PUNE INTERNATIONAL CENTRE

ENSURING ELECTRICITY FOR ALL

Ultra mega power project for the poor

POLICY APPROACH PAPER & RESEARCH
BY PRAYAS ENERGY GROUP

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ENSURING ELECTRICITY FOR ALL
Ultra Mega Power Project (UMPP) for The Poor

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ABOUT PUNE INTERNATIONAL CENTRE

Pune has always been a hub of learning, scholarship, liberal values, enlightened thinking and action and, in recent years, of entrepreneurship as well. The city today prides itself of the presence of thought leaders from all walks of life.

What this great city had missed though was a meeting point for all such inquiring minds, a place where, in an intellectually stimulating and peaceful environment, enlightened discussions and debates can be held about the future of this great city, of this great nation and indeed the world. This very thought triggered a meeting of several eminent personalities in Pune. There was an profound support to the creation of Pune International Centre (PIC). It aims to be a platform to interact with open mind for considering various issues touching our lives at local, national and international level, promote and exhibit art and culture, provide an opportunity to youth for creative participation in growth of the nation. PIC is registered under Societies Registration Act of 1860 and Bombay Public Trusts Act 1950. It has more than 180 Founding Members from different walks of life and 9 leading academic institutes are institutional members.

ABOUT PRAYAS

Prayas (Initiatives in Health, Energy, Learning and Parenthood) is a non-governmental, non-profit organisation based in Pune, India. Members of Prayas are professionals working to protect and promote the public interest in general, and interests of the disadvantaged sections of the society, in particular. The Prayas Energy Group works on theoretical, conceptual and policy issues in the energy and electricity sectors. Activities cover research and intervention in policy and regulatory areas, as well as training, awareness, and support to civil society groups. The past work of the Prayas Energy Group includes an analysis of the power purchase agreement between the Dabhol Power Company and the Maharashtra State Electricity Board, an analysis of the Sardar Sarovar Project, the development of a least-cost, integrated resource plan (IRP) for the state of Maharashtra, an analysis of agricultural power consumption and subsidy, a critique of the activities of multilateral development banks in the energy sector in India, and the organisation of numerous capability building workshops. Since the last few years, the group has focused mainly on issues relating to power sector reforms, renewable energy, energy efficiency and climate change. Its work in the area of power sector reforms includes a study of the regulatory aspects of the Odisha model of power sector reforms, several policy and regulatory interventions at the Central and State levels, a survey based report on Electricity Regulatory Commissions, a report on the privatisation of distribution in Delhi, a study of the Bhiwandi distribution franchisee model and a review of the Rajiv Gandhi Rural Electrification program..

PUNE INTERNATIONAL CENTRE PUBLICATIONS

1. Towards Better Corporate Governance

Good corporate governance is not just a 'good thing to have'. It is a must for the functioning of a sound democracy. The disastrous effect of bad governance is accepted widely as the key factor in the recent downfall of the western economies. While a great deal has been done to improve corporate governance in India, much more remains to be done. This paper addresses the unfinished agenda and suggest implementable solutions.

2. Energy & Environment Dilemma and National Security

Climate changes due to global warming and increasing demand of human society are clearly the two major concerns of the future that can affect global peace and stability. PIC organised a round – table seminar on the subject of ' Energy & Environment Dilemma and its Impact on National Security' on 2nd August 2012 at Pune to bring focus in the need to recognise the complexity of this multi-dimensional problem and to evolve a policy advisory paper to highlight the urgent actions required to address the combined threat to national security.

The round-table discussion was chaired by Dr. Arvind Gupta, DG, IDSA, New Delhi and attended by over 80 participants where several experts shared their well-informed views. Former President of India, Dr. APJ Abdul Kalam addressed the final session attended by over 400 people.

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1. Black and Dirty: The real challenges facing India's coal sector, Prayas (Energy Group), 2013
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6. Electricity for all: Ten ideas towards turning rhetoric into reality, Prayas (Energy Group), 2010
7. An overview of Indian Energy Trends: Low Carbon Growth and Development Challenges, Prayas (Energy Group), 2009
8. Emerging Issues in the Indian Gas Sector: A Critical Review, Economic & Political Weekly, 25/08/2007

For more publications by Prayas Energy Group, see page no. 46-47

DEDICATION

This work is dedicated to the memory of Girish Sant, a founder trustee of Prayas and our close friend, who tragically passed away on February 02, 2012. Girish played a key role in developing the core idea of this paper.

ACKNOWLEDGMENTS

This paper is a continuation of Prayas Energy Group work in the area of improving electricity service to the poor. We thank the participants of the meetings held in Pune on February 18, 2012 and in Lucknow on September 28, 2012, where earlier versions of this paper were presented. We also thank government officials, regulators, utility engineers and civil society leaders who provided feedback during our visits to New Delhi, Rajasthan and Bihar to discuss the paper. Our special thanks to Navroz Dubash, Partha Mukhopadhyay, Kapil Mohan, Veena Joshi, Thimma Reddy, Narasimha D Rao, and Douglas Barnes for providing detailed comments during the research. We thank Neeta Deshpande for language editing. Our colleagues at Prayas and the Pune International Centre have helped us through the course of our work. We owe our gratitude to them.

EXECUTIVE SUMMARY

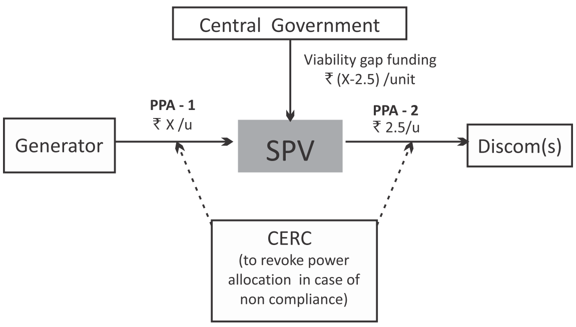
The National Electricity Policy 2005 recognises electricity as a major driver of rural development and hence that of poverty alleviation. The challenge of providing electricity to all in India is much more complex than that in other countries due to our large population, vast area and immense diversity in geography, climate and social factors. India has the dubious distinction of having the highest population without electricity access. Electricity access for all will bridge a crucial gap between the haves and have-nots, and will thus contribute to social equity as well as economic development. Therefore, efforts towards providing electricity to all are a social and economic investment, rather than an obligation to the poor. The experience of successful international rural electrification efforts indicates the need for a comprehensive approach with a one-time push by all concerned actors. This should cover all dimensions of rural electrification: setting up infrastructure, providing universal access, supplying affordable and adequate power, and promoting productive load.

The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) is electrifying households below the poverty line by extending the grid using the resources of the Indian government. There has been progress on this front, though issues regarding the quality of construction and delays persist. Households above the poverty line were expected to obtain electricity connections, but progress on this front has been slow. The most important issue is that the responsibility of operating the distribution system and making electricity available rests with the Distribution Companies (DISCOMs). However, for each unit supplied to poor households, the DISCOM makes a loss of nearly 4 rupees, because the tariff is very low while the cost of power purchase is high. It is impossible to recover this loss through tariff increase alone, because of the current and past financial losses of DISCOMs, and the quantum of revenue increase needed to meet the goal of universal electrification. At present, adequate supply to rural households is not being achieved, and the infrastructure created under the RGGVY is under-utilised. Hence, it is essential to address the structural disincentive which discourages DISCOMs from supplying to rural areas. This structural disincentive can be remedied by allocating low-cost power via the Ultra Mega Power Project (UMPP) approach for providing 24 x 7 minimum electricity supply of 1 unit/HH/day to beneficiary households.

In the 12th Five Year Plan, the RGGVY should be focussed not only on creating infrastructure and connecting BPL households, but also on making arrangements for low-cost power allocation to DISCOMs to support minimum consumption by the poor, campaigning to electrify all households including those above the poverty line, and managing agriculture loads through feeder separation. The power required for this scheme can be procured from the market through a Special Purpose Vehicle (SPV) of the Central Government, by way of a Power Purchase Agreement (PPA) based on competitive bidding, and supplied to the DISCOM based on a separate PPA at a fixed rate of say ₹ 2.5 per unit. The Central Government will have to fund the gap between the discovered price and the fixed rate at which the SPV supplies power to DISCOM. Alternatively, bidding can be done based on coal allocation for the power requirement, in the form of a captive coal mine, so that the tariff discovered can be low, with possibly no need for funding from the government. The share of each state would be in proportion to the load requirement for selected areas.

Monitoring implementation and ensuring accountability of DISCOMs to supply power at a low-cost to the poor is a big challenge. The scheme outlined above should be made available only in those states which agree to rid identified poor districts of load-shedding. Supply hours on the Low Tension Feeders in these districts can then be remotely monitored through automatic meters, random surveys and audits by third party agencies. Respective State Electricity Commissions and State/Regional Load Dispatch Centres can monitor DISCOM load-shedding based on such feeder metering and auditing. To ensure accountability, the PPA should grant the Central Electricity Regulatory Commission the authority to revoke the allocated share if any DISCOM does not comply with the zero load-shedding requirement.

The following figure provides an overview of the arrangements for this scheme.



Indicative calculations show that provisioning 14,000 MW of low-cost thermal power capacity and an annual support of ₹ 10,000 cr, which would reduce over the years, would be sufficient to rid 170 districts across the country of load-shedding. This is a reasonable investment, considering the 11th and 12th Five Year Plan outlays of around ₹ 50,000 to 60,000cr/year for distribution alone. Making 14,000 MW power available and setting up oversight mechanisms will take time. In the meanwhile, this scheme could be launched immediately based on the unallocated share of central sector power or by providing viability gap funding to generation projects nearing completion.

This could be achieved with very limited fiscal impact, if an approach similar to the Sasan or Tilaiya UMPP is adopted to achieve a generation cost of less than ₹ 2.5/unit from pit-head plants. This would imply coal allocation of less than 20% of the coal mines already allocated for captive mining. Allocating coal to ensure electricity for all is the best use of this precious national resource. Even in the absence of such coal allocation, the fiscal impact can be limited by the contractual design of the PPA between the SPV and the DISCOM. This also makes it possible to withdraw the subsidy at the end of the contract.

This approach can significantly speed up efforts to meet the national commitment to provide electricity access to all households, and to ensure minimum lifeline consumption of 1 unit/HH/day as a merit good. This would enable 24 x 7 power supply to around 7 crore households (28% of the population) and catalyse rural development vigorously.

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1. INTRODUCTION

The National Electricity Policy 2005 recognises electricity as a major driver of rural development and hence that of poverty alleviation. It was aimed at providing electricity access to all households and to ensure minimum lifeline consumption of 1 unit/HH/day as a merit good by 2012 (Ministry of Power, 2005). The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) was planned to achieve this objective. However, these targets have not been met by 2012 due to delays, issues in the quality of construction, and most importantly, the challenges of supplying adequate power to rural consumers. The RGGVY is proposed to be continued in the 12th five year plan (2012-2017), and needs to be geared up to fulfil this national commitment. The experience of successful international rural electrification efforts indicates the need for a comprehensive approach with a one-time push by all concerned actors. This should cover all dimensions of rural electrification: setting up infrastructure, providing universal access, supplying affordable and adequate power, and promoting productive load. This discussion paper presents an approach to restructure the RGGVY towards meeting the national commitment of providing electricity to all.

1.1 Electricity and Development

India has a massive development mandate. Nearly half of its children are malnourished (World Bank, 2010), 40 crore people are without access to electricity, and 68% of the population relies on biomass for cooking (Census, 2011). Nearly half of the rural houses are in a poor shape (semi-pucca or kaccha), built partly or completely from mud, thatch and other low quality materials (Census, 2011). The per capita GDP at $3468 per year in 2005 $ PPP is about a third of the world average, and a tenth of the OECD average (Human Development Report, 2011).This is also reflected in low fossil fuel use which stands at a quarter of the world average, and low energy emissions of 1.38 T CO_2 per capita per year, against the world average of 4.49 in 2009 (IEA b, 2011).

It is of relevance here to understand that providing basic electricity services, though essential, is insufficient for wholesome development and poverty reduction, which call for activities in other sectors as well. However, based on the Indian as well as the international experience, it is widely accepted that electricity consumption and development have a positive correlation. Therefore, it is important that integrated rural development policies with a multidimensional approach to enable and empower people should also incorporate the provision of electricity. One should expect that electricity will play a significant role in achieving a Human Development Index of 0.8, which is an indicator of high development according to the Human Development Report (2011). Addressing poverty no doubt requires changes in policy, but it also needs a sizable increase in energy access and use (Sant & Gambhir, 2011).

Thus, electrification should be considered as a social and economic investment, rather than a social obligation.

1.1.1. The Two-Way Relationship

The Human Development Index (HDI) is a very good indicator of social and economic development. The positive correlation between the consumption of electricity and HDI, especially at low levels of HDI, is well known (Gaye, 2008). This cause and effect relationship is two-way. Increase in electricity consumption could lead to a higher HDI, or a rise in the HDI could lead to higher electricity consumption. However, even a small increase in electricity consumption can make a marked difference in the quality of life of the poor. Figure 1, a plot of HDI against per capita annual electricity consumption based on data for 132 countries, demonstrates this correlation. A similar relationship is also seen between HDI and other development indicators like child mortality, female life expectancy, undernourishment and energy use (Smil, 2010).

The Indian situation is no different. States with low per capita Gross State Domestic Product have low levels of electricity consumption as well. It can be seen from Figure 1 that India's position is low with respect to HDI and per capita consumption. There are exceptions like Vietnam with an HDI close to that of India, but with much higher electricity consumption. In Figure 1, the high slope at low levels of HDI offers some insights. First of all, for countries like India located in the high slope area, a small increase in electricity consumption could lead to a large increase in HDI. Secondly, there are countries like Indonesia and Sri Lanka with a higher HDI for the same level of electricity use as that of India. This lends support to a critique of the current developmental path, and

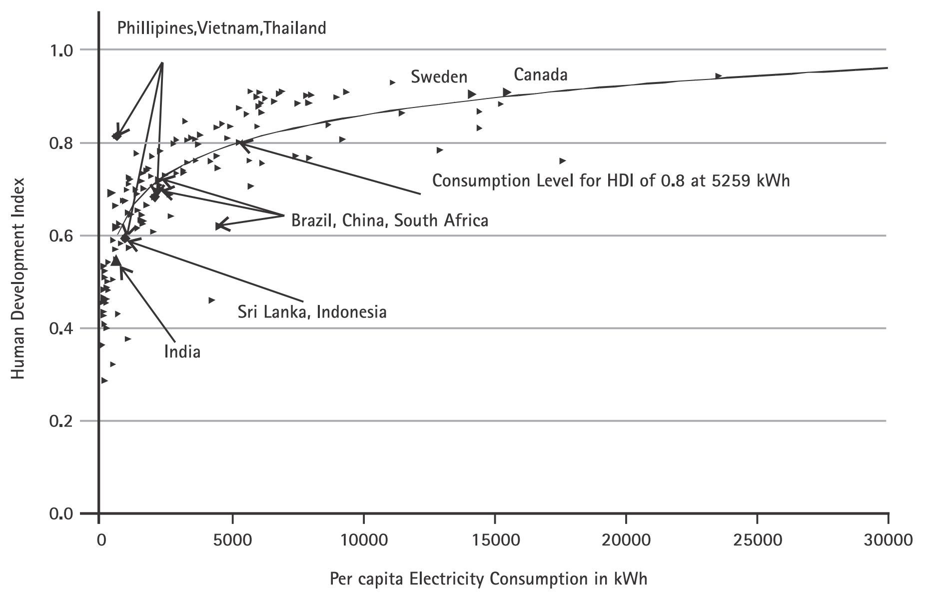

Figure 1: HDI and annual per capita electricity consumption for 132 Countries.
Source: 2009 figures, HDI,from Human Development Report 2011; Per capita electricity consumption from World Development Indicators, The World Bank

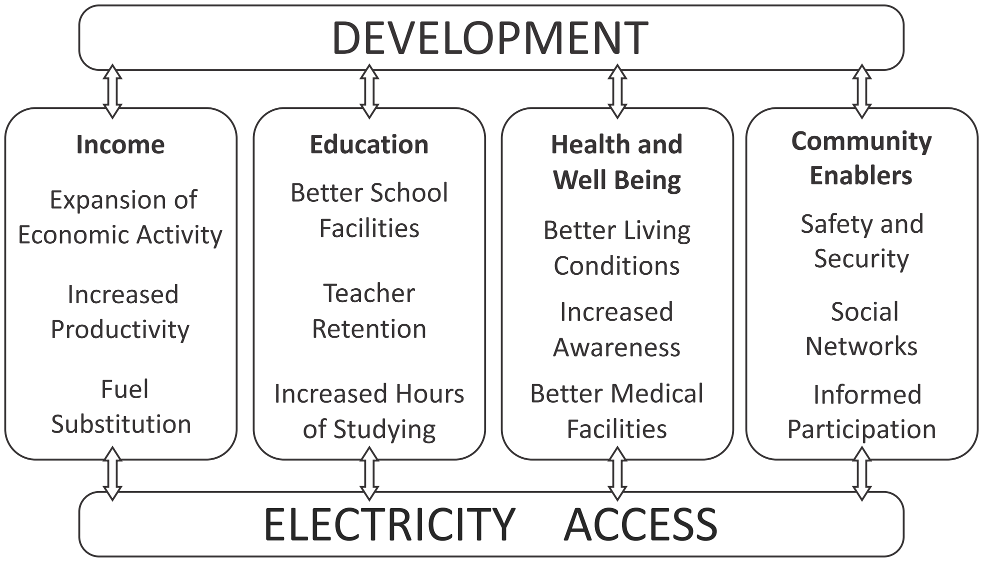

Figure 2: Linkages between electricity and development

underscores an urgent need for a more inclusive development process with a more equitable distribution of electricity. A similar high positive relationship is also seen between HDI and the percentage of household electricity access.

1.1.2 Electrification – An Investment, not a Social Obligation

The high correlation between electricity and development discussed in the previous section sheds no light on the cause and effect linkages. There are many studies which show that electricity consumption is growth driven (Payne, 2010). In India, for the period 1950-97, growth in income was shown to be responsible for a major part of electricity consumption (Ghosh, 2002) (Masih & Masih, 1996). Conversely, electricity supply can help initiate or catalyse the process of development. Modern energy services are considered an indispensable enabler in attaining the Millennium Development Goals (MDGs) which provide concrete, time-bound objectives for dramatically reducing impediments to human development by 2015 (Modi, McDade, Lallement, & Saghir, 2005). We now attempt to understand the linkages between electricity and development based on studies conducted in India and abroad.

Development is brought about by factors like increase in income, better education, improvement of health, and enhancing community enablers. Some of these relate to the individual, others to the family, and yet others to the community. These factors are not mutually exclusive, and each consists of diverse components, which are listed in Figure 2. Quality access to electricity can enable and catalyse improvement in all these areas. Impacting education and health outcomes and increasing income earning capabilities aids human capital formation, and ensures

Factors	Components	Development Impacts
Income	Expansion of Economic Activity	Increase in income (up to 36%) and reduction in poverty (about 13%). Larger cropping area and spread of small industry; Agro-processing activities are conducted in the same village; Shortening the supply chain and increasing value added to the community. Female workforce participation increased (many countries); Women had 15-17% more time for work (India)
	Increased Productivity	Irrigating with electric pumps results in 45% to 81% increase in income (India); Income of households with non-farm enterprises could increase by about 37% with 16 hours of supply (India); Electricity supply is responsible for around 30% increase in farm income (Vietnam); Electrified shops operate for about 4 hours longer than non-electrified shops and have higher incomes (Philippines); Consumers with no blackouts have around 60% higher incomes (Indonesia)
	Fuel Substitution	Access lowers kerosene use by about 35% (India); Substitution of Kerosene Hurricane Lamp by an incandescent bulb increases the consumer surplus by about ₹ 500 per month (India).
Education	Better School Facilities	Water, light, teaching aids, etc. Positive relationship between electricity and education (9 country study)
	Teacher Retention	73% of the teachers would not want to be transferred if there is electricity provision (Kenya)
	Increased Hours of Studying	Children in electrified households spend up to about 20 minutes more per day studying; School enrolment in electrified areas higher by 6-7 % (India), 15-17% (Vietnam)
Health	Better Living Conditions	Home lighting, fans, drinking water supply; Electrified households have about 30% and 60% more access to water (Ghana, Egypt); Increasing supply by 1 hour is associated with increase in household connection by about 2.5% and consumption by about 14% (India)
	Increased Awareness	Men who watch television are about 8 times more likely to be aware of AIDS and other health issues (Bangladesh)
	Better Medical Facilities	Operations, storage, use of medical equipment, retention of professionals
Community Enablers	Safety and Security	Street lights: Drop in crime rates was noted two years after electrification (India); Women report reduced vulnerability to physical assault (South Africa); Reduced risks from wild animals, snakes etc.
	Social Networks Informed	Longer free time to socialise; Use of mobile phone. Increase of self-esteem and participation by women (Bangladesh)
	Participation	Access to TV for information and entertainment, use of mobile phones for community radio

Table 1: Impact of electricity on development
Source: Compiled by the authors from Barnes 2007, Barnes 2011, Kooijman 2010, Rao 2012, and Khandker 2012

that the local economy can productively employ people. It also ensures improved living conditions, and access to a better quality of life. Thus, ensuring electricity for all is warranted not only on the principles of equity and justice, but also from the point of view of catalysing economic and social development. Any efforts towards this objective should therefore be perceived as a social and economic investment, rather than a social obligation.

Various studies have been conducted to assess the qualitative and quantitative impacts of electricity access and supply on development. Table 1 presents an overview of the impact of electricity access on development.

1.2 Lessons from International Experience

The challenge of providing electricity to all in India is much more complex than that in other countries due to our large population, vast area and immense diversity in geography, climate and social factors. India has the dubious distinction of having the highest population without electricity access. If people who do not have access to electricity in India were to form a country, its population would equal that of the USA. One of five people in the world without electricity access is an Indian (IEA a, 2011). World over, electricity access levels are low in rural areas. Rural electrification is a tough challenge due to the dispersed low load concentrated during evening peak hours, low paying capacity of consumers, and slow load growth.

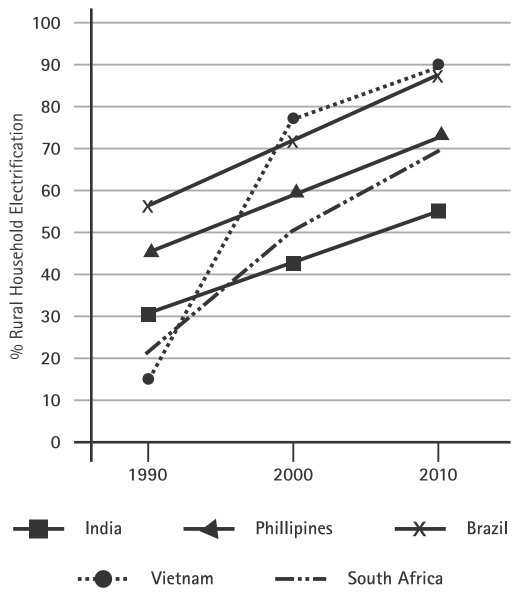

Figure 3: Progress in the rural household electrification ratein different countries
Source: Compiled by the authors from reports of Census (India), NEA (Philippines), IBGE's PNAD (Brazil) EVN, World Bank (Vietnam) and NER (South Africa)

It is interesting to examine how different countries addressed the tough challenge of rural electrification. Most countries have been able to tackle the issue of rural household electrification through focussed programmes. They have shown that it is possible to increase electricity access substantially in a short period of time. It is also important to note that countries which have levels of development comparable to India have succeeded in this regard. Figure 3 shows the progress in rural household electrification in India, Philippines, Brazil, Vietnam and South Africa from 1990 to 2010. It can be seen that the electrification level in India was low to start with, and the growth has been a modest 10-12% per decade. China witnessed a large increase in access, from 61 to 97% between 1978 and 1997 (Bhattacharya & Ohiare, 2011). Rural household electricity access in Thailand increased from 7% in 1970 to 91% in 1990, and was over 98% in 2010. Rural electrification in the USA went up from 10% in 1930 (when electrification was more than 50% in many European countries) to 95% in 1955, under the US Federal Government supported programme called the New Deal (Barnes, 2007).

Though different countries have used diverse institutions and applied varied models to achieve rural electrification based on their local realities and development history, there are common themes in their experiences. Central governments have played important roles in rural electrification, long-term subsidies and government support were necessary to achieve this goal, and distribution companies had to be financially strong and technically adept.

In the USA, the central Rural Electrification Administration supported many rural electricity cooperatives to achieve targets. Cheap power, at nearly half the rate, to the extent of one-third of the total requirement, was made available to cater to cooperatives through the Tennessee Valley Authority and other projects. A similar model of using rural electricity cooperatives to procure low-cost power as bulk consumers was used in Bangladesh, Costa Rica, and Philippines with great success. Costa Rica also used long-term loans with reduced interest rates for investments in the distribution network. Even in countries with private distribution companies, electrification required financial assistance and policy support. This is clear from the experiences of Brazil, Chile and Peru (Barnes, 2007). In Mexico, Tunisia and Thailand, a central authority ensured universal access to electricity. It provided financial support and also ensured that the distribution companies were supplying electricity to households. In Tunisia and Mexico, rural electrification was financed through grants. In Mexico, infrastructure for electricity was financed through grants given to the community, and once the infrastructure was in place, the distribution company was to supply power to the community. In Thailand, an office for rural electrification was created to manage the finances and implementation of grid extension projects. Given the shortage of funds, Thailand decided to electrify on priority those villages which indicated increased benefits, productive uses and therefore increased ability to pay for electricity services. The feasibility of electrifying a village was evaluated on the basis of its proximity to roads and the grid, its size, the expected number of consumers five years after electrification, and the number of public infrastructure facilities. The selected villages were electrified on priority, and villages which failed in the selection process were to be electrified if they shared the construction costs, or if they were selected in later years (Barnes, 2007). The electrification efforts were financed by urban consumers who cross-subsidised them, loans, and aid from international organisations (Barnes, 2011).

The IEA 2010 comparative study on rural electrification conducted in India, China, Brazil and South Africa suggests that social fairness in terms of ensuring universal household access can be one of the initial driving motivators in the first stages of electrification. It notes that economic development will follow sooner or later, even when productive end-use is not the primary objective of electrification (IEA, 2010). Experience from successful international rural electrification efforts indicates the need for a comprehensive approach with a one-time push by all concerned agencies. This should cover all dimensions of rural electrification: setting up infrastructure, providing universal access, supplying affordable and adequate power, and promoting productive load.

It is also important to note that all successful electrification programmes require distribution companies that are financially strong and technically adept, as they are the final implementers. To ensure sustainability, distribution companies must address the issue of increased losses and low revenues, and must be provided support to do so. No distribution company with the burden of high losses, either current or past, can play an important role in rural electrification.

With this background, we provide a brief overview of India's massive rural electrification programme, the Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), and review its progress.

1.3 Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)

In India, State Electricity Boards set up immediately after independence had the mandate to supply electricity beyond the major cities. Till 1970s, rural electrification was a by-product of connecting the towns with the grid, and villages near the grid benefited. In the mid-1970's, there was a trend to reduce agriculture tariff in many states based on farmers' demands. This led to a large demand for agricultural connections, and further led to rural electrification (Shankar T. L., 2009). The Rural Electrification Corporation (REC) was set up in 1969 to finance and promote rural electrification all over the country. Household electrification to provide electricity to all was not a priority of these rural electrification efforts. Household electrification was considered as a by-product of the conventional electricity development plans based on commercial considerations, and the universal electrification of all villages and households was expected to be achieved in some distant future as a result of the trickle-down effect. It is therefore no wonder that many states with high village electrification levels have low household access (Shankar T. L., 2009).

Considering the importance of rural household electrification, some initiatives were undertaken from the late 1980s to explicitly address the issue of low electrification of households, especially those of the rural poor. These initiatives included grid options led by the Ministry of Power (MoP), and off-grid options led by the Ministry of New & Renewable Energy (MNRE). The RGGVY, launched in 2005, merged all the grid initiatives, and is wider in scope than all previous initiatives.

1.3.1 **RGGVY – Opportunities and Challenges**

The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), launched in 2005 during the 10th plan and continued in the 11th and 12th plans, is a major step towards providing electricity access to all households. The RGGVY addressed two components of providing electricity to all: developing distribution infrastructure in rural areas to meet electricity demand of all households, and giving connections to all BPL families. As of August 2012, around 2 crore BPL households have been provided connections through this scheme, and 1.06 lakh villages have been electrified (Progress Report of RGGVY, 2012). The central government has disbursed about ₹ 29,000 cr to the states.[1] This implies that about ₹ 15,000 have been spent per connection. Village electrification has increased from 74% in 2005 (CEA, 2006) to 94% in 2012 (CEA, 2012). As for household electrification, data from the 2011 Census indicate that 55.3% of the rural population has access, a significant increase from 43% in 2001. The report of the Working Group on Power for the 12th plan indicates that another ₹ 60,000 cr may be set aside in this plan for the RGGVY, making the total investment close to ₹ 90,000 cr.[2]

Figure 4 shows the progress of village and rural household electrification for the past few decades. It can be seen that there has been good progress in village electrification till 1991. The subsequent drop in the graph is due to a change in the definition of village

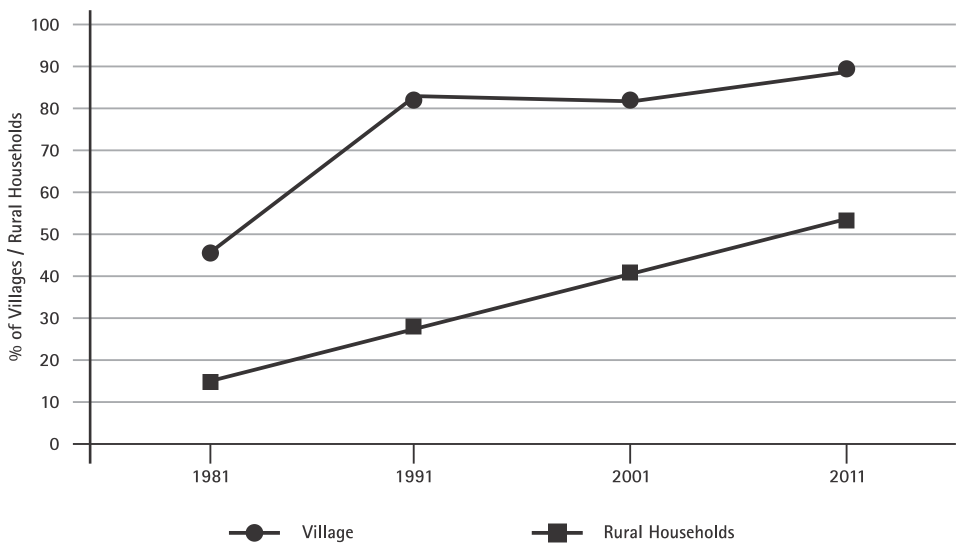

Figure 4: Progress in village and rural household electrification in India[3]

[1] The MIS report of the RGGVY at the Bharat Nirman website, August 2012: http://powermin.nic.in/bharatnirman/pdf/MIS_of_RGGVY.pdf

[2] Report of the Working Group on Power for the 12th plan: http://planningcommission.nic.in/aboutus/committee/wrkgrp12/wg_power1904.pdf

[3] Definition of village electrification was changed in 1997 and 2004-05.

electrification and the progress after 2001 due to the RGGVY. Progress in rural household electrification has been slow at around 10% per decade, much lower than the 20% decadal growth in rural household numbers. This rate continues to be so even after the RGGVY, though in absolute numbers, the achievements of the scheme are impressive, with nearly 2 crore households electrified.

The RGGVY has resulted in significant progress in village electrification and in providing BPL household connections, but there are concerns regarding the planning, implementation and sustainability of the program (Prayas, 2011). These have resulted in issues related to the speed of progress, quality of construction, and adequacy of the network to cater to full rural demand. It is also observed that a large number of APL households have not been electrified. Another important issue is that availability of power for rural households is often for much lesser than 6 - 8 hours/day, the figure envisaged under the RGGVY. According to a countrywide survey carried out in 2005 and anecdotal reports, the average number of hours of supply for a rural electrified household is 10 to 15 hours for India, but in Bihar it is 2 to 4 hours, in Uttar Pradesh it is 5 to 8 hours, and in Madhya Pradesh it is 9 hours (India Human Development Survey, 2005)[4]. Another survey reports that in Bihar the average hours of supply is as low as 1.3 hours in certain districts[5] (Oda & Tsujita, 2011). If this situation persists, a large number of households will not benefit from the RGGVY. Continued lack of power in rural areas can put the substantial RGGVY investment under risk of either sub-optimal utilisation or rapid degradation of infrastructure due to non-utilisation and inadequate maintenance.

1.3.2 Role of stand-alone systems

Stand-alone systems can be in the form of captive generation to supplement grid power for existing grid electricity consumers, or for remote areas where the grid has not reached. Captive generation, which can be connected to the grid, is used for industries, and also cities, due to the poor reliability of grid supply. These power plants have small generation capacities compared to power generating stations, and hence are costly compared to grid power, and also polluting. With the fall in prices of renewable power and rise in the tariff of grid power, there is a strong case to be made for promoting options like small solar PV or wind-based generation for commercial loads like air-conditioners and mobile phone towers. This makes economic and ecological sense. Such efforts will also help to stabilise the technological and institutional issues of small grid-interactive systems. Having touched upon these aspects, we now turn our attention to small stand-alone systems for rural electricity access.

For remote areas where the grid has not reached, electricity access can also be achieved through stand-alone power

4. India Human Development Survey (IHDS) – a National survey of 41,554 households jointly organised by researchers from the University of Maryland and the National Council of Applied Economic Research (NCAER)

5. Rohtas, Kishanganj, Bhagalpur, Madhubani, and East Champaran

generation and distribution systems. These could be set up through the Remote Village Electrification Programme of the Ministry of New and Renewable Energy (MNRE) based on renewable sources, or the Decentralised Distributed Generation (DDG) programme, which is part of the RGGVY, based on renewable or conventional sources[6]. According to the Rural Electrification Policy (Ministry of Power, 2006), stand-alone systems may be adopted for supplying electricity to households in remote settlements where grid connectivity is not feasible. The RGGVY has provisions for DDG in villages where grid connectivity is either not feasible or not cost effective, with a provision of 90% capital subsidy. The option of stand-alone systems for electricity access has merit because of many reasons. These systems reduce distribution losses and investment on distribution infrastructure, promote local ownership and are less polluting, if based on renewable sources.

As of now, such stand-alone projects are few and thinly spread. The MNRE reports a mixture of biomass gasifiers, small wind/hybrid systems, solar PV systems, and micro-hydro projects adding up to a total capacity of about 650 MW, which have electrified around 9000 villages, providing electricity to 10 lakh people. They rely heavily on government subsidies for finance, State Nodal Agencies and NGOs for project implementation, and community organisations for operation. As yet, there is no institutional set-up to ensure the sustainability and growth of such schemes. A subsidy of ₹ 540 cr allocated in the 11th plan for DDG under the RGGVY was under-utilised (₹139 cr for 87 projects sanctioned till July 2011 as per the 12th plan Working Group report) due to different reasons. For a comparison, grid-based RGGVY has provided connections to more than 2 crore households (Ministry of Power, 2012), and the centralised grid supports more than 16.6 crore households (Planning Commision a, 2012).

It is also to be noted that small stand-alone systems based on renewable sources provide only intermittent supply and have high consumer tariffs, with high one-time and operational costs. Thus, back-up supply has to be planned, and the cost of generation is high in spite of capital subsidies. Battery replacement costs (for solar PV), the problem of financing major repairs or replacements, and hurdles in assured affordable biomass supply add to the challenge of affordability. High tariffs, low capacity and intermittency may not encourage the productive use of stand-alone systems in households, as their willingness to pay reduces at higher levels of consumption (Wilson, Besant, & Audinet, 2011). Monitoring the efficacy of stand-alone systems has also been challenging due to issues with institutional and regulatory arrangements. A number of stand-alone systems are currently non-functional due to many reasons.

6. Paragraph 3 of the Guidelines for Village electrification through DDG under the RGGVY states that DDG can be from conventional or renewable sources for villages where grid connectivity is either not feasible or not cost effective. This has been modified on January 5, 2011 to include grid connected villages where adequate power supply is not available.

Grid coverage has been steadily increasing with 94% of the villages electrified. Stand-alone systems are important in remote areas where the grid cannot reach. In other areas where the grid has reached or is likely to reach in the near future, planning to connect stand-alone systems to the grid helps to supplement grid power, and increases the capacity utilisation of the stand-alone system. Therefore, they could be considered as a precursor to the grid where the grid has not reached, and a supplement to grid power in grid interactive form. Meanwhile, promoting grid-interactive renewable systems for urban consumers helps to stabilise the technology and solve implementation issues.

2. BARRIERS FOR RURAL ELECTRIFICATION

Distribution Companies shoulder the dual burden of satisfying the rising demands of existing high-end consumers and meeting the social obligation of reaching out to poor consumers. High-end consumers demand constant improvement in the quality of supply and service at the lowest possible tariff. Connecting and providing supply to the poor, who are mostly in rural areas, requires high investment and high recurring costs, and generates low returns.

Undertaking rural electrification involves challenges and costs in three major areas for the DISCOM:

a. Setting up network infrastructure and providing connections – one-time as well as enhancements

b. Operation and maintenance - routine operation, preventive maintenance, and repair

c. Supply and service - power purchase, supply to consumers, metering, billing and collection

The RGGVY addresses only the first area of setting up the rural network and providing free connections to one section of households, namely the BPL families. Other households or consumers are expected to pay and obtain connections. There could be exclusion errors in BPL identification, and many poor households who manage to barely qualify as APL may still find the connection charges in the range of ₹1,500 - 3,300[7] unaffordable. Therefore, in spite of the electricity network reaching the village, many APL households may remain without access. Figure 5 provides a break-up of electrified and non-electrified rural households, further divided into APL and BPL categories. 33% of rural households are BPL, and 55% of rural households are electrified. Only one-fifth of the electrified rural households are BPL, which is understandable. However, more than half of the non-electrified rural households are APL, indicating a major limitation of the RGGVY to meet the target of universal access.

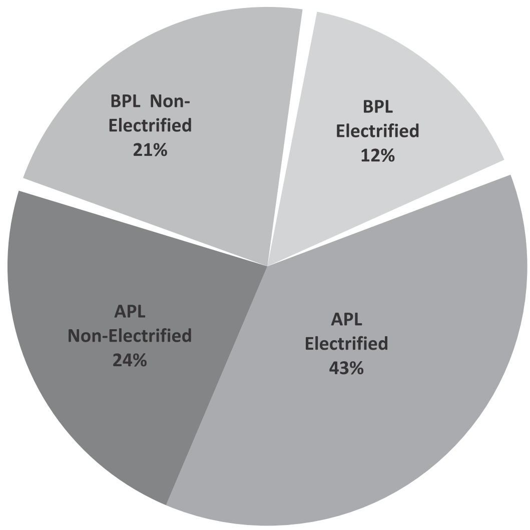

Figure 5: Rural household electrification – APL and BPL
Source: NSSO, 2008-09

[7] The current RGGVY household connection norm is ₹ 2200/- HH. The Working Group for the 12th plan has suggested that this be revised to ₹ 3300/- HH in this plan. The SERC specified charges for new connections are in the range of ₹ 1,500/- connection. There are significant unofficial additional charges that consumers have to pay, and they also face several procedural difficulties in obtaining connections, such as inadequate identification and house ownership documents. Due to these factors, many APL families cannot get connections.

The DISCOM is expected to manage the distribution network and supply power along with ancillary responsibilities (b and c above). The RGGVY has suggested the option of rural franchisees to support DISCOMs to fulfil these responsibilities, but this idea has not taken off (Prayas, 2011). Most state DISCOMs are facing supply shortages and will not be able to provide good quality supply and services to these newly electrified households. The cost at which the DISCOM procures power, and its recovery from consumers, effectively decides the quality and quantity of supply the consumers will get. For distribution companies, increasing supply to rural households is often a loss making proposition as the tariff for these consumers is typically set below the cost of supply. The next section elaborates on this issue.

2.1 Structural Disincentive For Discoms To Supply Power To The Poor

The DISCOM's reluctance to supply power to poor households is mainly on account of the structural disincentive which makes this activity economically unviable. This can be understood from Table 2.

Table 2 shows that even taking into consideration a modest transmission and distribution loss level of 20% and a low power purchase cost of ₹ 3.5/unit[9], the DISCOM makes a loss of ₹ 3.9/unit of sale to a poor household. Considering the poor financial health of many DISCOMs and the inadequate cross-subsidy on account of lower overall consumption, such a loss becomes a strong structural disincentive for increasing rural supply hours. Until this structural disincentive

Marginal power purchase cost in ₹/unit	3.5[#]
Power purchase cost after accounting for a transmission and distribution loss of ≈ 20%[8]	4.4
Distribution margin in ₹/unit	1.0
Total cost of supply in ₹/unit	5.4
Revenue from sale to electrified HH in ₹/unit	1.5
Loss per unit	3.9

Table 2: Structural disincentive for DISCOMs in supplying to poor households
Without accounting for the fact that this power will be required at peak hours and hence will be 10-15% costlier

8. Taking a modest figure of 20% as the distribution loss, the power purchase cost = 3.5/0.8 = 4.4.

9. The price discovered in the latest rounds of competitive bidding for base load capacity through long-term contracts by various state DISCOMs

Key	Population without electricity
	> 40 lakh households
	8 lakh - 40 lakh households
	< 8 lakh households

Figure 6: Non-electrified households in states
Source: Census 2011

is removed, DISCOMs will not be able to supply adequate power to these households. The next section describes the challenges in removing this disincentive.

2.2 Challenges In Removing The Structural Disincentive

The problem of low electrification is concentrated in a few regions in the country. This can be seen in the map of India in Figure 6, which shows the concentration of a high number of non-electrified households in a few states. There are 6 states which have more than 40 lakh (5% of the total 8 crore) households without electricity, 7 states having 8 - 40 lakhs and 15 states with less than 8 lakh households without electricity access. The main challenge is in the six states with more than 40 lakh non-electrified households. The approach paper to the 12th plan also mentions the need for concentrated electrification efforts in a few states (Planning Commission b, 2012).

As seen in Figure 7, these six states viz. Bihar, Uttar Pradesh, West Bengal, Madhya Pradesh, Rajasthan and Odisha account for more than 75% of the total non-electrified 8 crore households in the country (Census, 2011).

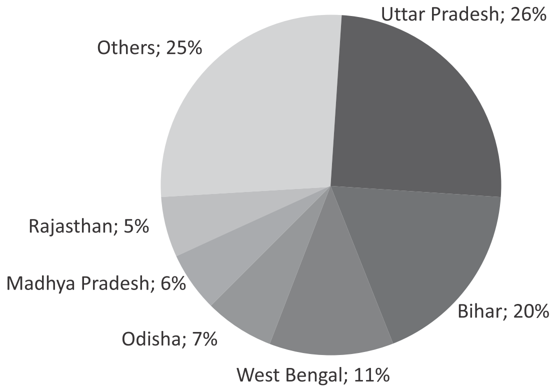

Figure 7: State-wise percentage of non-electrified households
Source: Census 2011

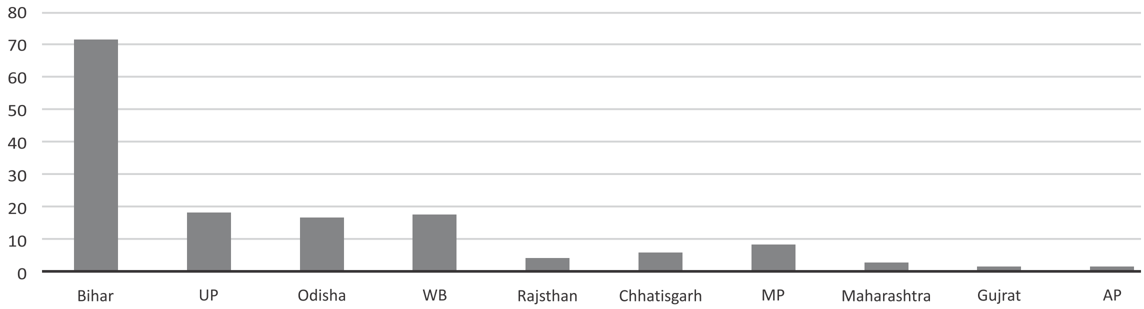

Figure 8: Percentage tariff increase required to ensure electrification[10]

Increasing consumer tariff or budgetary support to DISCOMs by state governments is often suggested as a desirable option to overcome this structural barrier. However, this may not be a feasible proposition, for the reasons discussed below:

a. Tariff impact on account of supplying power to newly electrified consumers is very high for states with very low levels of electrification. Figure 8 shows the indicative tariff increase required to ensure electrification for some select states based on the 2010-11 tariff orders. Bihar, which has a very low electrification level, will need a tariff increase of more than 70%, which is practically impossible. States with low electrification levels also tend to have

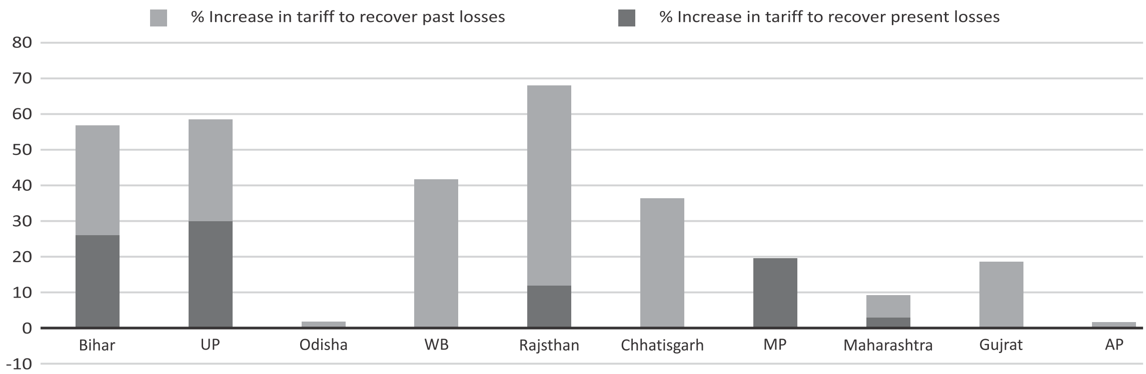

Figure 9: Percentage tariff increase required to meet past and present financial losses[11]

10. This is calculated based on tariff orders by the SERCs of respective states. The tariff impact is calculated assuming that the DISCOM will have to recover a loss of ₹3.9/unit sold to the newly electrified household (refer Table 2), at 30 units/month/HH consumption, and considering the number of non-electrified households in the state. The chart represents the increase in the tariff, i.e. the average billing rate (ABR), based on the current consumer mix. This is a conservative estimate as the actual tariff increase will vary for different consumer categories, and would be much higher for several categories as it would not be feasible to have such a tariff shock for agricultural and other small consumers.

11. This is calculated as the increase in the average billing rate (ABR) required to recover past (accumulated) losses over 5 years (with carrying cost), as well as current year losses. Past losses for certain states are not known as they were not part of the Shunglu Committee report, which is the data source for these losses (Planning Commission, 2011).

low industrial consumption and hence a low cross-subsidy. The cross-subsidy could have helped to protect small consumers from tariff shocks. It is also to be noted that a high tariff increase does not necessarily assure a matching increase in revenues, especially if the increase is too high.

b. Many state DISCOMs are reeling under past and present financial losses, mitigating which will need a significant increase in tariff. Figure 9 shows the tariff increase required for same states to meet the past and present financial losses. Indicative calculations show that for states with a major proportion of non-electrified households, a tariff increase in the range of 40 to 70% would be required to mitigate past losses (over the next 5 years) as well as current losses. It is to be seen how the financial bail-out plans proposed in September 2012 roll out and address this problem.

Thus, most states with large non-electrified houses will have to increase tariff in the range of 60 to 120% to address losses and recover the additional loss on account of increased sales to rural households. Moreover, if the proposed mandatory distribution open access[12] is implemented, the cross-subsidy would reduce further, and there would be a very limited scope for an overall increase in the tariff to overcome this structural barrier, without a significant tariff shock to small consumers.

The tariff increase required to meet the higher operation and maintenance costs, as well as fuel costs, would be in addition to this. Budgets of most states are also under severe financial stress, because of which they will not be in a position to offer budgetary support at the required scale to overcome the structural disincentive for DISCOMs to supply power to rural households.

Hence, the structural disincentive may persist for a long time, thereby severely restricting rural hours of supply. This can adversely affect not only households, but also the supply to other productive and socially essential loads such as public health centres, schools, drinking water supply schemes, and small commercial and industrial establishments. With the expanding rural grid, the demand for agricultural will also increase, and a similar low realisation from these consumers would aggravate the disincentive. In the next section, we propose an approach to meet this challenge.

12. The Ministry of Power, in a letter dated November 30, 2011, has circulated a letter to all the stakeholders conveying the opinion of the Ministry of Law and Justice on the matter of operationalisation of open access. The ministry is of the opinion that consumers of more than 1 MW connected load are to be deemed open access consumers, and the regulator has no jurisdiction over fixing energy charges for them.

3. TRANSFER OF LOW-COST POWER TO DISCOMS FOR ACHIEVING ELECTRICITY FOR ALL

There could be three options for addressing the revenue loss and hence the structural disincentive for DISCOMs to supply electricity to the poor: direct cash transfer to consumers, cash transfer to DISCOMs, or transfer of low-cost power to DISCOMs. These are discussed below. Of these options, we argue that transferring low-cost power to DISCOMs is the best option, which is discussed in detail subsequently.

3.1 Options To Remove The Structural Disincentive Of Discoms

Three options for addressing the structural disincentive of DISCOM to supply electricity, namely direct cash transfer to consumers, cash transfer to DISCOMs or transfer of low-cost power to DISCOMs, are discussed below.

3.1.1 Direct Cash Transfer to Consumers

The required amount can be directly transferred into the consumer's bank account, and the DISCOM can charge the full cost of supply to all consumers. However, at present such schemes are proposed only for economic BPL households, and hence may not solve the problem for the large section of the poor population that is APL, thus failing to address the disincentive for DISCOMs. The efficacy and accountability of direct cash transfer is yet to be established, as the systems necessary for its implementation will take time to be developed and accepted. Another drawback of this option could be the difficulty in withdrawing the subsidy support within a definite timeframe. However, sometime in the future, direct subsidy transfer may become the preferred option. Hence, alternative measures adopted in the meanwhile should be flexible to incorporate direct subsidy transfer whenever it is implemented.

3.1.2 Cash Transfer to DISCOMs

Under this option, the financial resources needed to mitigate structural disincentive can be directly transferred to the DISCOM. One advantage of this option is ease of implementation. It removes the financial deficit, but will not address the challenge of efficient power procurement, and the resultant burden/demand for increase in such a subsidy. If the DISCOM is not able to contract power below ₹ 3.5 per unit, the subsidy required can significantly increase. It will also be difficult to withdraw such a subsidy in a time-bound manner, or if the DISCOM fails to supply power to the targeted households.

3.1.3 Transfer of Low-Cost Power to DISCOMs

The third option is the transfer of low-cost power to DISCOMs. Allocating low-cost power to support rural supply has been suggested by others including Shri T. L. Shankar in 2002. In his People's Plan, he had proposed a new approach to power sector reform, with the objective of universal supply of electricity within ten years, and entitlement of specified quantities at low tariffs for poor households and agricultural pumpsets. Low-cost power from hydro and depreciated thermal stations were to be reserved for this purpose[13](Shankar T. L., 2002). In section 1.2 on the international experience, we cited the example of the USA, where low-cost power was allocated for rural electrification.

This paper builds on such approaches and proposes that the central government, through the RGGVY, facilitate adequate availability of low-cost power to DISCOMs. The allocation of generation capacity (equivalent to the expected peak load of rural households) to DISCOMs with a significant proportion of non-electrified houses should be considered. Since household consumption has a low load factor as it is mostly at the evening peak, there would be surplus power available which DISCOMs can sell to other higher paying consumers during non-evening peak hours. For example, for an allocated generation capacity of say 200 W/HH[14], the DISCOM would get around 3.8 units/day, whereas consumption only to the tune of 1 unit/HH would qualify for the subsidy (as indicated in the National Tariff Policy, 2006), thereby allowing the DISCOM to sell the remaining 2.5 units[15] at a higher tariff (within or outside the state at the transmission level) to earn additional revenue in order to further reduce the structural disincentive (See Table 3 in Annexure). In case of sales outside the state, the respective SERC should ensure that the DISCOM is not diverting power while carrying out load-shedding within the state.

In this manner, this approach can significantly reduce the structural disincentive. It will also encourage supply to other productive loads on rural feeders. Sale of additional units by the DISCOM can also help in deepening the market and support open access.

The core principle of this approach is that availability of low-cost power to the DISCOM should be ensured to reduce the disincentive to supply to the poor. In the case of the above example, if power is available at ₹ 2.5/unit (proposed scenario in Table 3), instead of ₹ 3.5/unit (current scenario in Table 3), and if the DISCOM is able to sell an additional 2.5 units at ₹ 3.3/unit (assuming that 1.25 units have to be purchased to supply 1 unit to the consumer, and surplus units are sold at the

13. This was also supported by Amulya KN Reddy, who had commented: "(This) is a highly innovative and creative solution to what has seemed an intractable problem. It is also encouraging to note that the people's plan has been endogenously produced without foreign consultants. It only shows that the key to tackling major infrastructural problems is to start with the needs of the people and be committed to addressing them." (EPW, November 2, 2002).

14. This connected load estimate of 200W is based on a modest appliance mix of 2 bulbs of 40 W each, 1 fan of 50 W and 1 tube light/TV of 60 W. 200 W used for 5 hours works out to the national lifeline consumption commitment of 1 unit/day. RGGVY norms were 50 W for BPL and 500 W for APL HHs (Draft RE Plan prepared by the MoP and the State Rural Electrification plan of Maharashtra). Using a norm of 200 W as the lifeline, connected load for all households is in line with the proposed revision of the RGGVY norm to 250 W for BPL and 500 W for APL Households (Working Group Report for the 12th Plan).

15. If 200 W generation/household is allocated to the DISCOM, assuming 85% availability and 7% auxiliary consumption, the DISCOM will have to purchase 3.8 units/day. Of this, 1.25 units will have to be kept aside to supply 1 unit at a low tariff to every household, assuming a T&D loss of 20%. The surplus of 2.5 units can then be sold.

Cost	Current Scenario -supply 1 unit to HH	Proposed Scenario - supply 1 unit to HH and sell surplus
Marginal Power Purchase Cost	3.5	2.5
Power purchase Units (20% loss implies 1.25 units, 200 W capacity means 3.79 units)	1.3	3.8
Power Purchase Cost of units @ Marginal Power Purchase Cost	4.4	9.5
Distribution cost for units supplied to Households	1.0	1.0
Total Cost of supply Power purchase + distribution cost)	5.4	10.5
Per unit cost	5.4	2.7
Revenue	Current Scenario -supply 1 unit to HH	Proposed Scenario - supply 1 unit to HH and sell surplus
Sale to Households @ 1.5/unit	1.5	1.5
Revenue from sale of additional 2.54 units @ ₹ 3.3/unit*	Not Applicable	8.4
Total Revenue	1.5	9.9
Per Unit Revenue	1.5	2.6
Loss	Current Scenario - supply 1 unit to HH	Proposed Scenario-supply 1 unit to HH and sell surplus
Net Loss per unit	3.9	0.1
*At transmission level and off- peak market prices (2011 average)		

Table 3: Change in structural disincentive after considering availability of low-cost power

transmission level, i.e. an earning of about 0.8 ₹/unit surplus from the sale of additional units), then the loss of ₹ 3.9/unit (as discussed in Section 2) could be nearly fully wiped out as seen in Table 3. However, three critical requirements - making an arrangement to transfer low-cost power to the DISCOM, proper identification of beneficiaries and the quantum of power, and ensuring transparency and accountability - have to be met for effective implementation of this approach. These requirements are discussed in Section 4. Low-cost power can be transferred to the DISCOM through competitive bidding or coal allocation. These options are discussed in the following sections.

3.2 Ensuring Low-cost Of Power To Discoms

To ensure low-cost of power to DISCOMs, two options can be considered – competitive bidding or coal allocation.

3.2.1 Competitive Bidding

The first option is an approach similar to procurement based on competitive bidding guidelines. In this approach, a Central Government Special Purpose Vehicle (SPV) can procure power from the market through bidding, and supply it to the DISCOMs of target areas, at a fixed rate of say ₹ 2.5/ unit.

For this purpose, the SPV will have to sign independent PPAs with project developers as well as DISCOMs. Figure 10 shows a schematic representation of this arrangement. The 12th Plan, through the RGGVY, could fund the gap between the discovered price and the fixed rate at which the SPV supplies power to the DISCOM. The PPA with the DISCOM could also provide for gradual (year on year) increase in the DISCOM purchase price so as to reduce the fiscal burden of the RGGVY. Decentralised generation sources could also participate in such a scheme wherever appropriate.

3.2.2 Coal Allocation

If this option is implemented, power will still need to be procured based on competitive bidding done by the central government SPV, but coal allocation for the power requirement will be offered in the form of captive coal mines, so that the tariff discovered can be low and there will be little or no need for funding from the government. This would be similar to the Sasan or Tilaiya UMPP approach, the only difference being that beneficiary DISCOMs will be decided on the basis of the electrification level, and their willingness to comply with the transparency and accountability provisions discussed in subsequent sections. The SPV will sign back-to-back PPAs with developers and DISCOMs in this case as well.

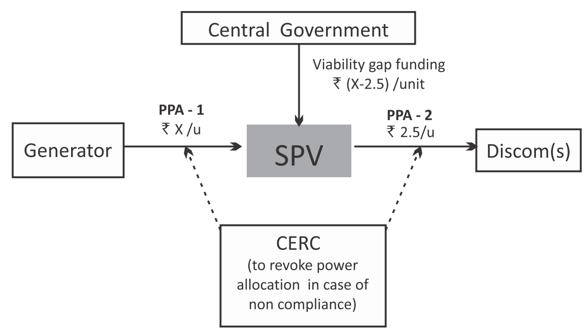

Figure 10: Schematic representation of the power procurement process

4. RESTRUCTURING RGGVY IN THE 12TH PLAN

If the national commitment to provide electricity to all is to be met, there is an urgent need to address the structural disincentive of DISCOMs and to incentivise legal connections to all households, including those who fall in the APL category. One of the potential approaches for achieving this objective is to restructure the RGGVY in the 12th Plan.

Along with the current focus on rural grid strengthening and free connections to BPL households, the restructured RGGVY should address three key issues: increasing APL connections, managing the agricultural load, and ensuring supply to electrified households. These issues are discussed below.

4.1 Increasing APL Connections

Experience from a few states has shown that when the connection charges are significantly lowered, say up to the range of ₹ 200-500/HH, a very large number of families opt for legal connections.[16] To encourage APL connections under the RGGVY, partial support can be given to DISCOMs to implement schemes such as, say, 100 x 100 connection drives. In this scheme, DISCOMs should give connections to all non-electrified households within 100 metres of the line, without insisting on strict procedural and documentation compliance, and at very nominal charges. This will certainly help the DISCOM to reduce losses, increase revenue (as hitherto illegal connections will be made legal), and ensure optimal utilisation of the infrastructure (Prayas,2010). As both the DISCOM and the consumer stand to gain from such an arrangement, both should share a part of the cost burden, and the RGGVY could provide additional funds to incentivise such 100 x 100 schemes by DISCOMs.

Thus, the central government, the DISCOM and the consumer could each share a part of the connection charges. Further, the incentive provided by the Government of India (GoI) or the DISCOM could be taken into account in case the consumer accepts either a limited wattage (load limiter based) connection or a pre-paid meter. To further encourage more legal connections, the DISCOM could also allow its new consumers to pay their share of the connection charges in instalments along with the monthly bills. Even assuming that the number of rural non-electrified APL households is 4 crores[17], and using the revised RGGVY norm of ₹ 3,300/connection[18], the RGGVY can provide a subsidy of around ₹ 4,400 cr (one-third of the total cost) under the 12th plan to support 100 x 100 connection drives by DISCOMs.

16. Business Standard (March 31, 2011) reported that when the connection charges were reduced by one-fourth to one-tenth in West Bengal, 7.5 lakh consumers mostly from rural areas across the state applied for connections in February 2011.

17. According to the NSSO data, 54% of the total rural non-electrified households are APL. From the 2011 census, 55% of the 16 crore rural households have access to electricity.

18. The current RGGVY household connection norm is ` 2200/HH. This figure is likely to be revised to `3300/HH in the 12th plan.

4.2 Managing Agricultural Load

With the network reaching villages, the demand from the agricultural segment may increase, which can further aggravate the structural disincentive. To improve the management of rural supply, separation of agricultural feeders from the rest of the rural load is essential. Many states are undertaking such schemes in order to manage the load better. However, states with lower electrification may need the support of a capital subsidy after a few years when electricity based pumping picks up. The Working Group report for the 12th plan proposes a central subsidy of ₹10,000 cr for feeder separation in states which have an agriculture consumption of greater than 20%. This could be extended to more states. Simultaneously, in a couple of districts where the water table is shallow, solar agricultural pumps can be introduced through the Solar Mission. Also, the possibility of not extending agricultural connections through the grid can be explored if there is social acceptance.

4.3 Ensuring Supply To Electrified Households

Once all households including APL families have received electricity connections, and arrangements to manage agriculture load are in place, the next steps to ensure supply to electrified households can follow. These involve actions in three areas: calculating the amount of power required and identifying beneficiaries, allocating low-cost power to DISCOMs, and ensuring transparency and accountability. These areas are described below.

4.3.1 Calculating the Amount of Power and Identifying Beneficiaries

The amount of power required depends on the number of households and their power needs. We propose that the power required to meet the basic needs, that is 30 Units/month/HH and 200 W/HH, should be arranged through this scheme. As for identifying households, we feel that it is not possible to target a group of households for power allocation because of the nature of electricity, and because it will reduce positive spill-overs and dampen the development potential. It is better to target areas where uninterrupted low-cost power can be provided to promote development. This entails selecting areas based on some criteria for development potential. There are two possible methods in which these areas can be selected .

The first method is to select the most backward districts or the least electrified ones, and then allocate power equivalent to 200 W/HH to the respective DISCOM. Table 1 in the Annexure shows the indicative number of households that will benefit based on this approach, if the backward districts identified by the Planning Commission report of the Inter ministry Task Group on redressing growing regional imbalances, 2005 are considered (Planning Commission, 2005). Accordingly, Table 2 in the Annexure shows the state and district-wise power and energy requirement based on the calculation method mentioned above.

The second method could be to adopt a state-wise approach based on the current firm allocation of NTPC power, and the level of household electrification within the state. Presently, six states (Bihar, Uttar Pradesh, West Bengal, Madhya Pradesh, Rajasthan and Odisha) which account for over 75% of the rural non-electrified households in the country receive about 40% of the total central sector power capacity (firm and unallocated), as shown in Figure 1 of the Annexure (CEA, 2011). Similarly, Figure 2 in the Annexure shows that these states are not allocated enough power to meet the normative demand of 30 units a month (i.e. the central allocation to these states is much lower than the 200 W/HH that is required to use 30 units/HH/month assuming a usage of 5 hours per day). Therefore, we suggest that to meet the national goal of electricity for all, a share of low-cost power can be allocated to states on the basis of the deficit in central allocation. That is, states with less than 200 W/HH of central allocation could be provided this additional allocation of low-cost power to bring the central allocation to these states to the level of 200 W/HH. The state can then decide which regions should be prioritised to receive benefits from this allocation. Irrespective of the criteria for selecting the target area, all households within the area should be considered for the scheme.

After the target areas (and hence the number of households) have been identified, the megawatt requirement can be calculated assuming a normative load of say 200 W per household (equivalent to 1 unit/day consumption @ 5 hr/day). This quantity of power could be allocated to the respective states, which could then be asked to fine tune the choice of districts to implement the scheme.

4.3.2 Allocating Low-Cost Power to DISCOMs

Indicative calculations show that an additional 14,000 MW will have to be allocated to provide electricity to 170 districts with 7 crore households. The rationale for allocation of low-cost power and options for implementation have been discussed in section 3.

4.3.3 Ensuring Transparency and Accountability

Monitoring the scheme is essential to ensure that target households actually receive supply from the DISCOM at evening peak hours. This can be done by mandating all LT feeders in the target district to be load-shedding free. Supply hours on these LT feeders should be remotely monitored through automatic meters (the cost for countrywide deployment would be less than ₹ 500 cr)[19]. The respective SERCs/RLDC can easily monitor the DISCOM load-shedding based on such feeder load data. To ensure accountability, the CERC should have the authority under the PPA (signed between the DISCOM and SPV), to revoke the allocated share if any DISCOM does not comply with the zero load-shedding requirement. Such an arrangement can ensure that the DISCOMs comply with agreed conditions, without having to involve the ministry in monitoring.

Figure 11 shows the process of implementation and monitoring at the national and state levels. All involved agencies in the scheme have a role to

[19] This estimate is based on the recent MSEDCL capital expenditure proposal.

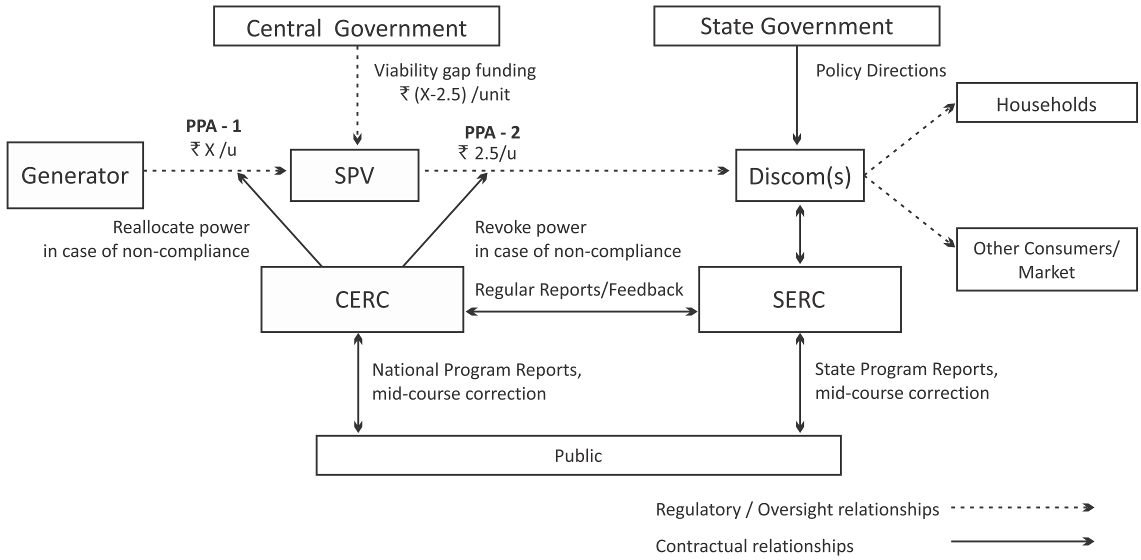

Figure 11: Schematic to show implementation and monitoring

play to ensure that it is operational. The roles of the various agencies are listed below.

- **Generator:** Enters into a PPA with the SPV for the required quantum as per the relevant bidding guidelines.

- **Special Purpose Vehicle:** The SPV, via the competitive bidding contracts, procures the required quantum on a long-term basis from the generator and supplies power to the DISCOM at a fixed rate. Therefore, it signs back-to-back contracts with the generator as well as the DISCOM.

- **Consumer and Public Interest Groups:** Organisations working on rural development would appreciate the crucial catalysing role of quality affordable electricity supply. They could participate in designing the scheme in detail and pushing it. Once a longer duration of supply is made available, there should be community pressure on the DISCOMs and state governments to maintain it.

- **DISCOM(s):** As the final implementer of the scheme, the DISCOM enters into a PPA with the SPV for low-cost power at a fixed price, and supplies power to households in the target districts. The DISCOM ensures that the target districts are load-shedding free, and that households receive the lifeline consumption of 1 unit/day at lower rates. The DISCOMs have the opportunity to sell electricity in excess of the lifeline consumption requirement without curtailing local demand. If the target districts are not load-shedding free, the allocated power is revoked. Therefore, in order to benefit financially the DISCOM must reduce its T&D losses and improve the quality of service. Metering and billing systems should be strengthened using schemes like the Restructured Accelerated Power Development & Reforms Programme (R-APDRP). Options like prepaid metering or load-limiter connections for small consumers could be explored. The scheme will succeed only if the DISCOM adheres to its terms and conditions.

• **SERC:** The State Electricity Regulatory Commission (SERC) ensures the adherence of the DISCOM to the scheme by monitoring the 11 kV feeder data collected by the State Load Dispatch Centre (SLDC)/Regional Load Dispatch Centre (RLDC). It can ensure greater transparency and accountability in load-shedding by mandating good practices in protocol as done in Maharashtra. The respective state and regional LDCs can assist the SERCs in monitoring the compliance of the DISCOM to the load-shedding protocol. SERC reports non-compliance to the CERC. The SERCs must also promote efficient operation of the DISCOM by ensuring that they adopt loss reduction strategies and ensure high collection efficiency.

• **State Government:** State Governments provide policy direction and support DISCOMs to ensure the implementation of the scheme. They encourage supplementary schemes for reducing losses or increasing connections, and feeder separation to ensure the success of the scheme. State Governments also identify beneficiary districts for the scheme. They decide how the scheme can be adopted to suit the conditions of the state, and can even opt to implement the scheme in a phased manner.

• CERC: Based on reports from the SERC, the CERC can regulate, reduce or revoke the allocated power contracted through the SPV to the DISCOM in case of non-compliance.

• **Central Government:** The Central Government performs the role of the apex body which ensures the operation of the scheme. It funds the gap between the discovered price and the fixed price at which power is to be supplied to the DISCOM to ensure the financial viability of the DISCOM. It works closely with other agencies to ensure that monitoring mechanisms are in place. The Central Government also ensures that supportive actions to assist the scheme are undertaken, including agriculture feeder separation and concentrated connection drives. It can adopt this scheme as part of the restructuring of RGGVY under the 12th plan. Details regarding the method of power procurement, basis for selection, and monitoring of contracts will have to be decided after consultations with all states and the CERC. Using the national electricity, rural electrification and tariff policies, a clear mandate should be given to the State Regulatory Commissions to oversee and ensure the implementation of schemes related to rural electrification, including the RGGVY. The policy should also prohibit state DISCOMs from selling power outside the state while undertaking load-shedding within the state.

It should be noted that the scheme addresses the structural disincentive based on contractual agreements to ensure that all agencies are working towards a common goal. These agreements have to be clear and robust to take care of potential implementation problems.

5. IMMEDIATE POSSIBILITIES FOR IMPLEMENTATION OF SCHEME

Making arrangements for low-cost allocation to DISCOMs would take some time. To begin pilot implementation of the scheme, there are two options – making some unallocated power of the NTPC available to select states, or taking up pilot projects in a few states.

5.1 Unallocated Power of The NTPC

While it is true that undertaking bidding through the SPV and actually getting low-cost power will need at least 4-5 years, the scheme can still be immediately launched by utilising the NTPC unallocated share (which is currently sold at less than ₹ 2.5/unit[20]). The present unallocated share is over 5500 MW, of which 4,000 MW can be immediately allocated to this scheme. Such an approach would immediately enable 24 x 7 supply to over 50 most backward districts, and would benefit nearly 2 crore households. This scheme can also utilise the capacity lying idle in the form of projects nearing completion, which are unable to commence generation due to problems related to fuel or inability to find buyers. The SPV promoted by the Government of India can procure power from these projects through competitive bidding, and supply the same to DISCOMs in targeted states. As mentioned above, the Government of India could pay the viability gap funding to the SPV to ensure that power is available to DISCOMs at ₹2.5/unit. This would enable direct targeting of the viability gap funding for rural development and electrification of poor households. Coal mines could also be allotted to such projects on a priority basis for the benefit of poor households.

5.2 Pilot Projects

The scheme, if implemented, would provide reliable, low-cost power to 28% of the population. However, the states can select one or two districts/areas where such a scheme is feasible, and implement it on a pilot basis. Mechanisms to provide shorter hours of supply (say 12-18 hours) per day as a beginning could also be explored in areas where the supply quality is very poor. Implementing the scheme in a district with 5 lakh households will require 100 MW. If DISCOMs, with the support of the state government, find that the scheme can be implemented, it could be scaled up and implemented in other districts as well. Pilot studies will also help understand how the scheme can be improved, and can help evaluate its impact. The success of pilot studies may also encourage governments to implement the scheme on a larger scale.

20. This figure varies over plants from 1.9/unit to 3/unit. We are assuming a weighted average of 2.5/unit.

6. ENSURING ELECTRICITY FOR ALL: ULTRA MEGA POWER PROJECT (UMPP) FOR THE POOR

This paper has presented an approach of allocating low-cost power to DISCOMs to remove the structural incentive to supply electricity to poor households. Indicative calculations based on a district-wise approach show that provisioning 14, 000 MW of low-cost thermal power capacity would be sufficient to make 170 districts, spread across the country, load-shedding free. This will enable 24 x 7 power supply to around 7 crore households (28 % of the population), and significantly catalyse economic activity in these 170 most backward and rural districts of the country. Necessary steps to ensure oversight and accountability of DISCOMs should also be put in place.

The proposal is summarised below.

a. Provision of adequate reliable supply to households is as important as laying down the network so that they can benefit from electrification.

b. The challenge of providing electricity to all cannot be met by the states without removing the structural disincentive for DISCOMs to supply to the rural poor. This objective needs to be supported by the central government, and the RGGVY should be restructured to address this issue. This restructuring should include taking up connection drives to connect APL households, addressing issues with agriculture power supply, and allocating low cost power to DISCOMs.

c. The amount of power allocation to DISCOMs is calculated based on a normative household requirement of 200 W and 1 unit/HH/day, to be provided to all households in 170 districts. With this allocation, DISCOMs will have 2.5 units to sell (at a higher tariff) after supplying 1 unit to households, thus reducing the amount of support needed by the DISCOMs. The amount of cheap power to be allocated works out to be 14,000 MW. Supplying this at ₹ 2.5/unit would need a viability gap funding of ₹ 10,000 cr/year by the central government, or allocation of coal mines to dedicated generating stations - UMPP for the poor.

d. To ensure universal electricity access, the monitoring of RGGVY implementation and electricity supply has to be improved. The state government, regulatory commissions (state and central) and DISCOMs should set up monitoring and accountability mechanisms to improve power supply to rural areas and the poor.

e. Stand-alone systems and Decentralised Distributed Generation (DDG) do have a role to play in complementing grid power. Grid coverage has been steadily increasing with 94% of the villages electrified. Stand-alone systems are important in remote areas where the grid cannot reach. In other areas where the grid has reached or is likely to reach in the near future, planning to connect stand-alone systems to the grid helps to supplement grid power, and increases the capacity utilisation of the stand-alone system. Therefore, they could be considered as a precursor to the grid where the grid has not reached, and a supplement to grid power in grid interactive form.

f. The proposed scheme requires the coordination of many agencies, which could be ensured by commercial contractual agreements and monitoring mechanisms. This approach has to be fine-tuned through discussions among the central and state power sector agencies, especially of the six states – Uttar Pradesh, Bihar, Odisha, Madhya Pradesh, Rajasthan and West Bengal - which account for 75% of the non-electrified households.

g. As an immediate measure, unallocated power of the NTPC could be used to kick start the scheme. This could be examined to plan pilot implementation in a few states which are keenly interested in the scheme.

These results could be achieved with very limited fiscal impact, if an approach similar to the Sasan or Tilaiya UMPP is adopted to achieve a generation cost of less than ₹ 2.5/unit from pit-head plants. This would imply coal allocation of less than 20% of coal mines already allocated for captive mining. Allocating coal to ensure electricity for all is the best use of this precious national resource. Even in the absence of such coal allocation, the fiscal impact can be limited by a contractual design of the PPA between the SPV and the DISCOM. This also makes it possible to withdraw the subsidy at the end of the contract. Rough calculations indicate the requirement of the viability gap funding to the tune of ₹ 10,000 cr/year for a few years. This is a reasonable investment, considering the 11th or 12th five year plan outlay of around ₹ 50,000 to 60,000 cr/year for distribution alone.

Such an approach can significantly speed up efforts to meet the national commitment to provide electricity access to all households, and to ensure the minimum lifeline consumption of 1 unit/HH/day as a merit good.

REFERENCES

Barnes. (2011). Effective solutions for rural electrification in developing countries: Lessons from successful programs. Current Opinion in Environmental Sustainability: Themed Issue.

Barnes. (2007). The Challenge of Rural Electrification: Strategies for Developing Countries. Resources for the Future, ESMAP (World Bank).

Bhattacharya, S., & Ohiare, S. (2011). The Chinese electricity access model for rural electrification: Approach,experience and lessons for others. OASYS South Asia Project.

Cabraal, R., Barnes, D. F., & Agarwal, S. (2005). Productive uses of energy for rural development. Annual Review of Enviornmental Resources, pp. 117-144.

CEA. (2006). All India Electricity Statistics. CEA.

CEA. (2011). Load Generation Balance Report 2011-12. New Delhi: CEA.

CEA. (2012). Progress report of village electrification as on 31-7-2012. CEA.

Census. (2011). Household Level Indicators. Government of India.

Gaye, A. (2008). Access to Electricity and Human Development. New York: UNDP.

Ghosh, S. (2002). Electricity consumption and economic growth in India. Energy Policy, pp. 125-129.

IEA a. (2011). Energy for all: Financing access for the poor-Special early excerpt for the World Energy Outlook 2011. IEA.

IEA b. (2011). International Energy Statistics.

IEA. (2010). Comparitive Study on Rural Electrification Policies in Emerging Economies: Keys to successfull policies. International Energy Agency.

Khandker, S. R., Samad, H. A., Ali, R., & Barnes, D. F. (2012). Who Benefits Most from Rural Electrification? Evidence from India. World Bank.

Kooijman-van Dijk, A., & Clancy, J. (2010). Impacts of Electricity Access to Rural Enterprises in Bolivia, Tanzania and Vietnam. Energy for Sustainable Development , pp. 14-21.

Masih, A. M., & Masih, R. (1996). Energy consumption, real income and temporal causality: Results from a multi-country study based on cointegration and error-correction modelling techniques. Energy Economics , pp. 165-183.

Ministry of Power. (2006). Rural Electrification Policy. New Delhi: Government of India.

Ministry of Power. (2012). Bharat Nirman DMU Report. Government of India.

Ministry of Power. (2005). National Electricity Policy. Government of India.

Modi, V., McDade, S., Lallement, D., & Saghir, J. (2005). Energy Services for the Millenium Development Goals. New York: Energy Sector Management Assistance Programme, United Nations Development Programme, UN Millennium Project, and World Bank.

NCAER and University of Maryland. (2005). India Human Development Survey. New Delhi.
NSSO. (2009).

Level and Pattern of Consumer Expenditure. Ministry of Statistics and Programme Implementation, Government of India.

Oda, H., & Tsujita, Y. (2011). The determinants of rural electrification: The case of Bihar, India. pp. 3086-3095.

Payne, J. E. (2010). A survey of the electricity consumption-growth literature. Applied Energy , pp. 723-731.

Planning Commision a. (2012). Annual Report on the Working of State Power Utilities and Electricity Departments. Government of India.

Planning Commission. (2011). High Level Panel on financial position of distribution utilities. Government of India.

Planning Commission b. (2012). Faster Sustainable and more inclusive growth - an approach paper to the 12th plan. Government of India.

Planning Commission. (2005). Report of the Inter ministry Task Group on redressing growing regional imbalances. New Delhi: Government of India.

Prayas . (2010). Electricity for all: Ten ideas towards turning rhetoric into reality. Pune: Prayas Energy Group.

Prayas. (2011). Rajiv Gandhi Rural Electrification Program. Prayas Energy Group.

Progress Report of RGGVY. (2012, August 20). http://rggvy.gov.in/rggvy/rggvyportal/plgsheethomeplan.jsp

Rao, N. (2012). 'Does (better) Electricity Supply Boost Household Enterprise Income in India?'. Energy Policy (under review).

Sant, G., & Gambhir, A. (2011). Energy,Development and Climate Change. In N. Dubash (ed)., Handbook of climate change and India: Development, politics and governance. New Delhi: Oxford University Press. Chapter 21.

Shankar, T. L. (2002). Towards a People's Plan for Power Sector Reform. Economic and Political Weekly, pp. 4143-4151.

Shankar, T.L. (2009). Rural Electrification, Energy Infrastructure: Priorities, Constraints and Strategies for India. In ADB, Energy Infrastructure: Priorities,Constraints and Strategies for India. Oxford University Press.

Smil, V. (2010). Science, energy, ethics and civilization. In C. et al. (ed.), Visions of Discovery: New Light on Physics,Cosmology and Consciousness. Cambridge University Press. pp. 709-729.

UNDP. (2011). Human Development Report. United Nations.

Wilson, M., Besant, J. J., & Audinet, P. (2011). A New Slant on Slopes Measuring the Benefits of Increased Electricity Access in Developing Countries . Sustainable Development Unit, MENA, ESMAP.

World Bank. (2010). World Bank Indicators.

ANNEXURE: CALCULATION OF POWER REQUIREMENT

Table 1 shows the indicative number of households that will benefit based on the backward districts identified by the Planning Commission report of the Inter ministry Task Group on redressing growing regional imbalances, 2005. Using these districts as the basis, Table 2 shows the power and energy requirement based on the calculation method mentioned above.

State	Total no. of districts	No. of backward districts	No of HH in lakhs in backward districts (2011 census)
Andhra Pradesh	23	8	60
Assam	27	8	20
Bihar	38	36	220
Chhattisgarh	27	9	20
Gujarat	26	1	4
Jharkhand	24	17	60
Madhya Pradesh	50	20	50
Maharashtra	35	4	10
Manipur	9	2	0.8
Meghalaya	7	3	4
Nagaland	11	3	1
Odisha	30	15	40
Rajasthan	33	9	30
Uttar Pradesh	75	30	130
West Bengal	19	5	40
Total	**–**	**170**	**690**

Table 1: State-wise list of backward districts in India

State	No of HH in lakhs	MUs/year (30 units/month/HH)	MW load (200 W/HH)
Andhra Pradesh	60	2,259	1,255
Assam	20	619	344
Bihar	220	7,916	4,398
Chhattisgarh	20	834	463
Gujarat	3	119	66
Jharkhand	50	1,733	963
Madhya Pradesh	60	2,050	1,139
Maharashtra	10	483	268
Manipur	0.8	28	16
Meghalaya	1.9	69	38
Nagaland	1.1	41	23
Odisha	40	1,570	872
Rajasthan	30	954	530
Uttar Pradesh	120	4,428	2,460
West Bengal	50	1,685	936
Total	**690**	**24,788**	**13,771**

Table 2: State and district-based power and energy requirement

Table 3 lists the assumptions made and calculations performed to arrive at the additional units that are available for sale to the DISCOM for every 200 W of power.

Load	200 W
Power purchase requirement per day @ 85% normative availability and 7% auxiliary consumption	3.8 units
Normative household requirement per day	1 unit
Household requirement per day after accounting for distribution losses	1.25 units
Additional units for sale available to the DISCOM at transmission	2.5 units

Table 3: Additional units available to the DISCOM if a generation capacity of 200 W per household is allocated

Figure 1 shows the state-wise share of firm power and unallocated power from the central generating stations. It also shows the allocation of UMPP power that will be available to the states. It is evident that states with low electricity access have low central and UMPP power allocation as well.

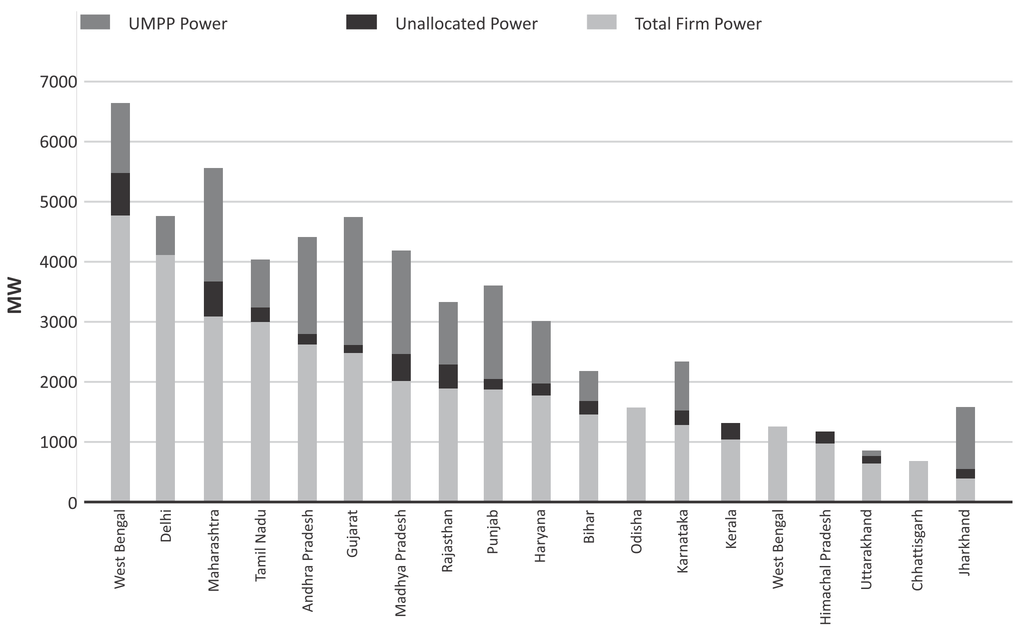

Figure 1: State wise historical allocation of Central Sector Power

This fact that states with low electricity access have low central and UMPP power allocation is even more obvious in Figure 2, where the per-household allocation of power is depicted. States with low access have low allocation, which is sometimes less than 200 W per household, whereas it is more than 600 W per person in 4 states. Delhi is allocated more than 1400 W from the central generating stations and UMPPs.

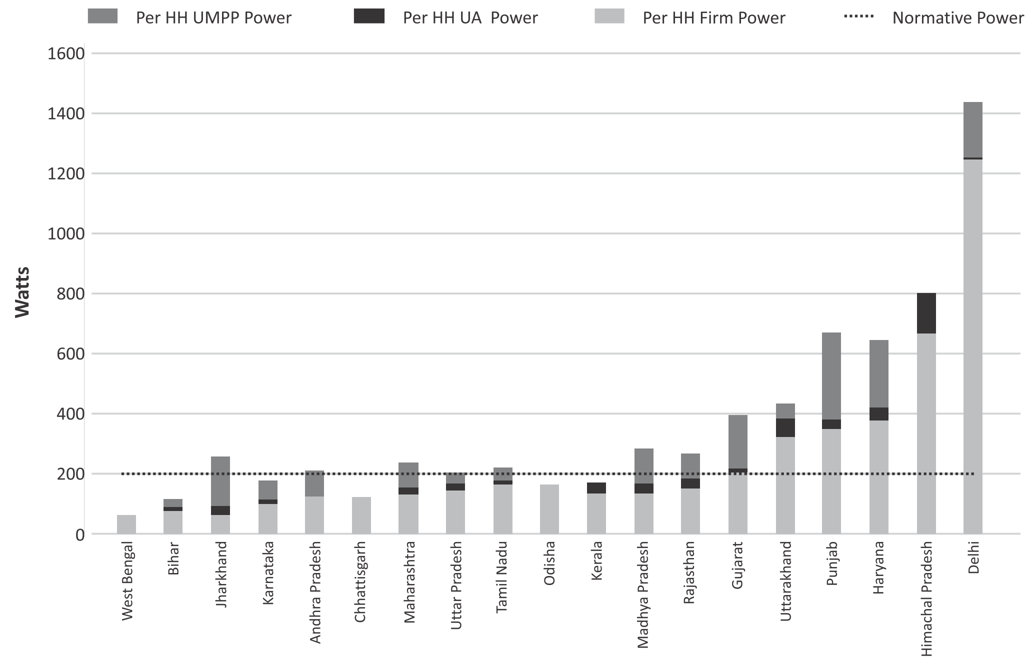

Figure 2: State wise per-household allocation of Central Sector and UMPP power (in Watts)

SELECTED PRAYAS PUBLICATIONS

Selected Publications of Prayas Energy group

1. Decentralised Renewable Energy (DRE) Microgrids in India : A review of recent literature, Prayas (Energy Group), 2012
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10. Climate Change: Separating the Wheat from the Chaff, Economic & Political Weekly, 31/01/2009
11. Awareness and Action for Better Electricity Service: an Agenda for the Community, Prayas (Energy Group), 2008
12. Electricity Governance Initiative a) The Electricity Governance Toolkit : Benchmarking Best Practice and Promoting Accountability in the Electricity Sector, 2007 b) Empowering People: A Governance Analysis of Electricity, India, Indonesia, Philippines, Thailand, 2007
13. Know Your Power: A Citizens' Primer on the Electricity Sector, Prayas (Energy Group), 2006
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15. Restarting Dabhol: Who Will Bear the Cost? And Why?, Economic & Political Weekly, 28/06/2005
16. India Power Sector Reforms Update- various issues - Update of power sector reforms in Andhra Pradesh, Uttar Pradesh and Odisha, 2001 to 2005
17. A Good Beginning but Challenges Galore, Report based on detailed survey of 12 electricity regulatory commissions in India, 2003
18. Electricity Sector Reforms in Asia: Experiences and Strategies - a compilation of selected papers prepared for the Asia Power Sector Reforms Workshop organised by Prayas (Energy Group) (India), Transnational Institute (The Netherlands) and Focus on the Global South (Thailand), 2002

19. Bujagali Power Purchase Agreement -An Independent Review, A study of techno-economic aspects of power purchase agreement of the Bujagali project in Uganda, 2002
20. HT Energy Audit: The Crucial Starting Point for Curbing Revenue Loss, Prayas (Energy Group) Occasional Report 1/2002, 2002
21. Least-Cost Power Planning: Case Study of Maharashtra State - Energy for Sustainable Development, The Journal of International Energy Initiative, Vol. IV, No 1, June 2000
22. Regaining Rationality through Democratisation: A Critical Review of Multilateral Development Banks' (MDBs') Power Sector Activities in India, Prayas (Energy Group), 1999
23. WB-Orissa Model of Power Sector Reforms: Cure Worse Than Disease, Economic and Political Weekly, 01/05/1998
24. Beneficiaries of IPS Subsidy and Impact of Tariff Hike, Economic and Political Weekly, 21/12/1996
25. The Enron Controversy: Techno-Economic Analysis and Policy Implications, Prayas (Energy Group) Monograph, 1995
26. Power Purchase Agreement (PPA) Between Dabhol Power Company and Maharashtra State Electricity Board: Structure and Implications, Economic and Political Weekly, 17/06/1995

Prayas (Energy Group) participates in power sector activities as a member of the following committees:

- CERC Advisory Committee (from 1998), MERC State Advisory Committee (from 1999), APERC State Advisory Committee (from 2007)
- Steering Committee on Energy for 12th Five Year Plan (Planning Commission), Working Group on Power for 12th Five Year Plan (2011), Working Group on Power for 11th Five Year Plan (2007), Energy Study Group, Government of Maharashtra for the preparation of power component of State's 11th Five Year Plan (2007-8)
- Planning Commission Expert Group on Strategy for a Low Carbon Economy (2010)
- The National Mission on Enhancing Energy Efficiency (NMEEE) (2008)
- Supreme Court Committee on Municipal Solid Waste (2006)

The National Electricity Policy 2005 recognises electricity as a major driver of rural development and hence that of poverty alleviation. The challenge of providing electricity to all in India is much more complex than that in other countries due to our large population, vast area and immense diversity in geography, climate and social factors. Electricity access for all will bridge a crucial gap between the haves and have-nots, and will thus contribute to social equity as well as economic development. Therefore, efforts towards providing electricity to all are a social and economic investment, rather than an obligation to the poor.

The Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) is electrifying households below the poverty line by extending the grid using the resources of the Indian government. The responsibility of operating the distribution system and making electricity available rests with the Distribution Companies (DISCOMs). However, for each unit supplied to poor households, the DISCOM makes a loss of nearly 4 rupees, because the tariff is very low while the cost of power purchase is high. Therefore, adequate supply to rural households is not being achieved, and the infrastructure created under the RGGVY is under-utilised. The loss to DISCOMs can be made up by allocating low-cost power via the Ultra Mega Power Project (UMPP) approach for providing 24 x 7 minimum power supply to beneficiary households. This paper presents a proposal to achieve this objective.

The proposed solution can significantly speed up efforts to meet the national commitment to provide electricity access to all households, and to ensure minimum lifeline consumption of 1 unit/household/day as a merit good. This would enable 24 x 7 power supply to around 7 crore households (28% of the population) and catalyse rural development vigorously.

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