

Roundtable on Electric Cooking

Are Indian homes ready for electric cooking?

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Energy Access



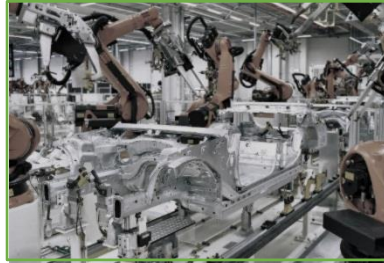
Renewables



Power Sector



Industrial Sustainability &
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Low-Carbon Pathways



Risks & Adaptation



Technology, Finance & Trade

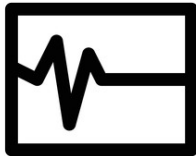


CEEW Centre for Energy Finance

Clean cooking transition in Indian kitchens underway



2011: **70%** Indian HHs relied on biomass for cooking (Census 2011)



2019: Biomass use in kitchens:

- ~**600,000** pre-mature deaths in India¹
- Major contributor to outdoor air pollution²



2020: 85% homes have LPG; 71% use LPG as primary fuel³

Sources: 1. State of Global Air 2020. ([Link](#)); 2. CEEW 2020. What's polluting India's Air? ([Link](#)). 3. CEEW 2021. State of cooking energy access in India. ([Link](#))

Electric cooking to decarbonise the cooking sector

- Rising dependence on LPG
 - Consumption doubled over past decade
 - **Imports** risen to **INR 50,000 crore** FY 19¹
- ~4% - contribution of cooking energy use in India's energy-based emissions
- Need for low-carbon solutions: eCooking for long-term decarbonisation

Pertinent questions:

- Who is using electricity for cooking?
- What role is eCooking playing in Indian kitchens?
- What is driving and likely to drive eCooking adoption?
- What barriers may hinder the transition?
- What needs to be done to support this transition?

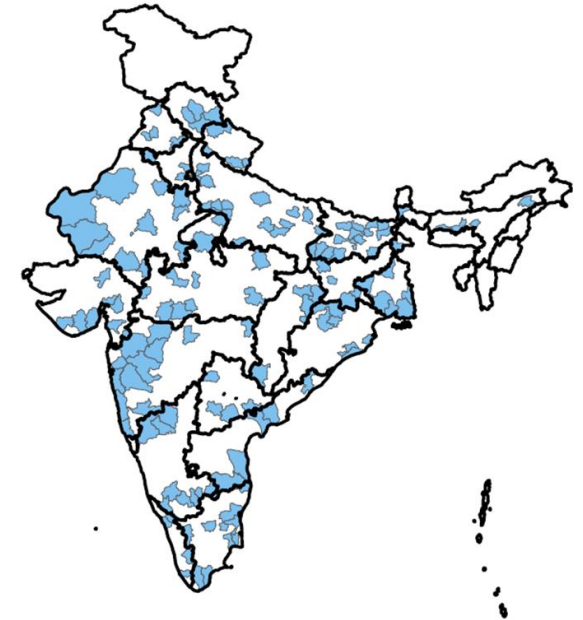
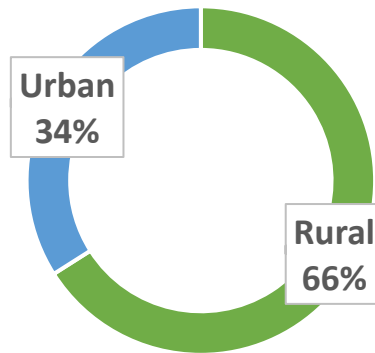
Sources: 1. CSTEP 2029. Decarbonising the cooking sector. ([Link](#))



India Residential Energy Survey (IRES) 2020

- Covered 152 districts from 21 most populous states of India

14,850



Multi-stage stratified sampling



21 STATES
covering 97% population



152 DISTRICTS
Cluster sampling

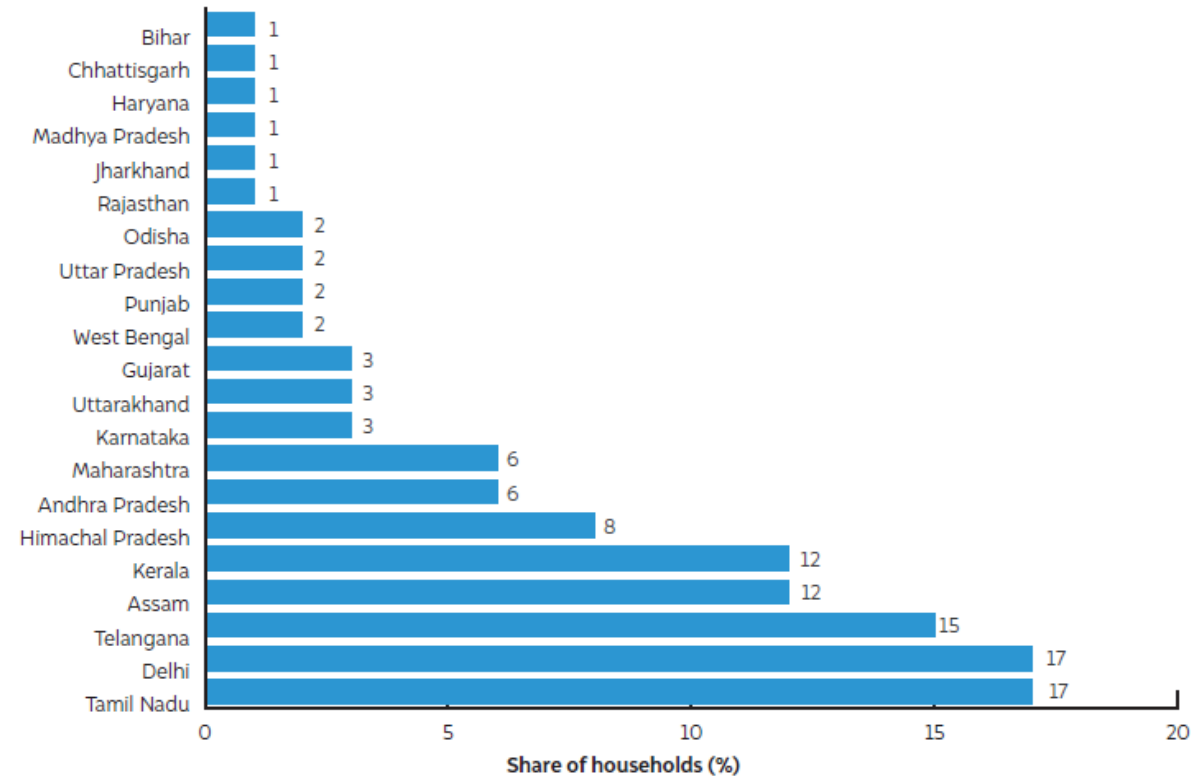
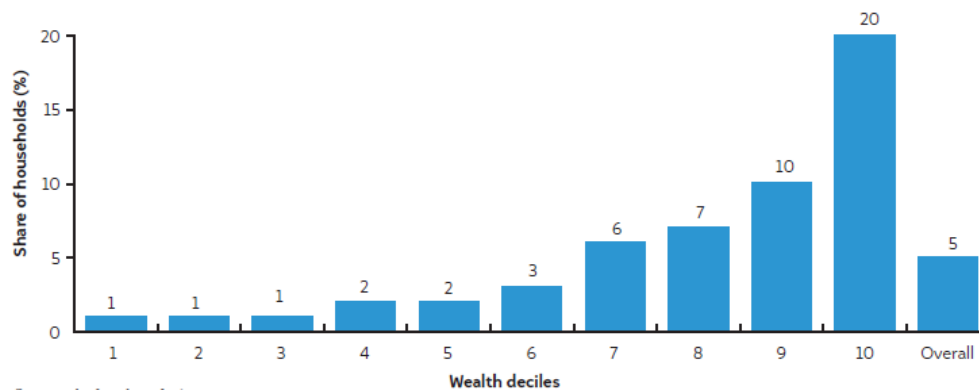
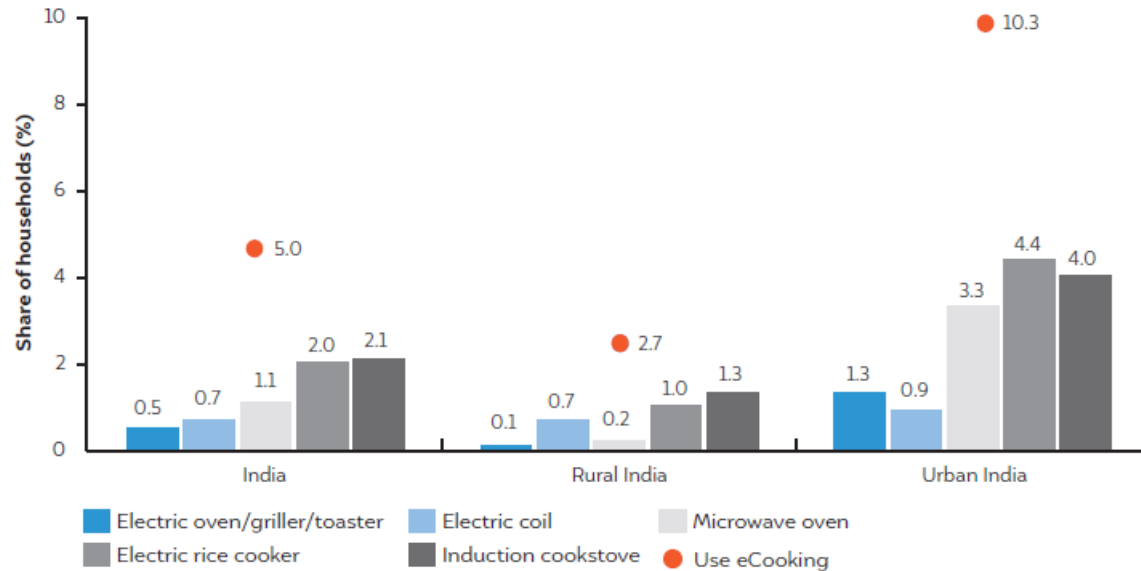


**1210 VILLAGES
& 614 URBAN
WARDS**
Cluster sampling



**14,850
HOUSEHOLDS**
8 from each village/ward

Only 5 per cent Indian homes use an eCooking device



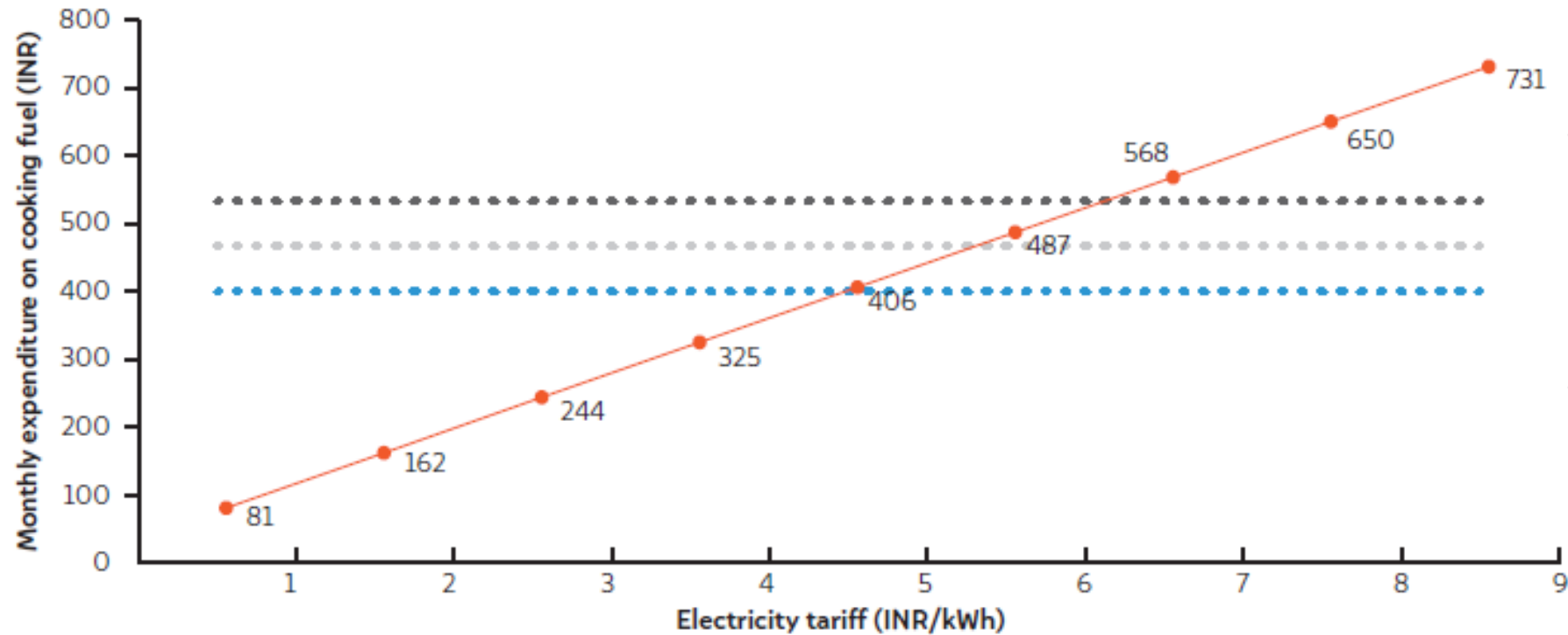
Source: CEEW (2021). Are Indian homes ready for eCooking?

Drivers of electric cooking

- Economic status and urbanization
- Culinary habits and preferences
- Power tariffs and payment discipline

State	Overall eCooking usage	Share of households using eCooking appliances				
		Electric-coil cookstove	Induction cookstove	Rice cooker	Microwave oven	Toaster/griller
Tamil Nadu	17%	5%	73%	34%	4%	5%
Delhi	17%	6%	42%	9%	90%	16%
Telangana	15%	1%	9%	96%	8%	3%
Kerala	12%	2%	88%	18%	6%	2%
Assam	12%	38%	4%	46%	22%	8%

Fuel economics: driver of future uptake of eCooking?



Monthly expenditure on cooking fuel, if they exclusively use

—●— eCooking (974 kWh in a year)

●●●● LPG, and refill costs INR 800

●●●● LPG, and refill costs INR 700

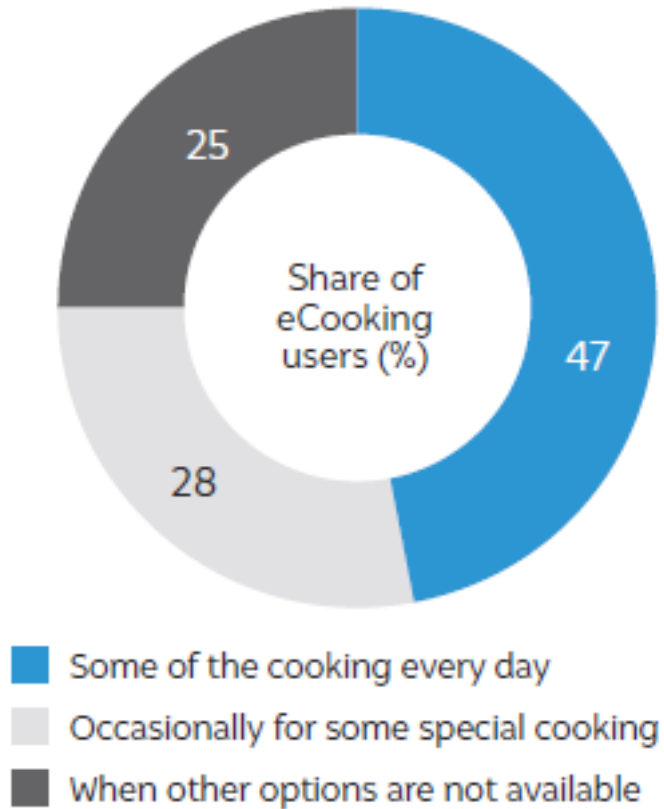
●●●● LPG, and refill costs INR 600

- eCooking cheaper than LPG (INR 900 or USD 12.3) for HHs paying < INR 7.4 (USD 0.09) per unit
- But upfront investment (~INR 4000 or ~USD 55) – a significant barrier for many HHs

Source: CEEW (2021) Are India homes ready for eCooking?

eCooking currently playing a supplementary role

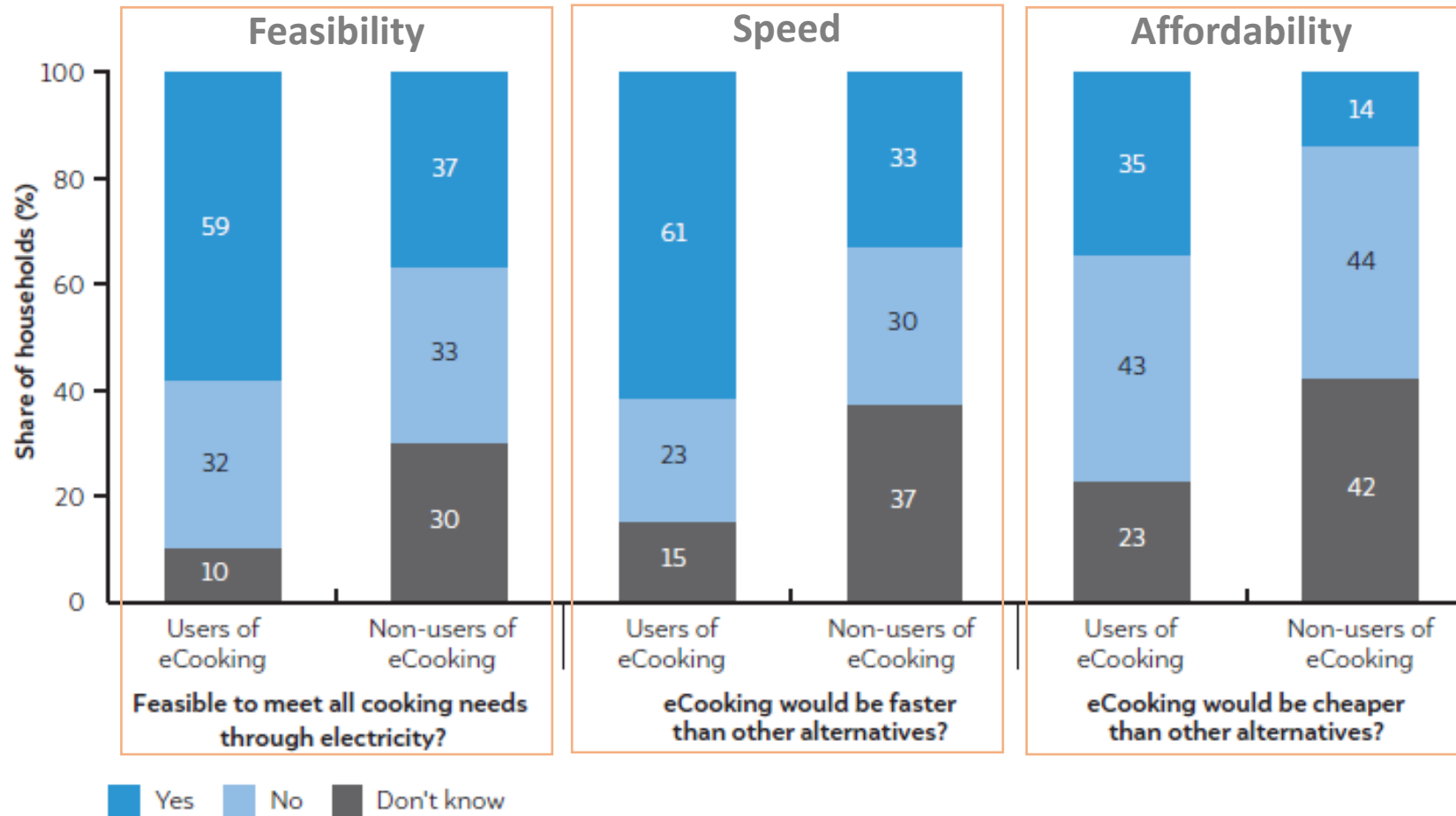
- 93% of eCooking users use LPG/PNG as primary fuel



Source: CEEW (2021). *Are Indian homes ready for eCooking?*

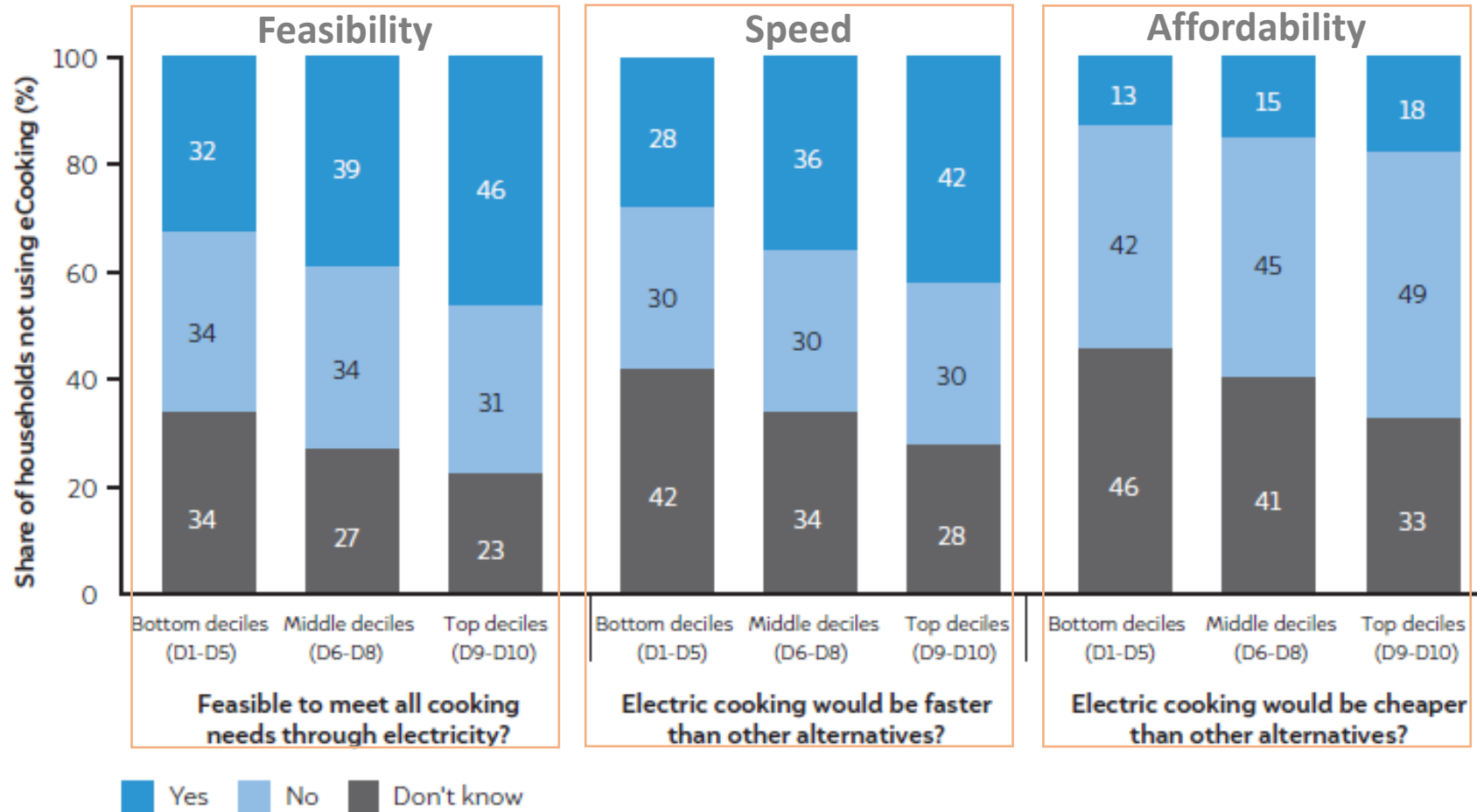


Vital to understand & responding to consumer perception



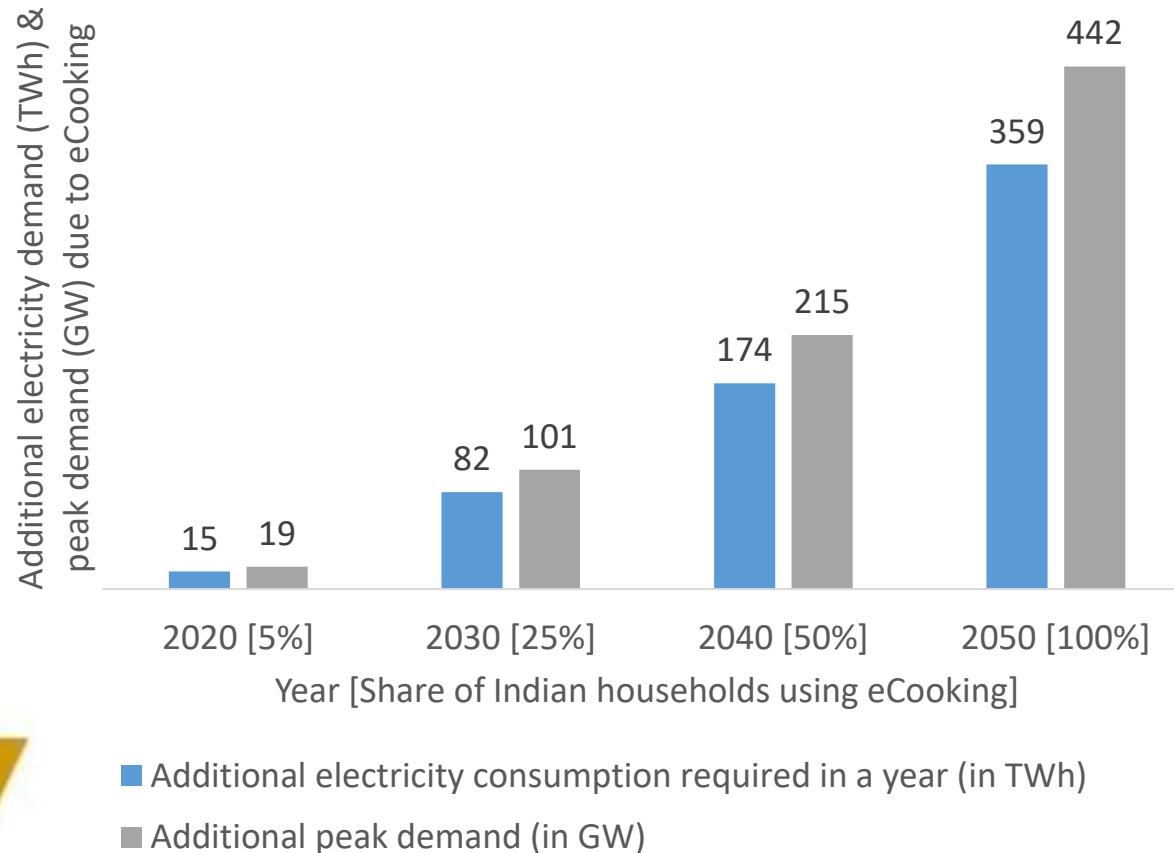
Source: CEEW (2021) *Are Indian homes ready for eCooking?*

Richer HHs more optimistic about eCooking



Source: CEEW (2021) *Are Indian homes ready for eCooking?*

Future implications of switch to eCooking on power demand



1275 TWh: Electricity demand in FY21
370 GW: Installed capacity in FY20

By 2030, eCooking's share would be:

- ~**3.6%** in total power demand (X3)
- ~**14%** in total installed capacity (X3)

Source: CEEW (2021) *Are Indian homes ready for eCooking?*



Way forward and recommendations for future research

- Incentivise R&D for low-cost and contextually suitable solutions
- Devise financing solutions to stimulate demand
- Strengthen grid infrastructure to ensure reliable supply
- In-depth studies to capture consumer experience under diverse contexts
- Integrate transition to eCooking in country's power planning and decarbonization strategy

Thank You

For suggestions/queries, email: shalu.agrawal@ceew.in

Links to relevant publications:

- Are Indian homes ready for electric cooking? <https://www.ceew.in/publications/are-indian-homes-ready-for-electric-cooking-transition>
- India Residential Energy Survey (IRES) 2020 unit level data: <https://dataverse.harvard.edu/dataset.xhtml?persistentId=doi:10.7910/DVN/U8NYUP>
- Link to other IRES publications: <https://www.ceew.in/india-residential-energy-survey-ires>

India Smart Grid Forum
CBIP Building, Malcha Marg,
Chanakyapuri,
Delhi-110021
Website: www.indiasmartgrid.org



Annexure: Cost comparison of LPG-PNG-Electricity

		Fuel type		
		LPG (unsubsidised)	Electricity (Induction cookstove)	PNG
Standard measuring unit		14.2 kg refill	1 kWh	1 SCM
Calorific value per standard unit ⁶	in kcal	1,54,354 kcal	860 kcal	10,000 kcal
	in GJ (kcal/239006)	64582x10 ⁻⁵ per refill	360x10 ⁻⁵ per kWh	3766x10 ⁻⁵ per SCM
Appliance efficiency		57%	84%	57%
Useful calorific value after adjusting for appliance efficiencies (In GJ) (Calorific value x efficiency)		36812x10 ⁻⁵ per refill	302 x10 ⁻⁵ per kWh	2146 x10 ⁻⁵ per SCM
Cost per standard unit (In INR)		800 per refill	5.5 per kWh	30 per SCM
Number of units required for exclusive use In cooking (annual)		8 LPG refills (113.6 kg)	974 units (kWh) ⁷	137.2 SCM
Annual cost of using the fuel exclusively for cooking (In INR)		6400	5,357	4116
Monthly cost of using the fuel exclusively for cooking (In INR)		~530	446	~340