



#StopGuessing

Revealing Clean Cooking Opportunities

February 18, 2021

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Agenda

- | | |
|--------------------------|------------|
| 1. Introduction | 5 minutes |
| 2. Overview of Research | 5 minutes |
| 3. Discussion of Results | 15 minutes |
| 4. Q&A | |
| 5. Close | 5 minutes |

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#StopGuessing

Are electric cooking appliances the future of clean cooking?

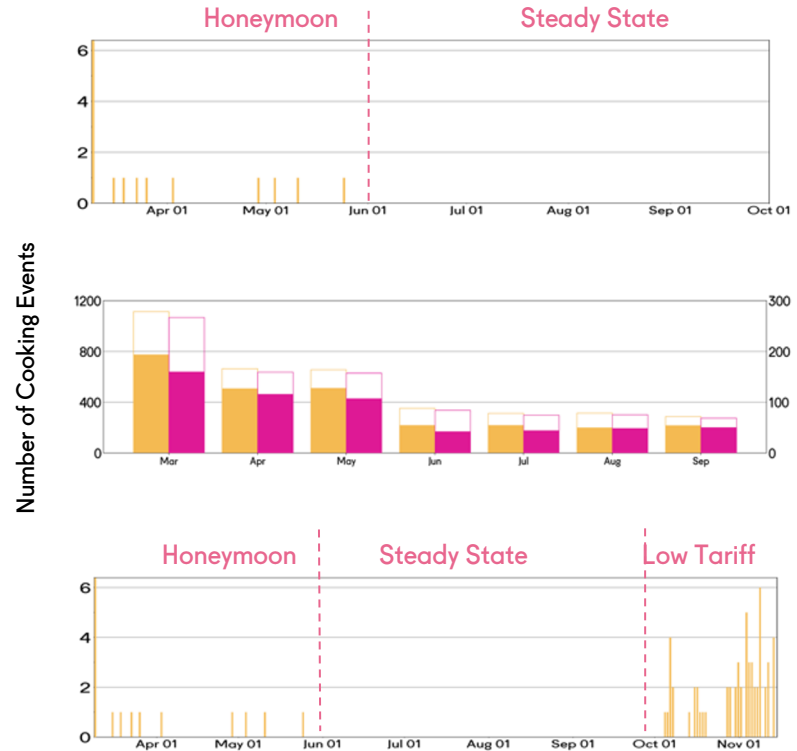
Motivations

- Impact: health, gender equality, environment
- Unique opportunity: potential pivot point for clean cooking
- Data show us the “why?” and the “how?”
- A2EI’s role: unbiased and quality data provided to the sector

Research Background

Are electric cooking appliances the future of clean cooking?

1. How do people cook with electric cooking appliances? How do individuals cook with the EPC?
2. What does EPC usage look like at scale? How will electric cooking affect the grid?
3. What happens when the electricity price drops?



Aggregate Energy Consumption, kWh

Project Overview

- 100 participants at six different mini-grid villages
- Start: March 2020, data up to Nov, pilot on-going
- Tariff: First 7 month: \$1 per kilowatt-hour, then reduction to \$0.04 per kilowatt-hour
- Electric pressure cookers (EPCs) connected to smart meters



Pilot Partners



*Biomass Cookstove
Monitoring*



*Cooking Diary Data
Collection*



*Community Outreach and
HH Energy Consumption*

#6 Smart Meter - Data Gathering at A2EI



Smart Meter Features

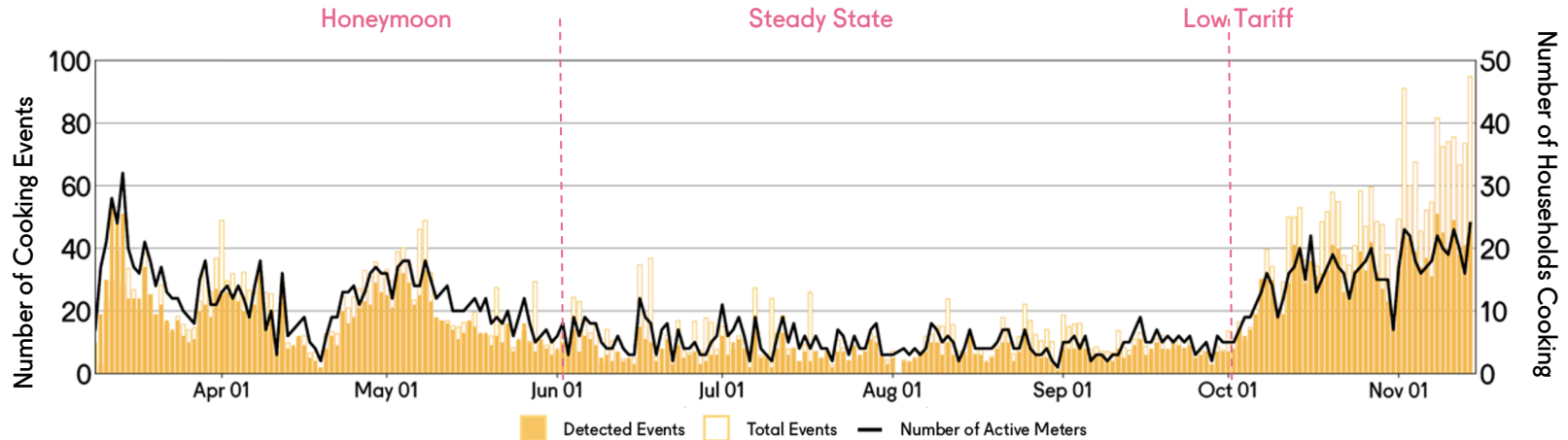
- Remote monitoring of electric appliances and automated data retrieval
- Electricity data: Energy consumption, power, etc.
- Data recording on 1 or 5 minute intervals
- Internal storage for times of bad network



EPCs connected to A2EI Smart Meters

Discussion of Results

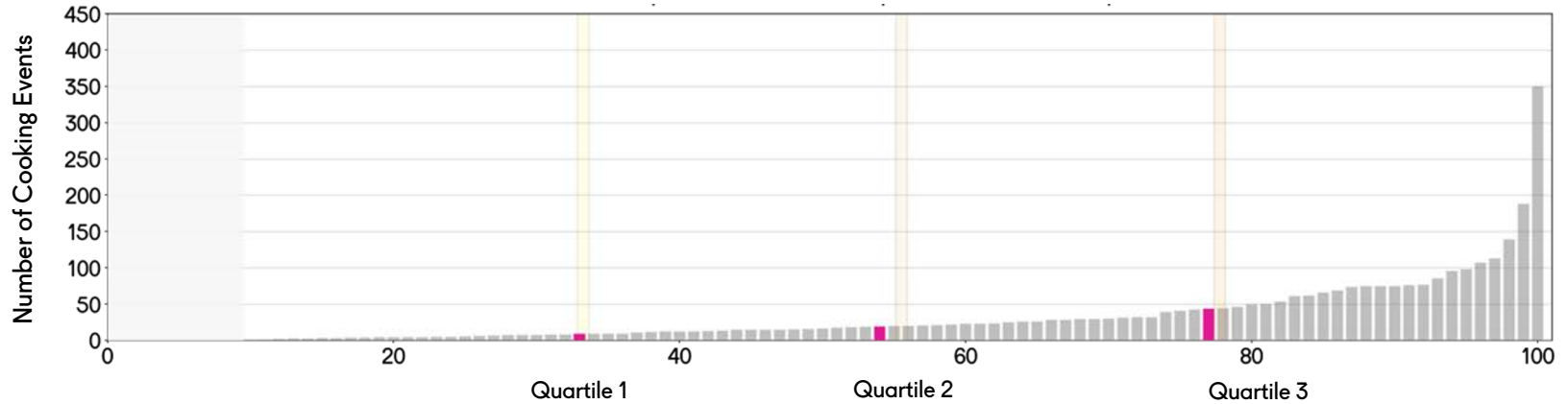
#7 How do Users Cook with the EPC?



- U-shaped trend of number of cooking events and active households
- 01.Mar - 31. May: Novelty of owning a new cooking appliance
- 01. Jun - 30. Sep: Usage flatlined
- 01. Oct - today: Tariff reduction from \$1/kWh to \$0.04/kWh, sharp rise in usage

#8 How do Individuals cook with their EPC?

Honeymoon and Steady-State Period - Ranking Users by Recorded Cooking Events



Quartile	Smart Meter	Cooking Events	Share of Cooking Events Up to Quartile (%)
0	#11	1	0%
25	#34	11	3%
50	#56	25	14%
75	#77	51	36%
100	#100	404	100%

- Honeymoon & Steady State: Very little utilization
- 25% of users account for 64% of cooking events
- At high electricity costs: Benefits of clean cooking concentrated on minority of users

#9 How do Individuals cook with the EPC?

Low-Utilization User

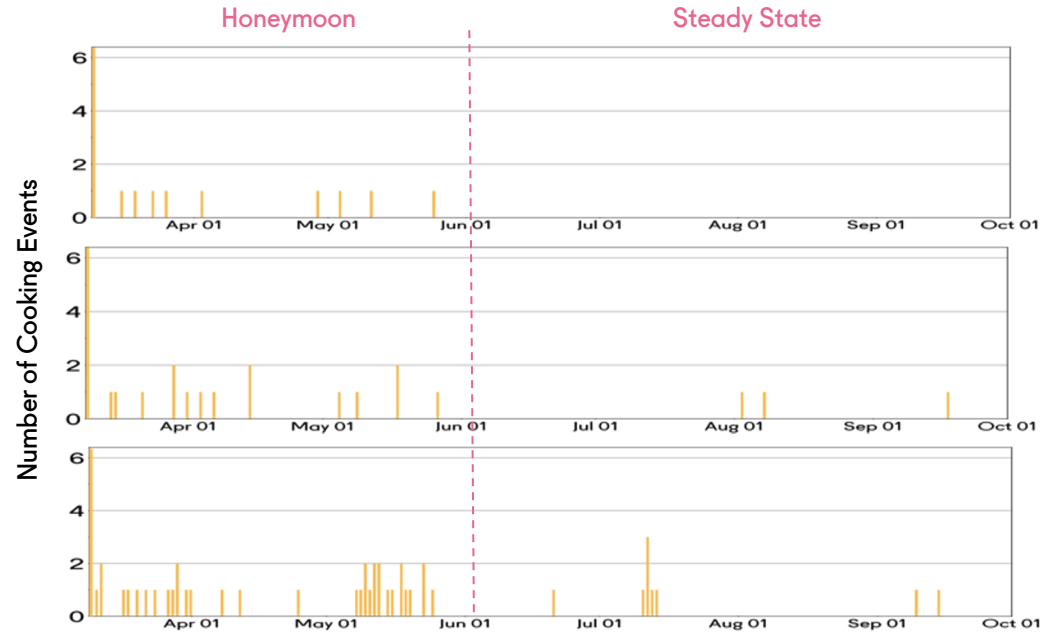
	Honeymoon	Steady State
Av. Mo. Cooking Events	3.6	0
Av. Mo. Energy Usage (kWh)	1	0

Medium-Utilization User

	Honeymoon	Steady State
Av. Mo. Cooking Events	5.4	0.8
Av. Mo. Energy Usage (kWh)	1.5	0.2

Low-Utilization User

	Honeymoon	Steady State
Av. Mo. Cooking Events	12.7	2.2
Av. Mo. Energy Usage (kWh)	3.2	0.7



- Low level of utilization during high tariff period (Both Honeymoon & Steady State)
- Steady State: Sharp decline in usage for all three users
- Electricity price effects users differently: Price sensitive “Low”-user

#10 What happens when the Electricity Price drops?

Low-Utilization User

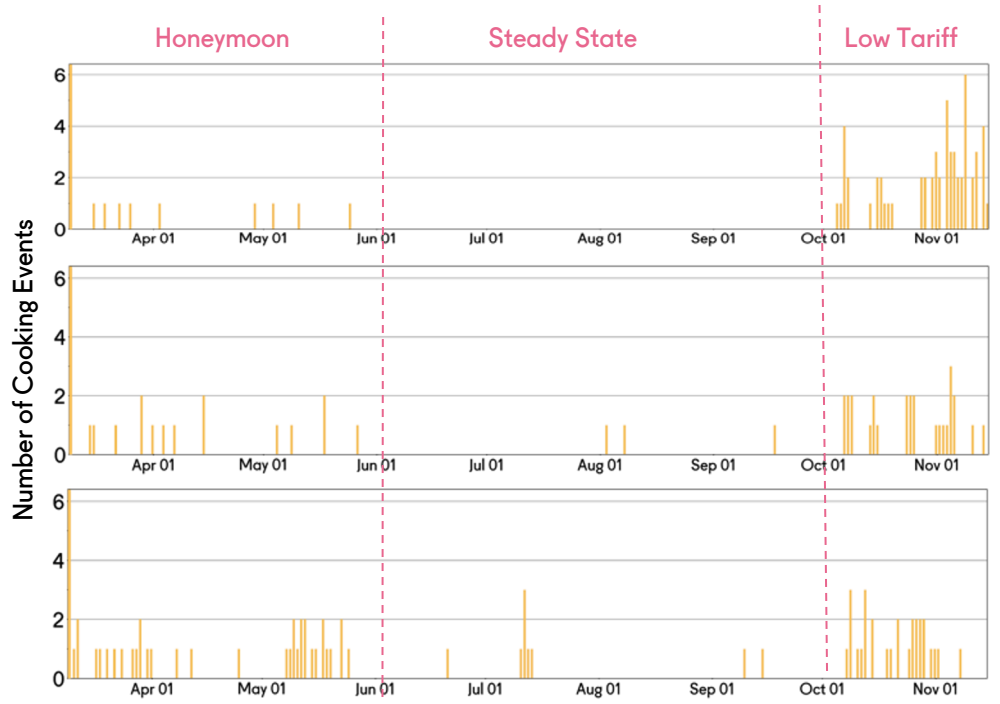
	Honeymoon	Steady State	Low Tariff
Av. Mo. Cooking Events	3.6	0	38.5
Av. Mo. Energy Usage (kWh)	1	0	9.8

Medium-Utilization User

	Honeymoon	Steady State	Low Tariff
Av. Mo. Cooking Events	5.4	0.8	18.3
Av. Mo. Energy Usage (kWh)	1.5	0.2	6.5

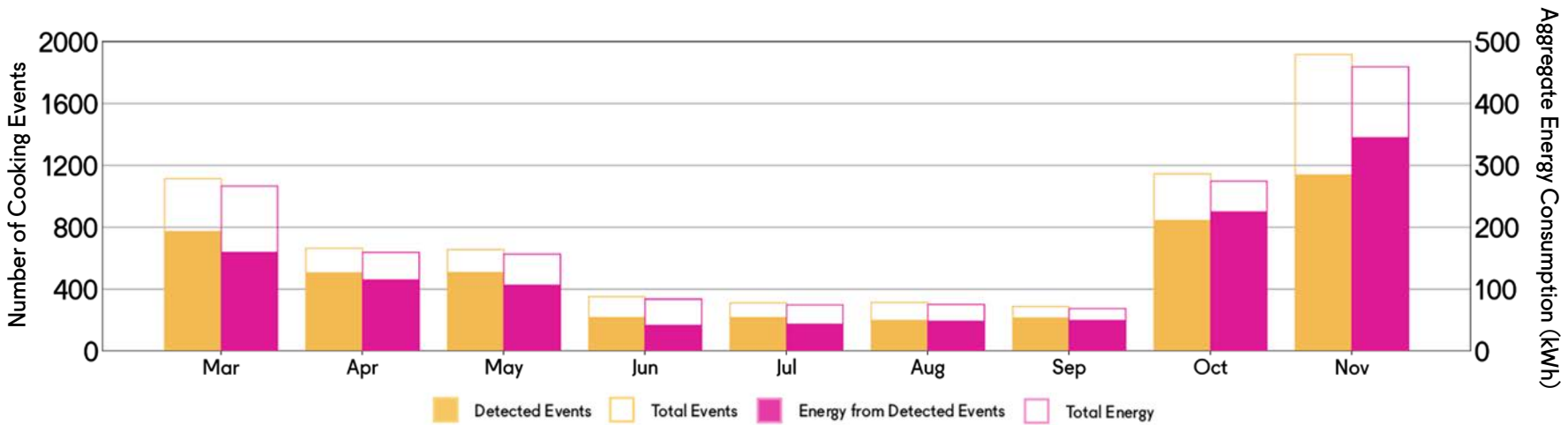
High-Utilization User

	Honeymoon	Steady State	Low Tariff
Av. Mo. Cooking Events	12.7	2.2	19.6
Av. Mo. Energy Usage (kWh)	3.2	0.7	5.4



- All three users increased consumption after tariff reduction
- Price-sensitive “Low”-User is now cooking more than both our “Medium” and “High” users
- High electricity price result in a small, walthier market segment, Low price: benefit lower-income users

#11 What does EPC Usage look like at Scale?

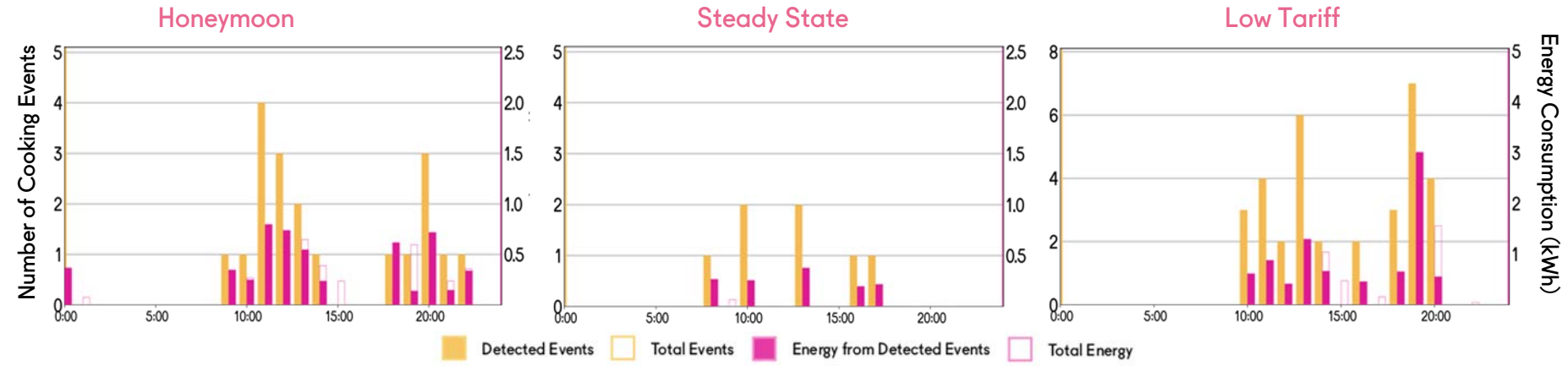


Research Questions

- Will the EPC usage overwhelm the utility?
- What will the market size look like at scale?

#12 Will Electric Cooking affect the Grid?

Medium-Utilization Day



- Honeymoon & Steady State Phase: No impact on the grid
- Even at low tariff:
 - Total consumed energy in 1h below 4kWh
 - Max simultaneous cooking event per day is 11
 - Likely no high effect on grid assumed, but more data needed

Medium Utilization Day

	Honeymoon	Steady State	Low Tariff
Cooking Events	20	7	33
Energy Usage (kWh)	5.3	1.3	8.58

#13 Market Size and Business Opportunities

	Energy Consumption [kWh]	Revenue [\$]	Cost per Meal [\$]
September	80	80	0.23
November	500	20	0.01

- Estimated tariff = \$0.16/kWh
- The lower the price the higher the usage
- Lower price might not be feasible for solar mini grids but other mini grids like hydro mini grids
- Utility providers can still be incentivised and get involved
- Support possibilities: government, subsidies, carbon offset credits

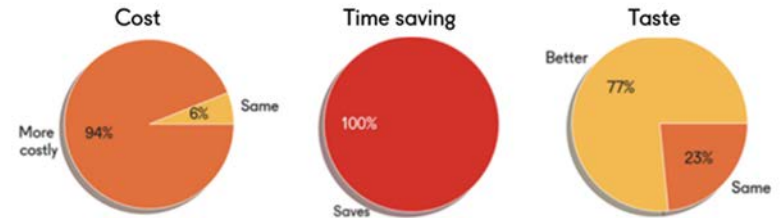


Research Questions

- How do people cook with electric cooking appliances? How do individuals cook with the EPC?
 - High Tariff: Low utilization and only a small number of households benefiting
 - Low Tariff: Frequent usage
- What does EPC usage look like at scale? How will electric cooking affect the grid?
 - Cooking events distributed over the day means likely no effect on the grid, more data needed to confirm
 - Scaling is most likely to happen in low-tariff areas
- What happens when the electricity price drops?
 - People start cooking frequently: up to 8 times a day
 - Previous low users lead in usage now

Further Insights

- Research on cooking needs months of data acquisition
- People love cooking with electricity but not paying for it



Q&A

Next Steps

Upcoming Research Topics

- EPC and Cooking Diary Analyses
What dishes are being cooked?
- EPC and Household Consumption Analyses
How does EPC energy consumption compare to a HH total energy consumption?
- EPC and Biomass Cookstove Analyses
How much biomass cooking is being displaced?



Motivation

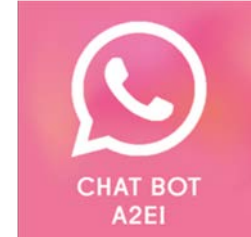
To collect a diverse data set from 1000 users world wide that sheds light on the opportunity for electric cooking appliances globally

A2EI is supporting partners by:

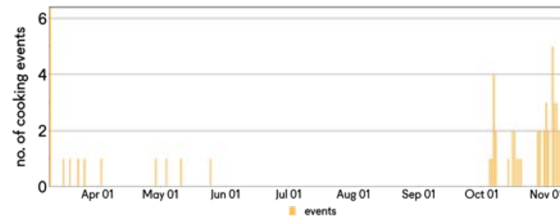
- Providing Smart Meters and WhatsApp bot technology for data collection
- Providing remote support for smart meter installation and guidance in WhatsApp bot usage
- Data processing, analysis and publishing



Smart Meters



WhatsApp Bot



Data Analysis



Joint Pilot Projects

NEED COOKING DATA?

We want to support your projects to get better data by putting 1000 smart meters on electric cooking appliances globally. Contact cleancooking@a2ei.org for more information.

DOWNLOAD THE FULL DATA RELEASE

Interested to get the raw data? Download it here:
www.a2ei.org/news/clean-cooking-data-release

Are you interested in future data releases? Do you have input, thoughts or ideas you would like to share with us? Please email us at cleancooking@a2ei.org.

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