

A Regional Decomposition of Domestic Electricity Consumption in India: 1980-2005

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Outline

- Brief overview of national electrification policy
- Status of electrification in India
- Electricity access and consumption in the residential sector
- Decomposition methodology
- Results of regional decomposition analysis
- Conclusions

History of Electrification Policy

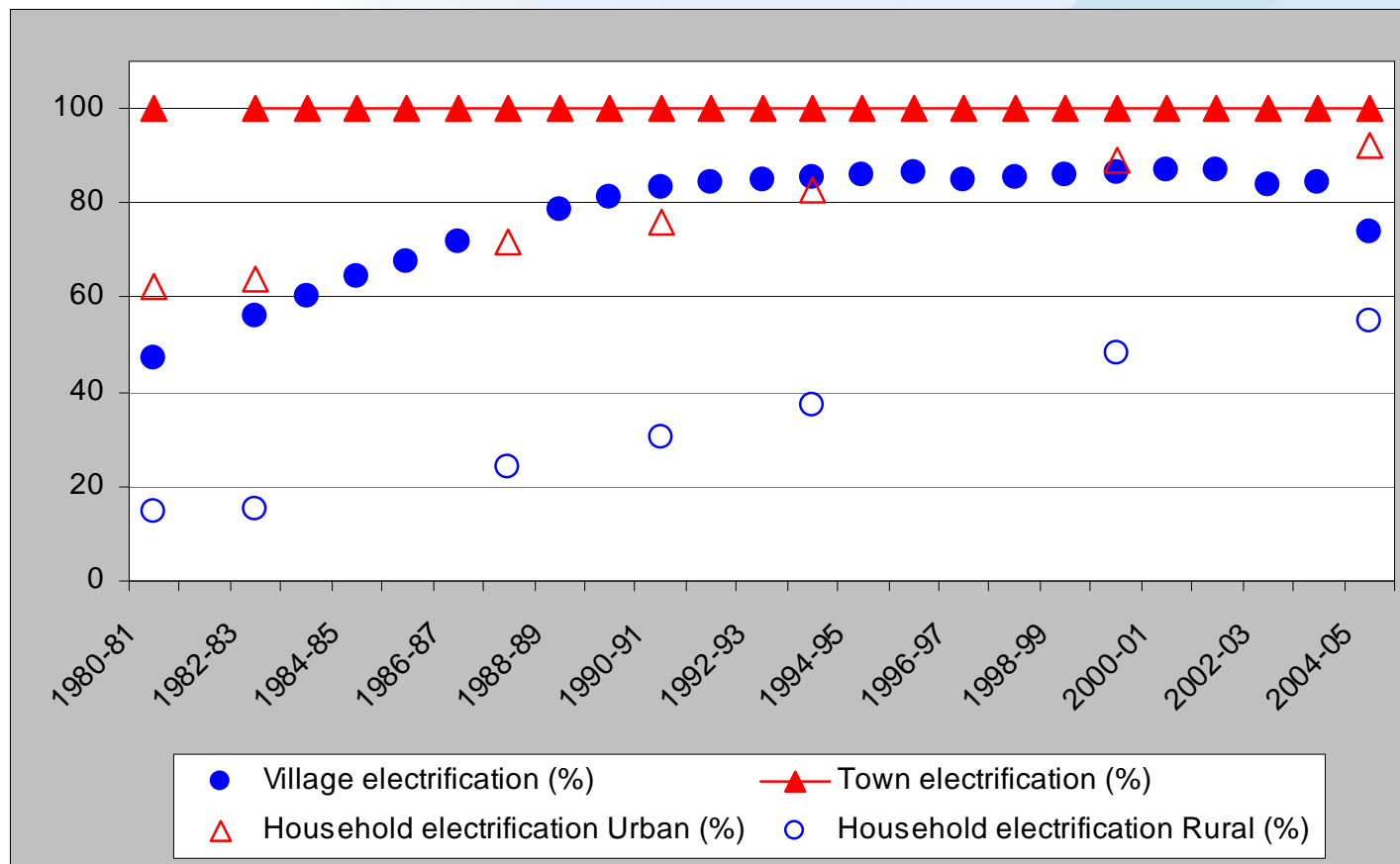
- In 1947 nationalized state utilities (SEB) were organized as vertically integrated monopolies
- High subsidies led to big losses and public utilities getting bankrupt
- Private participation allowed to attract funds in early 1992 with amendments to the Electricity Supply Act of 1948
- Most recently the Electricity Act (2003) was enacted to encourage competition in electricity supply

Recent Electrification Targets

- Rural Electrification Policy (2006) aims at provision of electricity access to all households by 2009.
- The National Electrification Policy (2005) sets targets for
 - total village electrification by 2010
 - total household electrification by 2012

But Can Stated Targets be Met?

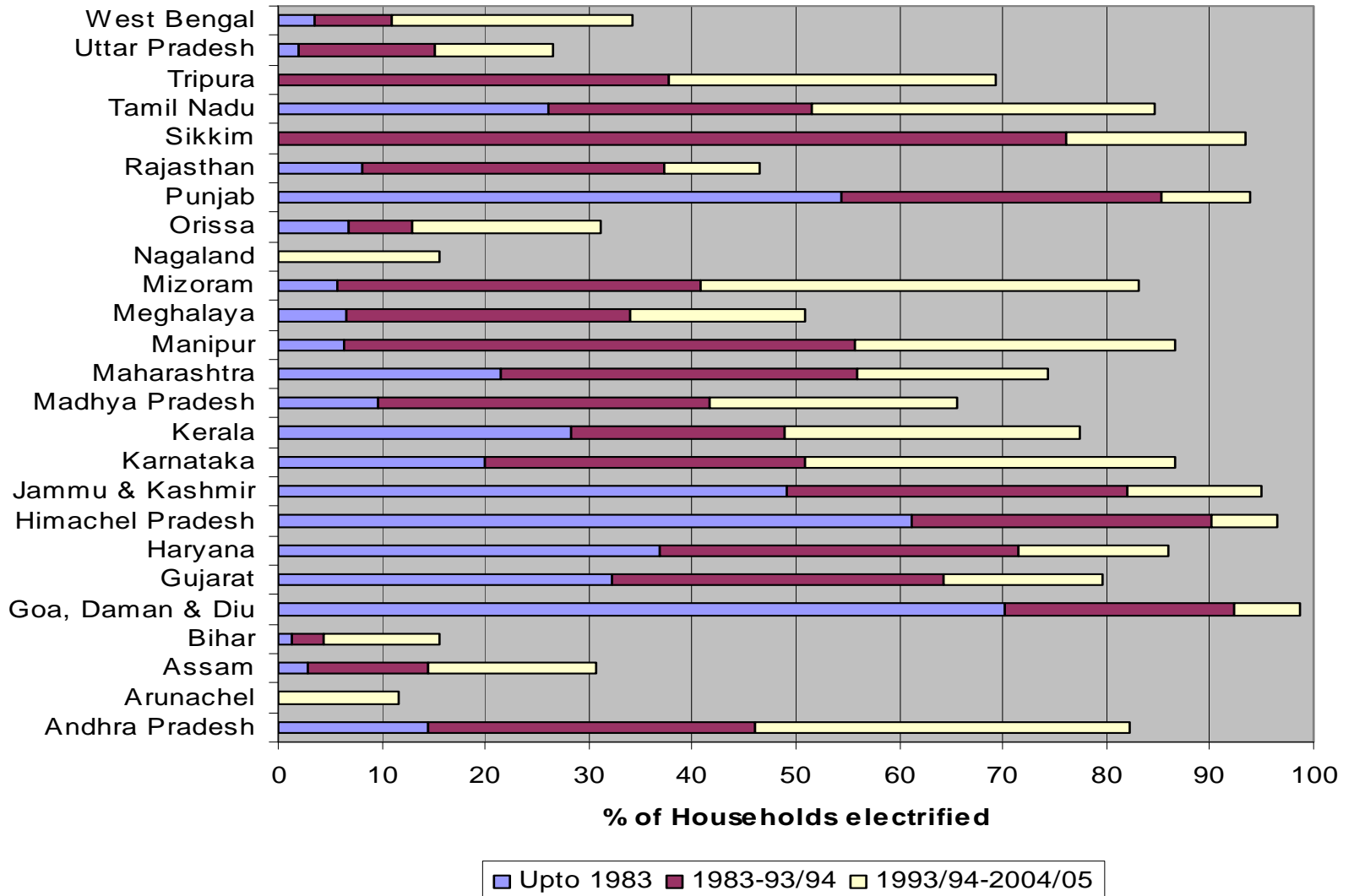
Trends in Electrification from 1980-2005



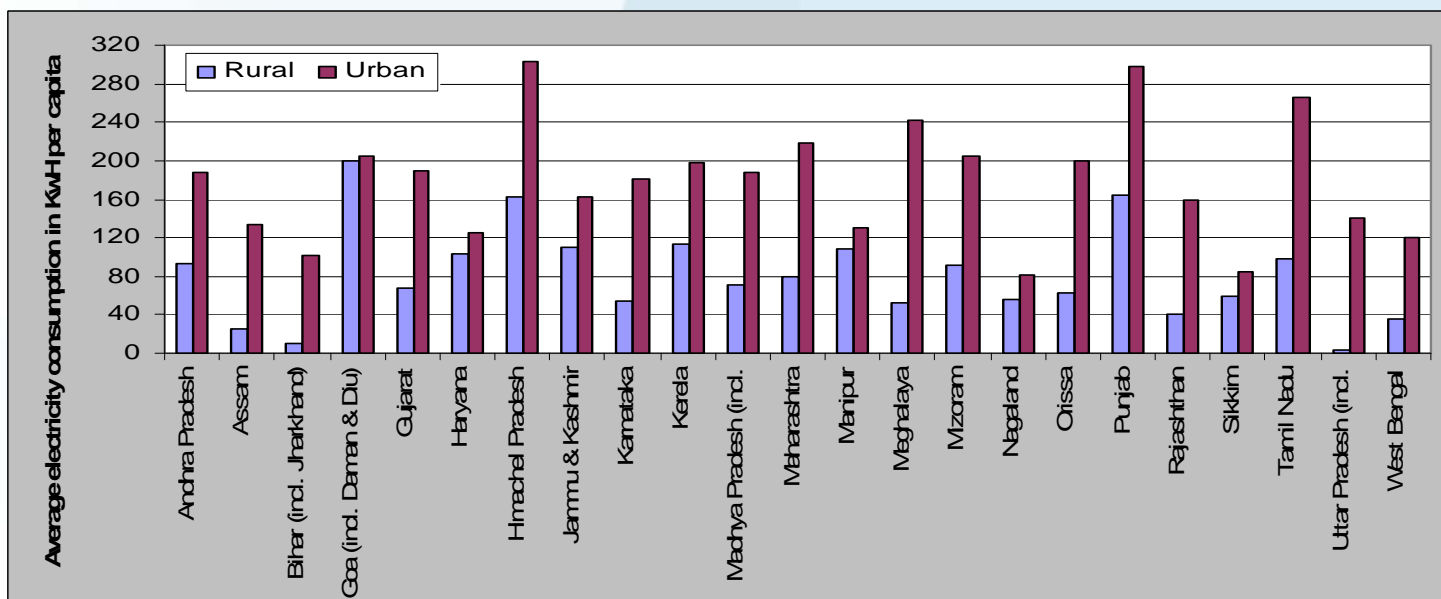
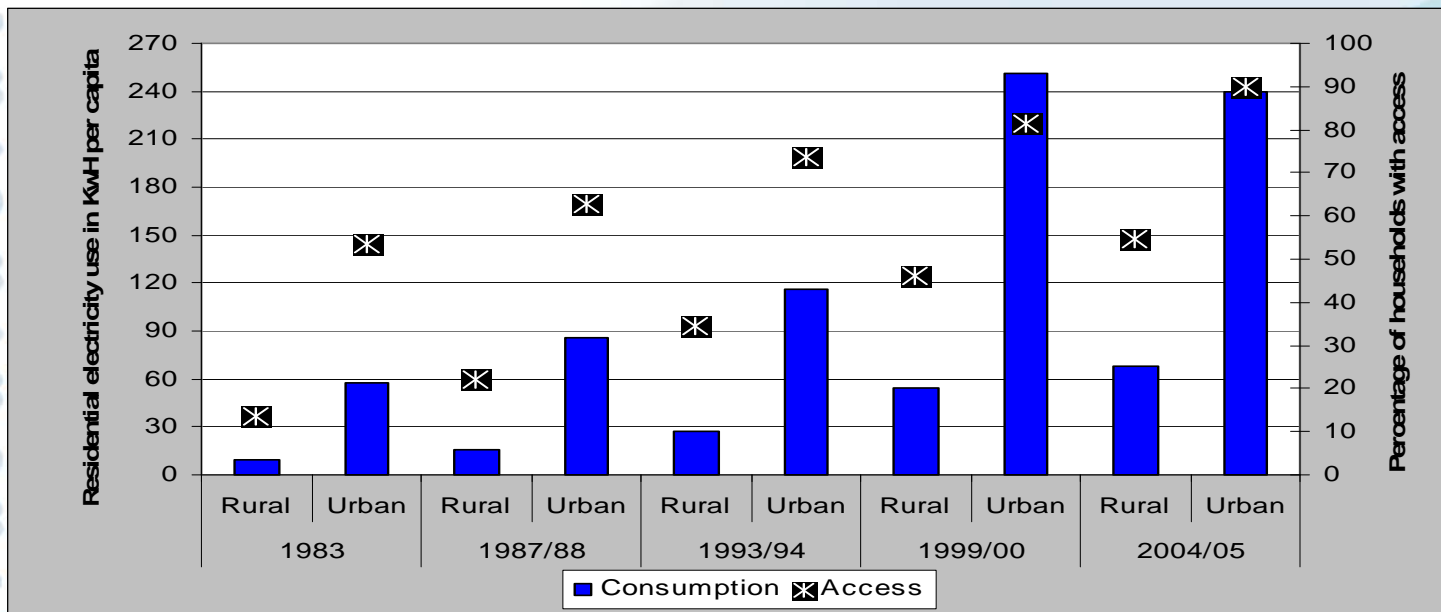
Differences in Rural Electrification

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Progress in Rural Household Electrification



Variation in Household Electricity Use



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Decomposition of Household Electricity Consumption

- Objectives
 - Understand the relative importance of changes in the size of population and households, increases in connectivity, and changes in level of consumption per connected household in rural and urban sectors across regions of India
- Data
 - National Sample Survey Organisation (NSSO) – Household Consumer Expenditure Surveys
 - Central Electricity Authority (CEA) Electricity Connections and Sales Statistics
 - Census of India – Population and Household Statistics

Methodology for Decomposition

$$El = \sum_i \sum_j El_{ij} = \sum_i \sum_j \frac{El_{ij}}{\hat{H}_{ij}} \frac{\hat{H}_{ij}}{H_{ij}} \frac{H_{ij}}{N_{ij}} \frac{N_{ij}}{P_i} P_i = \sum_i \sum_j el_{ij} a_{ij} s_{ij} f_{ij} P_i$$

Electricity consumption per connection (state i, rural/urban: j)

Share of connected households (state i, rural/urban: j)

Household size (inverse; state i, rural/urban: j)

Rural/urban share in population (state i, rural/urban: j)

Population (state i)

$$=: \Delta el_{t+1,t} + \Delta a_{t+1,t} + \Delta s_{t+1,t} + \Delta f_{t+1,t} + \Delta P_{t+1,t}$$

Results – All India Changes

Contribution to total change due to change in:

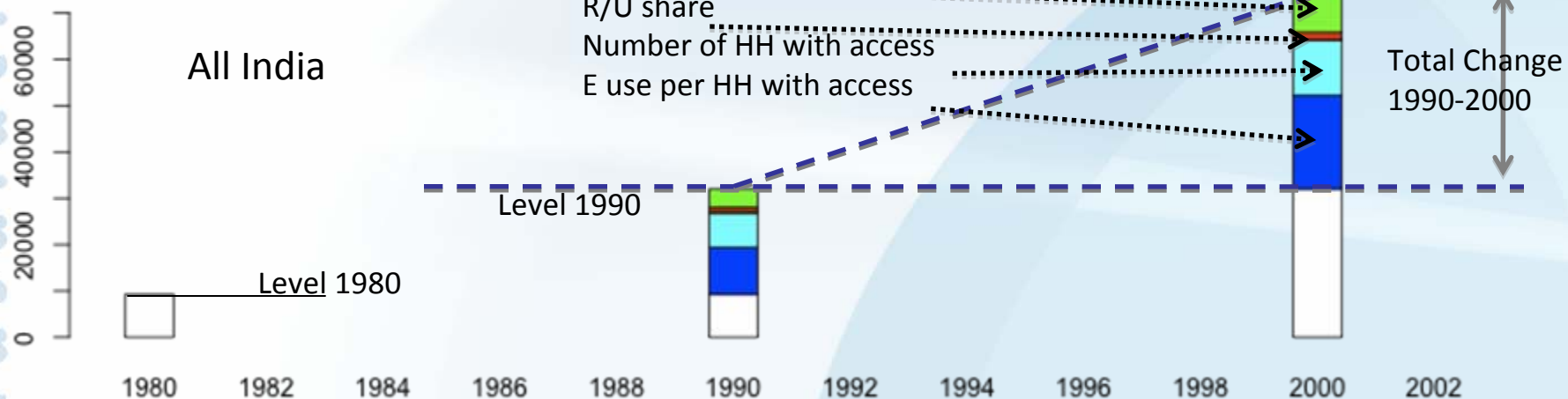
Population size

R/U share

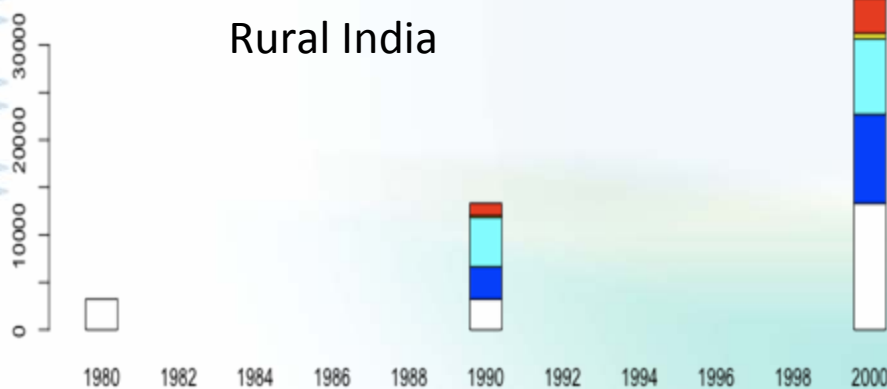
Number of HH with access

E use per HH with access

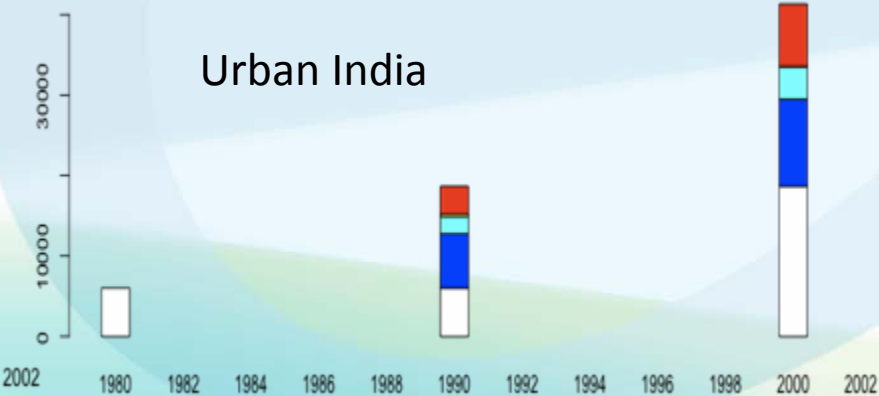
All India



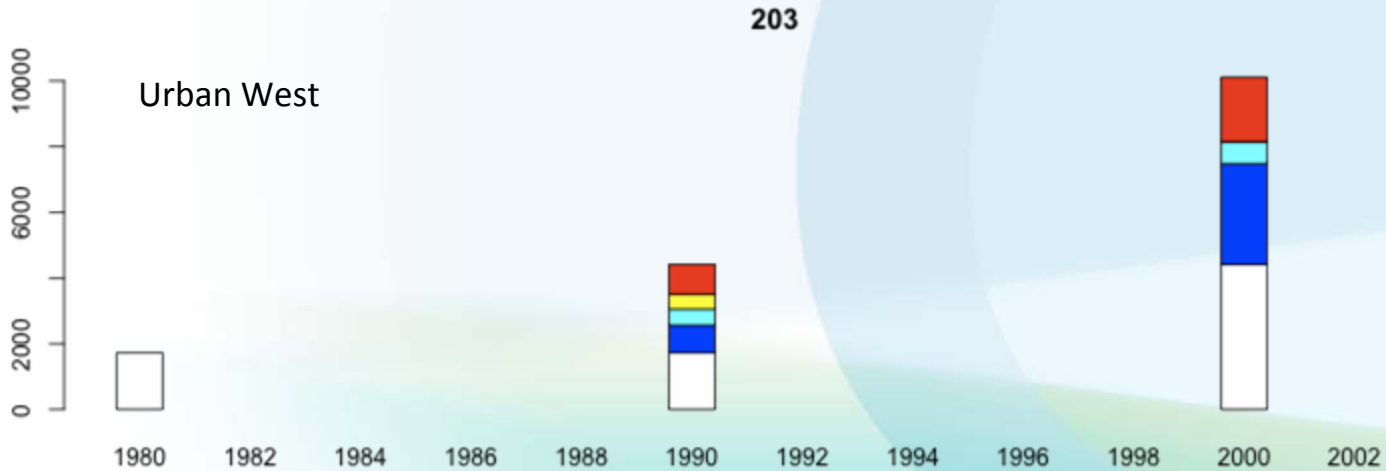
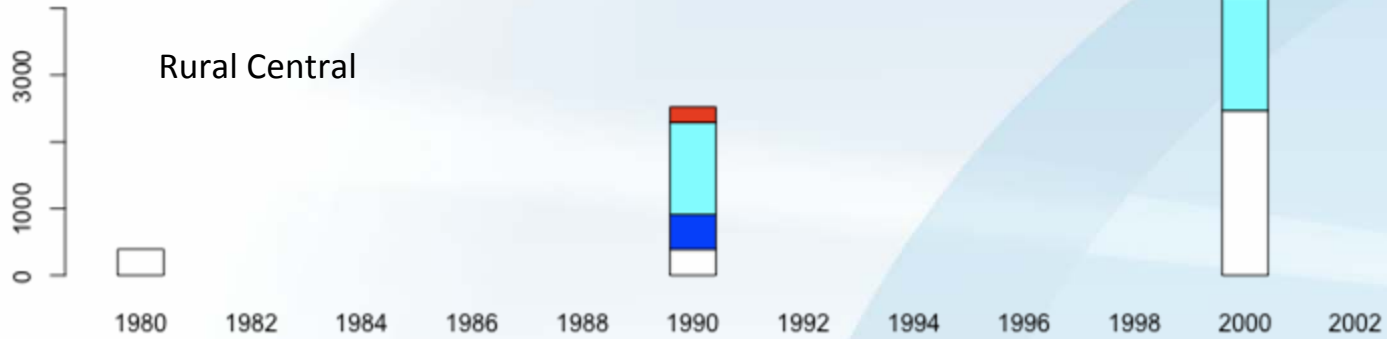
Rural India



Urban India



Results – Regional Changes





Conclusions

- Stated targets unlikely to be reached if current trends continue
- Rural household access and use remains very low and most of past change is due to increase in connections and population
- In urban areas population growth and increase in consumption per connected households explain most of the change
- Huge regional variations in electrification achievements, consumption levels and relative importance of key drivers in explaining change