

Energy Access and Renewable Energy

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Anil Agarwal Dialogue

India Habitat Centre, New Delhi
27 February 2014

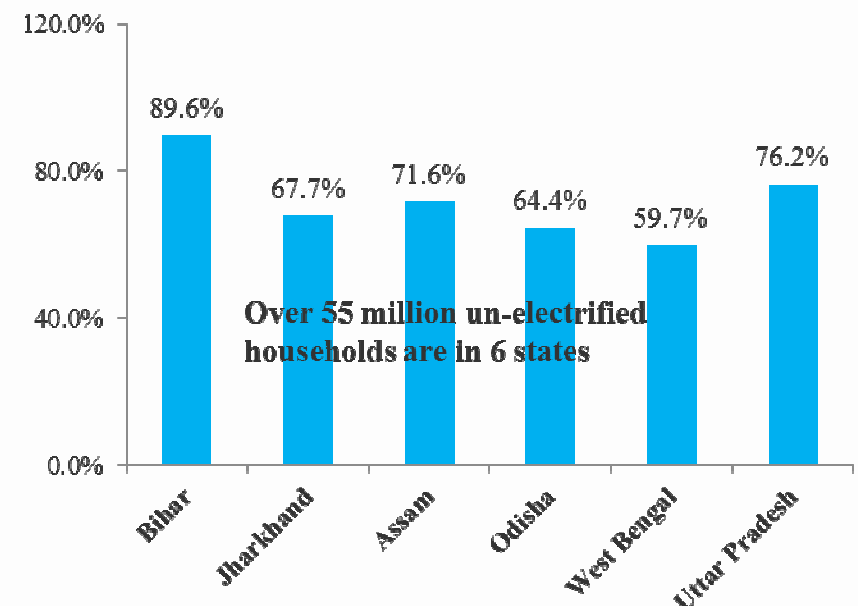
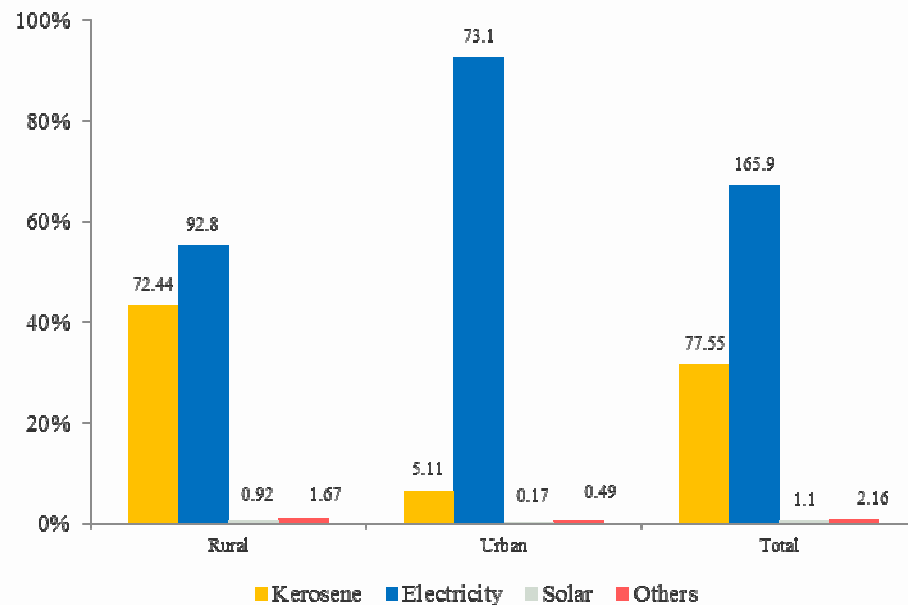
Energy Access

- **Lack of energy access is primarily a rural issue**
- **Energy access is critical to reduce rural poverty and drudgery**
- **It also is one of the fundamental conditions for human development including holistic rural development**
- **Globally, as many as 1.3 billion people (over 20 % of the global population) do not have electricity**
- **Around 2.9 billion people, over 40 % of the global population, rely entirely, or to a large degree, on traditional biomass for cooking and heating**

India Context

Electricity Access

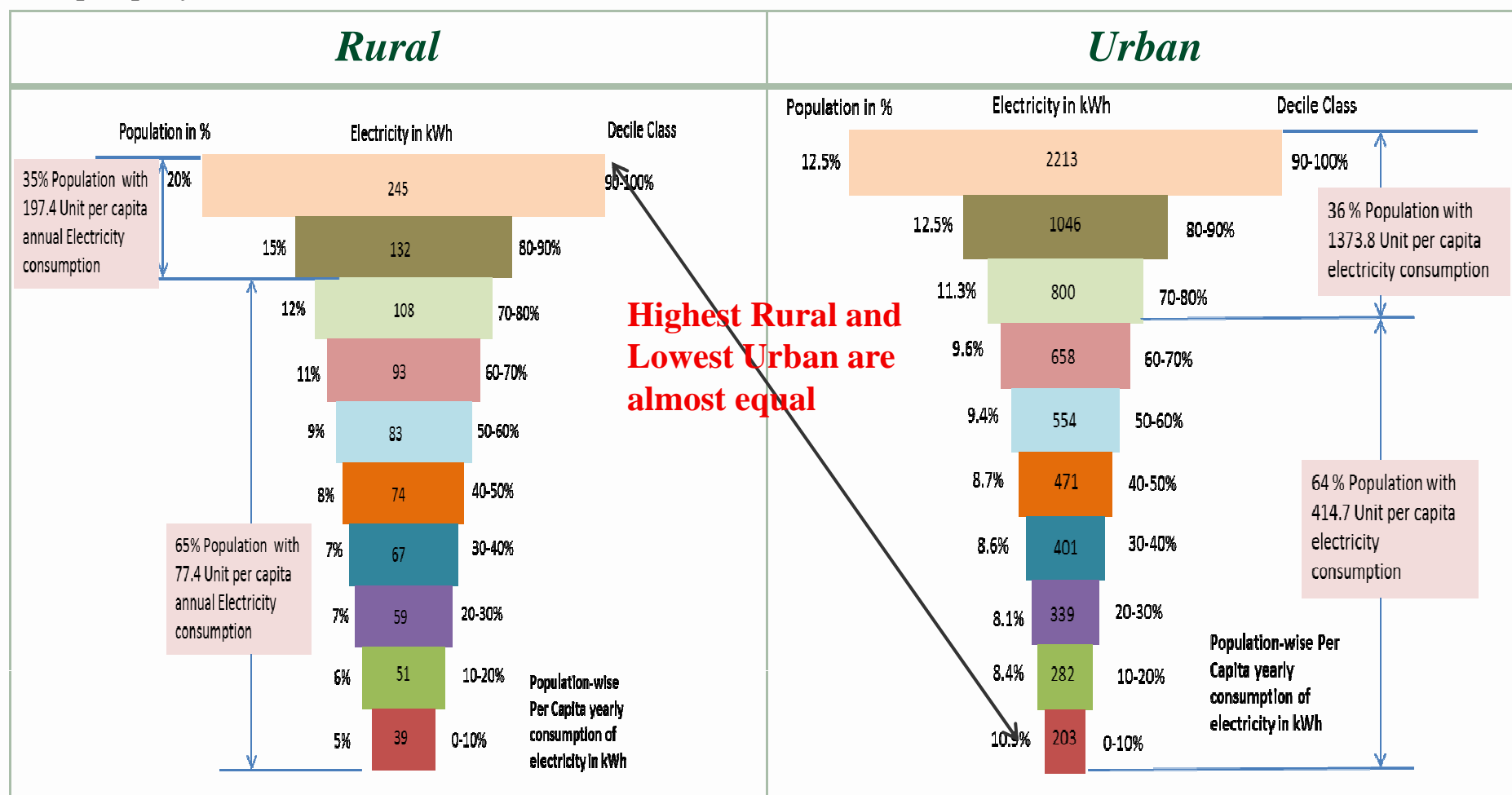
- Over 95% villages have reportedly become electrified -number of households electrified is much less
- Access to electricity stands at only around 55 % of the rural households
- Electricity access in percentage terms is deceptive – The unelectrified households only marginally decreased between 2001 and 2011- from 78 million to 75 million



Source: Census 2011

Electricity Access is an example of glaring rural-urban inequality

The 66th Round of the NSSO survey (2011) reveal that per capita electricity consumption in rural areas stood at 95 units per year. For lower 65% rural population per capita electricity consumption was only 77units per year. For urban areas it stood at 700 units per capita per year with lower 65% population consuming 415 units per capita per year.

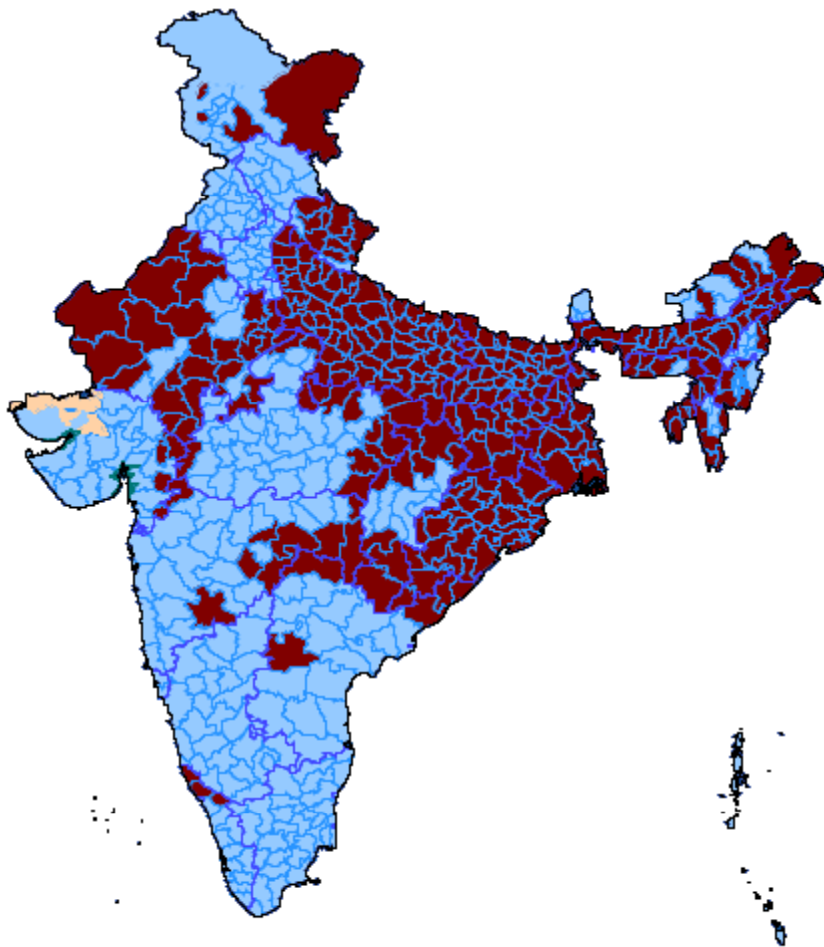


Exclude 75 million households with out electricity

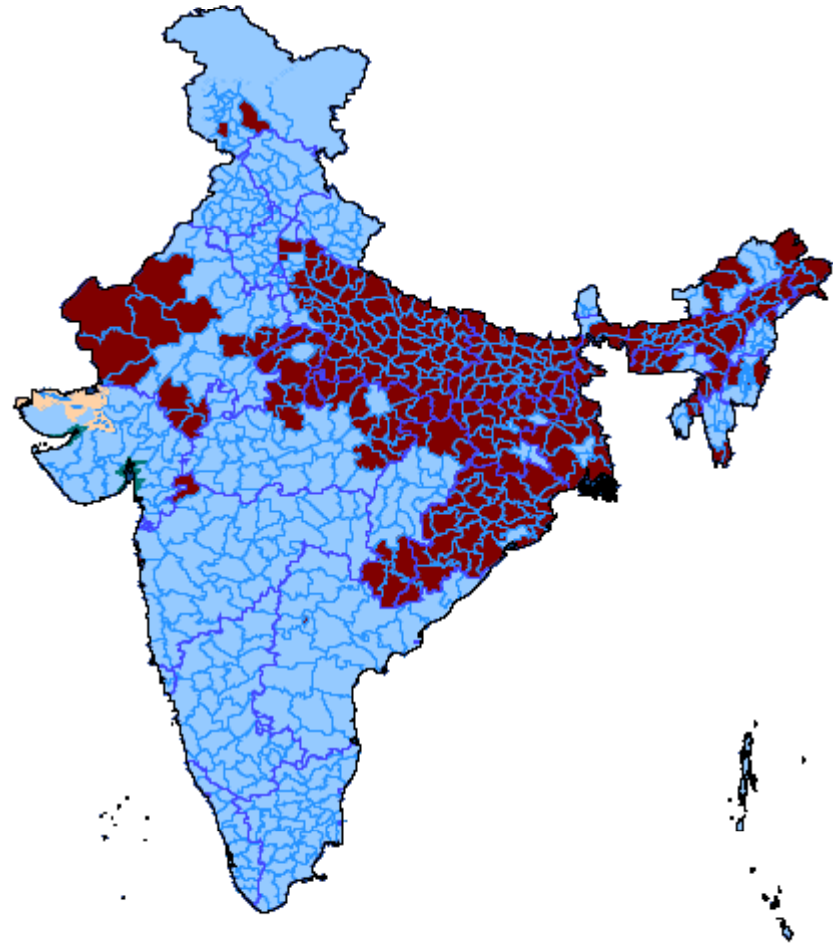
Exclude 5 million households with out electricity

Electricity in Rural areas less than 55%

Census 2001

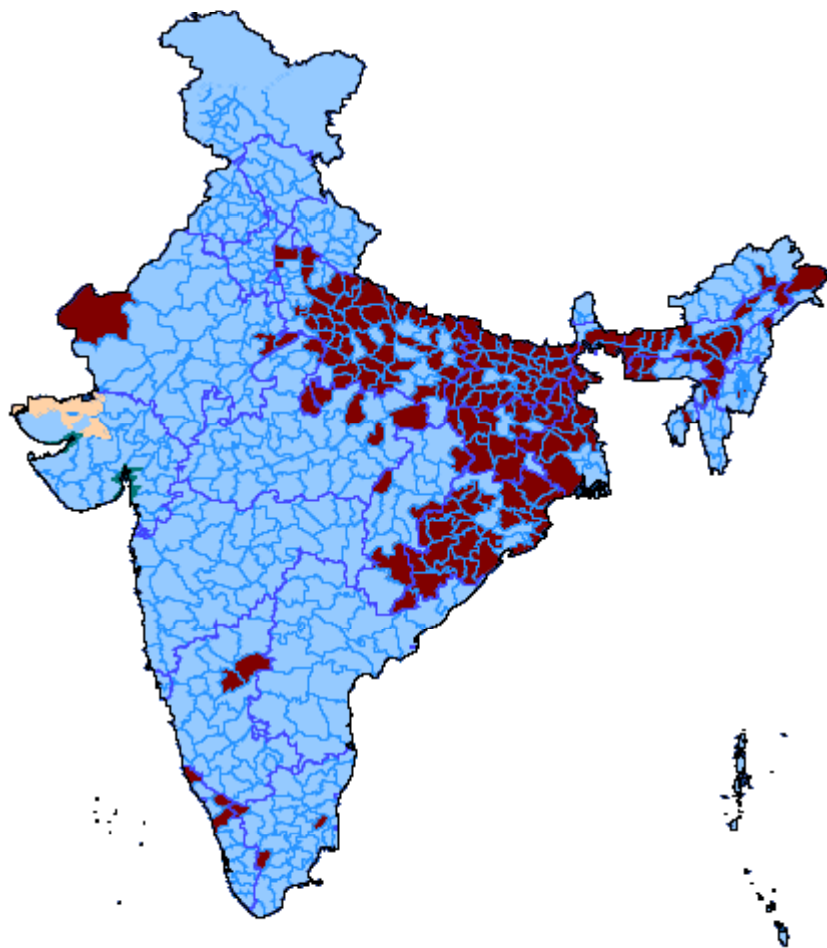


Census 2011

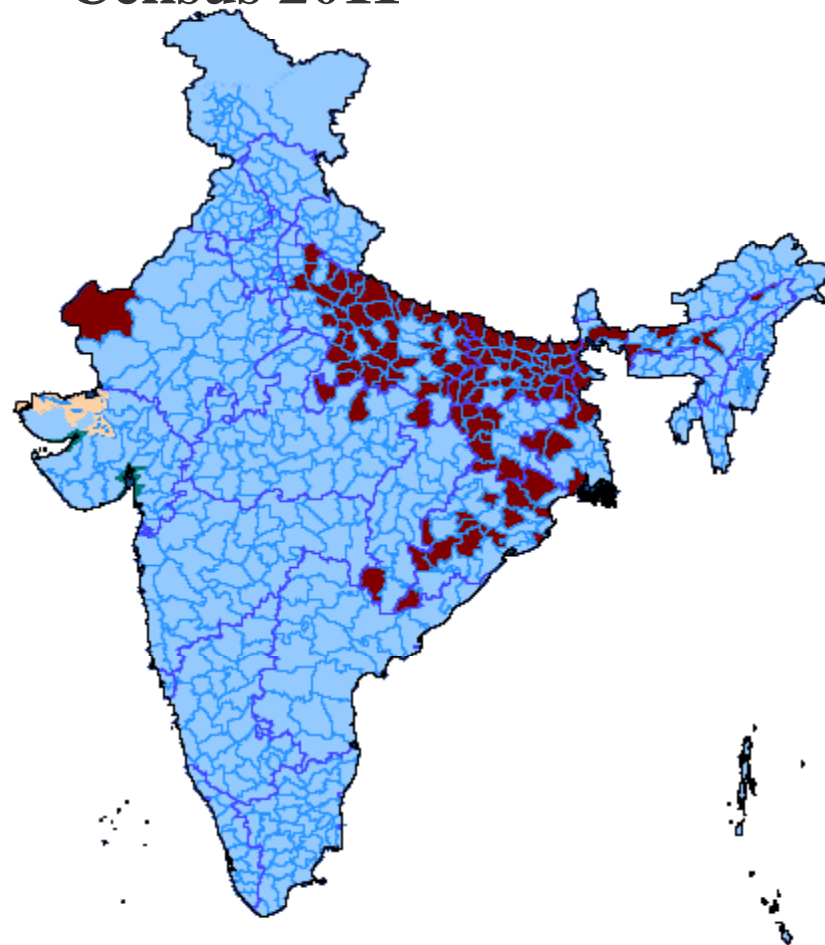


Kerosene for lighting in urban areas used by more than 20% population

Census 2001

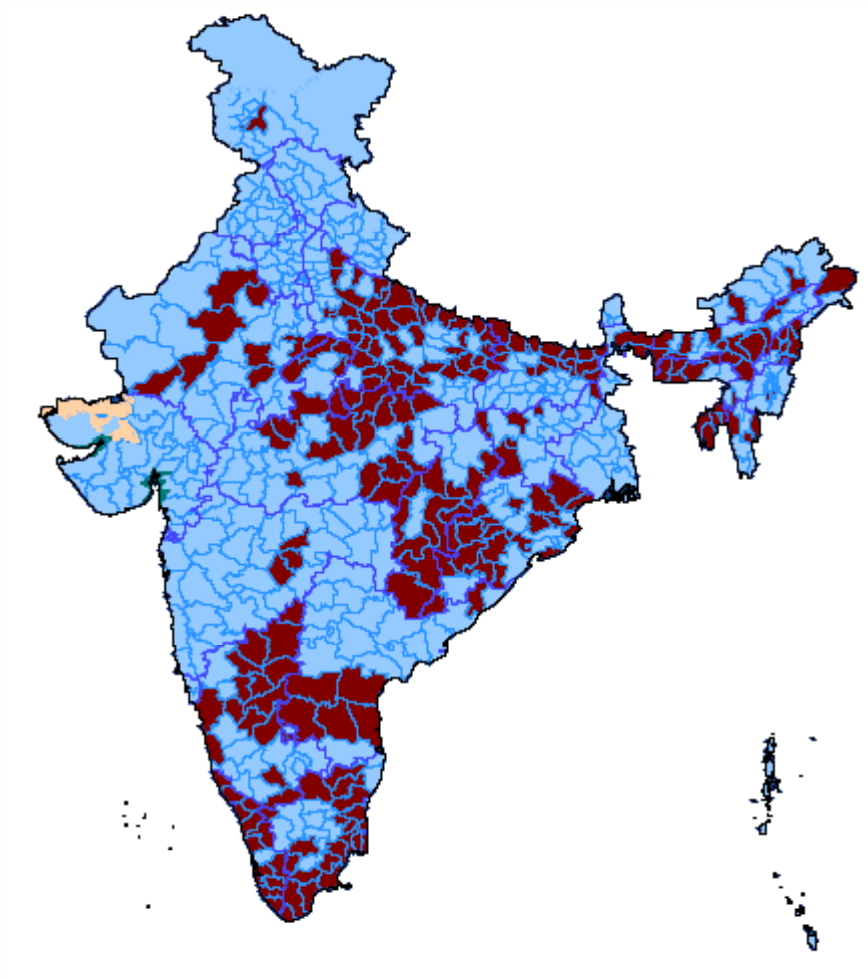


Census 2011

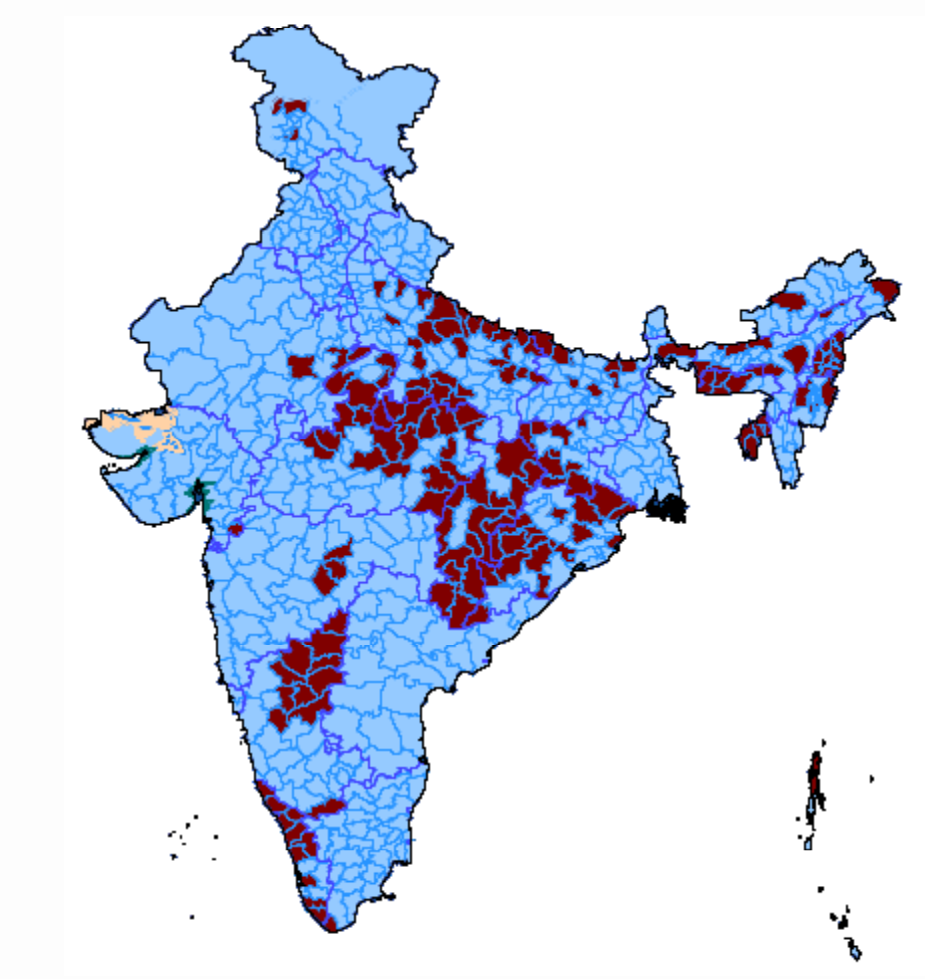


More than 40% population using firewood in urban areas

Census 2001



Census 2011



Quality of Electricity in rural areas is Poor

- Electricity supply in rural areas is quite unreliable in terms of quality and low voltage
- At the first instance availability is an issue- if at all it is available; the period is late evening or day time when villagers had no real use for it
- One evaluation found nil supply in Bihar during peak hours, while the other saw an average of about an hour. Even Maharashtra was found to have 1 hour and Haryana 2. Similar problems are there in Assam, Jharkhand and UP
- 97% households covered under RGGVY were using and spending on kerosene as an alternative source of lighting
- The electric utilities are not keen to energise villages or supply power to them. The general perception is – the more you supply the more you lose

Electricity Access - Issues and Challenges

- Appears the centralized fossil-fuel energy infrastructure has not been successful in achieving electricity access.
- Utilities have no incentive to provide electricity to villages as :
 - delivered cost is higher
 - cost of delivery increases with distance $\text{Rs } 1 / \text{kWh/km}$
 - low recovery
- Supply Constraints
 - Grid power shortage
 - Consumed elsewhere
 - Villages first to get power cut-hence either no supply or unreliable supply

Decentralized Renewable energy sources provides the most competitive and environmentally sustainable alternative

Renewable Energy Provides a Viable Option

- **Renewable energy offers sustainable solutions- solar PV, mini/micro hydro, biomass gasifiers and small wind aero generators in hybrid mode etc provide economic options for electricity access including to meet unmet demand in electrified villages**
- **Census 2011 reveal that over 1.1 million households were already meeting lighting energy requirement through solar energy**
- **As of now, over 10000 villages and hamlets have been provided with basic electricity services through distributed renewable power systems**
- **There are many successful examples. Entrepreneur based model for providing electricity for lighting and motive power applications based on rice-husk based gasifier system have shown promise, particularly in Bihar**
- **Mini-grid based solar electrification, Solar home lighting systems and lanterns are now well established technological solutions**
- **Mini/Micro-Hydel based Village Electrification are best suited in hilly Himalayan regions**

Tasks and Challenges

- As an immediate task - around 6000 MWp off-grid renewable power capacity (75 Wattp each HH) would be sufficient to provide subsistence level lighting services to all un-electrified households
- At normative support of Rs 10,000 per household total investment required will be around Rs 75000 crore
- At 30 % government support level Rs 22500 crores would be required

Challenges are:

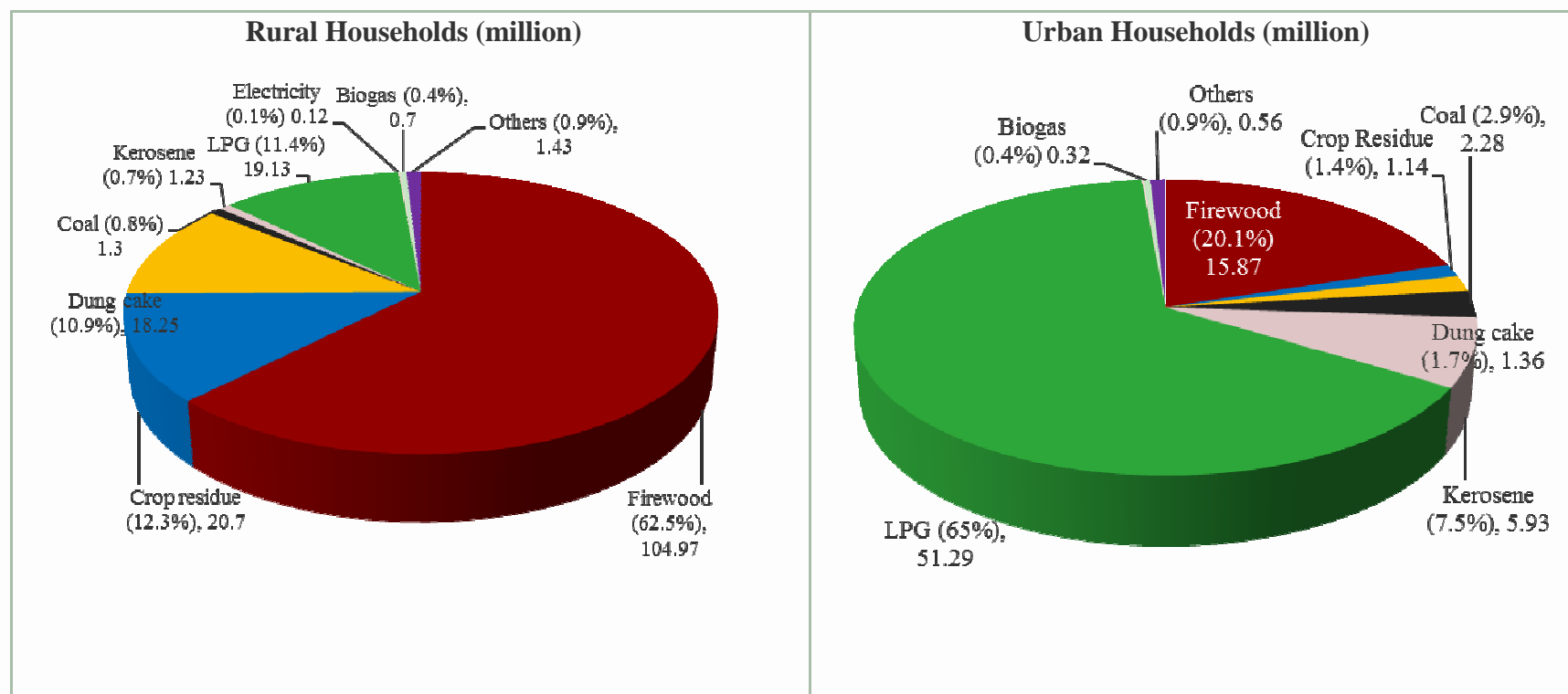
- Development of rural entrepreneurship based sustainable business model
- Identification and training of village level Entrepreneurs –best suited
- Enabling Policy Regime- low cost fund, viability gap funding
- Access to financing -Developing resource and location specific bankable business models- banks must lend
- Involvement of industry
 - under Corporate Social Responsibility
 - take up as business-faster solution

Rural industries like Charkha, milk chilling centres, potters wheel, lentil grinding etc to use renewable energy for productive application-will create big market

Cooking Energy Access

Biomass remains the most predominant source of cooking energy in rural areas with its use being uniformly distributed across all expenditure classes, with the richest 20% moving up the energy ladder by using LPG.

NSSO report on Household Consumption Expenditure(66th round 2009-10) showed that 87% of rural households used firewood and wood chips - Census of 2011, also suggests that 86% rural household uses biomass.



Renewable Energy as Cooking Energy Option

- MNRE has an experience of over two and half decade in providing energy solutions to rural areas.
- About 4.5 million biogas plants set up (Census data says 1.1 million were providing cooking energy in 2011).
- About 35 million improved cookstoves which double the efficiency of biomass burning were provided, with mixed results.
- MNREs' initiatives in biomass consumption for energy purposes have had the underlying objective of increasing efficiency of the conversion process by moving up, in the technology ladder.
- This technology ladder at the bottom begins with combustion of biomass in a traditional manner at around 10 % efficiency levels. In improved cook stoves it could be anywhere from 20-25 % upwards.
- The lack of Government support for cook stoves since then spawned a number of state, private, or commercial activities eg ARTI in Maharashtra and SEWA in Gujarat, TIDE in Karnataka.
- National Improved Cook stove Initiative has been launched - 3.5 million cookstoves planned to be distributed during 12th Five Year Plan period.

Solar Preheating of Boiler feed water and Steam generation are the low hanging fruits

- *There are many industries viz. pulp and paper, textile, dairy, leather, food processing, electroplating, fertilizer, drug and pharmaceuticals where hot water and steam are vital inputs for variety of purposes*
- *A solar steam cooking system for 500 people can save up to 5000 Kg of LPG/ year*

Sector	Water temperature required	Energy replacement potential per year (in ktoe)
<i>Electroplating</i>	<i>40°C to 60°C</i>	<i>20</i>
<i>Pulp and Paper</i>	<i>40°C to 80°C</i>	<i>45</i>
<i>Pharmaceutical</i>	<i>50°C to 80°C</i>	<i>9</i>
<i>Food processing</i>	<i>40°C to 80°C</i>	<i>80</i>
<i>Textile</i>	<i>60°C to 80°C</i>	<i>20</i>

Ethanol from Sugarcane Bagasse has potential to replace 40% of total petrol consumption in transport

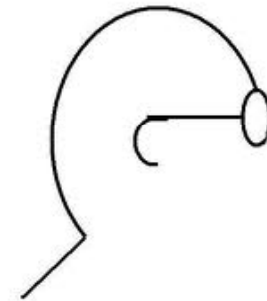
	Million tonnes per year
<i>Sugar cane crushed</i>	<i>250</i>
<i>Estimated dry bagasse</i>	<i>40</i>
<i>Potential for Ethanol production</i>	<i>12</i>
<i>Potential to replace Petrol</i>	<i>8</i>
<i>Petrol consumption for transport</i>	<i>20</i>

Energy access and Gandhi's Talisman

Whenever you are in doubt, or when the self becomes too much with you, apply the following test.

Recall the face of the poorest and the weakest man whom you may have seen, and ask yourself, if the step you contemplate is going to be of any use to him.

Will he gain anything by it?



Energy Access programs certainly have to be planned for the bottom of the pyramid

Thank You