Electricity Access and Demand Growth

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Today's Talk

- Electrification: India in the world
- Relationship between electrification and demand growth
- Policy implications
Electricity Access in India

- 2001-2016: 55% to 80%
- Epicenter: Uttar Pradesh and Bihar
- *Saubhagya* scheme
Modes of Electricity Access

- Grid extension: the historical normal
- Distributed generation: an emerging alternative
- Comparing costs of electricity access: geography, income
- India: overwhelmingly grid – different story in Sub-Saharan Africa
Electricity Access and Power Demand

- Do standard energy-economy models underestimate demand growth?

- Mexico: tipping points in power demand

- Evidence from India, Haiti, Kenya, Uganda: minimal power demand among the poor – especially in off-grid setting

- Highly relevant to India: remaining non-electrified households are very poor, given grid is now accessible everywhere and connection costs low

- Comparing costs of electricity access: geography, income

- India: overwhelmingly grid – different story in Sub-Saharan Africa
China’s Story

- 1949: no rural electrification
- 1978: 68% rural electrification - before economic reforms
- 1997: 97% rural electrification
- From distributed small hydro to a national grid
Rural Electricity Demand in China

- Per capita demand, rural areas, 1993-2002: from 168 kWh to 404 kWh

- Washing machines among rural population, 1990-2004: 9.1% to 37.3%

- Higher wealth levels and reliable service encourage appliance ownership, leading to growing consumption
Vietnam’s Story

- 1975: no rural electrification, major infrastructure destruction from war
- 1996: 50% national electrification rate
- 2009: 96% national electrification rate
Rural Electricity Demand in Vietnam

- Per capita demand, 1975-2009: from nothing to ~ 300 kWh

- Appliance ownership in 2008, rural areas: 83% color television, 75% fan, 55% rice cookers

- Higher wealth levels and reliable service encourage appliance ownership, leading to growing consumption

- Important role of affordable appliances
Figure 10: Appliance Ownership, by Years of Electrification

- **Color TV**: 83%
- **Fan**: 75%
- **Rice cooker**: 54%
- **Water pump**: 30%
- **Flat iron**: 15%
- **Refrigerator**: 14%
- **Car battery**: 10%
- **B&W TV**: 4%

The graph shows the fraction of households (%) with various appliances over different electrification periods in Vietnam.
Conclusion: Implications for India

- Key to rural demand growth: income growth, quality of service, affordable appliances – in that order

- India: negligible power demand among rural poor – could this change?

- Rural electricity demand to depend on success in poverty alleviation

- Without income growth, quality of service and less expensive appliances play a secondary role