Evaluating Appliance Ownership and Usage Pattern in India

Energy Evaluation Asia Pacific 2019
Bangkok

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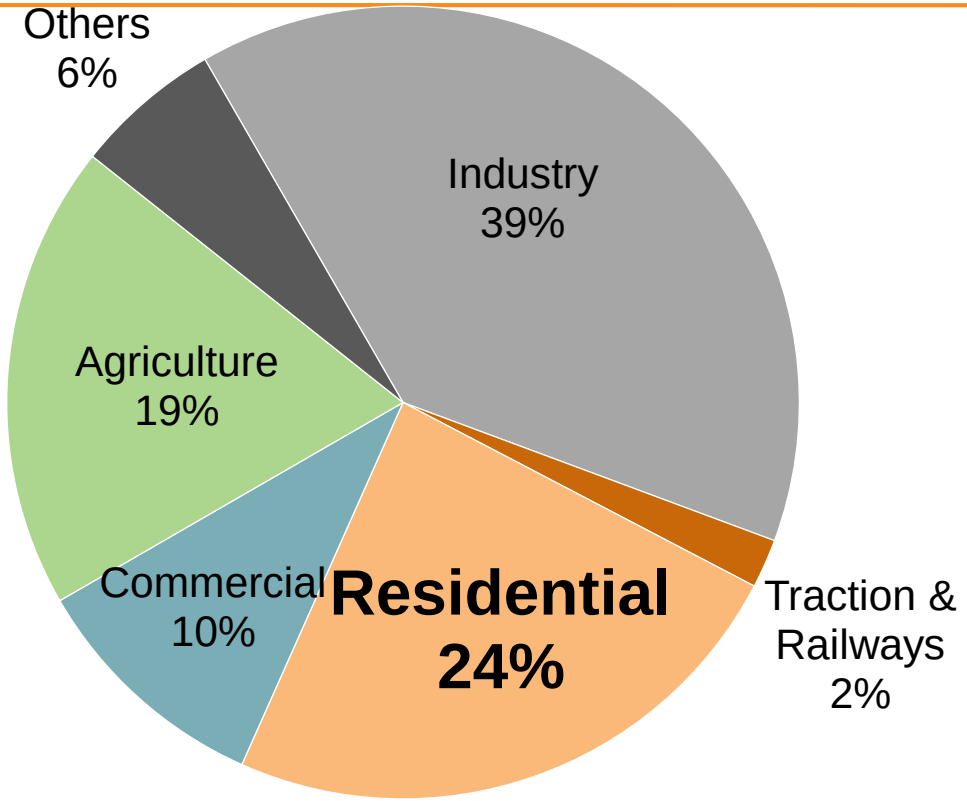
Sector Wise Electricity Consumption in India



(Source: Energy Statistics 2012, Central Statistics Office, MOSPI)

Sector-wise Consumption of Electricity (2016)

Residential electricity consumption is projected to grow eight fold by 2050

Need for reliable appliance energy use information

1. Increase in appliance purchase and use, leading to rising residential electricity consumption
2. Increase in number of domestic appliances under S&L program in the next 5 years
3. Absence of end-use baseline data to assess impacts of current and new S&L programs
4. Energy savings calculations are based solely on declared efficiencies of appliances
5. Appliance energy use, hours of use and use patterns are also based on assumptions

Residential End Use Survey

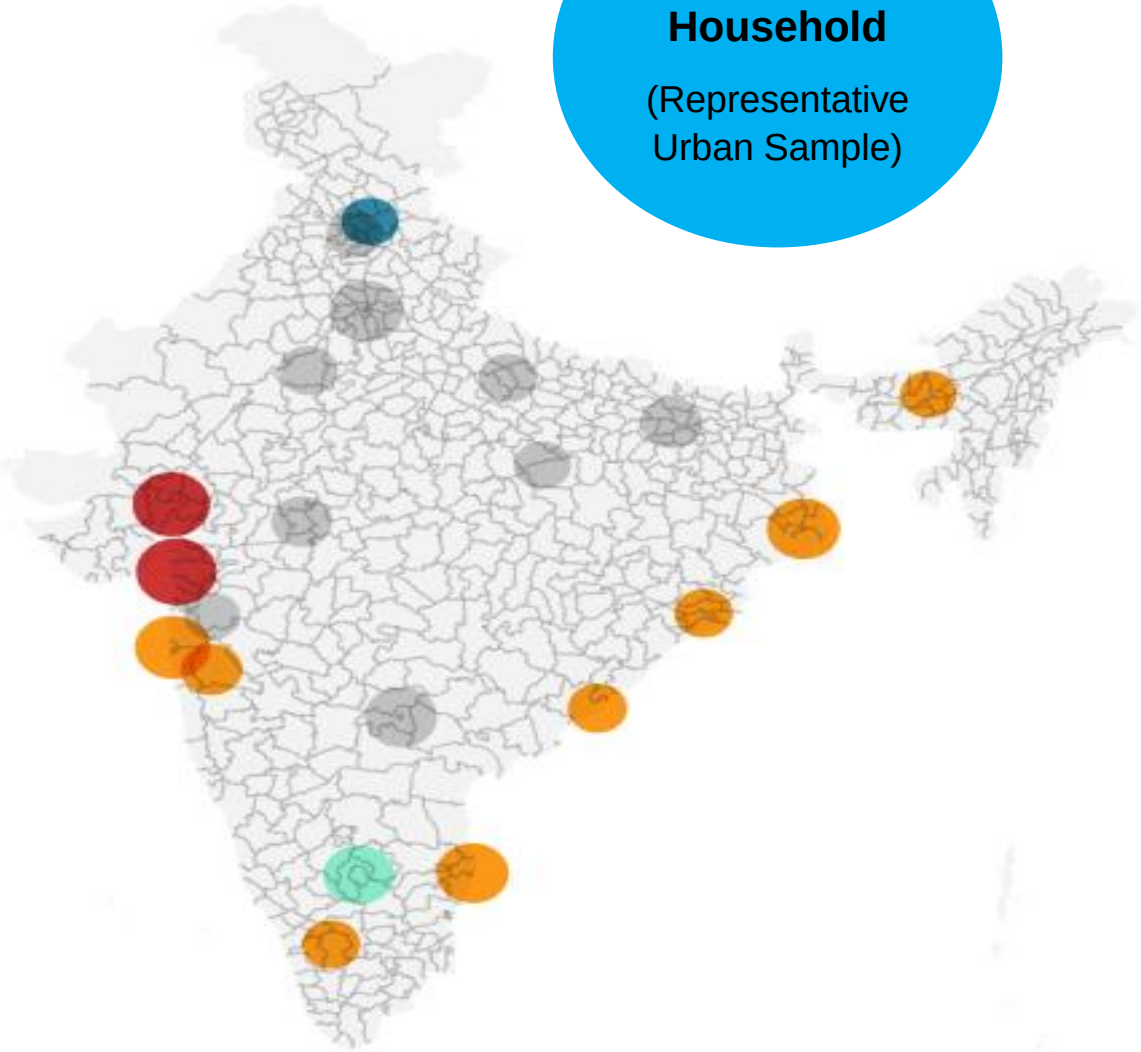
- Pan India residential end use survey across 5000 urban households conducted
- Samples represented various social, economic, cultural and climatic context across 21 cities
- First of its kind study with objectives to
  - Gather information on demographic characteristics
  - Ownership and usage pattern of appliances
  - Variation in energy consumption across various climate zones and socio-economic strata
  - Appliance purchase, technological and behavioural patterns
  - Data on the appliance inventory and age

Survey Distribution

Representative Household Samples

5,242 Household

(Representative Urban Sample)



Survey Questionnaire Framework

Demography
- Education level
- Socio economic strata
- Age, family structure

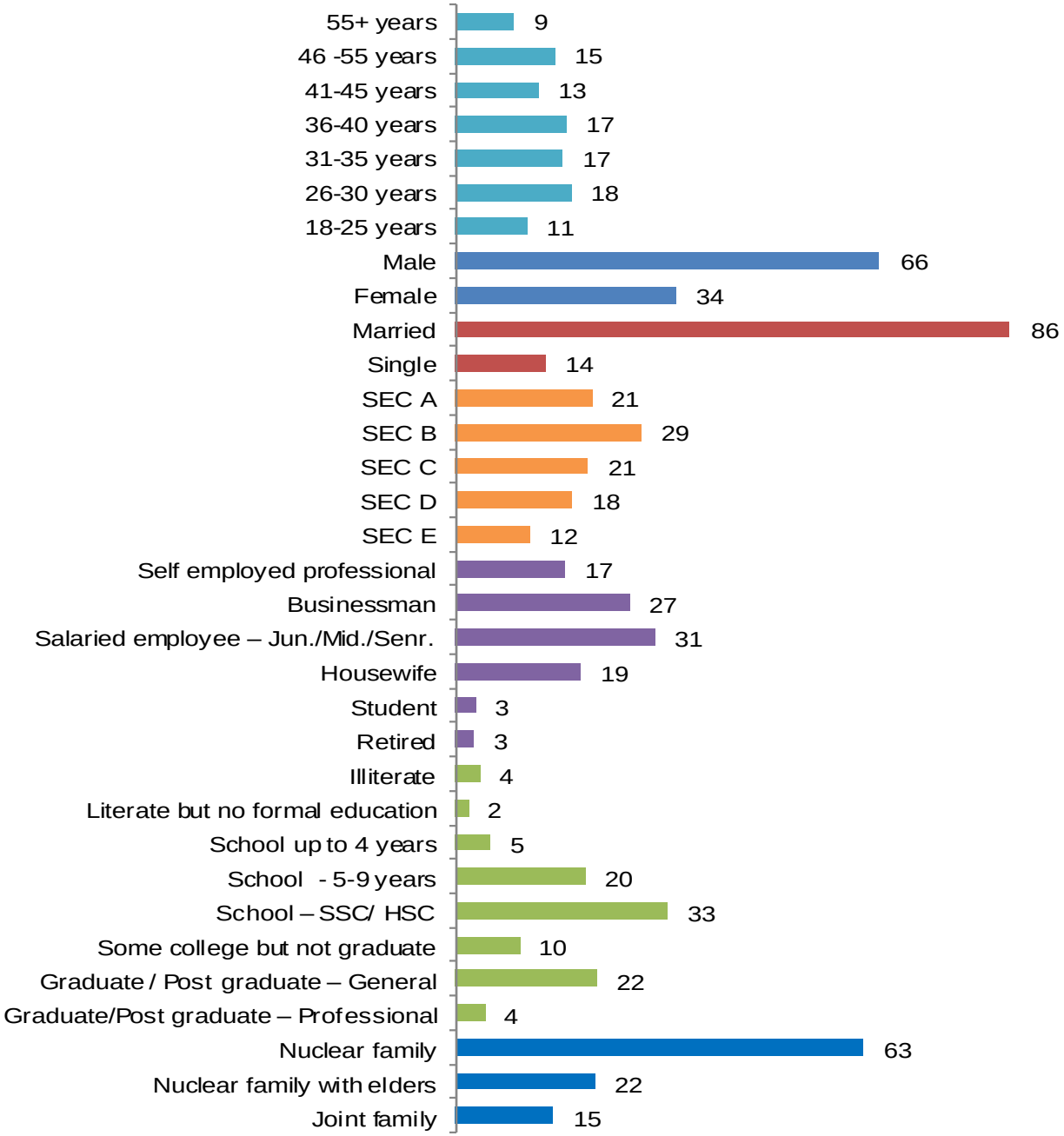
Purchase and disposal
- Factors affecting purchase
- Mode of disposal

Appliance Ownership
- Number
- Type
- Capacity

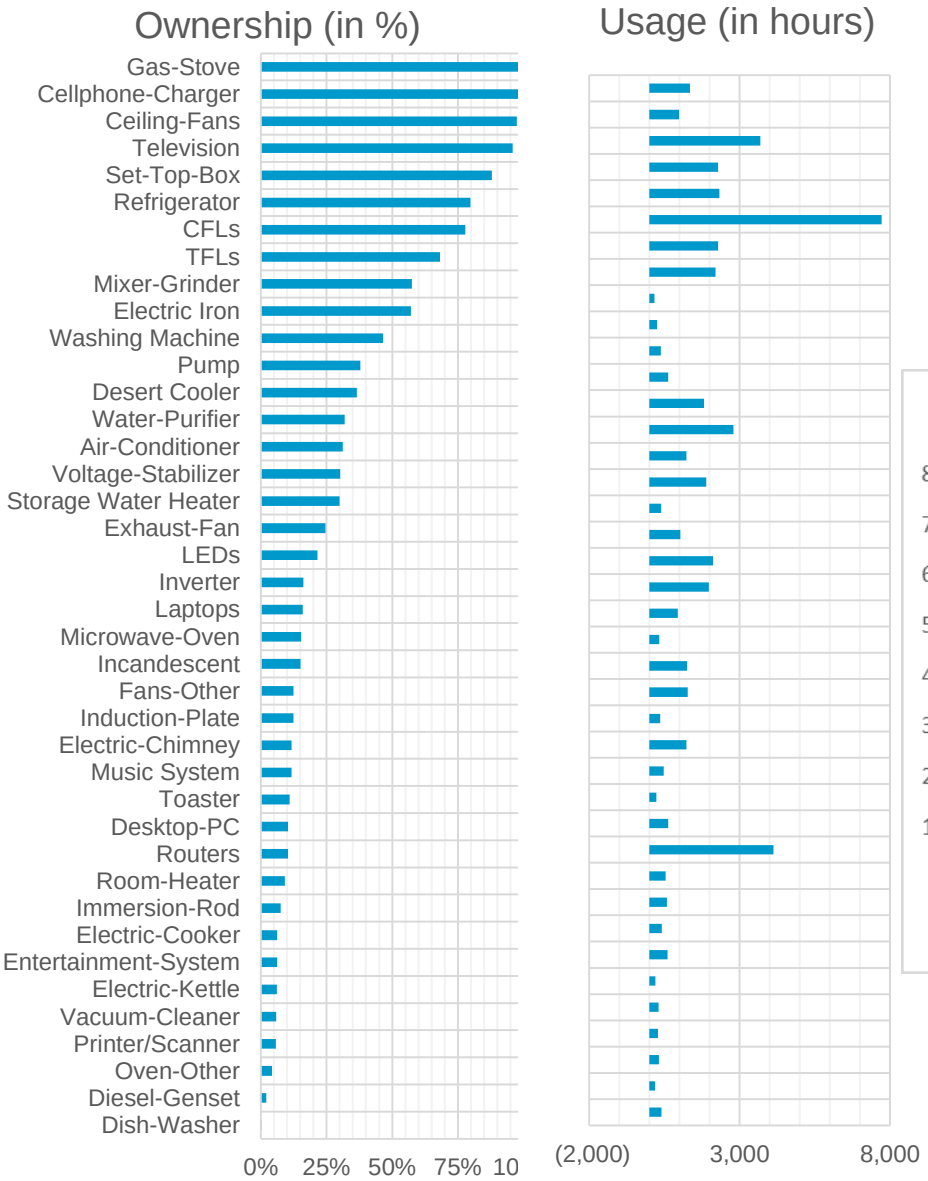
Usage Pattern
- Yearly usage hours
- Seasonal and climatic variation
- Socio economic strata

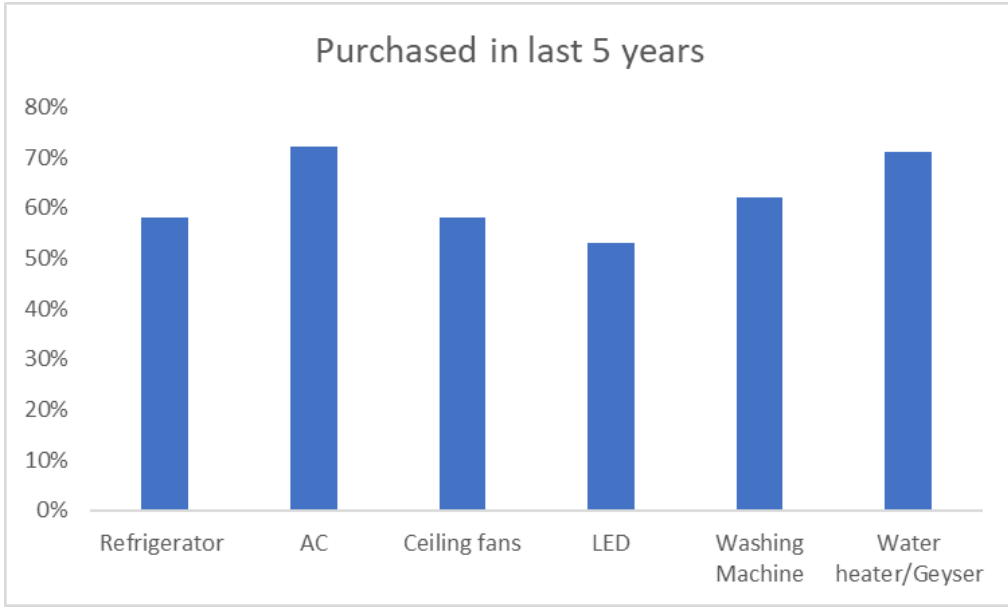
Structured household interviews were conducted using CAPI technique

Distribution of Respondents Across Demographic Factors



Appliance Ownership and Usage Pattern





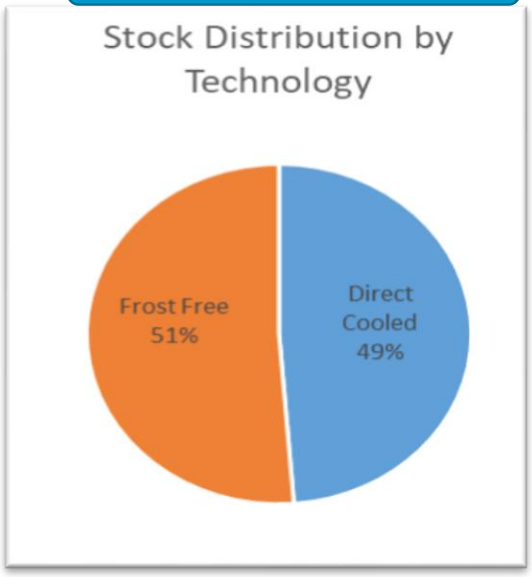
Appliance Ownership and Usage Pattern

Appliance	Parameter	% and annual hours	Climatic zone	Socio economic characteristics
Refrigerator	Ownership	80%	No impact	No impact
	Usage	7719	Temperate zone shows highest usage, followed by composite	No impact
AC	Ownership	31%	Similar across all climatic zones except cold climate	Increases with increase in income
	Usage	1200	Similar across all climatic zones except cold climate	No difference
Ceiling fan	Ownership	97%	100% ownership across climatic zones except cold climate	No impact
	Usage	3694	More than 3500 average annual usage hours across all climatic zones except cold climate	No impact

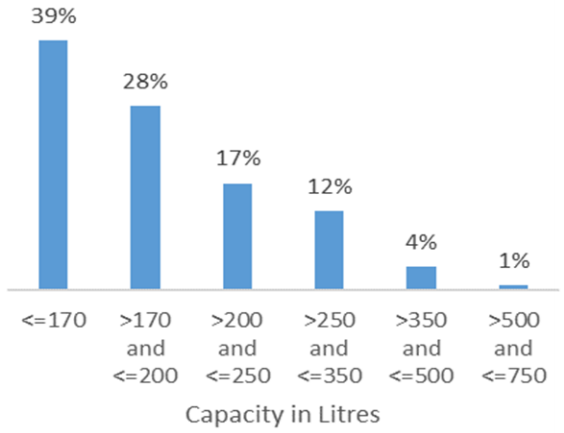
Appliance	Parameter	% and annual hours	Climatic zone	Socio economic characteristics
LEDs	Ownership	22%	Cold climatic zone reflected lower ownership while Hot-dry reflected highest ownership	Increases with increase in income
	Usage	2113	Lesser annual usage hours observed in cold and hot-dry climatic zone	No impact
Washing Machine	Ownership	47%	No impact	Lower income groups show less ownership compared to middle & higher income groups
	Usage	379	Cold climatic zone reflected maximum usage	Increases with increase in income
Water heater/ Geyser	Ownership	30%	Cold climatic zone reflected highest ownership	Ownership is dependent on socio economic strata
	Usage	395	Cold zone reflected highest usage while Hot-Dry climate reflected lowest use	No significant impact

Key Technological and Behavioral Patterns

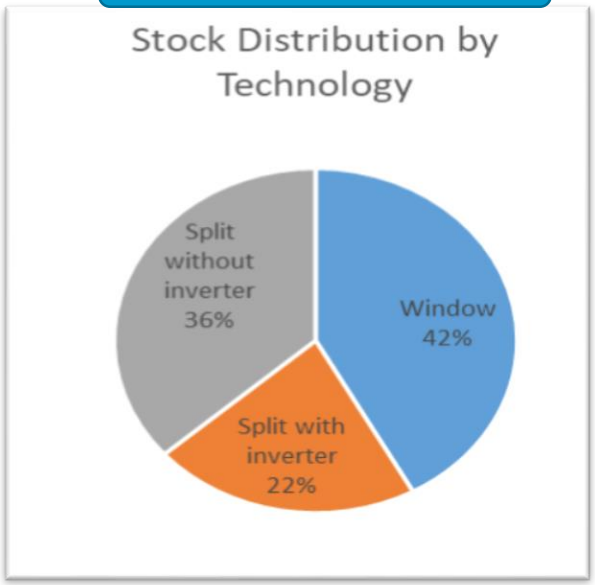
Refrigerator



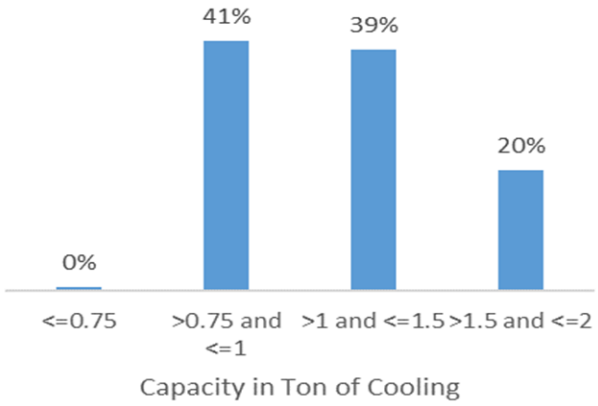
Stock Distribution by Size



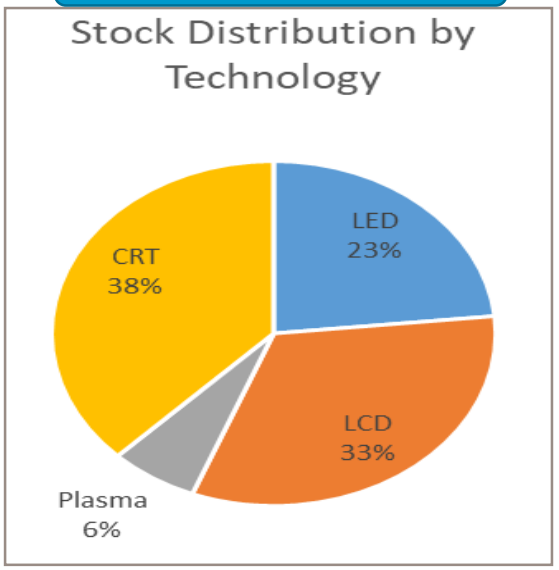
Air Conditioners



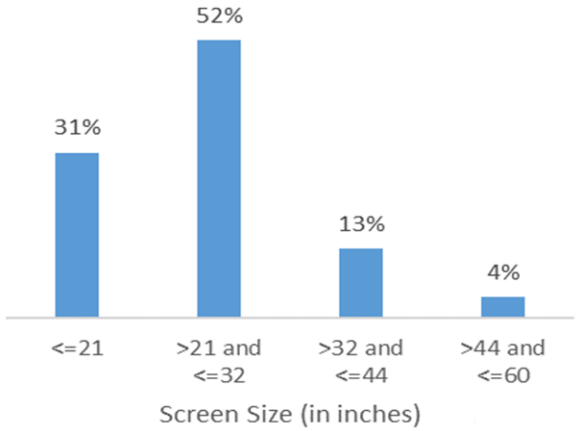
Stock Distribution by Capacity



Television

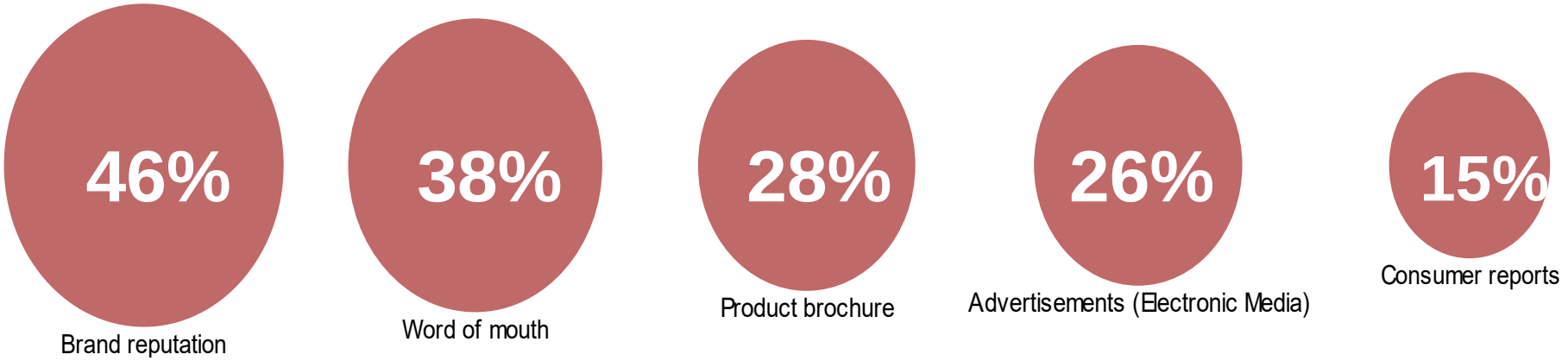


Stock Distribution by Size

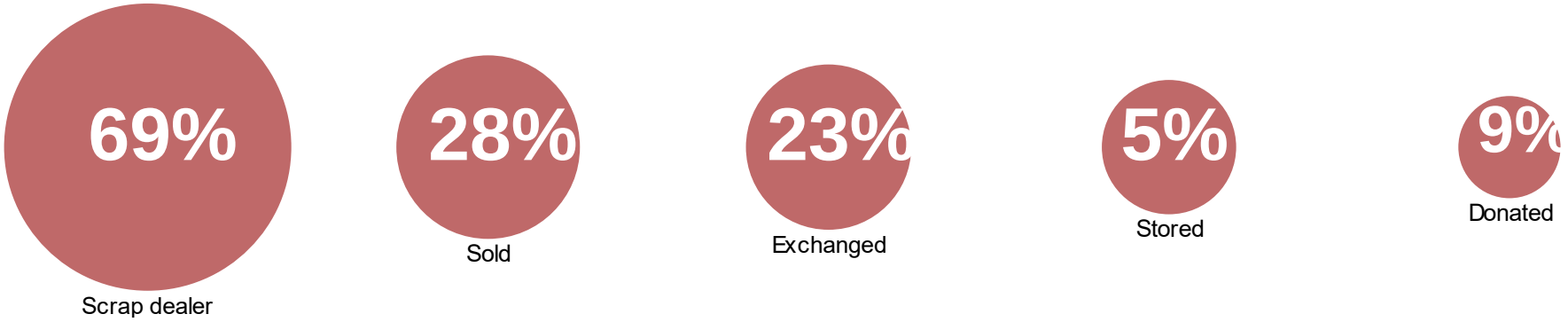


Purchase and Disposal Behavior

Purchase



Disposal



Outcomes and Way Forward

- Appliance ownership and per capita energy consumption rising
- Deeper insight on appliance ownership and electricity consumption
- Insights on variations in energy consumption across climatic zones, demographic parameters and socio economic strata
- Periodic surveys should be conducted to analyze trends
- Data beneficial to academicians, think tanks, policymakers, utilities and consumers
- The data will enable-
  - Formulation of product and region specific strategies and policy interventions
  - Enable estimation of more realistic energy savings
  - Promote better understanding of future electricity demand
  - Enabling research, modelling, better planning and demand side management programs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