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Viewpoint

Energy access problem of the poor in India: Is rural electrification a remedy?

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Abstract

India accounts for a third of the world's population without access to electricity and about 40% of those without access to modern energy. Such a situation exists despite several initiatives and policies to support poor households. Alarmed by the gravity of the situation, the government has recently announced an ambitious programme of rural electrification. This paper looks into the energy access situation of India and argues that rural electrification alone is unlikely to resolve the energy access problem because of low penetration of electricity in the energy mix of the poor.

Keywords: Access; Rural electrification; Alternative strategy

1. Introduction

The critical role played by energy in achieving sustainable development is now well recognised and the extreme form of disparity existing in the world in terms of production, consumption and access of energy is considered as a major concern. This has been highlighted in the recent past by the UN and other world bodies (as evidenced from WEC (2001) and WEC (2000), DfID (2002), and IEA (2002)), and received global attention at the Johannesburg Summit in 2002. Access to energy has been identified as a major challenge and there appears to be a consensus that 'provision of affordable, reliable, and socially acceptable energy services' is a prerequisite for achieving the Millennium Development Goals (WEHAB, 2002).

A high concentration of population without access to energy is found in India, where the largest number of people in any country in the world without adequate energy access lives.[1] Yet, little is written on this issue in the mainstream energy literature and forming a coherent view of the present situation is often difficult. Parallel to the international focus on the issue, the subject however appears to have caught Indian politicians' and policy-makers' attention recently. The government aims to achieve village electrification by 2007 and household electrification by 2012. In April 2005, a programme has been launched to implement the above objective. It is important to ask whether a drive for household electrification will be enough to address the energy access problem.

The objective of this paper is to present a comprehensive picture of the current energy access situation in India and to analyse whether an electricity-oriented programme is appropriate for the country. The paper is organised as follows: Section 2 examines the Indian situation in detail and presents India's comparative position in the global scene; Section 3 analyses the present mechanisms pursued in India for rural electrification and describes the new initiative announced recently. Section 4 examines whether

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[1]We have used the term 'energy access' to mean access to clean, affordable and reliable energy services. The term covers both urban and rural areas and unless otherwise indicated, the term covers all forms of energies (including traditional energies), which meet the above qualification. The term has not been used to mean access to electricity or electrification of rural areas.

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rural electrification can solve the energy access problem and finally, Section 5 presents the concluding remarks.

2. Energy access problem in India

2.1. India's position in the world

The most commonly cited figures on the lack of access to energy indicate that there are about 2 billion people without adequate access to clean cooking energy and about 1.7 billion people are without access to electricity (WEA, 2000).[2] Information on access to electricity is somewhat better as detailed country-wise electricity access information can be found in IEA (2002). This source suggests that about 1.64 billion or 27% of the world's population did not have access to electricity in 2000 (see Table 1). It can be observed that more than two-thirds of those lacking electricity access are concentrated in 12 countries,[3] mostly located in South Asia and Africa. India alone accounts for more than 35% of the world's population without electricity access,[4] making it the largest contributor to the problem in the world.

IEA (2002) estimates that about 2.39 billion people use biomass for cooking and heating purposes in the world (see Table 2). India, China and Sub-Saharan Africa are the major biomass dependent countries/regions in the world. India consumes around 200 Mtoe of biomass every year (or around 22% of the world biomass demand). Sub-Saharan Africa and China consume somewhat higher levels of biomass than India in absolute terms but China has a lower share of biomass in the primary energy demand and in the residential energy mix compared to India.

2.2. Situation in India

Two recent sources have provided a wealth of information regarding the overall energy access in India. The first is a report by the National Sample Survey Organisation (NSSO (2001a)) that provided detailed information on energy used by Indian households. World Bank (2003) and Pachauri and Sprend (2004) relied on this report for their analysis of access to clean fuel by the poor. The other is Census, 2001,[5] which has generated a vast amount of information on various aspects of the Indian population, including energy use. The presentation that follows relies on these sources and considers cooking and lighting needs separately.

Table 1
Countries with large population without electricity access in 2000

Country	Population without access to electricity		Per capita electricity consumption (kWh)
	Million	% of world total	
India	579.10	35.44	393
Bangladesh	104.40	6.39	102
Indonesia	98.00	6.00	390
Nigeria	76.15	4.66	85
Pakistan	65.00	3.98	374
Ethiopia	61.28	3.75	24
Myanmar	45.30	2.77	74
Tanzania	30.16	1.85	55
Kenya	27.71	1.70	107
Nepal	19.50	1.19	61
DPR of Korea	17.80	1.09	1288
Mozambique	16.42	1.00	47
World total	1634.20	100.00	2343

Note: PEC—primary energy consumption.
Source: IEA (2002).

2.2.1. Energy used for cooking purposes

Data from Census, 2001 indicates more than 139 million households in India (72% of all households)[6] rely on traditional energies for their cooking needs. Out of this, more than 124 million households reside in rural areas, while the remaining 15 million live in urban areas. Firewood remains by far the major source of cooking fuel in India, with more than 100 million households using this fuel, of which more than 88 million are rural households. Out of modern energies, LPG is most widely used for cooking purposes: around 26 million urban households and 7.5 million rural households are using this fuel.[7] Kerosene is used in 12.5 million households, out of which around 10 million are urban households. Electricity is practically not used for cooking purposes (see Fig. 1).

The urban–rural divide in the cooking fuel use can be more clearly seen from Fig. 2. Sixty-four per cent of the rural households rely on firewood for cooking and another 26% rely on crop residue or animal wastes. This implies that 90% of the rural households depend on traditional energies for their cooking needs. On the other hand, less than 30% of urban households rely on traditional energies for cooking. Thus, commercial energy dominates in urban areas as a cooking fuel.

[2]Similar figures are quoted in WEHAB (2002) and DfID (2002).

[3]These countries are: India, Bangladesh, Indonesia, Nigeria, Pakistan, Ethiopia, Myanmar, Tanzania, Kenya, Nepal, DPR Korea, Mozambique, Uganda and Sudan.

[4]As we will see, the figure reported now in India is much higher. For international comparison, we have used IEA (2002) data in Tables 1 and 2.

[5]See http://censusindia.net/.

[6]According to Census, 2001, there were around 192 million households in India, of which around 72% reside in rural areas and the rest in urban areas. The average household size was 5.3 persons in 2001.

[7]Ministry of Petroleum and Natural Gas website (http://petroleum.nic.in/fs.htm) indicates that there were 57.9 million LPG customers as on 1.4.2001. This figure is substantially higher than the Census, 2001 data. The difference may be due to a number of factors, including different record dates, existence of multiple connections in single households (therefore more consumer number as recorded by the marketing company), inaccuracy of information, etc.

Table 2
Details of traditional energy use in developing countries in 2000

Country	Population using biomass (million)	% of country's population	% of world total	Biomass energy consumption (Mtoe)	Share of biomass in PES (%)	Share of biomass in residential energy demand (%)
China	706	56	30	213	18	72
Indonesia	155	74	6	47	32	73
Rest of East Asia	137	37	6	62	16	74
India	585	58	24	198	40	84
Rest of South Asia	128	41	5	43	44	84
Latin America	96	23	4	80		44
North Africa/Middle East	8	0.05	0			10
Sub-Saharan Africa	575	89	24	254	51	93
Developing countries	2390	52	100	898	25	73

Note: PES—Primary energy supply.
Source: IEA (2002).

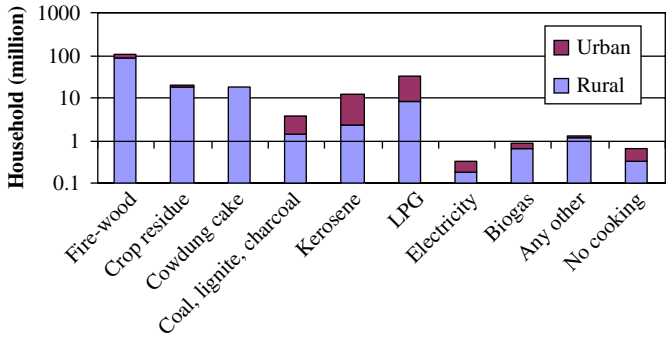

Fig. 1. Household distribution by cooking fuel use (% of households).

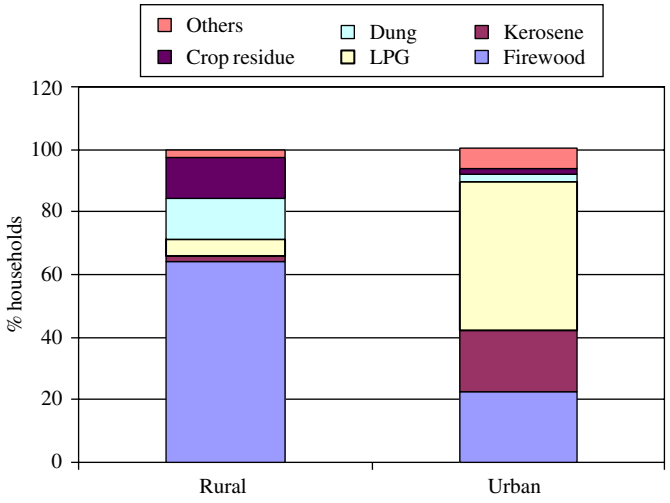

Fig. 2. Urban–rural differences in cooking energy use in India.

Figs. 3 and 4 present energy consumption[8] by different expenditure classes separately for rural and urban areas

[8]The data for Figs. 4 and 5 covers all household energy consumption and does not differentiate between cooking and lighting. However, it is reasonable to assume that electricity is mainly used for lighting while

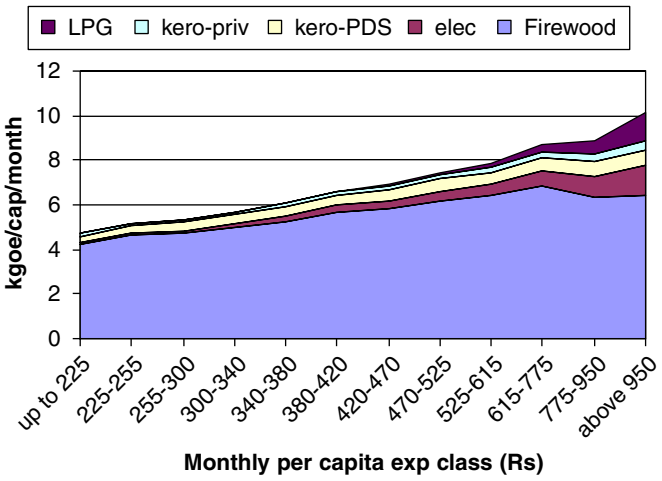

Fig. 3. Energy consumption pattern in rural India by expenditure class.

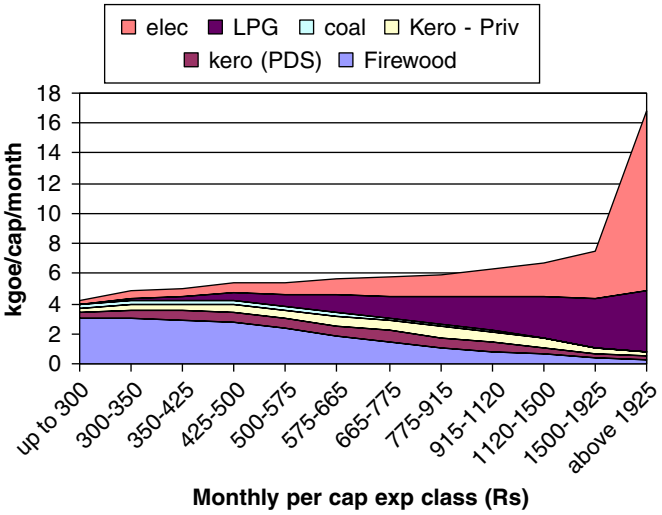

Fig. 4. Cooking energy consumption pattern in urban India by income class.

based on NSSO (2001b). Firewood dominates cooking energy scene in rural India irrespective of expenditure (and hence income) level, although its share falls from around 90% for the lowest expenditure class to around 64% in the highest expenditure class (see Fig. 3). Firewood consumption in absolute terms is more for the higher expenditure classes and their consumption is almost 50% more compared to the lowest class. This clearly indicates that the issue of access to clean cooking energy in rural areas has a much bigger dimension and is not limited to the poor households alone.

The picture changes significantly in urban areas where firewood use diminishes quite appreciably with higher income, allowing a greater role to cleaner fuels such as LPG or electricity. Firewood plays a minor role in poorer urban household compared to rural areas (around 70% share compared to 90% in rural areas). High levels of electricity and LPG use by higher expenditure classes suggest reduced level of affordability problems. Therefore, access issue to clean cooking energies in urban areas is essentially a poverty-related problem. Figs. 3 and 4 also suggest that the per capita energy consumption does not vary appreciably in the lower expenditure classes between urban and rural areas. But the highest expenditure class in urban area has a much higher per capita consumption compared to the rest of the households in the country.

Fuel used for cooking varies spatially as well. Fig. 5, based on NSSO (2001a) data, depicts the picture of rural scenario in major Indian states, while Fig. 6 indicates the situation in urban areas across different states in 1999–2000. Fig. 5 suggests that the reliance on traditional energies for cooking is quite uniform in rural areas of most of the states. Penetration of clean fuels like LPG is particularly low in eastern states (of Bihar, Orissa and West Bengal), in Madhya Pradesh, UP and Rajasthan. LPG share is above 10% in rural areas of only four states (Haryana, Punjab, Gujarat and Kerala), which suggests that even in wealthier states clean cooking fuel penetration is relatively low.

Reliance on traditional energies falls in urban areas of all major states but LPG penetration is particularly low in Orissa and Bihar whereas low-firewood use can be noticed in four states (Maharashtra, Gujarat, Punjab and West Bengal). Kerosene plays an important role in cooking in urban areas. In fact, kerosene and LPG account for a majority share of cooking energy use in most of the states. High levels of firewood use can be found in urban households of Kerala and Orissa.

In brief, a large section of Indian population (around 139 million households or around 740 million people) relied on traditional energies to satisfy cooking energy

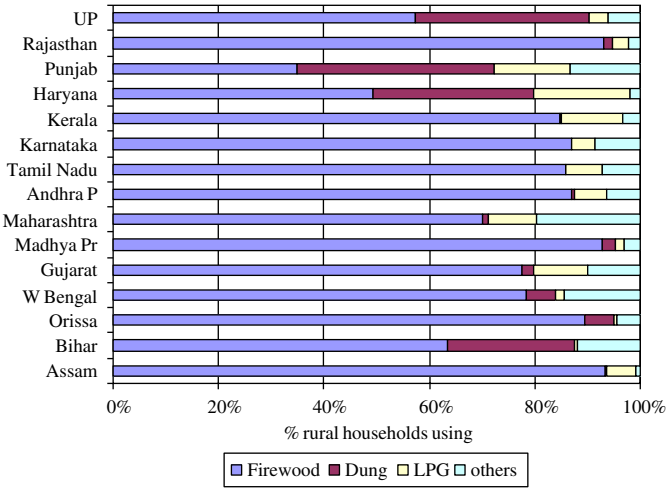

Fig. 5. Cooking fuel use in rural areas of major Indian states.

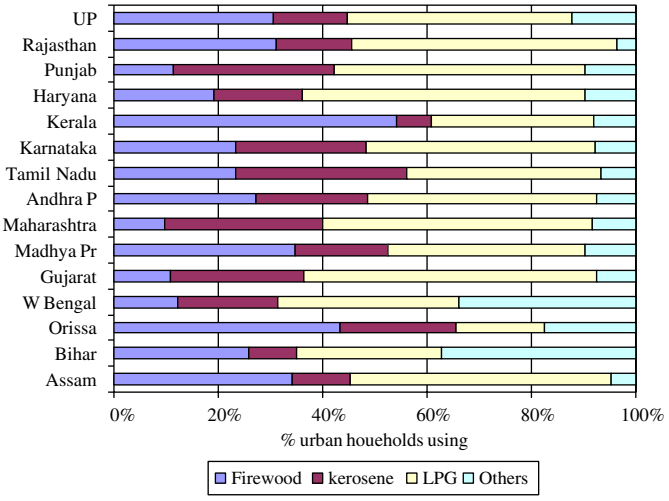

Fig. 6. Cooking fuel use in urban areas of major Indian states.

needs in 2001. Rural areas are more dependent on traditional energies and this is irrespective of income level of households or geographic location. Poor households in urban areas rely on traditional energies while richer families tend to use cleaner fuels such as LPG and kerosene. Electricity is rarely used for cooking purposes in Indian households. Based on the above information, the following inferences can be made:

(a) Access to modern cooking fuel is severely limited in rural areas. As this is a common problem in most major states, irrespective of income level, major national policy initiatives are required to bring a change in the cooking fuel use pattern. Transition to modern, clean cooking fuels can have significant implications for the supply side of the industry.
(b) High reliance on traditional energies has significant social costs including costs due to health effects on women and children. It is suggested that use of

(*footnote continued*)
firewood and LPG are used for cooking. Kerosene may be used for both lighting and cooking. NSSO (2001b) provides data in physical units (kg or litres). The following conversion factors were used to arrive at ton of oil equivalent figures: firewood-0.32 kgoe/kg, electricity-0.086 kgoe/kWh, kerosene -0.836 kgoe/l, LPG-1.13 kgoe/kg and coal-0.441 kgoe/kg.

traditional cooking fuels leads to 0.5 million deaths and 500 million cases of illness in India (World Bank, 2003).

(c) As rural households across all expenditure classes rely significantly on traditional energies for cooking, the issue of access to clean energies assumes greater importance, because affordability alone cannot explain such widespread reliance on dirty energies.

2.2.2. *Energy used for lighting purposes*[9]

There has been a renewed interest on rural electricity provision with the promulgation of the Electricity Act 2003 and formulation of national policy papers on electricity and rural electricity supply, although energy access is not a rural issue alone.

Kerosene and electricity are the major fuels used for lighting in rural and urban areas. Fig. 7 indicates that although 56% of Indian households use electricity for lighting, the urban–rural disparity is prominent. About 43.5% of rural households have access to electricity while the rest rely mostly on kerosene. In contract, about 87.6% of the urban households use electricity for lighting and about 11.6% use kerosene. In absolute terms, this represents around 60 million households using electricity in rural areas for lighting purposes while around 78 million rural households rely on kerosene or other forms of energy.[10] In urban areas, around 7 million households rely on kerosene or other energy sources for lighting while around 47 million now have access to electricity for lighting. Therefore, around 85 million households were without access to electricity in the country according to Census, 2001, around 92% of whom resided in rural areas.

State level details provided by Census, 2001 indicate a wide disparity of access to electricity among states. Only Union Territories of Chandigarh, Daman & Diu and Lakshadweep boast of near 100% electricity access, although they account for a small share of electrified households in the country. While few states (such as Punjab, Himachal, Goa and Delhi) have achieved an overall electricity access of more than 90% electrified households, a careful look into the data reveals that none of the major states except Himachal Pradesh has achieved more than 90% village electrification and the situation is particularly grim in some bigger states (see Fig. 8). The figure covers more than 90% of the non-electrified households of the country and shows that five states (with more than 5 million households without electricity access) account for around 60% lacking electricity access in the country.

The variation in electricity consumption by expenditure class in rural and urban areas is presented in Figs. 9 and 10. The figures indicate that, electricity consumption per capita increases with higher level of income; (b) for similar level of income, urban consumption is much higher than rural consumption and (c) low-income groups appear to use electricity mostly for lighting whereas very high level of electricity consumption in highest income groups of urban areas can only be achieved through significant appliance use.

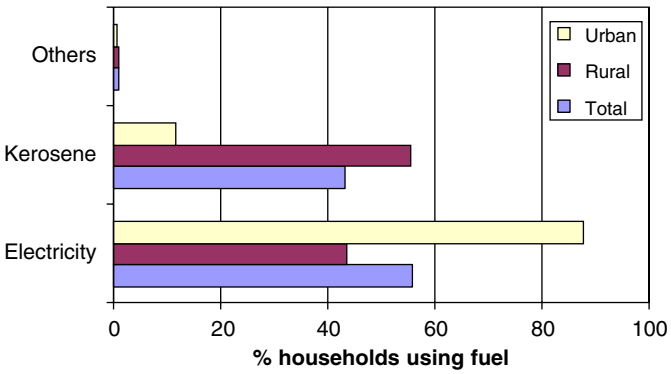

Fig. 7. Distribution of Indian households by source of lighting.

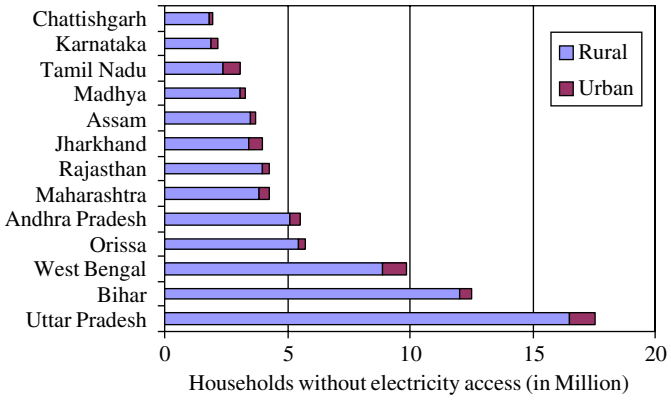

Fig. 8. Status of electricity access in major states.

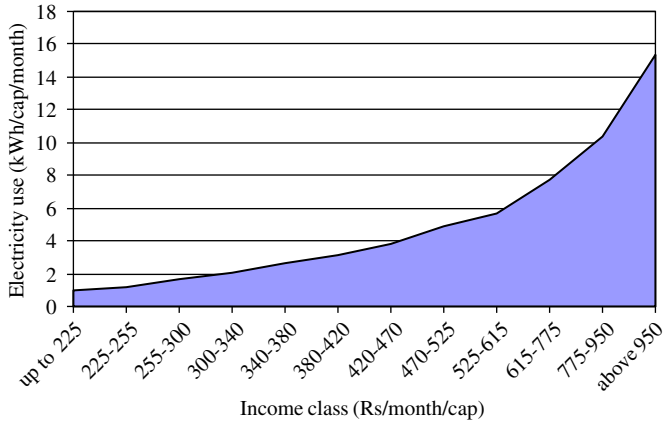

Fig. 9. Electricity use in rural areas.

[9]This section relies on NSSO (2001a b), Census, 2001 and information available from the Ministry of Power.

[10]Incidentally, the Ministry of Power now uses this figure in its policy documents on electricity and in its discussion on rural electrification. See Ministry of Power website at http://powermin.nic.in.

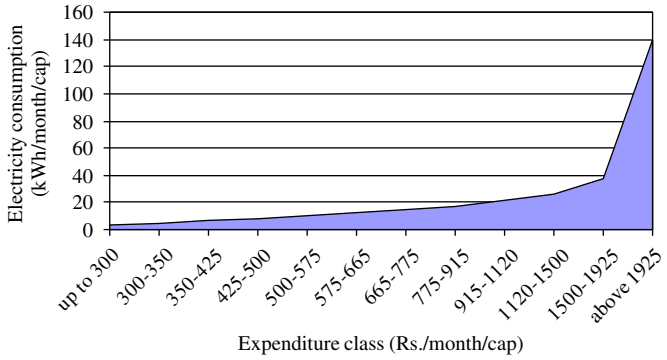

Fig. 10. Electricity use in urban areas by expenditure class.

3. Schemes for providing electricity access to the poor

This section looks at the mechanism used for providing electricity access so far and then presents the recent initiatives with a renewed focus on electricity access. Accordingly, the presentation is divided into two subsections.

3.1. Existing mechanism for providing electricity access

Energy provision in India so far had two dominant characteristics: (1) strong public sector presence and (2) prevalence of excessive subsidies and cross-subsidies. For a long period, private entry to the energy sector was restricted, if not disallowed and the public sector entities, under the influence of the governments and bureaucracy, were engaged in elaborate programmes of rural electrification and subsidised supply of energy, often without appropriate targeting.

State involvement for providing electricity to rural and disadvantaged section of the population was always prominent. The need for extension of the electricity system to rural areas was felt quite early, just after the independence of the country. Rural Electrification programme in India was launched with two distinct dimensions viz. (1) Village Electrification. (2) Irrigation Pump set Energisation. The former enhances consumer satisfaction and the latter optimises crop yield. The area of focus was certainly maximising farm output, which did result in the Green Revolution in the mid-1960s. Accordingly, the indicator of electrification was not based on the percentage of households or population with access to electricity but merely extension of electricity lines to a particular area. By this definition, almost 86% of the villages have access to electricity. Only in 2004, the programme has been refocused to provide electricity access to rural households.[11]

A number of specifically targeted schemes were launched from time to time to facilitate electricity access to the poor.[12] Most of these schemes were implemented by the state electric utilities with federal financial assistance disbursed through the Rural Electrification Corporation (REC). A brief description of some of these initiatives is given in Box 1. The Kutir Jyoti (KJ) programme is the longest serving scheme in this regard and has not been a highly successful programme as it has imposed certain undue financial burden on the utilities for the following reasons:

(a) Electric utilities received funds for rural electrification mostly as loans from the government/REC and hence the interest and loan repayment burden had to be borne by the utility.
(b) It is a source of electricity leakage for the utilities as the connections were given without meters and the consumption is estimated based on arbitrary assumptions about usage and connected load. It is often claimed that single point consumers are able to use higher loads than expected and is a major source of unaccounted for energy consumption. It is not clear however whether the initial cost paid for by the Central Government included the cost of meter installation or not and whether there was any misappropriation of funds in this regard.
(c) The number of consumers of this category increased over the years, adding a higher burden on the utility.
(d) New service connections often meant extension of low-voltage distribution lines, which exposed the system to theft and higher losses.
(e) Electricity rates are highly subsidised for these consumers and often, there is a flat monthly rate charged. For example, the regulatory commission in Karnataka in its first tariff order had set a tariff at 19% of the average cost of supply (KERC, 2000). State governments often did not accept the subsidy liability and when accepted, did not compensate the utilities in time or at all. With eroding cross-subsidy base, the subsidy burden affected the utilities financially.
(f) Low tariffs for these consumers were maintained for a long time. For example, in Karnataka, the nominal value of tariff did not change between 1987 and 2000, implying a fall in tariff in real terms (KERC, 2000). This made political acceptance of subsequent tariff changes difficult.
(g) There is high rate of default and poor revenue collection rate from these consumers. This is partly because of poor record keeping by the utilities and partly because of poor paying capacity of the consumers. Although utilities were supposed to disconnect consumers for repeated defaults, this did not happen in most of the cases.

[11]The definition of electrified village has been modified to put emphasis on households electrified from the previous requirement of extending the grid.

[12]These include Kutir Jyoti programme discussed below, Accelerated Rural Electrification Programme, Schemes for electrification of Scheduled Castes and Scheduled Tribe households, etc.

Box 1
Brief description of selected rural electrification programmes in India.

1. *Kutir Jyoti*: Government of India launched in 1988–1989 a single point connection programme for the poor living below poverty line (called Kutir Jyoti, KJ for short, or Bright Home programme). The federal government bears the entire cost of service connection and internal wiring and is provided to the states as a grant. The funds are channelled through the REC and the state governments/utilities are responsible for the execution of the programme. According to Rural Electrification Corporation, more than 5.8 million households in the rural areas have benefited from this scheme at a cost of 4.5 billion rupees. (See REC website http://recindia.nic.in/operkutir.htm for the details (last visited on March 23, 2004).)
2. *REC programmes*: Two major thrust areas of REC are irrigation pump electrification and village electrification. REC acts as the nodal agency for the centrally sponsored programmes and claims to have facilitated electrification of 62% of the Indian villages and 59% of electrified irrigation pump sets.
3. *Prime Minister's Village Development Programme (Pradhan Mantri Gramodaya Yojana)*: This programme was launched in 2000–2001 with an objective of achieving sustainable human development at the village level. This programme focused on providing basic services and in 2001–2002 rural electrification was included to cater to rural electricity supply through rural electrification. The scheme offered financing through loans (90%) and grants (10%). The states have the flexibility to deciding the allocation among six basic services. This programme is coordinated and monitored by the Rural Development Division of the Planning Commission.
4. *Minimum Needs Programme*: This programme provides 100% loans from the central government for last mile connectivity for rural electrification projects in less electrified states.
5. *Accelerated Rural Electrification Programme*: This scheme is designed for electrification of non-electrified villages. States can borrow funds from financial institutions and receive interest subsidies for undertaking rural electrification. The central government reimburses the interest subsidy provided by the financial institutions. States can also use funds available from other sources (such as Rural Infrastructure Development Fund, Local Area Development funds of Members of Parliament, etc.).

Source: MoP (2003), MoP website (http://powermin.nic.in), and REC website (http://recindia.nic.in).

As can be seen from Box 1, a number of other programmes attempted to enhance electricity access either as part of overall rural development or specifically targeting rural electrification. However, multiplicity of the programmes meant that the funding for each programme was not adequate and programme implementation was not properly coordinated or managed. Due to the financial burden that the programme imposes, utilities often showed less interest in promoting these schemes actively and even the targets set by the utilities were not met. In the late 1990s, as electricity regulatory commissions started to question functioning of the utilities, and when the states were being pressed for providing transparent subventions, state utilities became reluctant to promote rural electrification and similar pro-poor programmes. Consequently, the number of villages electrified dropped to 11,000 during 1997–2002 from 100,000 during 1985–90 (MoP, 2005).

3.2. Recent programmes for enhancing electricity access

Recent international focus on energy access has also resulted in a renewed interest on rural electrification at the national level. Two recent developments in this regard need to be highlighted: (a) changes in the legal framework relating to the electricity sector, and (b) a new village electrification scheme merging a number of previously existing programmes.

3.2.1. Changes in the legal environment post-electricity act 2003

The Electricity Act 2003 paved the way for a number of changes in the electric industry environment in India.[13] It put an obligation on the government to endeavour electricity supply to all areas including villages and hamlets. The act requires that the federal government should prepare a national electricity policy and a tariff policy, and review and revise them from time to time. The federal government is also required to prepare a national policy for rural electrification and for bulk purchase of power and management of rural distribution through local participation. The act also requires the federal government

[13]A number of reviews of the act are available now. See for example Singh (2005); Bhattacharyya (2005b); Sankar (2004); Thakur et al. (2005) and Ranganathan (2004).

to develop a national policy on stand-alone systems for rural areas.

To improve the prospect of rural supply, the act has removed the licensing requirement for generation and supply of electricity in rural areas notified by the state governments for such supply (hereafter called notified area approach). Consequently, regulatory supervision will not exist in these areas. This provision appears to apply to stand-alone systems and de-licensing can facilitate penetration of decentralised power supply at least in promising areas. Innovative arrangements can also emerge to take advantage of the exemption from the licensing requirement: for example, service providers may generate a small amount of power locally and procure the rest from other bulk suppliers for supply in the notified area. Such arrangements introduce some flexibility into the system (especially for private participation) and better accounting and targeting of subsidies would be possible in such notified areas. However, a number of concerns (such as consumer protection from monopoly power of the supplier, poor quality of supply, possibility of development of non-standard and de-integrated system, etc.) remain, which are expected to be addressed through the national rural electrification policy.[14]

Similarly, the act allows a distribution licensee to carry out its activities within its licensed area of supply through an agent, who does not require a licence (described as agency route hereafter). The licensee is responsible for the functioning of the agent. This offers some limited flexibility to the utility in managing the local systems without delegating the ownership rights or regulatory obligations.

The National Electricity Policy issued by the government aims at universal electricity access in five years from its issue (i.e. by 2010) and meeting demand in full by 2012.[15] It also aims at providing a minimum lifeline consumption of 1 kWh/household/day by 2012 as a merit good. In order to achieve this target, the policy calls for creation of a rural electricity distribution backbone (REDB) with at least one 33/11 kV (or 66/11 kV) substation in every block and installing at least one distribution transformer in each village. Electricity connection to households will be made available on demand.

3.2.2. New village-electrification programme

The main vehicle chosen for implementing the universal access objectives of the Electricity Policy is a new programme (called Rajiv Gandhi Grameen Vidyutikaran Yojana) launched in April 2005. It aims to develop the rural distribution backbone and to create village electrification infrastructure by installing at least one distribution transformer in each village within next five years. The scheme intends to provide free electricity connection to all rural households lying below poverty line and to provide round-the-clock electricity supply to villages.

The main features of this programme are as follows (MoP, 2005):

(a) The federal government will provide 90% of the capital cost of the programme as a grant. This is a major shift from the earlier system of providing loans for rural electrification. If projects are not successfully implemented, capital subsidy will be converted to interest bearing loans.
(b) The scheme will help develop rural electricity backbone, install one distribution transformer in each habitation and promote decentralised and distributed generation and supply in remote areas where grid extension is not cost-effective or feasible.
(c) The scheme will be implemented through the Rural Electrification Corporation.
(d) The projects financed under this scheme will be managed by franchisees, which can be local level organisations (such as NGOs, rural committees, etc.) or private entrepreneurs. States' prior commitment in this regard will be enlisted before project approval.
(e) For commercial viability of the franchisees, revenue subsidy and suitable bulk power purchase tariffs will be determined. The scheme will employ bidding scheme wherever possible for determining the BST.

This programme merges the 'Accelerated Electrification of 1 crore households and 1 lakh villages' and the Minimum Needs Programme for rural electrification. The first of these two was created by merging schemes like KJ and Accelerated Rural Electrification Programme as recently as in May 2004 but because of the political changes since then, the programme did not receive much attention.

The government has estimated the cost of the universal electrification programme to be around Rs. 160 billion ($ 3.8 billion) and the work will be spread over 10th and 11th plan periods. An allocation of Rs. 11 billion ($ 0.26 billion) has been made for this purpose in the federal budget for 2005–06.

Despite the intent and the grandeur of the programme, it remains to be seen whether it becomes successful. While 90% capital subsidy and use of franchisees are attractive features of the scheme, the following practical concerns remain:

(a) States have to take initiatives on the project formulation and development. As most of the laggard states are either plagued with governance problems or are antagonistic to power sector reform and to the Electricity Act 2003, it is doubtful whether any significant progress can be made in these areas.

[14]The Power Ministry circulated a discussion paper on rural electrification in November 2003. A draft policy document was also available for sometime in the Ministry website. This has now been removed and the rural electrification policy has not yet been notified, although the National Electricity Policy notified in February 2005 contains a section on rural electrification.

[15]Ministry of Power, Government of India (http://powermin.nic.in/JSP_SERVLETS/internal.jsp, last visited on May 4, 2005).

(b) The scheme has not outlined any specific prioritisation plan. As rural distribution backbone and rural infrastructure development would be time consuming projects, there may be a tendency to engage in simple grid extension exercises as was done earlier, thereby defeating the purpose of the scheme.
(c) The functioning of the franchisee system indicated for this scheme remains untested. If the states follow the notified area approach, the area of supply of the franchisee has to be carved out from that of the distribution licensee and the distribution licensee cannot be held responsible for any acts of the franchisee. This approach has the advantage that geographically differentiated tariffs can be applied and proper accounting and targeting of subsidies and grants can be ensured. A system of proper regulation of these franchisees would become important and legal authority for this does not appear to come from the Electricity Act 2003. Detailed procedures and regulations would be required for selection of franchisees, and supervision of their activities. Local authorities, NGOs and village level organisations may not have necessary skills and organisational set-up to manage such activities. Private investors may not be interested unless the activity is remunerative. This aspect required more careful practical consideration.
On the other hand, if the states follow the agency route, separate consumer tariffs will not apply. The assets would remain with the utility and it is not certain whether the subsidies and grants will be correctly passed on to the targeted consumers or accounted for. Moreover, the role of the agent will be essentially limited to billing and collection, making the system less effective.
(d) Although the scheme intends to use local people and skills, the programme design is not decentralised. It relies on REC, state governments and state utilities. The involvement of the local bodies remains peripheral.
(e) The scheme essentially relies on subsidies and grants and consequently, the commercial viability of ventures financed through it remains uncertain. In fact, the purpose of the programme of unleashing economic growth potential of rural areas will be defeated unless significant productive use of electricity is achieved.

To make the programme operational, issues like effective organisational arrangement for delivery of the programme, regulatory arrangement and control, separation of rural tariffs and balancing of tariffs and subsidies would require careful thinking. There is scope for more research in these areas.

4. Can rural electrification resolve energy access problem?

Energy demand in poor households normally arises from two major end-uses: lighting and cooking (including preparation of hot water).[16] Cooking energy demand is predominant in most cases and often accounts for about 90% of the energy demand by the poor. For any commercial energy to successfully penetrate the energy demand of the poor requires satisfaction of the following economic factors (Bhattacharyya, 2005a):

(a) The energy should be suitable and perhaps versatile for satisfying the needs;
(b) It should have a competitive advantage that would place no or little demand for money transactions (in other words, the low cost supplies) in the present circumstances, and/or
(c) the use of modern energy should result in supply of adequate money flows to the poor so that they become willing to spend some part of the money on purchasing commercial energies.

To resolve the energy access problem, rural electrification initiatives need to be analysed considering the above factors. A number of observations/inferences can be made:

- Electricity is mainly used for lighting purposes and accounts for a minor share of households' energy needs. In order to resolve the energy access problem through electrification, electricity use has to meet the cooking energy requirements of the poor. A number of issues arise in this respect:
  - *Competitiveness*: electricity is unlikely to be competitive when compared with traditional energies used for cooking purposes. As the new programme envisages subsidised supply to household belonging to lower income groups (below poverty line) following KJ criteria, it is unlikely that their connection will allow them to use electricity for cooking. Other households will have to pay for electricity supply, making electricity less competitive to traditional fuels.
  - *Quality of supply*: Although the programme aims non-discriminatory power supply to rural areas (i.e. 24 h supply), it is unlikely to ensure adequate quality supply during shortage conditions, as it exists in many parts of the country at present. Lack of adequate supply acts as a hindrance to expansion of electricity use in cooking.
  - *Initial investment*: Use of electricity for cooking entails significant initial investment when compared with traditional energy use. Cash-strapped poor households are unlikely to switch to electric cooking even if quality electricity is available at an affordable rate.
- Thus, electricity has a less chance of succeeding in the cost competition with other fuels. This in turn implies that demand for lighting cannot justify the investment in electrification of an area. Consequently, rural electrifica-

[16]In some climatic conditions space-heating may also be an important source of energy demand. However, for this discussion space-heating demand is not considered.

tion alone cannot resolve the problem of energy access in rural areas, as other fuels would be used by the poor to meet the cooking demand. It appears that policy makers tend to ignore or forget this simple truth, may be because of better prestige and visibility of electrification projects (and hence for better political mileage).

For economic and financial viability of rural electrification projects, expansion of productive use of electricity is essential. Use of electricity in agricultural water pumping was the traditional productive use of electricity in India. But this has created the well-known problems of excessive demand, huge subsidies, non-payment of dues and even supply at selected times. The new programme has to be careful in avoiding committing same mistakes of the past. Integrating other rural development programmes with rural electrification could create a synergy for promoting agro-based industrial activities and productive use of electricity in rural areas.

Besides focusing on a minor energy need, rural electrification also places sole emphasis on rural households and neglects urban population lacking access to electricity. As mentioned earlier, around 7 million urban households suffer from this while around 16 million rely on traditional energies for cooking. There is no specific programme to cater to their needs. The problem of urban poor can be expected to aggravate with growth in urbanisation and ignoring or forgetting these people can be a source of major future problem.

Additionally, in a country with a poor record of credible subsidy-management system and where governments face resource constraints on a regular basis, sustainability of subsidised schemes is highly doubtful. A credible alternative has to rely on development mechanisms that ensure adequate money supply to the poor on a regular basis. This makes it necessary for rural energy supply issues to be set in a broader canvass of overall development. While the new scheme recognises that the problem of universal access cannot be resolved without rural development and expects that investment in rural electricity supply will spur economic activities in rural areas, past experience does not offer much comfort in this respect. The main use of electricity in rural India remained irrigation, which while making the country self-sufficient in food grain production, has disproportionately benefited the well-to-do farmers with bigger farm holding. Rural industry or commerce has not developed as a thriving business proposition so far. Thus, sustainability of subsidised rural electrification system may remain a thorny issue for a long time to come.

5. Conclusion

Access to clean and affordable energy to the poor is a major concern for sustainable development. India houses a large section of the poor without access to clean energy. This paper has presented a comprehensive overview of the energy access situation in India and argued that although India is embarking on a massive rural electrification programme to achieve universal electrification by 2012, present policies directed towards rural electrification alone are unlikely to resolve the energy access problem, as electricity constitutes only a minor component of the energy mix of the poor. We believe that long-term strategies would be required to integrate developmental efforts with energy access issues so as to create opportunities for higher income generation in monetary terms and to make energy supply affordable through judicious use of alternative instruments. However, further work is required to develop a more detailed framework and institutional arrangements to implement such an idea.

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