

# UNDERSTANDING ENERGY INEQUALITY

Despite making great strides in energy access and availability, the country sees disparity across regions



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**T**he quality and quantum of energy consumption is a barometer of the progress of any society today. Household energy consumption is an essential subset of this, which in turn comprises household electricity consumption. Several researchers have studied the nature of this consumption at four distinct levels: access, availability, affordability, and quality and reliability.

This subject assumes importance in the context of the ambitious goal of supplying 24-hour electricity to every household by 2022 through the Union government's restructured policy initiatives (Deen Dayal Upadhyaya Gram Jyoti Yojana, Saubhagya and Power for All schemes). On the other hand, states have taken initiatives such as tariff

subsidies or free electricity thresholds to ensure minimum electricity consumption by the poorest sections of society. They have moved beyond yesteryear's definition of rural electrification, which has grudgingly moved from that of an electric pole in villages to certain minimum use and coverage of households, including the bottom-most sections of the village. One must admit that the aspirational demand for electricity at the household level and its political recognition has accelerated the pace of the efforts taken, pushing aside all the techno-financial excuses of earlier. This proves energy consumption is essentially a governance issue, not a techno-managerial one.

### Access inequality

Access to electricity has considerably improved geographically during the last two decades (2005 onwards). This can be seen by comparing the data of districts where more than 75 per cent of households had access to electricity in the last two Census exercises (2001 and 2011). However, rural India fares much more poorly compared to its urban counterpart. While southern Indian states have fared quite well in this regard, the same cannot be said of the non-hilly regions of central and northern India. There are a significant number of districts in the states of Uttar Pradesh and Bihar, where only about 20 per cent of the rural households have electricity access (see 'Improvement in electricity access').

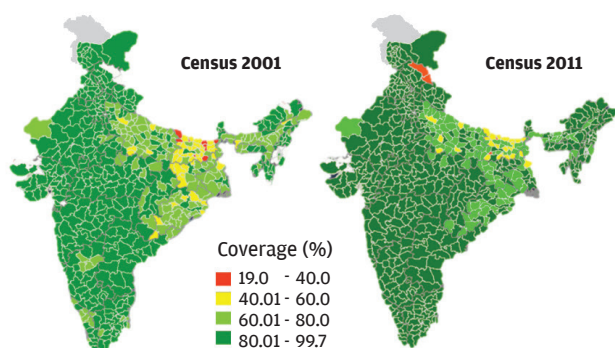
This raises the question of governance. How is it that the hilly states with difficult terrain are able to take electricity to their nooks and corners, while states with better tracts in the plain region have not been able to do so? Moreover, how is it that the pace of electrification goes up rapidly once it becomes a political priority, despite other hurdles remaining more or less the same? These questions need serious review, especially when one considers that the Census 2011 data reveals a large contiguous track of districts where more than 50 per cent of households depended on kerosene for their lighting requirements.

### Inequality in electricity consumption

Geographical spread of the access to electricity is only one part of the story, with consumption being the other. Is the average consumption below, above or at the borderline of the energy poverty? To determine this, it would bode well to benchmark our analysis against one of the definitions of energy poverty that prescribes the floor. According to the 2005 and 2017 drafts of the National Energy Policy, a person is "energy poor" if he or she does not have access to at least an equivalent of 35 kg liquefied petroleum gas (LPG) per capita per year from liquid or gas fuels; or from an improved supply of solid fuel sources and efficient and clean cookstoves. He or she also needs 120 kWh electricity per capita per year for lighting (amounting to 1 kWh per household per

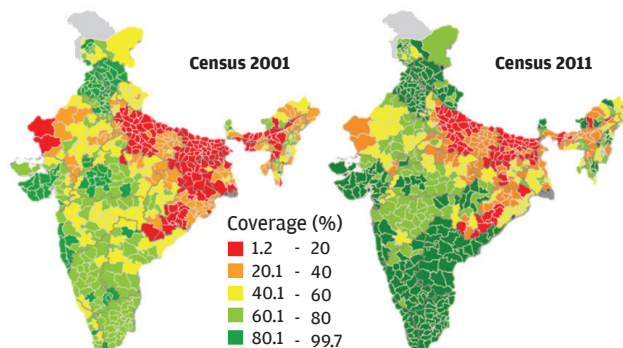
## IMPROVEMENT IN ELECTRICITY ACCESS

Access to electricity as a primary source of lighting in urban households



Source: Trends of India

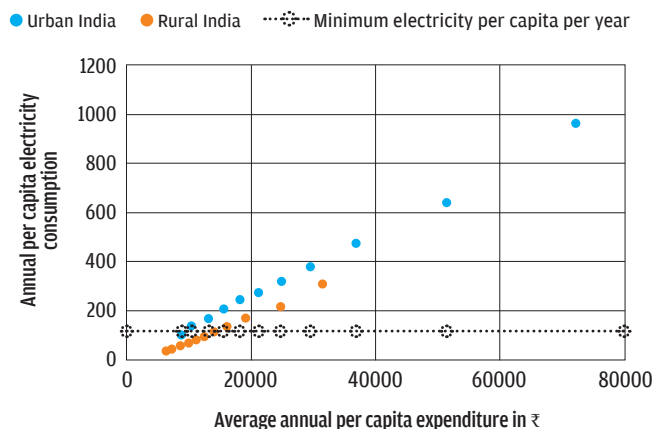
Access to electricity as a primary source of lighting in rural households



Maps not to scale

**DIFFERENCE IN USE**

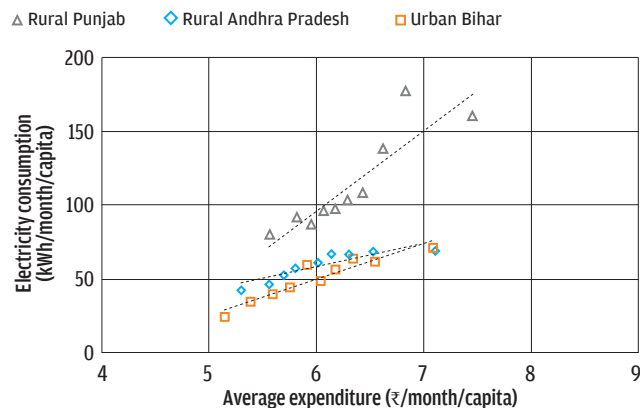
Electricity consumption in rural and urban India (2012-13)



Source: 68<sup>th</sup> round of National Sample Survey (2011-12)

**SKEWED DISTRIBUTION**

Correlation between electricity consumption and average monthly per capita expenditure



Source: 68<sup>th</sup> round of National Sample Survey (2011-12)

day), access to most basic services (drinking water, communication, improved health and education services and others), and added value to local production.

The National Sample Survey (NSS) helps assess the levels of consumption. It provides data on the household electricity consumption by prosperity as measured through the average monthly per capita expenditure (AMPCE). The 68<sup>th</sup> round of the NSS (2011-12) provides data on the annual per capita electricity consumption and annual expenditure for urban and rural areas (see ‘Difference in use’).

Household electricity consumption and AMPCE show a robust correlation, with a disparity between the rural and urban levels of consumption (see ‘Skewed distribution’). Importantly, more than half of the rural population consumes less than the bare minimum electricity, with the consumption of the richest rural decile is comparable with that of just the sixth lowest urban decile. Such a skewed distribution becomes even more glaring when we compare these across states. The urban consumption in Bihar, is similar to the rural consumption of Andhra Pradesh which highlights poor levels in the former. However, the poorest rural households in Punjab consume more electricity than the richer households of Bihar and Andhra Pradesh, showing the severity of intra-state inequality. The replicating trend of inequality across states and regions are worrying for policymakers and planners. Lower consumption levels can either be attributed to inadequate availability of electricity or the lack of affordability for the consumer. Since these states’ AMPCE (economic status) is comparable, lower consumption could also be the outcome of availability issues due to limited infrastructure.

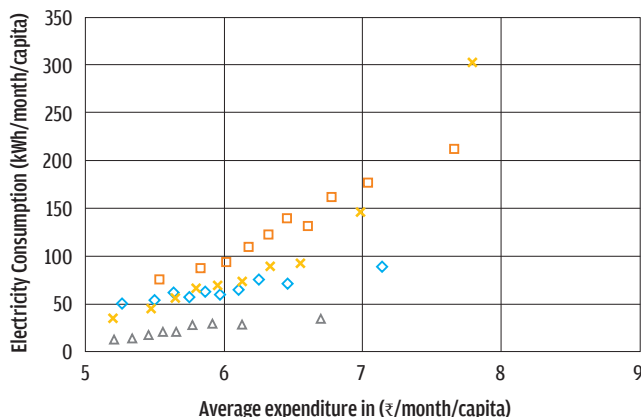
The rural-urban divide is strong both within states and among different states (Tamil Nadu and Uttar Pradesh) (see ‘Striking divide’ p171). The poorest of the rural Tamil Nadu consumers use significantly more electricity than the richest rural Uttar Pradesh consumers. Such inequality and striking electricity poverty needs serious attention with an immediate solution. A similar trend is observed when we compare urban consumption in both the states, as well as their internal trends.

Further, the poorest of Punjab’s rural consumers use more than twice that of the richest in Jharkhand (see ‘Question of constraint’ p171). This raises many questions on affordability, tariff structure, use of energy-efficient appliances and, more importantly, infrastructure constraints in terms of electricity availability in rural areas. This highlights two important points. The difference in infrastructure between regions constrains the consumption of electricity, whereas within a region, at the household level, it is the income level that matters. Similarly, within each region, between the rural and the urban segment, infrastructural constraint operates geographically while income constraint operates at the household level.

## STRIKING DIVIDE

Inter- and intra-state inequality in electricity consumption

◆ Rural Tamil Nadu    □ Urban Tamil Nadu  
 ▲ Rural Uttar Pradesh    × Urban Uttar Pradesh

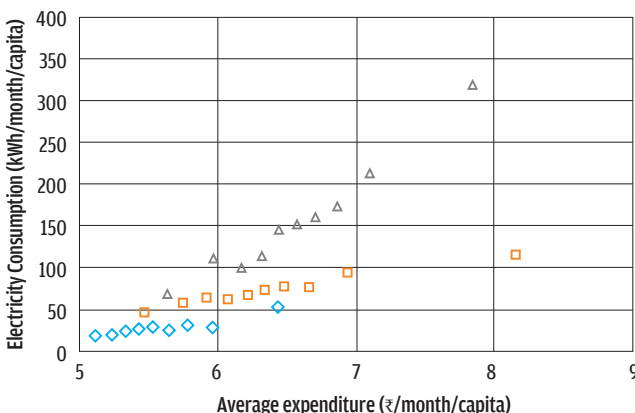


Source: 68<sup>th</sup> round of National Sample Survey (2011-12)

## QUESTION OF CONSTRAINT

Electricity consumption inequality in rural areas of different Indian states

◆ Rural Jharkhand    □ Rural Kerala    ▲ Rural Punjab



Source: 68<sup>th</sup> round of National Sample Survey (2011-12)

## Temporal change in electricity consumption

To understand large-scale patterns, we look at NSS data across three different rounds: the 50<sup>th</sup> (1993-94), the 61<sup>st</sup> (2004-05) and the 68<sup>th</sup> (2011-12). We notice a dramatic shift in the consumption pattern between the 50<sup>th</sup> and 61<sup>st</sup> round; at a time when power production had substantially increased and there was major unbundling of the electricity sector (see ‘Long-term consumption patterns’, p172). However, between the 61<sup>st</sup> and the 68<sup>th</sup> round, the line simply shifts a little towards the right—a pattern observed in most states.

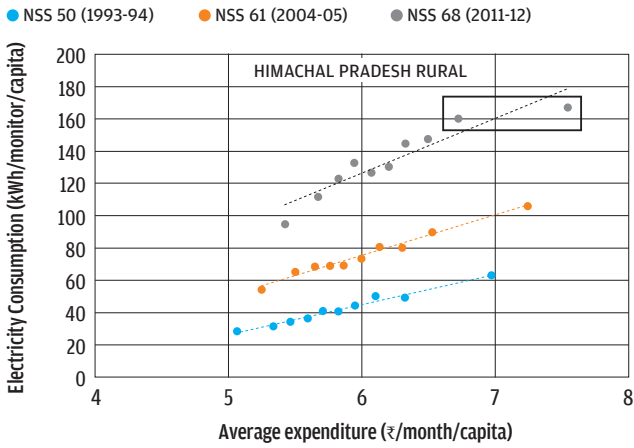
One of the interesting issues that emerge from the temporal analysis is the “runaway” or the top decile. One can notice the large income divergence between the top of the 10<sup>th</sup> decile and the remaining nine deciles, and the corresponding energy consumption gap. This raises several questions about the pattern of development. But more interesting from the energy consumption point of view is whether the top decile’s consumption shows any saturation effects. We are yet to see such a saturation even in urban areas; however, understandably, there is some plateauing in the rural consumption of Maharashtra, Gujarat, Himachal Pradesh, Haryana and other states. Whether this is due to efficiency measures, tariff differences, availability or limits to consumption itself cannot be said with certainty at this stage as these parameters would differ across different states.

Intra-state comparisons between different regions throw an interesting light on this issue (see ‘Trends within states’, p172). Within a state, *ceteris paribus* (all else unchanged) conditions apply in procedural respects. We notice that the regions show relatively undifferentiated consumption up to the sixth or seventh decile, after which there is a divergence in consumption across NSS rounds. The top decile invariably shows considerable variation across regions.

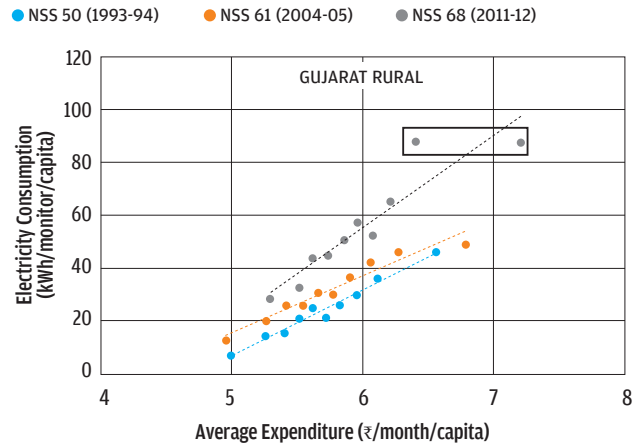
In this context, we must view the initiative taken by some state governments to provide a basic minimum supply of energy per household free of cost or at a very low tariff. This will have the unintended consequence of bringing most households above the energy poverty line, given that 100 kWh per household per month adds about 20 kWh per capita. It is not yet clear whether this will create a substitution effect or add to the net electricity consumption. While this may serve other purposes like reducing thefts at the household level, institutional theft may continue; it will improve the quality of life in the rural hinterland and shift the aspiration to the quality of the electricity supplied. In terms of income-wise distribution, the move by the state governments will shift the position of the bottom deciles. What ripple effects this will have on the higher deciles is yet to be seen. NSS data for 2016 and 2017 may show interesting if not dramatic shifts in overall consumption in rural areas. Will this improvement give a boost to rural livelihoods or enterprises? It is too early to say, but some

**LONG-TERM CONSUMPTION PATTERNS**

**Trends in electricity consumption over three decades**



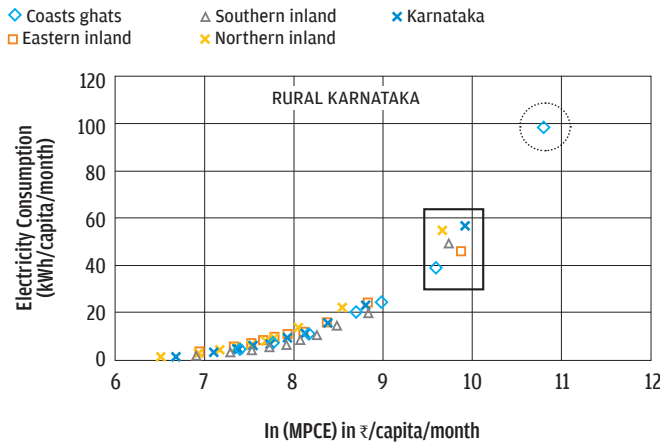
**Saturation effect in rural electricity consumption in top deciles**



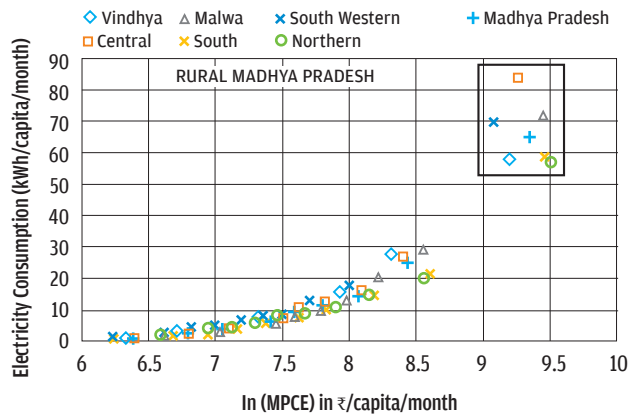
Source: 50<sup>th</sup> (1993-94), 61<sup>st</sup> (2004-05) and 68<sup>th</sup> (2011-12) rounds of National Sample Survey (2011-12)

**TRENDS WITHIN STATES**

**Intra-state and regional inequality in electricity consumption in Karnataka**



**Intra-state inequality in electricity consumption and the 'runaway' decile in Madhya Pradesh**



of the micro studies undertaken by students at the Indian Institute of Technology, Bombay have not yet given any indications.

A few conclusions can, however, be drawn from the foregoing analysis. First, the provision of entitlements gets clearly fast-tracked when these become political priorities and are recognised as such. Second, the sluggish pace of area expansion in some states is more of an issue of governance issue than of feasibility, whether technical or economic. Third, while prosperity as implied by AMPCE accounts for the individual household level consumption differences, infrastructural constraints operate at the regional level. Fourth, the growing income and energy consumption inequality between the top decile and the rest should be a matter of concern. Fifth, the step to provide a basic minimum unit to every household may raise a large number of households above the energy poverty line, provided this is an addition to the existing consumption rather than substitution. Finally, more and better electricity supply must translate into more economic activities, especially among the lower and middle deciles. ■

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