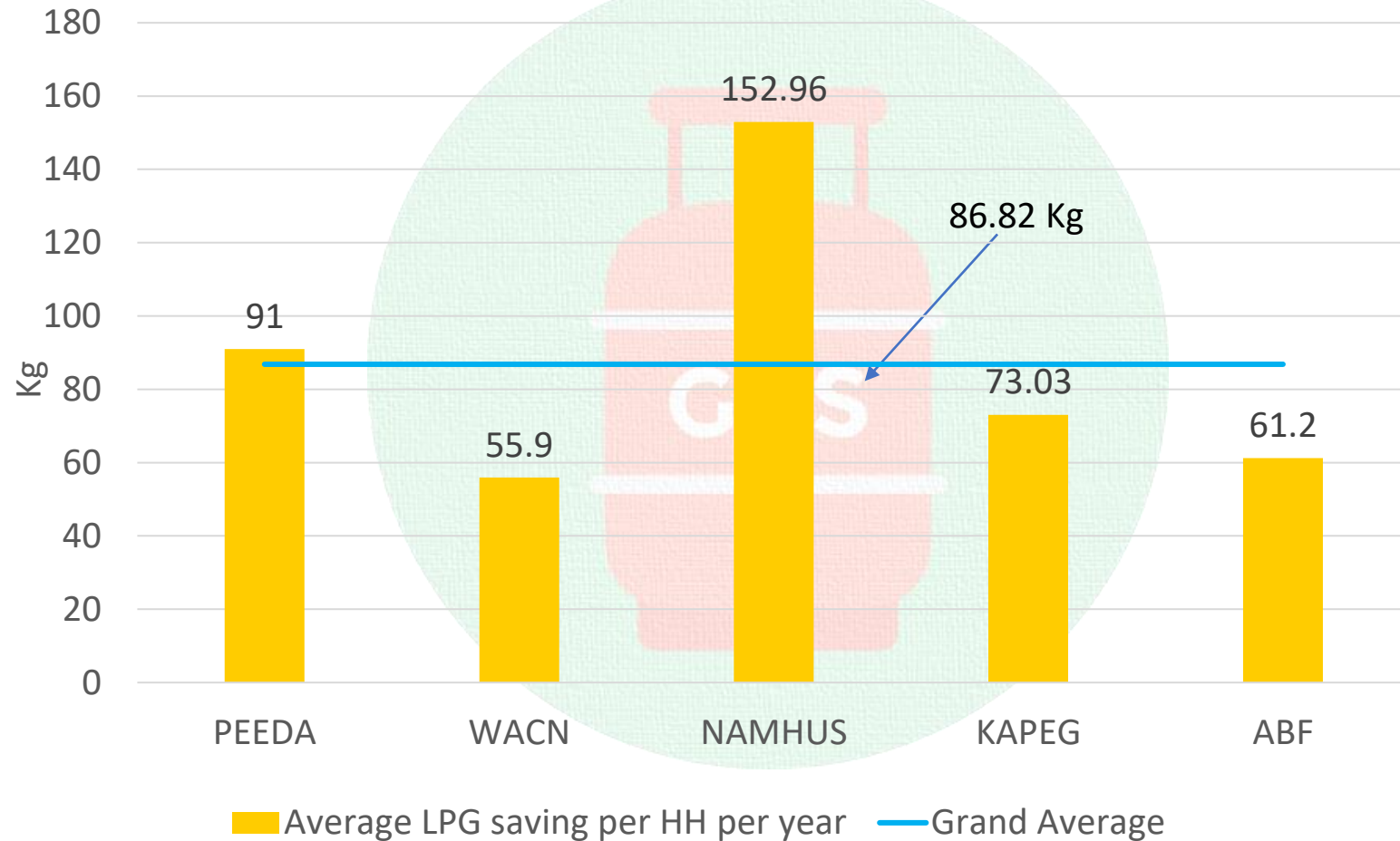




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## 2. How much traditional energy can be saved by transitioning to cooking entirely with electricity? (kg LPG saved per HH/per year)

- Cooking entirely with electricity can save 86.82 kg per household per year
- As per census 2021, 44.3% of Nepali households use LPG as a primary fuel for cooking. Transition of these households to electricity could save Nepal up to 25,6418.797 tons of LPG/year.

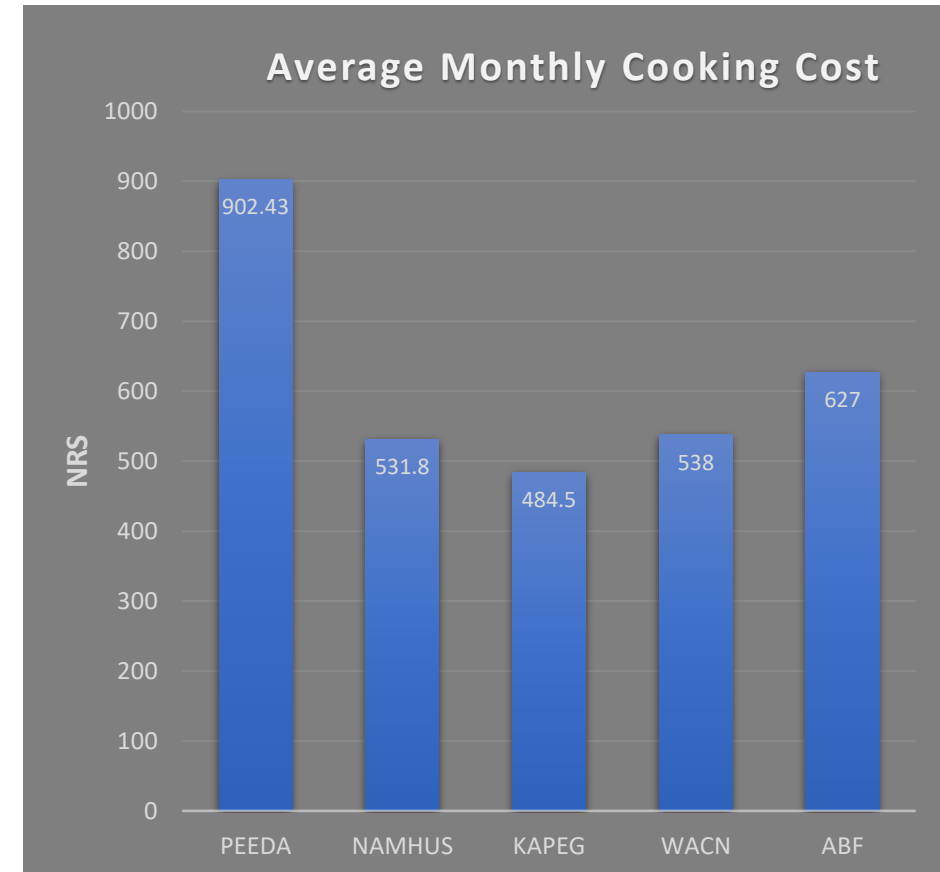




### 3. What are the cost implications of transitioning to cooking entirely with electricity?

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- Average monthly cooking cost of cooking entirely on electricity ranges from **NRs. 485 to NRs. 903** per household (*NRs. 9.5 taken as electricity rate*)
- Cost depends upon number of average meals per day and number of family members and types of eCooking appliance used
- Across the five projects, the cost saving of transitioning to 100% electricity from 100% LPG range from **NRs. 300 to NRs. 1200** (*average HH of 4.2 people*)
- Greater cost savings for households transitioning from firewood (*both purchased and in terms of cost opportunity*)

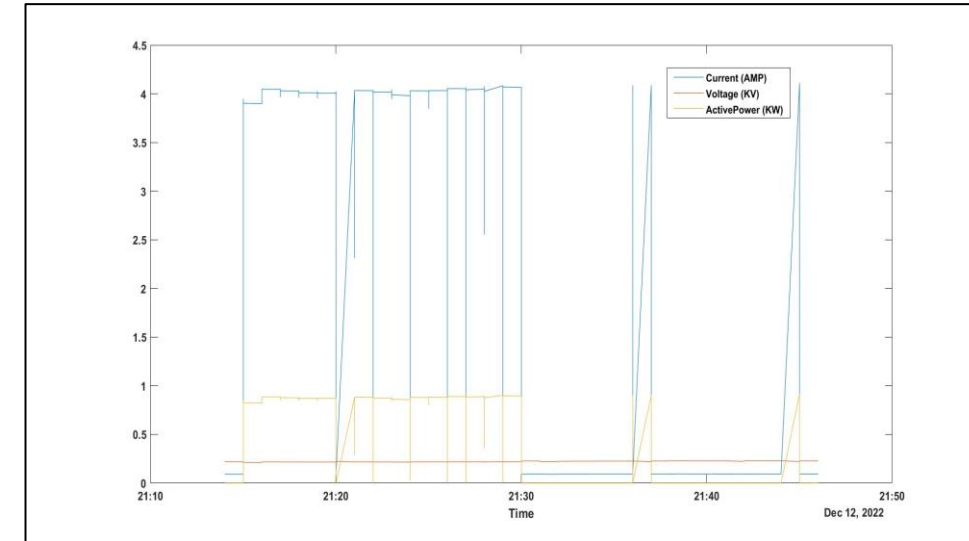




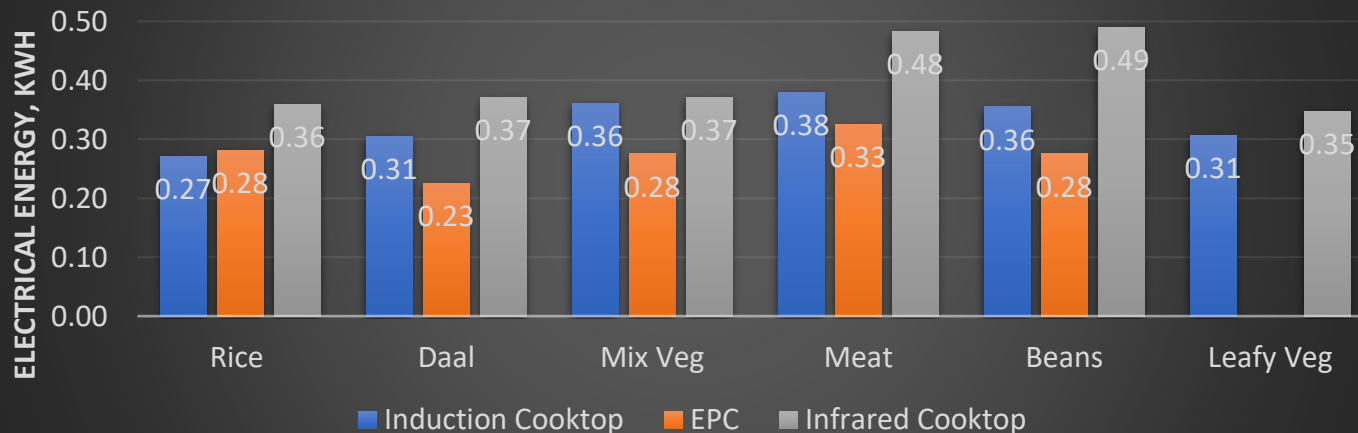
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# 4. How much energy is required to cook individual dishes using a range of electric cooking devices?

- EPCs are more efficient than induction and infrared stoves due to their fully insulated casing and on/off cycles during operation.
- Average Energy Consumption per typical Nepali meal (Rice-Lentil-Vegetable) is around 1 unit (0.94 in Induction, 0.78 in EPC and 1.1 in Infrared)



**Average Energy Consumption per Dish**



	Time taken (Second)	Time Taken (Min & Sec)	No. of Cycle
ON- Cycle	940	15' 40"	9
Off – Cycle	875	14' 35"	7
<b>Total Cycle</b>	<b>1815</b>	<b>30' 15"</b>	<b>16</b>

# 5. Which dishes do people prefer to cook using different electric devices?



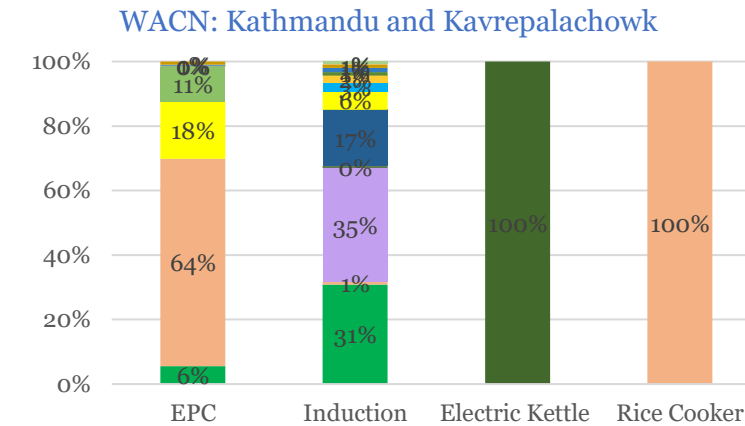
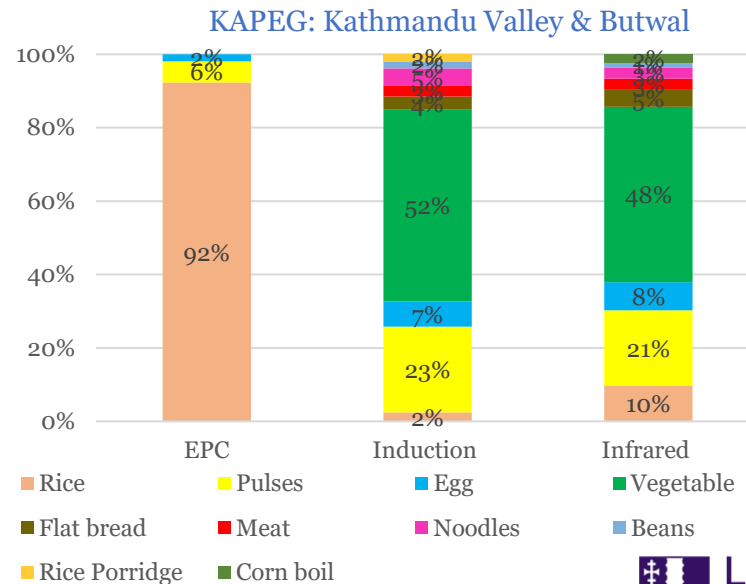
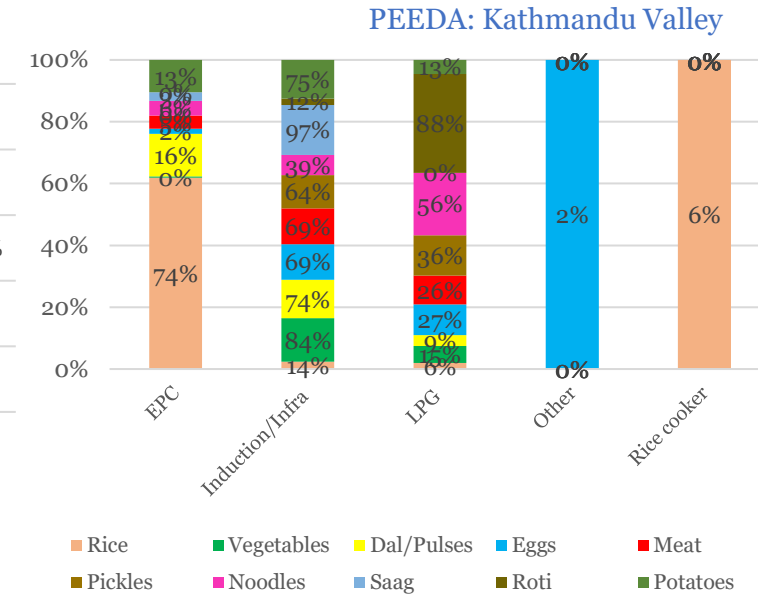
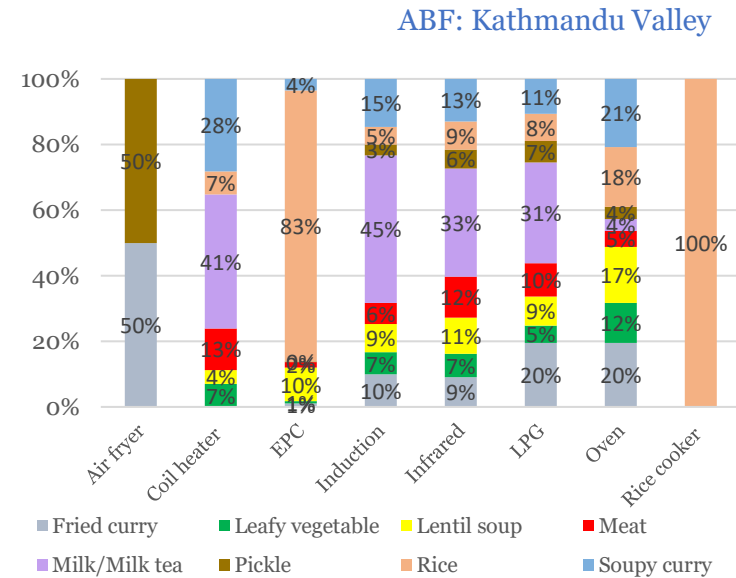
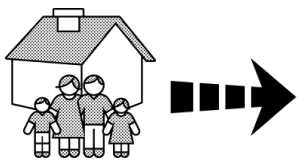
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- Diverse cultural and numerous dishes were prepared by the participants
- More than 60 different dishes were cooked
- Popular and most common dishes from all project are:

- i. Rice
- ii. Lentil/Pulse (dal)
- iii. Vegetable



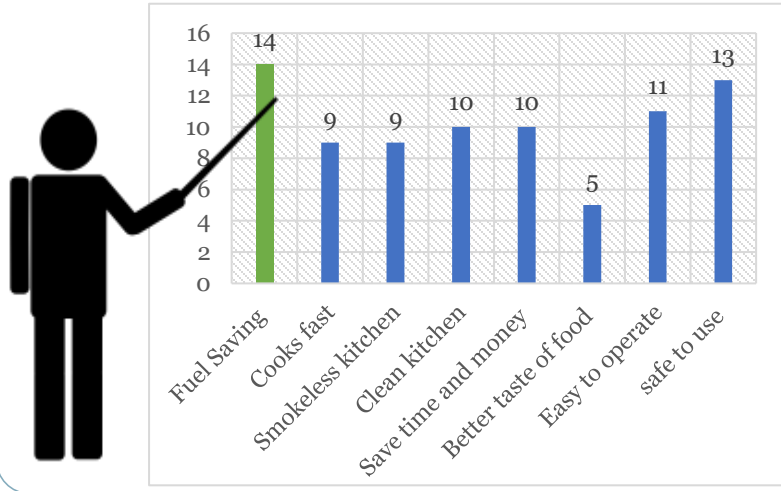
- This study highlighted the importance of two or more electric cooking appliances



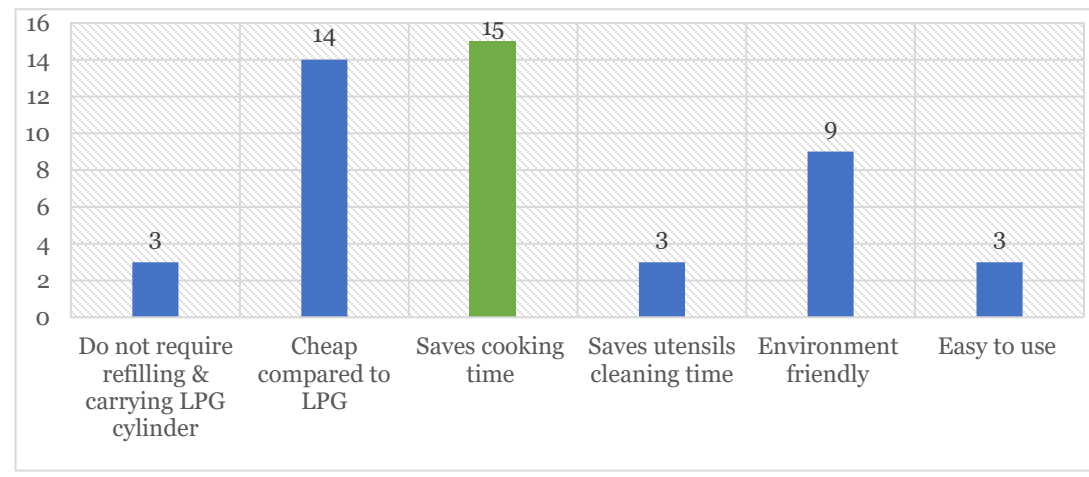


# 6. What is the user experience of cooking entirely with electricity?

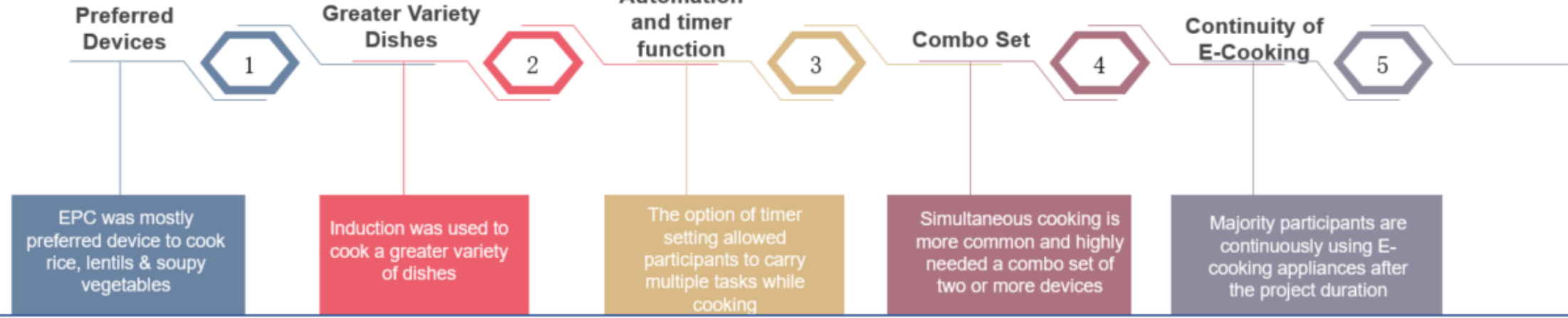
KAPEG: Kathmandu Valley & Butwal



WACN: Kathmandu and Kavrepalchowk



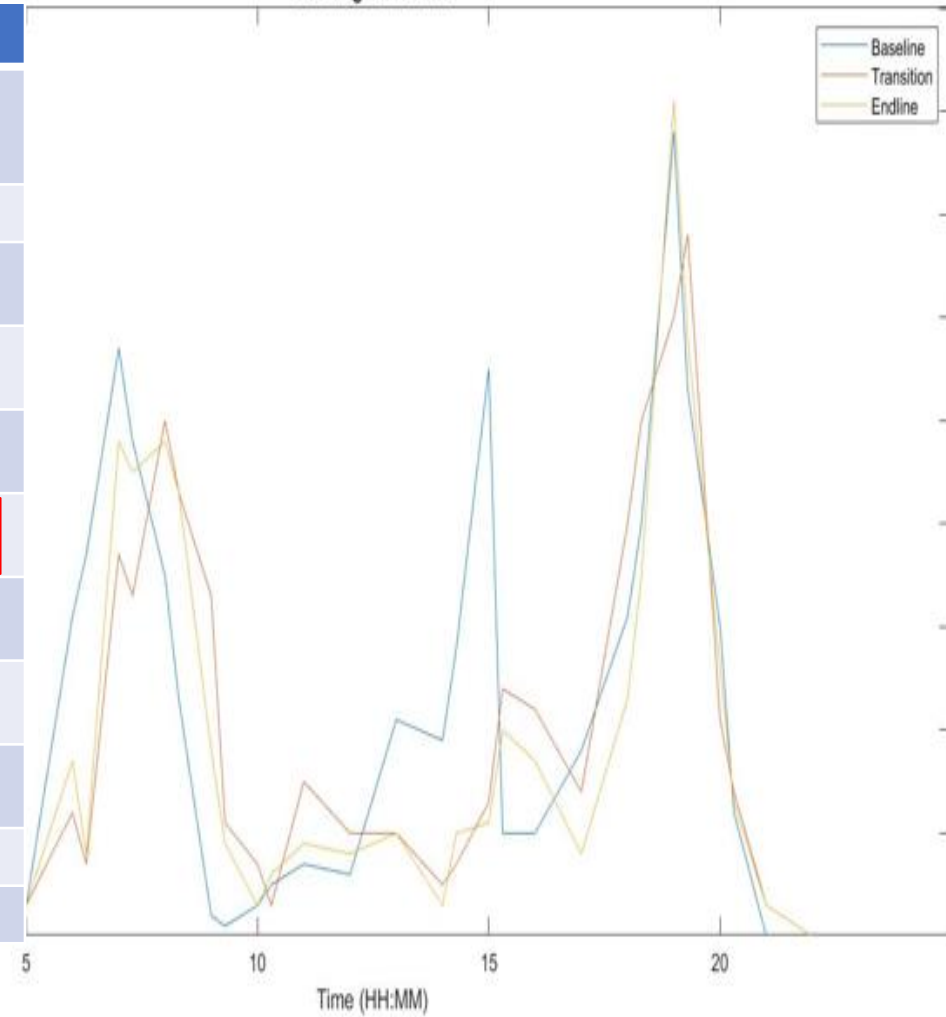
## Key Experience



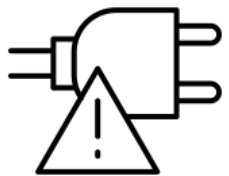
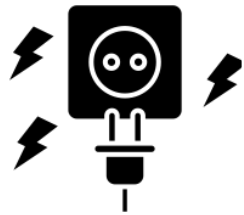
# 6. User experience of cooking entirely with electricity: cooking time of day and impact of outages

Bhaktapur				Chitwan			
Date	Outage Start	Outage End	Duration (Min)	Date	Outage Start	Outage End	Duration (Min)
1-Jan	9:15	9:20	5	7-Jan	8:10	10:00	1:50
1-Jan	18:35	18:41	6	8-Jan	8:37	8:45	0:08
7-Jan	10:15	10:30	15	20-Jan	5:20	5:35	0:15
9-Jan	13:10	13:16	6	21-Jan	7:00	7:10	0:10
10-Jan	18:32	18:34	2	23-Jan	6:30	9:45	3:15
10-Jan	18:45	18:50	5	24-Jan	7:10	7:30	0:20
12-Jan	17:40	17:48	8	26-Jan	8:40	9:10	0:30
24-Jan	7:30	7:50	20	1-Feb	6:45	7:00	0:15
<b>Total outage number</b>			<b>8</b>	<b>Total outage number</b>			<b>8</b>
<b>Average outage duration</b>			<b>8.375</b>	<b>Average outage duration</b>			<b>50.375</b>

Cooking time of the day



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NAMHUS: Bhaktapur and Chitwan

KAPEG: Kathmandu Valley & Butwal





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# 7. What barriers impede people from cooking entirely with electricity?

## Electricity Access

- Electricity supply reliability issues - power outages, voltage etc.

## Technology acceptability

- Lack of technical knowledge on electrical safety and the use of electric appliances
- Limited size/capacity options of eCooking appliances
- Voltage fluctuations led to longer cooking time and raised concern about damaging expensive e-cooking appliances.
- Repair services are generally expensive

## Economic Affordability

- Poor households require support to procure eCooking appliances



## 8. how can people overcome these difficulties they encounter when cooking entirely with electricity

### Electricity access

- Improving electricity supply (outage, voltage etc).
- Improving household wiring to support eCooking (tripping of MCB- miniature circuit breakers)

### Technology acceptability

- Awareness raising is required to support some people to use appliances correctly and safety (e.g. elderly).
- Improving eCooking supply chain: bundle induction compatible utensils with induction stoves
- Using two appliances can enable simultaneous cooking of dishes on electricity and enable eCooking to be a primary mode of cooking.

### Economic Affordability

- Financing to meet upfront cost of e-cooking appliances and hh wiring and power meter upgradations





# Conclusions and recommendations



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## Summary of key findings

**Data shows clear potential for e-cooking to be the primary mode of cooking for households in urban centres.**

- Average energy 57.56 kWh to cook entirely on elec. Highlights efficiency of modern appliances
- Can save huge quantities of LPG (i.e. about 87 kg of LPG per year per hh) – contribute significantly to Nepal’s macro-economic goals/trade deficit
- HHs can save between NPR 300 – 1200 per month per hh on energy cost by transitioning from 100% LPG to 100% e-cooking. Indicates significant savings are therefore also possible from part-transitions to eCooking
- EPC was found to be the most efficient electric cooking appliance, whereas induction cooktop and infrared cookstove were preferred for their flexibility
- E-cooking appliances (mainly a combination of EPC and induction/infrared cooktop) can cook a wide variety of typical Nepali dishes including all staples.



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## Summary of key findings

- Time saving, cost/fuel saving and convenience were most appreciated attributes of e-cooking
- People wanted simultaneous cooking, meaning at least two appliances are needed to support smooth transition to e-cooking
- Biggest challenge – unannounced power cuts interrupt cooking activities. This highlights the need for improvements in electricity transmission and distribution infrastructures
- Voltage drops lead to longer cooking time, highlighting the need for house wiring and power meter upgrades
- Local repair and maintenance services is very expensive



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## Recommendations & call for action

### To unlock the clear potential for greater domestic eCooking use:

- Electricity grid strengthening/integrated planning is important – which must involve peak loads management
- Mechanisms to support domestic HH wiring and power meter capacity upgrades must be put in place
- Raise public awareness about a wide range of benefits of transitioning from conventional cooking fuels to e-cooking
- Improved access to repair services
- Flexible payment options to improve access of low-income households to e-cooking appliances and accessories



# Cross project analysis: key takeaways

- Study households demonstrated that eCooking can be a primary mode of cooking
- This is in line with Government of Nepal NDC targets of achieving 25% households (versus 0.5% as per 2021 Population Census) using electric cooking as primary mode of cooking by 2030
- The study also highlights that transitioning to electric cooking does not have to mean a 100% shift and that major benefits are currently very much viable from a part-transition that needs to be far more actively promoted and encouraged.