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Supply of clean energy services to urban and peri-urban poor

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Table of Contents

EXECUTIVE SUMMARY	10
CHAPTER 1 INTRODUCTION TO THE UPEA STUDY	1
Background of the study	1
Urban and Peri-urban Energy Access (UPEA).....	5
Objectives of the research.....	6
Organization of the report.....	7
CHAPTER 2 RESEARCH METHODOLOGY	8
2.1 Basic Research Framework	8
2.2 Methodology	8
CHAPTER 3 ENERGY USE BY URBAN POOR AND POLICY INITIATIVES	12
3.1 Urban Poverty and clean energy	13
3.2 Fuels used by Indian households	14
3.2.1 Fuel used for Cooking.....	14
3.2.2 Fuel used for Lighting.....	16
3.2.3 Percentage expenditure on energy (lighting and cooking)	17
3.3 Institutional framework for delivery of energy services.....	17
3.3.1 Electricity.....	17
3.3.2 Liquefied petroleum gas (LPG)	19
3.3.3 Kerosene	19
3.4 Subsidies in energy sector.....	19
3.5 Policy initiatives	21
3.5.1 Institutional arrangements.....	21
3.5.2 Key policies for urban development.....	22
3.5.3 Key policies for improving energy access.....	24
3.5.4 Discussion on policy initiatives	25
CHAPTER 4 INTRODUCING THE CASE STUDY- DELHI	26
4.1 Urbanization.....	27
4.2 Economic profile.....	27
4.3 Slums- a glaring evidence of poverty in Delhi	29
CHAPTER 5 STUDY FINDINGS	32
5.1 Fuels used	32
5.1.1 Liquefied Petroleum Gas (LPG)	33
Delay in supplying refill	35
5.1.2 Kerosene	36
5.1.3 Electricity.....	37
5.1.4 Biomass.....	39
5.2 General issues/challenges for clean energy access	41
5.2.1 Definition of poverty in urban and peri-urban areas.....	41
5.2.2 Lack of data on urban poor and energy access	41
5.2.3 Lack of effective subsidies targeting the poor	41
5.2.4 Lacunae in present urban planning processes including lack of recognition of slums.....	41
5.2.5 Lack of focus on clean energy access in present day urban policies and fragmented institutional responsibilities	42
5.2.6 Lack of awareness and incentives to use clean energy	42
CHAPTER 6 POINTERS FOR POLICY/RECOMMENDATIONS	43

LPG.....	43
Kerosene	44
Electricity.....	44
Biomass.....	45
General Policy pointers.....	45
REFERENCES	47
BIBLIOGRAPHY	49

List of Tables

TABLE 1.1 ENERGY ACCESS FOR ACHIEVING MILLENNIUM DEVELOPMENT GOALS.....	5
TABLE 1.2 GNESD NETWORK PARTNERS AND THEIR STUDY AREAS FOR THE UPEA STUDY.....	6
TABLE 3.1 SOURCE OF SUPPLY FOR KEROSENE CONSUMING HOUSEHOLDS.....	21
TABLE 5.1: COMPARISON OF AMOUNT SPENT ON COOKING FUELS IN A MONTH.....	33

List of Figures

FIGURE 1.1 STATUS OF POVERTY ACROSS REGIONS	1
FIGURE 2.2 INCIDENCE OF ENERGY POVERTY IN THE WORLD.....	3
FIGURE 3.1 PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY PRIMARY SOURCE OF ENERGY FOR COOKING (URBAN)	15
FIGURE 3.2 PER 1000 DISTRIBUTION OF HOUSEHOLDS IN EACH MPCE CLASS BY PRIMARY SOURCE OF ENERGY USED FOR COOKING	16
FIGURE 3.3: PERCENTAGE DISTRIBUTION OF HOUSEHOLDS BY PRIMARY SOURCE OF ENERGY FOR LIGHTING (URBAN).....	16
FIGURE 3.4: PERCENTAGE SPENDING ON LIGHTING AND COOKING (URBAN)	17
FIGURE 4.1 NATIONAL CAPITAL TERRITORY OF DELHI	26
FIGURE 4.1 PERCENTAGE OF POPULATION LIVING BELOW POVERTY LINE: ALL INDIA AND DELHI	28
FIGURE 5.1: USE OF INEFFICIENT CHULHAS IN SLUMS... ERROR! BOOKMARK NOT DEFINED.	

List of Abbreviations

AIT	Asian Institute of Technology
APL	Above Poverty Line
BPL	Below Poverty Line
BRPL	BSES Rajdhani Power Limited
BSUP	Basic Services To The Urban Poor
BYPL	BSES Yamuna Power Limited
DVB	Delhi Vidyut Board
ERC	Energy Research Centre
FPS	Fair Price Shop
GDP	Gross Domestic Product
GIS	Geographical Information System
GNESD	Global Network on Energy for Sustainable Development
ICT	Information and Communications Technologies
IHSDP	Integrated Housing and Slum Development Programmes
JJ	Jhuggi Jhopdi
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LPG	Liquefied Petroleum Gas
MDGs	Millennium Development Goals
MPCE	Monthly Per Capita Expenditure
NCT	National Capital Territory
NDPL	North Delhi Power Limited
NSS	National Sample Survey
NSSO	National Sample Survey Organization
PDS	Public Distribution System
SEB	State Electricity Board
TERI	The Energy and Resources Institute
TPDS	Targeted Public Distribution System
UPEA	Urban and Peri-urban Energy Access
VAMBAY	Valmiki Ambedkar Awas Yojana

Executive Summary

India with its current population of over one billion people is fast exhibiting a trend towards increasing urbanization. Six to seven million people are added to urban India annually. The most alarming accompaniment to increasing population and urbanization in India has been the deepening of urban poverty, growth of urban slums and the deterioration in basic service delivery, especially among the urban poor, who constitute a large chunk of this urban population.

Delhi, the capital city of India, today is highly urbanized with 93% (12.9 million) of its population living in urban areas but the presence of slums in Delhi is a glaring evidence of poverty. This study assesses the status of access to clean energy sources like LPG and kerosene for cooking and electricity for lighting, for the poor residing in the urban areas in Delhi. This study gives an in depth analysis of the issues pertaining to access for each of the identified fuels based largely on discussions with key stakeholders like the consumer groups (urban poor), energy suppliers, supplemented by a review of available literature and policies on the subject. Despite its importance for basic survival, and from an economic and health (both personal and environmental) perspective, clean energy supply is not recognized as a basic urban service as a result of which the poverty alleviation and basic infrastructure provision programs in India have not addressed it completely.

The key objective of this study is therefore to identify viable and proven policy options that can assist in providing cleaner and more sustainable energy services to the urban poor. Based on a logical and sequential research methodology to assess availability, accessibility, affordability, reliability and continuity of usage of clean fuels, this study assess the current levels of access to clean forms of energy for cooking, lighting and productive/economic purposes, for the urban poor in Delhi and identifies challenges and policy measures to improve clean energy access. Assuming slum dwellers to be a proxy for urban poor in Delhi, findings revealed that slum dwellers essentially used all three fuels namely- biomass, kerosene and LPG for cooking, in varying degrees, subject to their availability, affordability and taste preferences at a given point of time. LPG was found prominent in the economically well-off households, however had issues like

affordability and delays in refill attached to it. Due to lack of awareness, LPG was perceived as a dangerous fuel. Access to biomass and kerosene was relatively easier than LPG or electricity as the latter required a valid residence proof and had higher upfront costs. Lack of awareness of the harmful effects of using conventional biomass stoves and lack of willingness to give up biomass usage due to its ease of access and the non-continuous supply of other fuels, were key factors driving continual usage of biomass even in households having other cooking fuel options. Kerosene was found to be the baseline fuel used in all households however due to factors like mistargeted subsidies, market distortions and need for ration cards to acquire it, the fuel had accessibility issues.

For lighting, electricity for lighting was used commonly, however in most cases it was acquired illegally due to inability for the household to apply for a legal connection due to non-recognition of the slums.

The key access issues for the urban poor in the slums studied in Delhi were high upfront costs, insecurity of tenure of land and the lack of recognition and permanence of many slums in Delhi. Mistargeted subsidies, market distortions, lack of accountability on part of service providers and no monitoring mechanisms were identified as the other pressing issues hindering access. Broader issues included lack of database on urban poor and their energy consumption patterns, unclear institutional responsibilities and lack of policies targeting clean energy access to the urban poor.

At a broader level, it was found that since clean energy was not recognized as a basic urban service and was not managed at a city level, it got neglected in most poverty alleviation and basic infrastructure provision programs developed for the urban poor. A variety of institutions handling different fuels at different levels made it even more complicated to focus on clean energy provision for the poor in a coordinated and accountable manner.

Chapter 1 Introduction to the UPEA Study

Background of the study

Energy plays a pivotal role in human lives around the world. However, despite unprecedented economic growth, energy remains an issue and more and more people across the world are now subject to *energy poverty*. The most vulnerable of them being the poor⁷ i.e. about 2.8 billion people or close to half of the world's population (UN Habitat 2006) especially in the developing regions of the globe.

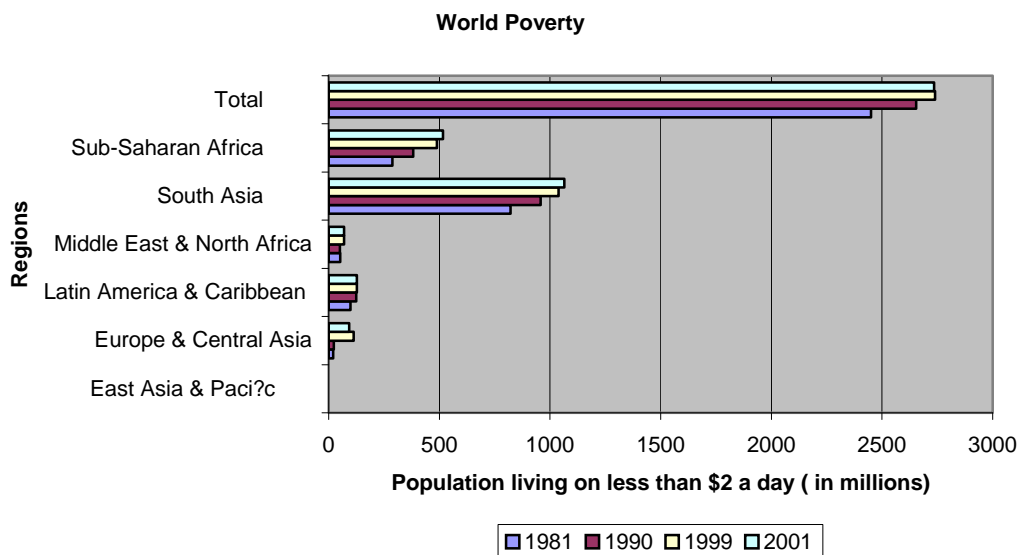


Figure 1.1 Status of poverty across regions

Source <http://devdata.worldbank.org/wdi2005/Section2.htm>

Figure 1.1 shows the growth of total population of poor across various regions of the world over years. Poverty across regions of the world has increased over years though there has been a marginal decrease from 1999 – 2001, which, hopefully indicates a reversal in the trend.

The critical role played by energy in achieving sustainable development and poverty reduction is now being well recognised in the international arena. Also the extreme form of disparity existing in the world in terms of production, consumption and access to energy is a major concern. This has been consistently highlighted in the

⁷ Survive on less than US\$2.00 per day as defined by international agencies

recent past by the UN and other world bodies and also received global attention at the Johannesburg Summit in 2002². Although the world's energy challenges are varied, complex and pressing but at the same time the most basic level energy services³ are indispensable for human well-being.

Energy Poverty

The energy dimension of poverty, termed energy poverty, has been defined as the absence of sufficient choice in accessing adequate, affordable, reliable, quality, safe and environmentally benign energy services to support economic and human development (UNDP 2000). Besides low income there are other reasons for energy poverty including absence of targeted subsidies for the poor, discrimination in policymaking, inadequate information about health impacts of current fuels and technologies and administrative hassles in obtaining clean energy. While increased access to energy services does not result in enhanced socio economic development by itself, the lack of adequate energy inputs act as a severe constraint on development, and thereby the attainment of the Millennium Development Goals (MDG's). This highlights the fact that energy inputs are necessary, albeit insufficient, condition for development.

The association between access to energy and development is also brought out by the fact that the relatively poorer continents of Africa, Asia, and Latin America and the Caribbean are characterized by large concentrations of people who are energy poor, relying to a considerable extent on traditional biomass fuels while simultaneously lacking access to electricity.

²http://www.johannesburgsummit.org/html/documents/summit_docs/wehab_papers/wehab_energy.pdf

³ Energy services include cooking, heating, lighting, transport, etc.

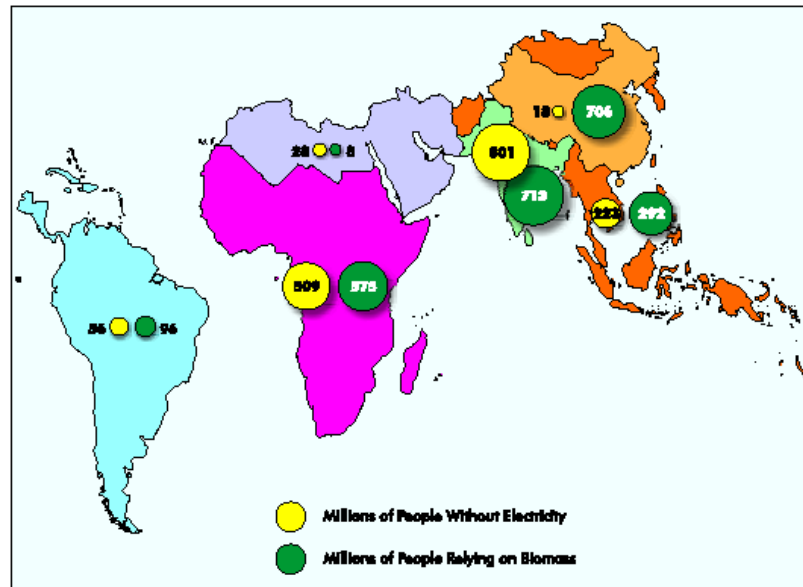


Figure 2.2 Incidence of energy poverty in the world

Source: World Energy Outlook, IEA 2002

Studies reveal that about 2.5 million poor people worldwide continue to rely on biomass to meet most of their daily energy needs for cooking and heating which accounts for about 80 % of their residential energy needs. Dependence on traditional fuels ⁴ results in many hours spent each day gathering biomass. In India about 2-7 hours a day are devoted to collection of fuel for cooking which reduces the time that can be devoted for productive activities. Also about 1.6 billion people have no access to electricity which exacerbates poverty and contributes to its perpetuation since value-adding income generating activities are constrained (IEA 2002). Figure 2.2 shows the incidence of energy poverty in the world. Thus, this situation limits opportunities for the poor, erodes environmental sustainability at local, regional and global levels and also has severe consequences on health undermining their socio-economic productivity potentials. According to WHO estimates 2.5 million women and young children in developing countries die prematurely of breathing indoor fumes from biomass usage since they are exposed for the longest hours (IEA 2002).

A key distinguishing feature of the world's poor is their lack of access to cleaner and reliable sources of energy. It is projected that over the next three decades, where almost 95 percent of population growth is expected to occur in the urban areas due to urbanisation and migration, widening

⁴Traditional fuels- Charcoal, fuel wood, Kerosene and coal in urban areas and crop residues and dung in rural areas

gaps in energy access will emerge in the developing world's urban areas. Enhanced development is thus, a necessity to lift people out of the energy poverty trap and provision of environmentally sound energy services is integral to poverty alleviation and sustainable development since it fulfils the basic human needs of nutrition, warmth and lighting, in addition to health and education. Although energy subsidies worth billions of dollars are in place but none of them are targeted towards the poor and IEA predicts an investment of US\$ 320 billion a year in the next 25 years to meet energy needs of developing and middle-income countries. Thus, energy development and reducing the number of people without access to energy would require targeted efforts and concerted actions in the urban areas.

This necessitates policy formulations such that the concerns to be addressed encompass the various dimensions of energy – in terms of accessibility, convenience, affordability, cleanliness, efficiency, current cost, and environmental spin-offs – as well as development. This is also a key to achieving the targets of most or all of the Millennium development goals (MDG's). Thus, access to energy and energy services is an essential means to support overall development. Table 1.1 shows how energy inputs and access can help in achieving the MDG's. These benefits are the reasons why providing access to the poor to modern fuels and electricity are important for achieving the MDG's.

As mentioned earlier, emerging urban poor in developing countries face, inter alia, three key energy challenges:

- Continued reliance on biofuels, which adversely affect human health and the environment.
- Inadequate access to cleaner energy services for productive purposes and institutional applications for attaining the MDG's for sustainable development.
- Limited access to appropriate financing schemes that would allow the largely neglected poor in the urban and peri-urban areas, to procure cleaner and more sustainable energy services that are currently more expensive.

Table 1.1 Energy Access for achieving Millennium Development Goals

Goals	<i>Importance of energy in achieving the goals (both direct and indirect contributions)</i>
MDG 1: Eradicate poverty and hunger -Economic attainment and thereby impact on poverty eradication	Energy inputs are required for increased production and consumption activities. Access to clean and affordable energy services enables enterprise development Permits income generation Clean, efficient fuels reduce the large share of household income spent on cooking, lighting, and keeping warm Energy for irrigation helps increase food production and access to nutrition Post-harvest losses are reduced through better preservation (for example, drying and smoking) and chilling/freezing
MDG 2: Education for all Achieving universal primary education	Energy can help create a more child friendly environment (access to clean water, sanitation, lighting, and space heating/cooling), thus improving attendance at school and reducing drop out rates Energy remains an important input for commuting to schools, in construction of buildings, production of books and other teaching material
MDG 3: Equality for women -Promote gender equality, empower women	Availability of energy services frees girls' and young women's time from survival activities (gathering firewood, cooking inefficiently) Clean cooking fuels and equipment reduces exposure to indoor air pollution and improves health Affordable and reliable energy services can also offer scope for women's enterprises
MDG 4: Reduce child mortality MDG 5: Make motherhood safe -Improving maternal health and reducing child mortality	Energy services are needed to provide access to better medical facilities for maternal care, including medicine refrigeration, equipment sterilization, and operating theatres Excessive workload and heavy manual labor (carrying heavy loads of fuel wood and water) may affect a pregnant women's general health and well being Availability of electricity can enable pumped clean water and purification
MDG 6 Stop HIV/AIDS, malaria and other diseases -Combat HIV AIDS malaria, and other diseases	Energy for refrigeration allows vaccination and medicine storage for the prevention and treatment of diseases and infections Safe disposal of used hypodermic syringes by incineration prevents re-use and the potential further spread of HIV/AIDS Energy is needed to develop, manufacture, and distribute drugs, medicines, and vaccinations Electricity enables access to health education media through information and communications technologies (ICT)
MDG 7: Protect the environment -Ensuring environmental sustainability	Increased agricultural productivity is enabled through the use of machinery and irrigation, which in turn reduces the need to expand quantity of land under cultivation, reducing pressure on ecosystem conversion Traditional fuel use contributes to erosion, reduced soil fertility, and desertification. Fuel substitution, improved efficiency, and energy crops can make exploitation of natural resources more sustainable Using cleaner, more efficient fuels will reduce greenhouse gas emissions, which are a major contributor to climate change Clean energy production can encourage better natural resource management, including improved water quality Energy can be used to purify water or pump clean ground water locally, reducing time spent collecting it and reducing drudgery

Source: DfID2002

Urban and Peri-urban Energy Access (UPEA)

With the understanding that ensuring universal access to modern energy services is a development imperative for the attainment of the MDGs and in order to address these challenges - recognizing the fact that the poorer sections of the population have largely been ignored in the past as far as clean energy access is concerned, the Global Network on Energy for Sustainable Development (GNESD) initiated a

study on Urban Peri-urban Energy Access (UPEA) under the theme of “Energy Access “. The study is being conducted by GNESD’s network partners in two phases i.e. Scoping Phase- initial assessment (Phase I) and Full thematic study (Phase II) with the aim to contribute to fulfilling the UN's Millennium Development Goals of sustainable development and poverty alleviation through access to affordable and modern energy services. Table 1.2 shows the various network partners involved in the study in their respective geographical areas. The study and its output aims to help policy makers in the developing world as well as decision-makers in agencies involved in international and regional development.

Table 1.2 GNESD network partners and their study areas for the UPEA study

Centers of excellence	Country	Study area
AFREPEN	Kenya	Nairobi
Asian Institute of Technology (AIT)	Thailand	Bangkok
CENBIO, COOPETEC	Brazil	Brazil
Energy Research Centre (ERC)	South Africa	Cape Town
Bariloche Foundation	Argentina	Buenos Aires
The Energy and Resources Institute (TERI)	India	Delhi

Objectives of the research

This research has been undertaken to identify issues pertaining to clean and sustainable energy services to the poor residing in urban and peri urban areas in India.

The objective of the scoping phase of the study was to

- Carry out an initial assessment of the energy situation
- Assess if existing energy policy reforms have addressed the challenges
- Focus on ongoing and planned energy policy reforms
 - how likely they are to improve, cleaner and more sustainable energy services for the poor in these areas in the country
 - how the processes can be improved to promote better access to cleaner energy services from the poverty alleviation, environmental and productive use of energy point of view.
- Identify viable and proven policy options that can assist in providing cleaner and more sustainable energy services to the poor in the rapidly growing urban and peri-urban population.

The objective of the thematic study is to

- Further probe into clean energy access issues identified during the scoping phase
- Recommend policy options in order to facilitate improved, clean and sustainable energy services to the poor residing in urban areas in developing countries from the perspective of poverty alleviation (including consumptive and commercial uses) and environmental protection.

Organization of the report

Chapter 1 gives the background and world perspective on the energy access to the poor and energy poverty across the globe. The chapter also gives a background for the study on Urban and Peri-urban Energy Access (UPEA) and outlines the overall research objectives of the study.

Chapter 2 discusses the overall research methodology and approach adopted for the Indian case study.

Chapter 3 discusses the background on urbanisation in India over years and discusses trends in energy consumption in Indian households and the delivery mechanism of the fuels. The chapter also gives an update on the national policy initiatives and responses w.r.t energy access and urban poverty alleviation in the country.

Chapter 4 gives a brief overview of the case study area i.e. Delhi in terms of condition of the urban poor and their socio economic profile.

Chapter 5 discusses in detail the findings of both the scoping and thematic phases of the UPEA study based on the literature review and interactions with various stakeholders and lists the key challenges to clean energy access.

Chapter 6 discusses policy recommendations to improve the status of clean energy access amongst the urban poor in India.

2.1 Basic Research Framework

The basic research framework adopted in this study focussed on assessing the access to clean energy and also attempted to capture a number of related parameters. The following questions guided the research framework for the study. The energy access situation at any location was assessed in light of these questions and the issues that surfaced were probed further.

Is clean energy available?

Is it easily accessible?

Is it affordable?

Is it reliable and safe to use on a regular basis?

Is it being used?

2.2 Methodology

As mentioned earlier the study was carried out in two phases. The first phase of the study was called the 'scoping phase', from November 06 to April 07, which was undertaken to establish a baseline of the current energy situation amongst the urban and peri-urban poor in the study areas and identify initial issues relating to access to clean energy services to the urban poor. This included an identification of the typical fuels used for lighting and cooking purposes and various aspects related to their accessibility and usage. The second phase was the full "thematic phase", which was carried out between June 07 and February 08. Based on the findings of the scoping phase, this phase prioritised the fuels and issues to be probed further and causes behind each of the issues were investigated in depth. The thematic phase aimed at:

1. getting a detailed understanding of the nature of the issues
2. understanding the reasons for the issues
3. making recommendations on how the issues could be addressed by improved /new policies and positive actions

In order to build our research around the questions stated earlier, TERI adopted a multi-pronged approach consisting

of a detailed literature review, a policy review and multi-stakeholder interaction. The process adopted has been described below in detail:

Literature review

A preliminary literature review was the first step taken in order to understand from available studies and reports, the energy situation for the urban and peri urban poor in India. This was useful in understanding the current energy consumption patterns by the urban poor households for cooking and lighting. A review of the institutional framework for delivery of these fuels to households was also undertaken. Preliminary issues and also positive actions taken, to enable clean energy access in particular and urban poverty alleviation in general, were identified.

Policy review

As the next step it was important to look at the current status of energy access to the urban poor in the country. To get an insight into the existing national level policies having a bearing on clean energy access to the urban poor, a study of various national level policies was carried out. This included recent policy initiatives linked to energy and urban infrastructure development like the Integrated Energy Policy and the Jawaharlal Nehru National Urban Renewal Mission (JNNURM), etc. Schemes and legislations dealing with urban poverty alleviation, urban development and clean energy access to the poor issued by various agencies were also studied.

Stakeholder Interaction

In order to supplement the information collected from the literature survey and to check ground realities of a few identified policies, it was considered necessary to acquire first hand information from a number of stakeholders. These included all the 3 players- consumers (the urban poor), the suppliers (LPG distributors, electricity distribution companies and Fair Price Shops selling kerosene) and the policymakers (Ministries, electricity departments, etc.)

Slum dwellers

Based on discussions in the various working group meetings held in the initial stages of the study it was agreed that people living in slums in a city would be an appropriate proxy of the urban poor population, and therefore the first hand information on energy access, to capture the consumer's perspective, be collected from such areas. TERI

targeted the following slum areas in Delhi for conducting primary assessments:

1. Scoping Phase- *Kalyanpuri & Tigri Camp in Sangam Vihar*
2. Thematic Phase- *JJ Camp in Andrews Ganj, New Khanna Market Jhuggi Camp near Lodhi Road, Indira JJ Camp, Lodhi Road, JJ Sai Baba Camp in Lodhi Institutional Area*

A checklist of questions based on the research framework discussed earlier was prepared and interviews and focus group discussions with the slum dwellers on the various aspects of their energy usage patterns were held.

Through discussions information on the following broad parameters was gathered:

- Household characteristics- size, employment/occupation, type of house, income level, literacy levels, etc.
- Fuel consumption for cooking and lighting by quantity and type
- Requirements to enable clean energy access
- Details of the type of electricity connection (legal/illegal, metered/un-metered)
- Costs and time involved in acquiring the energy supplies/services
- Awareness and perceptions about clean energy sources
- Issues in availability and access

Due to lack of time and resources, this study did not entail a full-fledged household survey.

The primary assessments in slum areas made during the scoping phase were further refined in the thematic phase. Conducting interviews in different locations in the thematic phase was with an intention to verify findings of the scoping phase and at the same time understand in greater depth the causes behind the issues identified.

Lastly, the thematic phase not only looked at the consumptive but also productive applications of energy at the household level (wherever it existed) in order to explore possibilities of upgrading such usage through improved energy access.

Energy suppliers

Once the issues concerning access to clean energy and the causes behind the same were identified at the consumer

level interviews with different suppliers of clean fuels were held to understand the issues on the supply side in detail. These included discussions with a private LPG distributor of Indian Oil Corporation Ltd., one of the private companies responsible for electricity distribution in Delhi (BSES), and franchisee of fair price shops dealing in kerosene in the identified slum areas.

Information on the following broad parameters was gathered:

- Requirements and options for a person in Delhi to get an LPG connection, electricity connection and kerosene
- Whether set of rules for connection and supply are applicable uniformly to all
- Whether there is universal obligation or areas in the city are prioritised for supply
- Any special obligation to serve poor or far flung areas in the city (usually most slums are forced to re-locate to the peripheral areas of the city)
- Hurdles faced by suppliers in making clean energy accessible to the urban poor on a regular basis

Policy makers

The research team conducted discussions with the officials of the concerned Ministries and departments like the Ministry of Urban Development and the Department of Food & Civil Supplies, Govt. of Delhi, to identify facilitators and hurdles at policy level relating to clean energy access to the poor in urban India.

This helped us to map the gap between planned and actual on ground, supplier responsibility and consumer satisfaction and identify deficiencies in the policy framework that once taken care of could facilitate improved access of clean energy services to urban poor.

CHAPTER 3 Energy use by urban poor and policy initiatives

Ever since the commencement of economic reforms in the early nineties, the economic growth in India is experiencing a rising trend. It exhibited a growth rate of 9.0 per cent and 9.2 per cent in 2005-06 and 2006-07, respectively⁵.

Though the economic transition is still at a relatively early stage, the estimated per capita income in real terms (at 1999-2000 prices) during 2005-06 was Rs 21,005 (Rs 1750/month)⁶ and continues to rise.

The country is also exhibiting a trend towards increasing urbanization. Six to seven million people are added annually to urban India. At the beginning of this millennium, 285 million Indians lived in nearly 5161 towns⁷, i.e. about 28 % of the total population is urban, which is estimated to increase to 550 million by the year 2021, and to 800 million by 2041 (NIPFP 2007).

Increasing urbanisation has also been characterized by large imbalances, both in terms of spatial patterns and class size distributions. The pace of urbanization has been found to be much faster in the larger cities (having over 1 million people) than in other urban areas in the country. In addition to the above, the country is also experiencing some of the most rapid rural-to-urban migrations in history, with the urban-rural ratio having almost doubled from 20.91% in 1951 to 38.47% in 2001. India already has 35 cities with a population of over a million, which alone are projected to rise to 70 by 2026 (NIPFP2007)

This unprecedented concentration of people causes enormous social strains in the urban areas which is facilitated by relatively easy access to land at the peripheral areas of the cities and towns due to unclear authority and governance issues, access to unorganised labour market, etc. These urban areas also act as employment magnets for the poor but due to lack of proper provision of infrastructure facilities to cope up with this unprecedented increase in population forces the poor to live under unhygienic conditions. The 'excess-demand -limited-supply' framework best explains the growing urban and peri-urban

⁵ <http://indiabudget.nic.in> (Economic Survey 2006-07) accessed on 2 February 2008

⁶ http://mospi.gov.in/nad_press_note_31may06.htm accessed on 2 February 2008

⁷ Census of India 2001

poverty and the concomitant growth of slums and slum population.

As per the Census of India 2001, 42.6 million people lived in slums, which constituted 15 % of the total urban population of the country. Also 17.7-million slum population has been reported in the 27 cities with million plus population in 2001. Greater Mumbai Municipal Corporation with 6.5 million slum dwellers had the highest slum population among all the cities followed by Delhi Municipal Corporation (1.9 million), Kolkata (1.5 million) and Chennai (0.8 million).

As aforementioned the provision of amenities and infrastructure in the slums has not managed to keep pace with the rapid growth in population and urbanization, there exist high levels of inequity in the provision of basic services like energy, water, transport linkages, etc. due to various reasons including inadequate investment in the infrastructure sector.

3.1 Urban Poverty and clean energy

In the context of income poverty, poor are “the people who earn less than or equal to the benchmark i.e. poverty line.”⁸

In India there exist vast differences in poverty line across the country. The Government of India had prescribed state specific poverty lines in 2004-05 and the All India Urban Poverty Line was estimated at Rs 538.60 per capita per month. It was also estimated that 25.70% of the urban population in the country still lives below the poverty line.⁹ However, according to National Sample Survey Organization (NSSO) the urban India average Monthly Per Capita Expenditure (MPCE)¹⁰ was Rs. 1052 during the same period. NSSO defines a household as a group of persons living together and taking food from a common kitchen and regards MPCE as the main indicator of standard of living.

As mentioned earlier, urban areas contribute significantly to the national economy and fuel national growth. In India about 60 percent of the Gross Domestic Product (GDP) is contributed by the population that resides in the urban areas. However, the significant role of cities in development is being hampered by the lack of infrastructure facilities. Lack of access to infrastructure services like- sanitation, clean drinking water, waste disposal, healthcare, education

⁸ Dhongde S. Decomposing Spatial differences in Poverty in India, Research Paper No. 1004/53 WIDER (World Institute for Development Economic Research)

⁹ www.pib.nic.in accessed on 3 February 2008

¹⁰ MPCE is defined as an aggregate monthly consumer expenditure of the household divided by the household size

and last but not the least, clean energy is serious among the urban poor who constitute a large chunk of this urban population. As a consequence of this they are forced to reside in unhygienic conditions and resort to use of unclean sources of energy, which has considerable environmental and health impacts. Since energy is a vital component of urban infrastructure, access to clean energy and clean energy sources like electricity, kerosene (used for cooking), natural gas; liquefied petroleum gas (LPG) and biomass (used in efficient biomass stoves) is an inescapable necessity to enhance quality of life and for economic development.

This is evident from a number of studies conducted in the past to assess the impact of clean energy on poverty including empowerment of women, health and enhancing schooling opportunities to children¹¹ and a shift towards clean sources of energy reduces the health costs incurred due to air pollution¹². Similarly access and use of clean fuels can save time for children in poor households who gather fuel wood or dung and could instead get primary education. Improved health and education thus increases involvement in income generating activities and eventually resorting to use of clean energy sources for basic end uses such as cooking and lighting.

3.2 Fuels used by Indian households

The household sector is one of the largest consumers of energy in India. It is responsible for about 45% of the total primary energy use, with non- commercial / biomass fuels having a large share of it.

At the household level, cooking and lighting are the major energy consuming activities. Typically a household in an urban or peri-urban area in India may keep switching amongst biomass (cow dung, wood and scrap), kerosene, LPG and electricity in exceptional cases for cooking. For lighting, these households rely mostly on electricity and occasionally on kerosene and biomass.

3.2.1 Fuel used for Cooking

Although energy usage pattern in rural households is changing, traditional fuels continue to be the main source of

¹¹ India: Household Energy, Indoor Air Pollution, and Health November 2002, South Asia Environment and Social Development Unit, South Asia Region, World Bank

¹² ESMAP World Bank 2004, Clean Household Energy for India: Reducing the Risks to Health, 2004

household cooking. In urban households, Liquefied Petroleum Gas (LPG) is the primary fuel used for cooking. As per the consumer expenditure data of the 61st round of National Sample Survey (NSS) of India conducted in 2004-05, 57% of the households depended upon LPG, 10% on kerosene and 22 % on biomass as primary sources of energy for cooking (see fig 3.1).

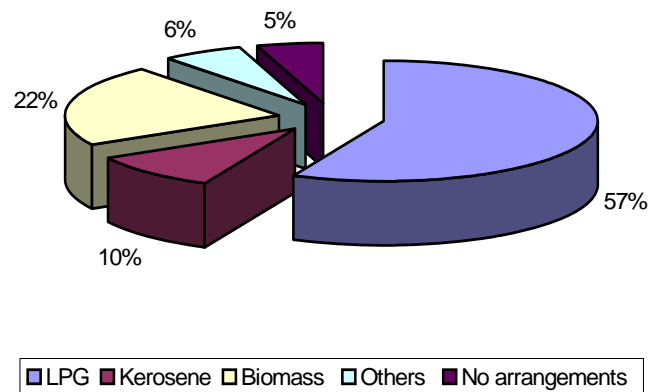


Figure 3.1 Percentage distribution of households by primary source of energy for cooking (Urban)

Source: GoI 2007

Past studies consistently also indicate a strong correlation between household income levels and the types and amounts of fuels used for cooking¹³. It was also found that the use of, LPG, has found more prominence among the people belonging to the higher Monthly Per Capita Expenditure (MPCE) classes¹⁴. Figure 1 demonstrates this. It can be seen that in the year 2004-05, the number of households using LPG increased with increasing MPCE classes and the households using kerosene or firewood exhibited a declining trend with increasing MPCE classes (see Fig 3.2).

¹³ Urban household energy use in India: efficiency and policy implications

¹⁴ The NSS survey takes consumption expenditure as a proxy to the income levels. MPCE for a household is equivalent to its consumer expenditure over a period of 30 days divided by its size.

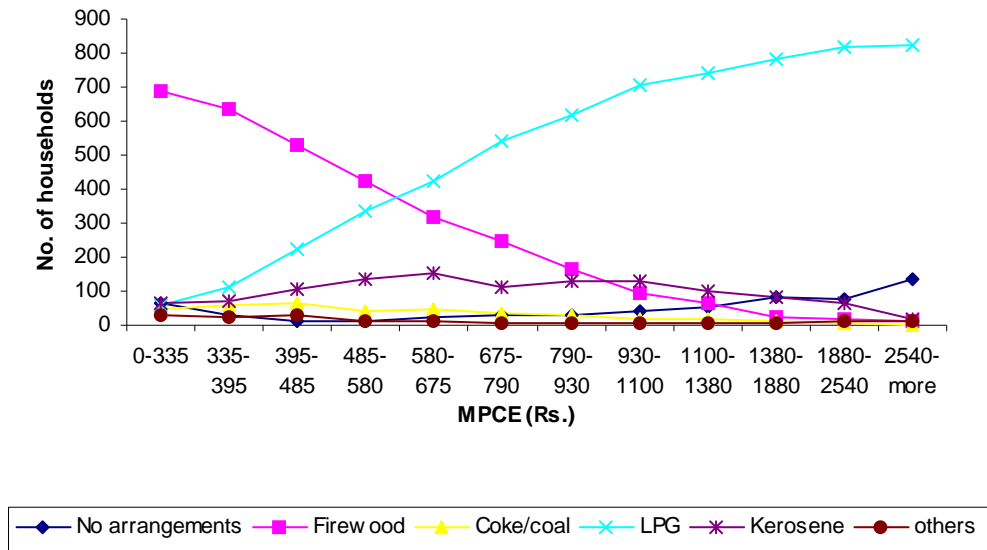


Figure 3.2 Per 1000 distribution of households in each MPCE class by primary source of energy used for Cooking
Source: Gol 2007

3.2.2 Fuel used for Lighting

The primary sources of energy used for lighting by the households in India are electricity, kerosene and others (gas, candle etc). The National Sample Survey also identified 92% households in urban India to be dependent on electricity for lighting and only 8% urban households using kerosene and candles for lighting (GoI 2007). Also urban households in higher MPCE classes use electricity for lighting purposes however, (Fig 3.3) kerosene is used by households with lower MPCE.

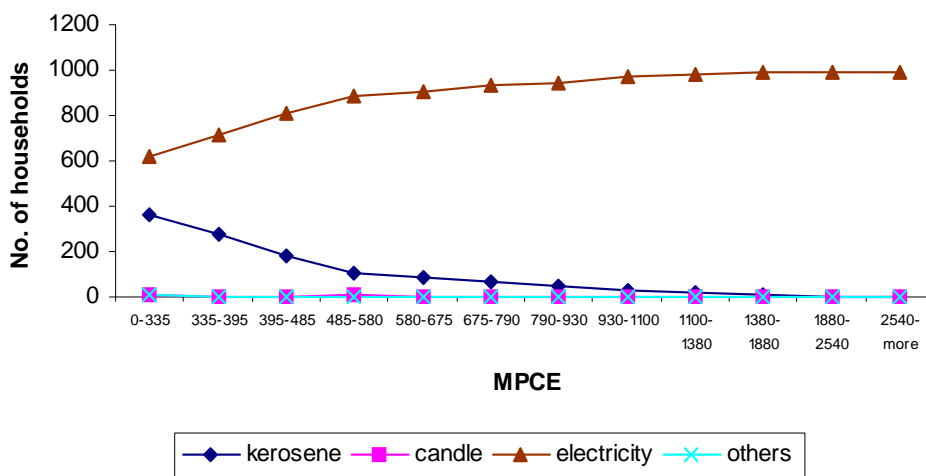


Figure 3.3: Percentage distribution of households by primary source of energy for lighting (Urban)
Source: Gol 2007

3.2.3 Percentage expenditure on energy (lighting and cooking)

The expenditure on fuels for lighting and cooking forms a larger share of the total expenditure for the lower income households as compared to households with higher incomes. This is evident from NSSO data as in Figure 3.4 which shows lower percentage spending on lighting and cooking by higher MPCE classes as compared to lower MPCE classes whose percentage of spending is comparatively higher.

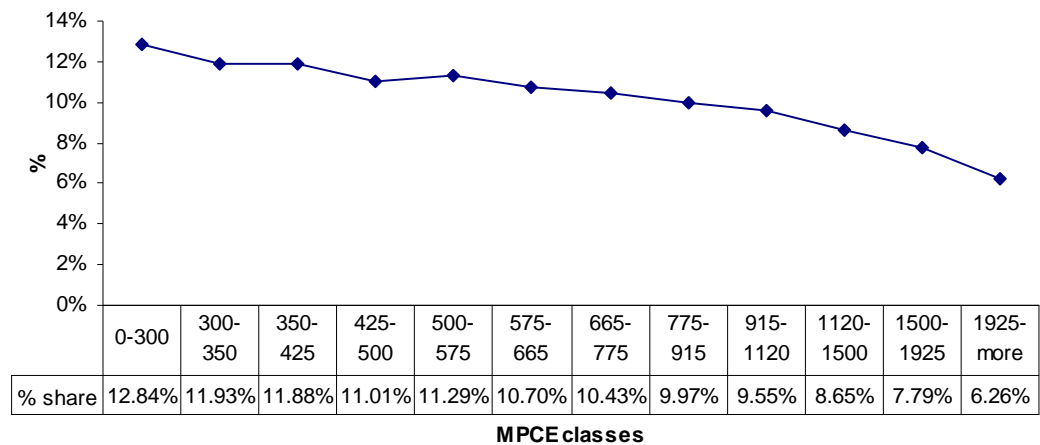


Figure 3.4: Percentage spending on lighting and cooking (urban)

Source: Gol. 2005

3.3 Institutional framework for delivery of energy services

This section details out the institutional framework for delivery of energy services used by urban households for lighting and cooking, for better understanding of the energy market in India.

3.3.1 Electricity

Electricity is a subject in the concurrent list of Constitution of India, i.e. both the Union and the State Governments can formulate policies and laws on the subject. However, distribution of electricity in particular comes in the domain of the states.

The state electricity board (SEB) is an entity that handles generation, transmission and distribution functions for the state, where the boards have not yet been unbundled. For the other 10 states, where the boards have been unbundled, separate companies handle generation, transmission and distribution. Also, there are generation and transmission utilities at the central level. These are discussed in detail below

- **Generating utilities:** Power is generated by central, state, and private generation utilities. Of the total

installed capacity in 2007, central utilities accounted for 34%, state 52.5%, and private utilities 13.5%.¹⁵

- **Transmission utilities:** Power grid Corporation is the central transmission utility managing the regional and national power grids. The whole country is divided into five regional power grids, namely northern, eastern, north-eastern, southern, and western.
- **Distribution utilities:** Distribution is handled either by the SEBs or by private companies as the case may be. In India, there are three states where private companies are operating as power distributors, including Delhi, capital of the country¹⁶.

The utilities in the power sector are obliged to fulfil the power demand of all the consumers and it is the distribution utility in particular, that interacts with consumers.

Box 3.1: Power sector reforms in Delhi

Delhi embarked on a comprehensive power reform programme in 1999 with the objective of providing adequate, reliable and better quality of supply to its consumers. Prior to reforms, Delhi Vidyut Board (DVB), a government entity, was responsible for providing electricity services in the city. DVB's operation was experiencing negative rate of return, very low plant load factor, high transmission and distribution losses, high commercial losses and large number of 'un electrified' 'unauthorised' colonies (responsible for nearly 14% of energy consumption in 2001 as estimated by DVB) among others

Privatisation of the distribution business was an important component of the reform. Three private companies BRPL (BSES Rajdhani Power Limited), BYPL (BSES Yamuna Power Limited) and NDPL (North Delhi Power Limited) were given three separate areas for power distribution. The outcome of reforms has been continuously debated and commented by large number of institutions and experts and the reaction has been mixed so far. On the positive side, among others, the companies have overachieved their transmission and distribution loss targets and have also been able to reduce the number of illegal connections through more interventions and better management.

¹⁵ www.powermin.nic.in

¹⁶ In Delhi, there are three private companies responsible for power distribution in the city.

2.3.2 Liquefied petroleum gas (LPG)

Exclusively three national oil companies¹⁷ in India market subsidised LPG through a chain of distribution networks LPG to consumers.

3.3.3 Kerosene

Kerosene continues to be the baseline cooking fuel for a majority of urban poor in India. Kerosene is supplied at subsidized rates through a network of Fair Price Shops (FPS) in a mechanism called the Public Distribution System (PDS), which is a part of the Central Government's economic policy to make food grains and kerosene available to the poor at affordable prices. The distribution is facilitated through the use of 'ration cards', and specified items are provided at subsidized rates to the ration cardholders. PDS is operated under the joint responsibility of the Central and State Governments. At the Centre, Department of Food and Public Distribution under the Ministry of Consumer Affairs is responsible for procurement, storage, transportation, and bulk allocation of commodities. The operational responsibilities including allocation within the State, identification of families below poverty line, issue of ration cards, supervision and monitoring the functioning of FPSs rest with the State Governments¹⁸.

3.4 Subsidies in energy sector

In the electricity sector, there are widespread subsidies and cross subsidies. The regulatory commissions are trying to gradually reduce the extent of cross-subsidy (as this is increasingly leading to a situation where more and more industrial consumers are leaving the grid and the losses of state electricity boards are mounting). A number of states still provide agricultural consumers power free of cost or at minimal cost. This has however benefited only large farmers and very often led to waste of electricity. The quality of supply and the hours of supply to agricultural consumers is also found to be low.

The regulatory commissions have also introduced 'lifeline' tariff wherein consumption upto a certain level (say 100 units) is charged a very low tariff and the tariff progressively increases with higher consumption, however this is across the board subsidy for benefit of the consumers.

¹⁷ Bharat Petroleum Corporation Ltd.; Hindustan Petroleum Corporation Ltd. and Indian Oil Corporation Ltd.

¹⁸ <http://fcamin.nic.in/> Official website of Department of Food and Public Distribution accessed on 23rd February 2007

In case of Liquefied Petroleum Gas (LPG) subsidies are universal in nature and are available to all domestic consumers uniformly. However it has been observed that these subsidies have limited success in increasing penetration of the clean fuel amongst poor population. According to a TERI analysis, around 76% of the LPG subsidy goes to urban areas with 25% of total population. Also about 52% of this urban subsidy is enjoyed by top 27% of households, implying that nearly 40% of the LPG subsidy is enjoyed by top 6.75 % of the population only.¹⁹ One of the primary reasons for restricted penetration of LPG amongst the urban poor is the high upfront cost associated with getting LPG connection.²⁰

Similar to subsidies on LPG, subsidies on kerosene are also universal in nature. Over time, it was observed that, the system (PDS) was not able to serve the poor and was widely criticized for its urban bias and negligible coverage in the States having relatively higher concentration of the poor. In June 1997, Targeted Public Distribution System (TPDS) was introduced which follows a two tier subsidized pricing structure for above poverty line (APL) and below poverty line (BPL) families²¹. Under the TPDS, certain commodities are sold to BPL families at further subsidized prices.

The allocation of subsidized kerosene by the central government varies from state to state based on historical patterns rather than on relative poverty levels. The government's intervention in the household fuel markets has been rather inadequate and has been largely aimed at providing across the board and graded subsidies for fuels and electricity, and rationing of subsidized fuels. A study conducted by the World Bank in 2004 on energy usage for Indian households, reported fiscally unsustainable subsidies on kerosene and LPG, unable to meet social policy objectives and mistargeted. Also their opportunity costs were found to be substantial. The report goes on to say that as much as half of the subsidized kerosene in 1999–2000 was estimated to have been diverted to the black market or other sectors, most prominently for mixing with the diesel for auto sector, at a cost to the central government of Rs 40 billion (close to US\$1 billion)". Among the households that reported positive consumption of kerosene there was

¹⁹ Misra N, Chawla R, Srivastava L, Pachauri RK 'Petroleum pricing in India: balancing efficiency and equity' TERI 2005, New Delhi

²⁰ According to estimates there is an upfront cost of Rs 1525/connection associated with LPG. Source: 'Supply of clean energy services to urban and peri-urban poor' TERI study no. 2006ER28

²¹ <http://indiabudget.nic.in>, Indian Budget 2002-03

increasing reliance on black market kerosene in the urban areas (Table 3.1).

Table 3.1 Source of supply for kerosene consuming households

Item	1993-94		1999-2000	
	Rural	Urban	Rural	Urban
Households using only PDS kerosene (percent)	57	55	61	46
Households using only market kerosene (percent)	28	29	20	32
Households using both market and PDS kerosene (percent)	14	15	19	22
Average PDS kerosene price paid (Rs/liter ¹)	3.16	2.95	4.40	3.80
Average market kerosene price paid (Rs/liter ¹)	5.48	5.51	9.24	9.70

Source ESMAP Study, 2004

3.5 Policy initiatives

With the background on existing status of clean energy services available to urban poor in India, it is important to know about the policies and schemes initiated by the government to improve such access and undertake urban development and assess their impact, if any. This section details out the government bodies responsible for policy formulation in these matters and policy initiatives undertaken so far.

3.5.1 Institutional arrangements

In India, Ministries at the Central level are responsible for policy formulation in various matters. Ministries responsible for urban development and provision of energy services in the country include

1. **Ministry of Urban Development & the Ministry of Urban Employment and Poverty Alleviation:** The ministry is the apex authority of Government of India to formulate policies, sponsor and support programme, coordinate the activities of various Central Ministries, State Governments and other nodal authorities and monitor programmes concerning all the issues of urban development, housing, employment and poverty alleviation in the country
2. **Ministry of Petroleum & Natural Gas:** The ministry is responsible of exploration and production of oil and natural gas, refining, distribution and marketing, import, export, and conservation of petroleum products (including LPG and Kerosene) and Natural Gas.
3. **Ministry of Power:** Apart from others, the Ministry is responsible for policy formulation and the

administration and enactment of legislation in regard to power generation (thermal and hydro), transmission and distribution of electricity. It also concerns conservation of power.

Institutionally in India there are a number of authorities having a role in planning for and delivering energy services. These include, Ministry of New and Renewable Energy, Ministry of Petroleum and Natural Gas, Ministry of Coal and Ministry of Food and Public Distribution. The agencies responsible for urban development and poverty alleviation are Ministry of Urban Employment & Poverty Alleviation and Ministry of Urban Development. There is a clear disconnect between the functioning of the authorities responsible for planning and delivery of energy services and those addressing urban poverty alleviation. One major reason for this is the fact that urban development schemes are usually planned at the city or the local level and energy is a subject handled either at the national or at the state level. There is no one body responsible and accountable for planning, delivering and monitoring energy supply at the local level.

3.5.2 Key policies for urban development

The Government of India, for more than past two decades, has taken several initiatives for the upliftment of the urban poor and improvement in their living conditions by provision of basic minimum services for a healthy and sustainable environment. Some of these initiatives are introduced in this section.

3.5.2.1 Jawaharlal Nehru National Urban Renewal Mission, December 2005²²

The Jawaharlal Nehru National Urban Renewal Mission (JNNURM) was launched in 2005 recognizing the challenge of an acute urban crisis. The proposed mission has two sub-missions namely *Urban Infrastructure and Governance* to be administered by Ministry of Urban Development and *Basic Services to the Urban Poor* to be administered by Ministry of Urban Employment & Poverty Alleviation. The Mission rests on the postulate that in order to make cities work and meaningfully contribute to India's economic growth and poverty reduction objectives, it is essential

- To create incentives and support for urban reforms both at the state and city levels
- Develop appropriate enabling frameworks

²² www.urbanindia.nic.in/moud/programme/ud/jnnurm.htm

- Enhance the creditworthiness of municipal government
- Integrate the poor with service delivery systems.

Urban Infrastructure and Governance

The thrust of the sub-mission under JNNURM is on infrastructure projects with a view of improving status of infrastructure services in urban areas. However, it does not target the urban poor specifically.

Basic Services To The Urban Poor (BSUP)

Basic Services To The Urban Poor (BSUP) aims to secure effective linkages between asset creation and asset management so that the basic services to the urban poor created in the cities, are not only maintained efficiently but also become self-sustaining over time. It also aims to ensure adequate investment of funds to fulfil deficiencies in the basic services to the urban poor and scale up delivery of civic amenities and provision of utilities with emphasis on universal access to urban poor.

Integrated Housing and Slum Development Programmes

The scheme “*Integrated Housing and Slum Development Programmes (IHSDP)*” was introduced for improvement of slums in the cities/towns not covered under JNNURM in the country. The programme aims at combining the existing schemes of

Valmiki Ambedkar Awas Yojana (VAMBAY): initiated with the objective to ameliorate the conditions of the urban slum dwellers living below poverty line.

Indira Awas Yojana: launched with the primary objective to provide grant for construction of houses to members of unprivileged classes (Scheduled Castes/Scheduled Tribes), free bonded labourers and also to rural poor below the poverty line. It also aims at ameliorating the conditions of the urban slum dwellers that do not possess adequate shelter and continue to reside in dilapidated conditions.

The scheme also seeks to enhance public and private investments in housing and infrastructure development in urban areas.

3.5.2.2 National Urban Housing and Habitat Policy, 2006²³

The draft National Housing and Habitat Policy, 2006 lays emphasis on social harmony and on increasing institutional finance for housing for the poor and its accessibility at

²³ http://mhupa.gov.in/pdf/outcome_budget/chap1-0708.pdf accessed on 16 February 2008

affordable rates. A new Centrally Sponsored Scheme to provide an interest subsidy of 5% per annum for a period of five years to commercial lenders for lending to Economic Weaker Section and Low Income Group segment of the urban areas have accordingly being proposed to be launched beginning 2007-08. Interest Subsidy is expected to leverage market funds to flow into housing for the urban poor.

3.5.2.3 Draft National Slum Policy²⁴, 2001

The Ministry of Urban Development and Poverty Alleviation prepared a draft on the National Slum Policy in April 1999. The policy endorsed an up gradation and improvement approach for all the slums in the country. The policy embodies the core principle that households in all urban informal settlements should have access to certain basic minimum services irrespective of land tenure or occupancy status. It provides for the delivery of basic services such as water, sanitation and **electricity** on an individual household basis. Even after these many years, the policy is still at the draft stage.

3.5.3 Key policies for improving energy access

3.5.3.1 Integrated Energy Policy 2006

The policy is an overarching framework for guiding the policies governing the production and use of different forms of energy from various sources. The policy acknowledges the need for setting of a goal to provide clean cooking energy such as LPG, natural gas, biogas or kerosene to all the citizens of the country within a time frame of ten years. For easy access to LPG as cooking energy, the policy proposes setting up of distribution networks and provision of financial assistance to the poor²⁵. However it does not target the urban poor specifically.

3.5.3.2 The Petroleum and Natural Gas Regulatory Act, 2006²⁶

The Act is a guiding document for the downstream sector for petroleum products and natural gas²⁷. It identifies setting up of retail outlets in remote areas as a service obligation of the regulator to the companies. It also mentions of the obligations of a local distribution entity to supply natural gas to the consumers for easy access for domestic and household consumption.

24 Draft National Slum policy, October 2001: Ministry Of Urban Development And Poverty Alleviation

25 Integrated Energy Policy 2006; Planning Commission GoI; pg 99; 101

26 Gazette of India; The Petroleum And Natural Gas Regulatory Board Act, 2006

27 Refining, processing, storage, transportation, distribution, marketing and sale

3.5.3.3 Electricity Act, 2003

The Electricity Act 2003 (EA 03) came into force on 10 June 2003, replacing the then three existing Acts, namely, the Indian Electricity Act, 1910; the Electricity (Supply) Act, 1948, and the Electricity Regulatory Commission 1998. The overall objective of the Act is to take measures conducive to development of the electricity industry as a whole. The Act specifically recognises its aims of provision of electricity to all areas, rationalisation of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies.

3.5.4 Discussion on policy initiatives

It is important to note here that none of the urban policies and schemes introduced here mention the need for provision of energy services to the urban poor as a part of the basic service provision. The JNNURM is a mega program for urban renewal and improvement of urban infrastructure but does not include energy as one of its thrust areas. This is because the program is meant for sectors falling in the mandate of the city governments and the responsibility for various forms of energy in India rest with different departments at the central and state level. Discussions with officials at the Ministry of Urban Development revealed that energy access for the poor had not come on the radar of the Ministry yet. Currently there is no agency either at the state or city level responsible for ensuring access to clean energy sources to the poor in the country. Like the telecom sector, there is also no universal service obligation on the part of the government to ensure a sustained supply of clean energy to the poor. The presence of mistargeted subsidies distorts further the accessibility. Further, the efforts of various ministries responsible for policy formulation in matters relating to urban development and energy lack synchronised efforts in order to provide clean energy services to urban poor. To sum up, recognition of clean energy access as a major issue, a clearly defined policy framework to address the same and the requisite institutional mechanisms to plan and implement solutions is missing.

CHAPTER 4 Introducing the case study- Delhi

Before observations and issues related to energy access are discussed at length for each fuel, it would be worth getting an understanding of the various demographic and socio-economic characteristics of the study area, Delhi, and the nature of urbanization and poverty challenges it faces today. It is important to set the context of the urban poor and their overall living conditions in the city, before delving into the subject of clean energy access.

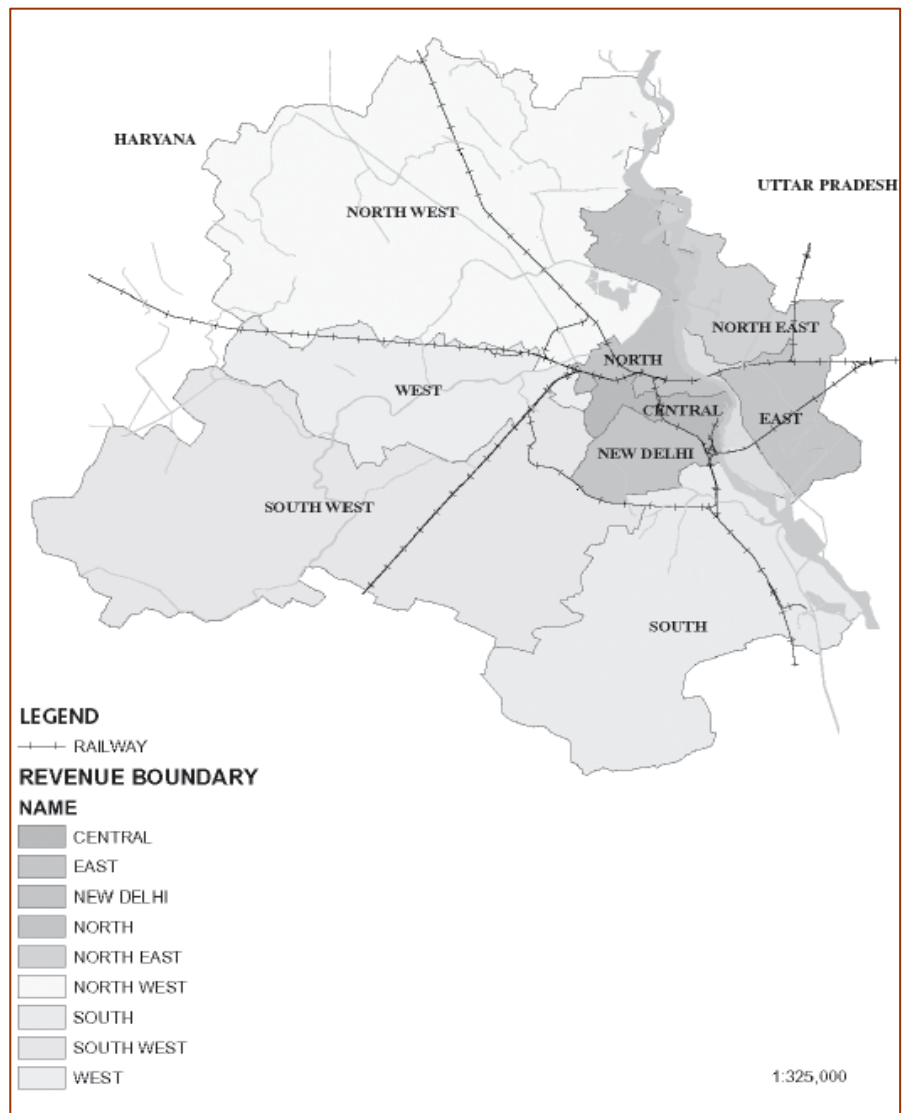


Figure 4.1 National Capital Territory of Delhi

4.1 Urbanization

Delhi assumes a unique geo-political significance in India. It is both the capital city of the country as well as an Indian state. In 2001, Delhi was the third populous city in the country, after Mumbai and Kolkata (Census of India, 2001). The population of Delhi has grown by 46.31 % and registered an annual growth rate of 3.81% during 1991-2001 making it one of the fastest growing cities in India. The National Capital Territory (NCT) of Delhi has a total area of 1483 square kilometres and the density of population in Delhi was 9340 persons per sq km in 2001.²⁸

With a population of just 0.2 million in 1911, Delhi today has grown into a metropolis with more than 13.85 million inhabitants. Delhi continues to remain a major attraction for migrants seeking work/employment and this continually adds to the pressure on the exiting land and other resources. During 1991-2001, close to 2.2 million migrants entered Delhi, which was significantly higher than 1.64 million, who entered the city between 1981-91 (Census of India, 2001). However today this has reached an alarming number of 3 million per annum, which adds up to the population of the city. A high level of in-migration into Delhi has resulted in an increasing in formalization of Delhi's labour force. The in-migrant population is largely unskilled labour force, which ends up seeking employment in the unorganised service sectors. Interestingly, the unorganised employment sector in Delhi accounted for nearly 81% of the total employment in the city in 1999-2000 (Govt. of NCT of Delhi, 2006). With increase in urbanisation levels and industrialisation Delhi today is highly urbanised with 93% (12.9 million) of its population living in urban areas²⁹ and only 7% (0.94 million) population living in rural areas (Census of India, 2001).

4.2 Economic profile

Delhi is the richest amongst all the Indian states. In 2002-03, its per capita income at current prices stood at Rs.47, 441, which was nearly two and a half times the all India average of Rs.18, 912 (Govt. of NCT of Delhi, 2006). Delhi also reported a Monthly Per Capita Expenditure (MPCE) of Rs.1490 in 2003, which was the highest amongst all other

²⁸ Census of India 2001

²⁹ As per Census 2001, an urban area is defined as " any place with a municipality, corporation, cantonment board or notified town area committee, or one satisfying the following three criteria simultaneously: (i) a minimum population of 5,000, (ii) at least 75% of the male working population engaged in non-agricultural pursuits, and (iii) a density of population of at least 400 per km.

Indian states³⁰. Despite recording one of the highest per capita incomes, Delhi is characterized by many inequalities in living standards and livelihood opportunities (Govt. of NCT of Delhi, 2006).

Planning Commission of India had prescribed state specific poverty lines in 1999-2000 and the All India urban poverty line was worked out to be at Rs 538.60. Figure 4.1 shows the declining trend in percentage of population living below poverty line across India and Delhi.

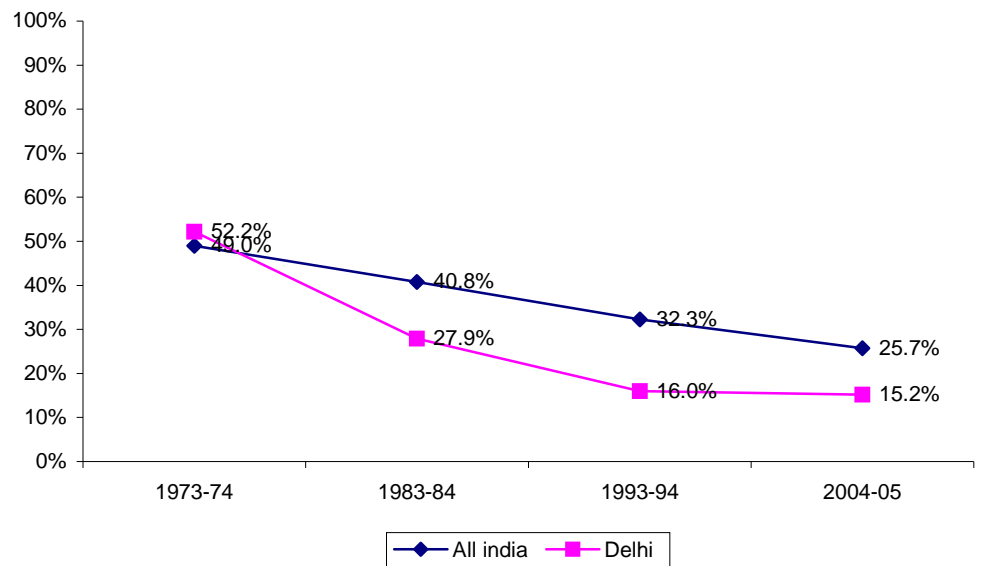


Figure 4.1 Percentage of population living below poverty line: All India and Delhi

Source: Government of India, 2001, Poverty Estimates, Press Information Bureau, New Delhi; and Government of India, 2007, Poverty Estimates for 2004-05, Press Information Bureau, New Delhi.

Delhi has exhibited a decline in poverty between 1973-74 to 2004-05. In 2004-05 15.2% of Delhi's population lived below poverty line, which was considerably lower than the national average of 25.7%.



A typical slum in Delhi

³⁰ Economic Survey of Delhi 2005-06

However as stated in the Delhi Human Development Report 2006, “...Delhi's low levels of income poverty fail to capture the unsatisfactory living conditions of a large proportion of slum dwellers and the others living in Delhi's unauthorized colonies” (Govt. of NCT of Delhi, 2006). Also the incidence of urban poverty in Delhi far exceeds that of rural poverty. The proportion of rural poor living under the poverty line in 1999-2000 was a mere 0.4%, whereas the corresponding figure for urban poor was 9.42% (Govt. of NCT of Delhi, 2006).

4.3 Slums- a glaring evidence of poverty in Delhi

Human poverty in Delhi has manifested itself in the form of severe shortage of affordable housing, especially for the poor (Govt. of NCT of Delhi, 2006). Uncontrolled growth of population, in-migration, and unavailability of land, housing and other basic amenities to match with the growing demand has led to creation of small, shanty and unhygienic living conditions for the poor, including homelessness. As is clear from the facts stated above the poverty levels have been declining over years in Delhi whereas, the number of slums and slum population has been rising. Figures from census 2001 reveal that slum and squatter population account for 15.72% of the total population of National Capital Territory of Delhi. However, the population living in J.J. Clusters, Slum Designated Areas, Unauthorised Colonies and Resettlement Colonies stood at an astonishing 52%³¹. Also in the last five years, there has been large-scale relocation of informal settlements from various parts of the city to the periphery, which has resulted in a concentration of slum population in the peripheral areas³².

The presence of slums in Delhi is clear evidence of poverty and physical decay. Slums include informal settlements, which are either squatter settlements or illegal/unauthorized colonies where people live on undeveloped and unserviced lands without a secure tenure and without access to basic services. Today slums in Delhi are characterized by the following:

- Appalling unhygienic conditions threatening health and well being of the dwellers

³¹ Government of Delhi (2002), Economic survey of Delhi 2001-02,
³² Kishore Kumar Singh, Shikha Shukla 2005, Profiling “Informal City” of Delhi, Policies, Norms, Institutions & Scope of Intervention, WaterAid India & Delhi Slum Dwellers Federation 2005

- Very high density
- Absence of legal recognition and tenural rights
- Acute shortage of basic services such as water, sanitation facilities, garbage disposal, street lighting, roads, power supply, etc.

The entire urban space of Delhi is characterized by a number of striking inequities in the physical settlements and built habitable environment. Settlements in Delhi can be grouped under various heads³³:

- **Unauthorised colonies** – These are colonies created on land that is not meant for residential use. Very often these colonies are created on agricultural land by private developers who make a colony plan, streets and lanes etc, but these plans may not get approved. At present there are close to 2000 such colonies in Delhi with at least 450 on private land.
- **Regularized-unauthorized colonies:** These are unauthorised colonies, which are regularised by the Government agencies after changing the land use of these colonies. Government of India regularized 567 unauthorized colonies in 1977. Thereafter, a plan was formulated in 1979–80 to provide basic amenities in these colonies.
- **Jhuggi Jhopdi (JJ) clusters** – these are normally shanty constructions made by migrant labour in Delhi. These tend to be largely on government agency land or on ‘encroached’ lands and are also referred to as squatter settlements. The continuous flow of migrants combined with the absence of adequate affordable housing for the poor led to the emergence of JJ settlements even prior to Independence. Whereas some of them were accommodated in resettlement colonies, they continue to grow. The general approach towards them has been that of clearance. According to Census of India 2001, around 1.8 million persons were residing in slums including JJ clusters in Delhi.

³³ Adopted from Delhi Human Development Report, 2006 and “*Entitlement to Services and Amenities in JJ clusters, JJ Relocation Colonies and other non-planned settlements in Delhi*”: An Overview. Available on <http://www.isst-india.org/PDF/Entitlement%20to%20Services.pdf>; last accessed on 01.03.07

- **Resettlement colonies-** Resettlement colonies are formed when populations from JJ clusters are relocated to other areas. These tend to be better off than JJ relocation colonies as there is some commitment on the part of the government to address these and allocate plots and basic amenities to them. However over the years, the plot sizes have been reducing and the level and quality of the current levels basic services provided is not satisfactory.
- **JJ relocation colonies** – when the authority that owns the land on which JJ clusters are built requires the land, clearing takes place of the clusters and families are relocated to these colonies as per the relocation policy. These colonies are also known as squatter resettlement sites, and should not be confused with resettlement colonies.
- **Urban/Urbanised Villages** – these are villages that having been overrun by the city of Delhi, awaiting a clear and legal status and definition. There are close to 135 urbanized villages in Delhi.
- **Planned/ Approved colonies, including government housing** – these are colonies that are approved by the zonal agencies and form part of the Master Plan of Delhi. They by far enjoy the maximum levels of comforts in terms of services and amenities.
- **The Walled City area** (the city centre) can be traced to the 17th century and once a grand settlement, it has now become an extremely over-crowded area lacking in many basic amenities.
- **Rural Villages** – these are villages that exist within the National Capital Territory of Delhi, mostly at the peripheral areas, which are yet to be notified as urban villages.

CHAPTER 5 Study Findings

This chapter discusses in detail the findings of both the scoping and thematic phases of the UPEA study, based on the literature review and interactions with various stakeholders.

5.1 Fuels used

Cooking fuels

For cooking purposes, most of the households visited in the slums, used a combination of three fuels viz. LPG, kerosene and biomass. None of the households interviewed reported the use of electricity for cooking.

Lighting fuels

Electricity was used for lighting in the households surveyed. This was either through illegally hooked connection or through legal metered connections. However during hours of no supply, candles or kerosene lanterns were used as supplementary fuels for lighting.

Sections below discuss each of the fuels in detail. Aspects like sources, costs, reasons for using or not using the fuels, and issues concerning access, identified during stakeholder interactions have been discussed. Also is given below a snapshot of the expenditures for the three cooking fuels:

Based on the interactions with slum dwellers in Delhi, a rough comparison of the reported costs incurred for using the three cooking fuels - LPG, biomass and kerosene individually, in urban poor households is carried out (see Table 5.1). It is interesting to note that purely from an affordability point of view, the amount spent on using clean energy sources- either LPG or kerosene, on a regular monthly basis is quite comparable (and in this case even lower) that the amount spent on purchasing only biomass. This clearly re-emphasizes the need to ensure ways to provide access to cleaner fuels to the urban poor.

Table 5.1: Per month Costs incurred for using different cooking fuels in urban poor households in Delhi (2007)

LPG	
Cost of an LPG cylinder under a legal connection	Rs 294
Average number of days one LPG cylinder lasted	22-25 days
Amount spent on LPG usage per month	Rs 350-400/-
Biomass	
Cost of biomass purchased from the local dealer	Rs 2/kg
Amount of biomass needed per day if used as primary fuel	6-8 kg
Amount spent on biomass per month	Rs 360-480/-
Kerosene	
Cost of kerosene purchased from FPS	Rs 9/ltr
Cost of kerosene purchased from black market	Rs 25/- 30/ltr
Quantity of kerosene allocated per ration card	22 ltr (>9 members)
Quantity of kerosene needed per month if used as primary fuel	25-30 ltr
Amount spent on kerosene per month	Rs 300-420/-

A TERI study done on impact of rising oil prices on the poor established that the household expenditure on energy in urban areas in India usually constituted a larger share of the total expenditure as compared to households in rural areas. Also in terms of change in prices of dominant cooking fuels and coping mechanisms urban households in India were found to be worst affected as compared to rural households. Here again there was an increasing adverse impact on urban poor with decreasing incomes (TERI, 2006).

5.1.1 Liquefied Petroleum Gas (LPG)

The state oil companies in the country are responsible for distribution of subsidised LPG to households through a number of distributors in each city. The prospective consumers need to have an identity proof and proof of residence to apply for LPG connections, irrespective of their economic status.

A typical domestic cylinder contains 14.2 kgs of LPG. Cost of a new connection of LPG is around Rs/- 1800 inclusive of LPG cost and the following components are included in the cost for single cylinder connection

[A LPG consumer in the slum](#)



Rs 800/- as deposit for 1 cylinder

Rs 100/- as deposit for regulator

Rs 200/- for rubber tube

Rs 400/- for hot plate –single burner

Rs 25/- for booklet

As per TERI estimates and NSSO data mentioned above, majority of higher expenditure classes consumed LPG, and the fuel was also found to be more prominent amongst the economically better off and literate slum dwellers, which were distinguishable from others due to permanent house structures. It was found that the households having a legal connection of LPG used it as primary fuel but still continued to use biomass or kerosene as backup which was during periods of delay in refill or inability to pay lump sum amount for replacement with new cylinder.



Use of domestic LPG for commercial purposes

A few households were found to carry out commercial activities in the form of small restaurants, etc. alongside their homes and used LPG cylinders for the same. However since the cost of a commercial LPG was nearly double that of a domestic subsidised LPG, illegal diversion of domestic cylinders for commercial purposes was a common practice. Though LPG was known to be a convenient and clean fuel by all, there were some factors that hindered its usage. The key issues identified were:

Need for a valid residence proof to apply for a connection

One of the major reasons for limited penetration of LPG usage amongst the poor was found to be the need for them to possess a proof of identity with a valid address proof. Since there is a significant share of slums in Delhi that is still awaiting a legal status due to which they lack address proofs, which makes obtaining LPG connections difficult.

High upfront cost for acquiring a connection

High upfront cost was found to be a common issue. The upfront payment for a LPG connection ranged from Rs 1800/- for a single cylinder and single burner to Rs 3300/- for a double cylinder and double burner. Since the majority of the slum dwellers were daily wagers it was not possible for them to pay the entire amount i.e. about Rs 1800/- together for the gas connection in one go. Thus they resorted to fuels like open market kerosene and biomass, which were procurable on daily basis in smaller quantities.

Delay in supplying refill

Many using LPG on a regular basis complained that supply of refill to replace the empty cylinders took on an average 6-10 days from the day of registering for the refill. During this period, slum dwellers depended on other sources like kerosene and biomass for cooking. Discussions also revealed possibility of creation of pseudo shortages by the LPG distributors in order to encourage black-marketing of cylinders.

Mindset issues

Many people, despite possessing LPG connections preferred to cook certain food items on biomass, on account of taste preferences and used LPG selectively.

Safety issues

LPG was perceived by many as unsafe fuel to use. Lack of awareness of handling LPG cylinders and presence of children in the house was a major factor in discouraging people from using LPG. Moreover, traditional cooking habits where women sit on the floor and cook, was a factor of concern as LPG being heavier than air would settle near the ground in case of leakage, thereby causing more risks. Typical slum structures that were small one-room accommodations at times were made of inflammable construction materials, also acted as a deterrent for LPG usage.

Mistargeted subsidies by the suppliers

LPG for domestic usage has been highly subsidized in India. However this subsidy is across the board for all users and does not specifically target the poor. Also there are no dedicated programs to increase penetration of LPG amongst the poor.. Besides this, oil companies admitted having no incentives for increasing their customer base as they were loosing money on every cylinder they sold because they were not fully compensated for the subsidy and additional customers meant additional losses.

5.1.2 Kerosene

Kerosene continues to be baseline fuel for a majority of urban poor. More than 90% of the households surveyed used kerosene along with either LPG or biomass. For years now, kerosene is supplied through the Public Distribution System (PDS) in India, and requires a ration card³⁴ as the eligibility criterion. In Delhi, the Department of Food & Civil Supplies, Govt. of Delhi, manages the PDS. Allocation of 12 litres is made available to households with 1-5 members while 22 litres for a family with 9 or more members. This is available at a cost of around Rs 9/litre. It was also found that only those households that did not possess a LPG connection are allocated kerosene under PDS. Further, kerosene was perceived as a safer and easy to handle when compared to LPG.

The key issues identified were:

Need for proof of residence to acquire a ration card

The need for a valid address proof was a pre-requisite for issuance of a ration card required to procure kerosene at subsidized rates. Given the temporary and unrecognised status of many slums, inability to apply for ration cards due to lack of a valid residence proof, was found to be a common barrier in accessing kerosene. This forced the poor to resort to purchasing kerosene from the black market, which added to their cost burden.

Insufficient quantity of kerosene allocated to households

Almost all households interviewed felt that kerosene allocated through the PDS from FPS was inadequate to meet their monthly needs. Consequently of this to supplement their fuel requirements, they either purchased additional kerosene from the black market at much higher costs (ranging from Rs 20-30/- per litre) in addition to biomass purchased from local sources.

Lower quantities supplied by the Fair Price Shops

It was also found out that the FPS dealers supplied quantities lesser than what were entitled to households as per the ration cards, on some pretext or the other, thereby causing inconvenience to the consumers and forcing them to make repeated visits or to purchase from the black market. TERI in an earlier study had estimated that around 26% of the total kerosene allocated in the country could not be accounted for (TERI, 2005) and another recent study

³⁴ A ration card is a proof of identity issued by the government with details of the members in the family.

had put this figure to a disturbing 40%³⁵. Corrupt practices on part of the FPS dealers involving diverting remaining quantities to the black market and thereby earning profits, was also an issue. Such distortions did not allow the true benefits of fuel subsidy to reach the targeted group.

5.1.3 Electricity

Electricity distribution in Delhi is under the purview of three private companies since 2002. Acquiring a legal connection requires a certain set of documents including a proof of residence and an initial connection charge of Rs 4000/- to be deposited by the consumer. The connections and supply are thereupon provided by the utility after installation of meter in consumer premises. However, as per the tariff structure of the companies, the JJ clusters are required to pay a fixed charge of Rs 175/- per month.

In India, one of the major issues that have been plaguing the power system has been the loss in electricity transmission and distribution. A major portion of these losses has been caused by theft of electricity through hooking to the distribution wires. In Delhi, majority of slums are still officially un-electrified and such practices of hooking are not uncommon in such areas. As an example, during interactions, one of the private companies in Delhi identified 6500 out of 8700 of its consumers spread over large geographical and theft prone areas as having no legal access to power.



Acquiring illegal connections through hooking

In the slums visited by TERI, most of the households acquired electricity through hooking (illegal connections). Some of them hooked on their own and others paid contractors to do so. The amount paid to these contractors

³⁵ http://www.ncaer.org/downloads/medioclips/press/pcoc17_pdskerosene.pdf

ranged from Rs.1000 to Rs.1500 as upfront costs and Rs 100 as monthly costs.

In some areas it was found that the utilities were taking steps to reach out to the poor unelectrified areas and give them legal connections by taking initial deposits from the residents having residential proofs. However this process had some starting hiccups as delays in actual provision of connections and installation of meters for electricity supply were observed on the part of the utilities. As an example, in the absence of connections, minimum amount bills were still being generated and sent to the residents who had originally applied and deposited money for getting legal connections. This way the consumers were forced to pay twice- once to the contractors for illegal hooking and the second time to the utilities. However this task/effort of electrifying slum areas in Delhi was identified as a positive action on part of the authorities (see Box item no. 5.3).

Box 5.3: Delhi Electricity Regulatory Commission's initiative to electrify slum areas

The DERC aims to electrify its consumers living in slums and presently indulging in unauthorized tapping of power and bring them under the billing net. DERC is increasing its consumers through initiatives like HVDS (High Voltage Distribution System) and LVDS (Low Voltage Distribution System) in theft prone areas in the city. There are some unmetered connections provided by the erstwhile DVB (Delhi Vidyut Board), which are being billed on flat rates on the basis of plot size as per the tariffs approved. These are connections mainly in area, which are not completely electrified areas. DERC has envisaged a comprehensive plan as soon as the desired number of consumers (About 75% of the residents of the poor pockets/ colony) show interest for connections by depositing the requisite developing charges. This shall help DERC in expanding its billing net through provision of metered connections and thereby help in reduction of its T&D losses also. To facilitate the process of electrification in such poor un-electrified pockets it has initiated awareness camps with a view to attract consumers for metered and legal connections. Despite the difficulties and reluctance of the consumers DERC is striving to complete its exercise of regularization of these consumers.

The key issues identified in accessing electricity were:

Need for proof of residence and unclear status of slums

Acquiring a legal connection required a proof of residence. Owing to the dynamic and uncertain nature of slums, where most of them are not yet recognized and authorized; the residents did not have a residence proof and thereby resorted to illegal hooking practices. Interactions with slum dwellers also revealed that since the drive of resettlement of many slums had not been undertaken in a planned manner by the government and was solely driven by the land availability for resettlement at any point in time, this discouraged the residents from taking permanent and legal electricity connections and bearing high upfront costs.

Instead they found it cheaper to pay to the local contractors for illegal hooking.

High upfront cost of connection

Interactions with the electricity distribution companies revealed that a new electricity connection also required an initial investment charge under development charges, meter installation cost and others, amounting to around Rs 4000 per connection. Thus a high upfront cost for acquiring legal connections was another reason for hesitance among slum dwellers.

Lump sum payment of bills

To opt for legal electricity connections lump sum electricity bills acts as a deterrent due to low affordability levels of the slum dwellers.

Frequent power cuts

Long duration power cuts in these areas is yet another reason for reluctance amongst slums dwellers for opting for new electricity connections. It is believed that such long duration outages deprived the poor of electricity to carry out various basic activities and hence it was not considered a wise decision to opt for legal electricity connection.

Conditionality of having a certain percentage of applicants

Though the initiative of the Delhi government to electrify all slums irrespective of their status is a positive effort, however the conditionality of having at least 75% of applicants from a slum area in order to provide them with the facility, acts as a deterrent.

5.1.4 Biomass

Though not a clean source of energy, it was found that biomass is the most prevalent of all fuels in the urban slums amongst all classes. In the slums visited by the research team, the availability of biomass varied from location to location. Slums at the periphery of the city had relatively easier access to biomass than those falling near the city centre. While in the former, cow dung cakes, wood scrap, etc. was available at the doorstep through vendors who collected it from nearby villages and sold them from house to house, in the latter case women and children had to walk long distances (5-7km) in order to fetch wood once in every few days.



Prevalent use of Biomass in poor households

Even households having an LPG connection or kerosene stoves used biomass as a backup fuel. It is also used for cooking, especially to make rotis (Indian bread). This was purely due to reasons of taste, as rotis cooked with biomass tasted much better than those cooked with other cleaner fuels. Secondly, since the consumer could purchase biomass on a daily basis depending on his/her daily wage and did not have to pay any upfront costs, it turned out to be a very attractive fuel option, especially for very low-income households. The cost of cow dung cakes paid by them was Rs 2/kg. However TERI estimated that when calculated on a monthly basis, the cost of using biomass was actually the highest amongst all the fuels (see Box item no.5.1). It is also worth noting that some of the households bought biomass for usage whilst the others managed it for free.

Biomass also acted as a stopgap fuel in periods of non-availability of other fuels. The most critical issue related to biomass usage was the lack of awareness of harmful effects of burning it in the conventional manner. The poor cooked with biomass usually in the open streets assuming that the smoke created would get diffused into the surroundings. However, these households were located very close to each other and when all of them cooked together, the smoke generated was considerable.

Use of inefficient Chulhas for cooking (stoves)



Due to factors like taste preferences, easy availability, lack of awareness of the long term harms of using biomass in inefficient chulhas, etc. biomass continues to be the base fuel in almost all poor households. Also for slum dwellers not having a residence proof to enable them to be eligible for cleaner energy options, resorting to biomass is the only option.

5.2 General issues/challenges for clean energy access

The original research framework for this study, proposed to address a few set of questions (see Chapter3), and from the above it becomes evident that issues concerning to clean energy for the poor in Delhi exist at various levels and seem to be stemming from large and overarching challenges at policy, planning and institutional levels. Based on the survey of literature and discussions with policymakers, the following were identified as some overall challenges that must be addressed at a broader level, in order to improve the clean energy access situation for the poor.

5.2.1 Definition of poverty in urban and peri-urban areas

To start with there is no clear definition or demarcation of poverty in urban or peri-urban areas in India, which is required for identifying the target segment of population and thereby the appropriate policy interventions.

5.2.2 Lack of data on urban poor and energy access

The Census of India collects data on slums after an interval of ten years however that is restricted to basic information like the number of slums reported in each city and the population of these slums. The data collected by the NSS targets the energy consumption in households by income class, however there is a dearth of information on levels of access, affordability, etc. to different energy markets. A lack of availability of data leads to exclusion of the poor from infrastructure network extensions or their absence on the city maps leaves them unnoticed and they do not qualify for targeted incentives, schemes, etc.

5.2.3 Lack of effective subsidies targeting the poor

Economists have for a long time questioned the efficiency of the energy subsidy mechanisms in India and have argued that having subsidized supply of fuels available to all households has led to the poor having less access to these fuels (Shelar 2007).

5.2.4 Lacunae in present urban planning processes including lack of recognition of slums

Rapid expansion of urban areas, creation of slums, and resultant inequities in the provision of basic urban services is a reflection of the lacunae in the basic urban planning processes prevailing in Indian cities today. The complex issue of land ownership and insecurity of tenure and lack of recognition of slums has led to a number of problems for the urban poor including deprivation of clean energy sources to them.

5.2.5 Lack of focus on clean energy access in present day urban policies and fragmented institutional responsibilities

There is a clear disconnect between the functioning of the authorities responsible for planning and delivery of energy services and those addressing urban poverty alleviation. Unlike housing, water, sanitation and roads, energy is not recognized as a basic service in urban areas and is therefore not on the radar of the urban development authorities as an issue that demands attention. There are no specific targets/provisions for providing clean energy access to the poor in any of the national urban development policies or city development plans, though national level energy policies do recognize access as an issue. There also exist no clear guidelines or obligation on the part of the service providers to ensure supply of clean energy services to the poor. The situation becomes more complex, because at the institutional level, different structures, distribution mechanisms and division of responsibilities exist in case of each of the energy sources and this makes looking at clean energy in an integrated manner and creating accountability of service providers a bit more challenging.

5.2.6 Lack of awareness and incentives to use clean energy

There exist basic mindset and preference issues amongst the poor regarding usage of certain fuels and there is both a lack of awareness of the benefits of using cleaner fuels and a lack of incentives to use them.

CHAPTER 6 Pointers for policy/recommendations

It has been observed that the challenges associated with clean energy access to the urban poor are both complex and multidimensional in nature. Drawing from the findings of the study, this chapter discusses the possible directions for policy and gives recommendations for the usage of clean fuels by the urban poor.

LPG

Provisions for reduction in costs

High upfront costs and unaffordable cylinder costs are a major hindrance in the access of LPG which need to be dealt through user friendly ways like making provisions in the form of instalments. These instalments could be time based (monthly, once in two months) or added to the refill cost. This would not only help in promotion for usage of fuel but also help the utilities and companies in expanding their consumer base.

Promoting smaller cylinders

Smaller LPG cylinders (weighing about 5 kg) are made available in hilly and remote areas in the country, and the government could consider making them available to the urban poor as a choice along with the regular cylinders (weighing 14.2 kgs). Smaller cylinders could offer poorer households the choice of keeping two cylinders, thereby solving the problem of delays in refills and the need to fall back on unclean fuels like biomass during periods of refill. Smaller cylinders would not only help in reducing the upfront costs for procuring LPG but also the cost of refill thereby making LPG a more affordable fuel. Moreover, effective monitoring mechanisms should be designed to ensure that no pseudo shortages are created and refills are supplied in a specific time frame from the time the request is made

Ensure regular supply

Due to lapses at the end of the suppliers the supply and refill of cylinders are delayed for longer durations than usual. Thus it is recommended that effective monitoring mechanisms should be designed to ensure that no pseudo shortages are created and refills are supplied in a specific time from the time of booking and should be strictly enforced.

Safety awareness programmes

There is a need for the LPG suppliers to undertake on a wider scale and more intensively, LPG usage related safety and awareness programs particularly amongst the urban poor.

Kerosene

Adequate amount allocation of fuel

It is suggested that calculations for appropriate quantity of the fuel to suffice the needs and requirements of the poor household be carried out and then reallocations made under PDS.

Ensure sufficient supply

It should be ensured that the full quantity allocated to the consumer is supplied in a fair manner during the designated periods (once or twice a month as per rules). This would call for strict monitoring on behalf of the authorities to ensure compliance for comfort and convenience of the customers.

Electricity

Reduction in upfront costs

A reduction in the initial upfront costs of the connection is recommended and recovery of upfront costs in the form of easy instalments on a monthly basis could be one of the ways to make it accessible and affordable.

Charges according to consumption

It is suggested that the households be charged on consumption basis rather than being charged on a minimum monthly amount basis. This would help in making electricity access affordable along with careful consumption avoiding its misuse.

Safety awareness programmes

There is a need for the suppliers to reach out the consumers more extensively, breed trust and make them a part of their user base and convince them for legal connections.

Ease in getting connections

Any conditionality on part of utilities for getting a minimum number of applicants from poor areas in order to give connections in that area should be done away with to encourage people.

Initiatives for Alternative arrangements

It is recommended to promote alternative arrangements like prepaid connections for electricity among the urban poor. This becomes important since this would help in recharging the connections as per consumption needs and affordability of the households.

Biomass

Recognizing that biomass continues to remain a commonly used fuels owing to personal reasons like tastes, affordability, etc., the penetration and usage of “smokeless stoves” in order to curb indoor air pollution, along with increased awareness of its merits and the demerits of directly burning biomass, need to be taken up. The Shell Foundation initiated the ‘Breathing Space’ program in 2002 to curb indoor air pollution caused due to the usage of biomass for cooking purposes. The program is targeting provision of millions of improved biomass cook stoves in seven states of India³⁶.

General Policy pointers

Ensure security of tenure

There is a need to regularise and recognise the unrecognised slum areas and allot the some kind of provisional status. Thus what becomes important is institutional mechanism of urban management and governance to encourage community upgrading, housing finance, land regularisation, resettlement and other programs to make housing and services available to the urban poor. Also initiatives like inclusion of integrated housing projects for the urban poor into larger development projects in a city- region should be encouraged. Policies that provide incentives to the private developers to invest in affordable housing for the poor are recommended.

Provision of temporary identity proofs

In case of unrecognised slums it is recommended that innovative options like temporary identity cards for the residents be devised in order to make them eligible to access clean energy sources. This would give them recognition required to access clean fuels although with no rights to land or property on which they reside.

³⁶ <http://www.shellfoundation.org/index.php?newsID=460> accessed on 15 February 2008

Ease in the provision of ration cards

There is also a need to re-look at the current system of issuing ration cards and make it more user-friendly and accessible. With increase in the LPG consumer base over the years and reasons alike, a number of ration cards have in fact become redundant and out of use. The list of issued ration cards should be reviewed from time to time to validate the active cards thereby updating the database. This would help in reallocating kerosene on the unused cards to the poor population for use and ease their access to cleaner fuels. Since in the current scenario, access to clean energy is intrinsically linked to possession of a ration card or an identity proof, which in turn is dependent on the slum being legally recognized, it is recommended that the two be de-linked.

Maintaining a comprehensive database for better targeting

For better targeting and proper identification, a strong database becomes an important need since lack of availability of data leads to exclusion of the poor from infrastructure network extensions or their absence on the city maps leaves them unnoticed and they do not qualify for targeted incentives, schemes, etc. Therefore for measurement and mapping of informal settlements, Geographical Information System (GIS) tools should be used and databases developed.

Provision of energy in urban slum policies/firm up a policy soon

Developing inclusive policies for the urban poor calls for a working definition of the urban poor, and the presence of a good data base on their various socio-economic characteristics and energy usage patterns. Such a policy should also be focused and adapted in context to the national Slum Policy. Thus, clean energy and access to clean energy should be on the high agenda of most policy makers, along with other basic amenities/ infrastructure services.

Learning form Best practices

Learning from best practices with respect to energy issues in the region/ country would be beneficial and also formation of regional associations, which would help in promotion of clean fuels in the area, are recommended.

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