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Energy poverty in developing countries' urban poor communities: assessments and recommendations

Technical Synthesis Report

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Contributing centres

This synthesis report brings together the key findings of the country reports prepared by the following GNESD Member Centres of Excellence:

Africa

Environment and Development Action in the Third World (ENDA-TM) is a non-governmental organisation based in Dakar, Senegal. Its activities are aimed towards contributing to a better technical, economic and socio-cultural understanding of energy issues in African countries (Authors: Touria Dafrallah, Abdou Ndour, Abdou Diop and Mansour Diagne).

Energy, Environment and Development Network for Africa (AFREPREN/FWD), Nairobi, Kenya brings together 106 energy researchers and policy makers who have conducted policy studies in 19 African countries (Authors: Stephen Karekezi, Jared Otuke, Godfrey Kanyanta).

Energy Research Centre (ERC), University of Cape Town, South Africa, is a leading institution for development of African energy and energy-environment policies (Authors: Gisela Prasad, Louise Tait, Holle Wlokas).

Latin America:

The Bariloche Foundation, Rio Negro, Argentina is a private, non-profit institute founded in 1963 focusing on research, training, technical assistance, diffusion and other activities in the area of energy and environment. (Authors: Daniel Hugo Bouille, Rocio Araoz Sandoval, Raul Landaveri).

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Asia:

The Asian Institute of Technology (AIT), based in Thailand, promotes technological change and sustainable development in the Asian-Pacific region through higher education, research and outreach.

(Authors: S. Kumar, P. Abdul Salam and Pujan Shrestha).

The Energy and Resources Institute (TERI), is a policy think tank located in New Delhi, India. It carries out research in the fields of energy, environment and sustainable development (Authors: Shabana Charaniya).

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List of Abbreviations

ASER: Agence Sénégalaise d'Électrification Rurale
AEC: Ahmedabad Electricity Company
AMC: Ahmedabad Municipal Corporation
AREED: African Rural Energy Enterprise Development
BPL: Below poverty line
BRS: Banque Regionale de Solidarite
BSES: Bombay Suburban Electric Supply Ltd
BSUP: Basic Services to Urban Poor CAA:
Constitutional Amendment Act CETP:
Common Effluent Treatment Plant CoCT:
City of Cape Town
CMO: Chief Medical Officer
CODI: Community Organizations Development Institute
DERC: Delhi Electricity Regulatory Commission
DSM: Demand Side Management
DOEB: Department of Energy Business
DoE: Department of Energy
EWS: Economically weaker sections (EWS)
LIG: Lower income groups
EBSST: Electricity Basic Services Support Tariff
EPPO: Energy Policy and Planning Office
ESMAP: Energy Sector Management Assistance Program
FBAE: Free Basic Alternative Energy Policy
FBE: Free Basic Electricity
GNESD: Global Network on Energy for Sustainable Development
HHs: Households
INEP: Integrated National Electricity Program
ICA: International Copper Association
KENSUP: Kenya Slum Upgrading Program
KAP: Knowledge, attitude and performance (KAP)
PLA: Participatory learning and action

MUDRA: Mainstreaming of urban poor women in design for resource assessment

MPD: Master Plan for Delhi

MEA: Metropolitan Electricity Authority

MDGs: Millennium Development Goals

NRCS: National Consumer for Compulsory Specifications

NEDPs: National Economic and Social Development Plans

NHA: National Housing Authority

NSO: National Statistics Office

NDPL: New Delhi Power Limited

RAY: Rajiv Awas Yojana

REDS: Regional Electricity Distributors

SELR: Slum Electrification and Loss Reduction

SNP: Slum networking project

UPEA: Urban Peri-Urban Energy Access (UPEA)

VAT: Value added tax

1. Introduction

A large proportion of urban population in developing countries suffers from chronic poverty and lack of access to clean energy. Despite being critical for poverty alleviation, access to clean energy still remains highly neglected in both policy and action initiatives of developing countries. Nearly 1.3 billion people continue to remain without access to electricity and 2.6 billion do not have access to clean cooking facilities (World Energy Outlook, 2012).

Ten countries¹ – four in developing Asia and six in sub-Saharan Africa – account for two-thirds of those people without electricity and just three countries – India, China and Bangladesh – account for more than half of those without clean cooking facilities (World Energy Outlook, 2012).

While efforts have been made to improve this situation, these efforts have largely been geographically confined, sectorally isolated and sporadic in nature. In most cases, energy access for the urban poor does not figure as the defined focus in policy efforts. There is a wide gap in terms of understanding of the existing situation of clean energy access to the urban poor, the barriers to energy access and possible solutions to address this challenge. With an objective of addressing this gap, the Global Network on Energy for Sustainable Development (GNESD) initiated research work on the theme of Urban Peri-Urban Energy Access (UPEA) through its member centres in Africa, Asia and Latin America.

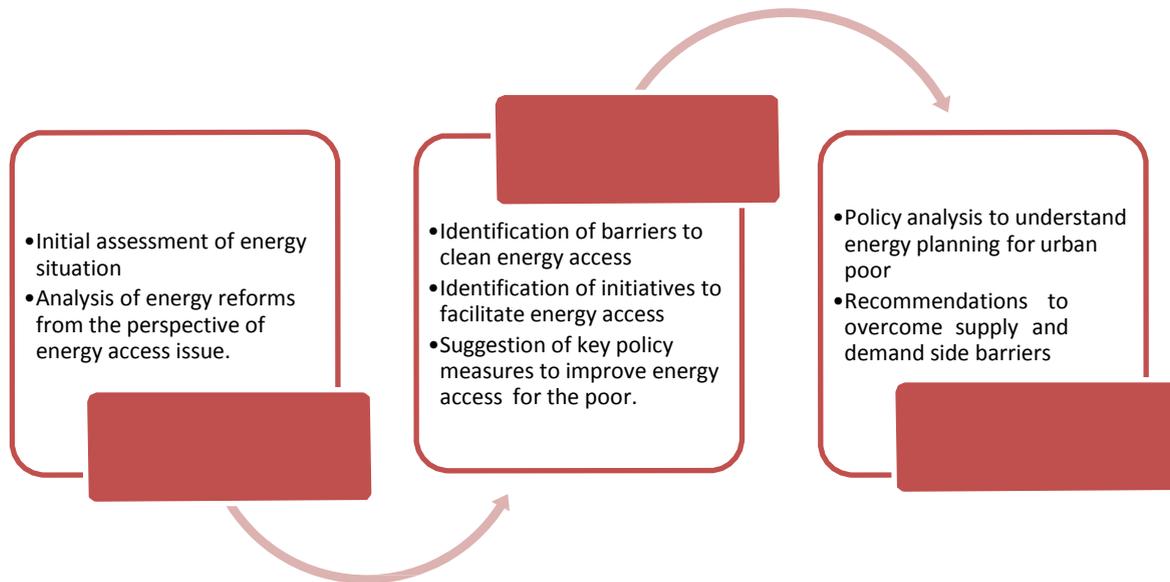
1.1 Urban Peri-Urban Energy Access (UPEA) Study

The Urban and Peri Urban Energy Access (UPEA) project initiated by the Global Network on Energy for Sustainable Development (GNESD) focuses on understanding the situation of energy access to the urban poor in developing countries.

Phase I of UPEA study was a scoping phase for initial assessment of energy situation, while phase II was a full thematic study on identifying viable and proven policy options that could assist in providing clean, affordable and more sustainable energy services. UPEA Phase III further develops the work done in previous phases by identifying the specific demand and supply side barriers to energy access, analysing urban and energy policies and recommending operational measures to address these barriers (Figure 1).

¹ India, Bangladesh, Nigeria, Ethiopia, Indonesia, DR Congo, Pakistan, Tanzania, Kenya, Uganda

Figure 1: Approach of UPEA study on energy access to the urban poor



UPEA Phase III study involved policy review, identification of demand and supply side barriers and documentation of best practices. Active engagement with stakeholders was sought through structured interviews and policy panel dialogues.

The study has helped in understanding the energy usage patterns of urban poor households and has brought forward that energy planning for the urban poor is nowhere addressed in various plans/policies related to either urban poverty alleviation or urban development/planning.

Objectives of UPEA Phase – III

- Assess the current levels of access to modern forms of energy for the urban poor
- Identify the supply-side and the demand-side barriers to energy access for the urban poor
- Collect and compile barrier specific best practices i.e. successful policies that have supported energy access for the urban poor
- Provide specific recommendations to overcome barriers to enable energy access for the urban poor

1.2 Participating centres

GNESD member centres that participated in the study included:

- Asian Institute of Technology (AIT), Bangkok, Thailand
- Brazilian Reference Center on Biomass/USP (CENBIO), São Paulo, and CentroClima/COPPE/UFRJ, Rio de Janeiro, Brazil
- The Bariloche Foundation, Rio Negro, Argentina

- Energy Research Centre (ERC), Cape Town, South Africa
- ENDA Energy Environment, Development, Dakar, Senegal
- The Energy and Resources Institute (TERI), New Delhi, India
- Energy, Environment and Development Network for Africa (AFREPREN/FWD), Nairobi, Kenya

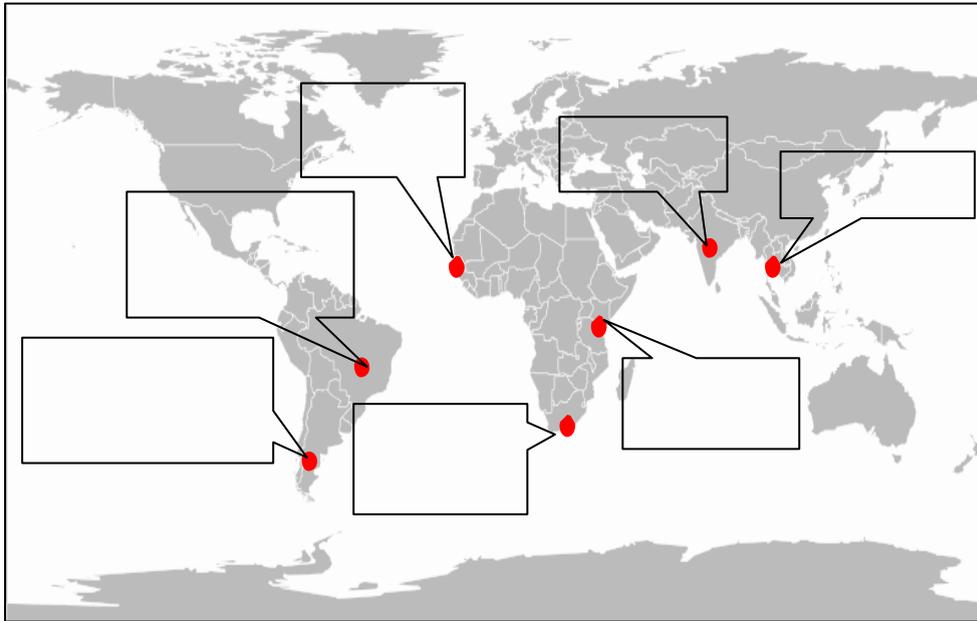


Figure 1: Centres participating in the UPEA Study

1.3 Research framework

To achieve the stated research objectives, a research framework was developed. It included the following key components:

Background- The objective was to document study area characteristics like demography, urbanization, profile of the urban poor and situation of clean energy access to the urban poor community. This section involved:

- Studying urban poor settlement characteristics in the study area, like: average income levels; occupations; other typical characteristics such as lack of tenureship, illegal status, limited availability of legal basic services [water, power, sewage, waste management, health, education, sanitation, and energy], etc.
- Analysing the existing relevant sectoral policies related to urban planning, poverty alleviation and energy to identify if energy planning for the poor is being addressed in these.

Access to legal and cleaner energy by the urban poor- This involved finding responses to the following research questions:

- What are the main energy sources (for cooking and lighting) used by the urban poor? (types of energy sources; affordability and availability of energy sources)
- How is the energy procured (e.g. legally / illegally)

- What are the key energy access issues (e.g. tenureship, affordability, lack of infrastructure, etc.)

Energy planning for the urban poor- This component of the research framework involved identifying and reviewing key plans, policies and programs for the urban poor with the objective of evaluating whether energy access for the urban poor is being adequately addressed in these plans/ policies/ programs.

Identify the supply-side barriers to energy access for the urban poor- This involved identifying the agencies involved directly or indirectly in the energy supply chain with an objective of understanding their role and identifying the barriers that they face in supplying energy to the urban poor.

Identify the demand side barriers- This involved identifying the demand-side barriers and the steps undertaken by the supply agencies to address the identified barriers.

Best practices- This involved collecting and compiling barrier specific best practices i.e. successful policies/initiatives that have supported or enabled energy access for the urban poor in their regions. These were used to inform the recommendations suggested for the study areas.

1.4 Methodology

Data compilation: This involved compiling existing data on the energy sector, population statistics, and supply agency profile as well as compiling data on initiatives implemented by various agencies to improve energy access.

Literature review: An extensive review of literature including energy policies, energy acts and other relevant material on energy access was conducted. A review was undertaken based on available data and statistics from government agencies.

Structured interviews with supply agencies: In order to identify supply side barriers to access of clean energy by the urban poor, structured interviews were carried out with supply agencies involved in the energy supply to the residents of the study area, including LPG suppliers and electricity utility companies. Structured questionnaires were used with both open and closed ended questions to gather views of relevant agencies. The following were discussed through structured interviews:

- General information regarding objectives, functions and jurisdiction of the agency
- Requirements to get a new domestic energy connection by all users
- Connections for the urban poor households in terms of specific requirements and/or relaxations
- Specific strategies to enable clean energy access to the urban poor

Household Surveys:

As a part of this study, an effort was made to substantiate the barriers identified in the UPEA Phase II study by conducting household surveys in slum settlements. The survey was

mainly aimed at finding the household details in terms of family size, total income; identifying the major fuels used for cooking and lighting purposes; and the pattern of fuel usage and expenditure in the households.

Household surveys were carried out in the selected settlements in urban and peri-urban areas, which represented:

- Households having access to legal LPG/electricity connection
- Households having no access to legal LPG/electricity connection
- Households having high reliance on other fuels like kerosene, biomass for cooking.
- Households having illegal access to electricity

The sample size was selected as per the aims and objectives of the survey and availability of time and resources. There was also a need to re-examine the findings of previous studies with respect to any new developments in the last 4years, hence slums surveyed for UPEA II were also selected for HH surveys.

For each household, the following information was collected using questionnaires:

- Basic household information (size, income, expenditure, etc.)
- Information regarding fuel used for cooking (source, cost, etc.)
- Information regarding energy source for lighting and space conditioning (source, cost, service, etc.)
- Other information regarding the willingness of the household to acquire clean energy connection, awareness about negative impacts of using kerosene, etc.

Policy Dialogue Panel: Policy dialogue panels were organized by each participating member centres with stakeholders concerned with the provision of energy access and services to the urban poor. Stakeholders consulted included representatives from the government agencies, local authorities, energy suppliers, housing authorities; regulatory agencies; NGOs, academia and consumer's associations. Where the panels were not possible to organize, as in Brazil and South Africa, individual meetings were held with important stakeholders to discuss the issues.

The policy dialogue panels were useful in helping identify the supply and demand side barriers as well as recommendations on how to address the barriers.

Review of Best Practices and Energy Policies: For each barrier, best practices i.e. successful policies/ initiatives that have supported or enabled improved energy access were identified based on literature review and discussed during the stakeholders' discussion. Analytical review of current policies governing the energy sector, urban planning, housing and other relevant sectors was conducted. The analysis of policies provided useful assessment of the critical role they play in addressing energy access for the urban poor.

2. Urban development and Energy policies: Do they promote clean energy access to the urban poor?

2.1 Policies for urban development

Urban planning mainly concentrates on land use planning to meet the needs of rapid urban population growth. A review of existing policies related to urban development was conducted in UPEA phase II and the current phase to understand the focus of the policies and explore whether energy access has been addressed. Current policies guiding urban development focus on urban infrastructure improvement primarily so as to meet the growing infrastructure needs of rapid urbanisation. Most of the poverty alleviation and urban development policies have a component on urban poverty that aims at provision of basic needs services like housing, water supply etc. to the urban poor. However, clean energy is not recognised as a basic urban service in these policies. For instance, in India, it is observed that the main thrust of the agencies responsible for the qualitative improvement of slum settlements is to provide minimal civic infrastructural facilities like toilets, bathrooms, night shelters and *Basti Vikas Kendras* (Community Centres) in JJ Clusters². However, the provision of energy services does not feature under their activities.

Improvement in the living conditions of the urban poor is recognized as a critical link to achieving sustainable urban development and hence all urban development efforts (central and local) have slum improvement as a key component. For instance, the National Housing Policy for Kenya considers slum upgrading as a high priority and it also includes electricity as part of physical infrastructure (Government of Kenya, 2004b). It states that the upgrading will start with current slums addressing land tenure issues, providing basic infrastructural facilities and services, improving houses and livelihoods of the target population. In addition, it incorporates socio-economic activities that will improve living conditions of the population such as poverty alleviation through income generating activities and employment. The Thailand government has implemented several programmes for slum upgrading, which includes re-blocking (re-design), reconstruction, land-sharing and relocation of slum areas. It has encouraged private investors to provide low-cost housing for the targeted dwellers living in some squatter settlements on land owned by temples or by the Crown Property Bureau, and enacted policies for low cost housing and infrastructure development in slums making access to electricity and other modern forms of energy for the slum dwellers easier (Guerra and Guerra, 2004).

Largely, the broad areas of various schemes being implemented in the study areas are as follows:

1. Slum up gradation and redevelopment
2. Affordable housing programs

² JJ stands for *Jhughi Jhompri*, a term used in Hindi language to refer to slum settlements

3. Provision of basic amenities (water supply and sanitation) to improve the living conditions

Table 1 gives an overview of various housing policies and programs launched by governments in the UPEA III study areas and their coverage of energy access issue. The table also highlights examples of certain countries like Kenya, Brazil, Thailand and India, where the linkage between low cost housing and energy infrastructure development has been recognised. For instance, electrification is included in the low income housing units programs of the National Housing Authority in Thailand, ensuring its reliability and affordability to the low income people.

Table 1: Housing policies and programs launched by national governments in UPEA III study areas

Country	Program/Policy name and Description	Whether energy is addressed?
Kenya	<p>Kenya Slum Upgrading Program (KENSUP)</p> <p>KENSUP was launched in 2004 by the government of Kenya with the support of the UN-HABITAT where the government pledged to raise an estimated 883.76 billion Kshs (<i>Kenya shilling</i>) (USD 11.05 billion)¹ for slum upgrading program for the period of 2005 to 2020 (Amnesty International, 2009). Its main goal is to improve living situation for at least 5.3 million Kenya's slum dwellers by 2020. In the program strategy, it outlines provision of basic infrastructure as one of the focus areas by KENSUP. The infrastructure budget is approximately 40% of the program cost and it includes provisions such as water, electricity, roads, sanitation and street lighting (UN-HABITAT, 2008).</p> <p>Under the implementation phase KENSUP is working on slum upgrading programs in four urban centres, which include, Kisumu, Mavoko, Mombasa and Nairobi, and expansion plans in other towns are also underway.</p> <p>A decanting site has been completed in Nairobi, where Kibera residents of Soweto East area were relocated to new 5-storey flats (Ministry of Housing, 2011). The site was constructed with provision of basic infrastructure such as the street lighting, water and sewerage services, electricity and security of tenure.</p>	<p>Though the main goal of KENSUP is to improve living situation of slum dwellers by 2020. The slum upgrading program does include electricity in the basic infrastructure and has a budget assigned for it.</p>

<p>Brazil</p>	<p>„Minha Casa Minha Vida“ (My House My Life)</p> <p>The „Minha Casa Minha Vida“ is a massive public housing campaign launched by the Brazilian Federal Government in March of 2009, for building one million low-cost housing units throughout the country by 2014. This National Housing Plan intends to reduce the housing deficit in Brazil by 14%.</p> <p>In July 08, 2011, the Ministry of Cities Ordinance N. 325, from July 07, 2011 which provides for the general guidelines of the Minha Casa, Minha Vida Program, stage II. In this new text, all the enterprise projects composed by single-family units must contemplate a solar heating system, where the new maximum values established for these households already include the costs of the solar heating system.</p>	<p>The policy primarily addresses the issue of housing deficit with no specific focus on energy access.</p> <p>From the beginning of the program, all the projects for building villas included in the Minha Casa Minha Vida program must have their electrical installations, number of taps and minimum specification of materials well defined. But there is no mention of the mechanisms to achieve the same.</p> <p>The only mention of energy is with respect to the ordinance which compels all the households built inside the program to introduce solar energy for water heating, aiming at reduction in expenses.</p>
<p>India</p>	<p>National Urban Housing and Habitat Policy, 2007</p> <p>The basic premise of the policy is ‘affordable housing for all’; especially the economically weaker sections (EWS) and lower income groups (LIG). The policy proposes to adopt progressive approach like, public-private partnerships, and construction technology for modernizing the housing sector. It also focuses on developing healthy and environmentally sustainable cities through interventions in urban planning, and service delivery</p> <p>Rajiv Awas Yojana (RAY)</p> <p>RAY was launched in 2009, with an objective of ‘Slum free India’ aimed at encouraging States/Union territories to tackle the issues of slums holistically by, formalizing the existing slums and enabling them to avail basic services, tackling the shortages of urban land and housing that force the poor to resort to illegal solutions in a bid to retain sources of livelihood</p>	<p>As far as energy is concerned, efficiency, use of renewable sources of energy and conservation aspects are addressed in terms of tools and institutional structure for achieving the same. However, basics of energy like accessibility, affordability to the economically weaker section (EWS) and lower income group (LIG) have not been addressed in the said policy.</p> <p>It is the only policy at central level that identifies electricity as a critical component of physical infrastructure (along with road network, water supply, sewerage, drainage, communication) and stresses on ensuring the availability of the same while preparing Slum-free City Plans. Clean energy for</p>

	<p>and employment and redressing the failures of formal system that are responsible for creation of slums</p> <p>Master Plan Delhi (2021)</p> <p>The Master Plan for Delhi (MPD) guides the urban development planning process of Delhi. The current Master Plan 2021 (MPD 2021) addresses critical issues such as land, physical infrastructure, transport, ecology and environment, housing and other socio cultural and other institutional facilities, the planning process itself and related aspects of governance and management.</p> <p>The MPD 2021 acknowledges that the availability of housing for inhabitants of squatter settlements, informal service providers and migrant population is the biggest challenge and provides directions to address the same. One of which includes: <i>Need for individual services like water, sewerage and electricity in resettlement colonies.</i></p>	<p>cooking is not addressed.</p> <p>Master Plan Delhi 2021 recognizes electricity as an integral part of basic services (along with water, sewerage, drainage and solid waste management) necessary for sustainable development and for maintaining a minimum standard of living. However, access to electricity in general or in context of urban poor communities in Delhi is not addressed clearly.</p>
Argentina	<p>Program for Housing Improvement and Basic Infrastructure</p> <p>This program is designed to promote development and improvement of habitat, housing and social infrastructure conditions for households with unsatisfactory basic needs. It targets vulnerable groups from small villages or places, rural areas in a situation of emergency, risk or social exclusion. The Program gives non-reimbursable funds for the acquisition of construction material, housing improvement and completion, or community facility building, such as multi-purpose facilities, first aid clinics, day-care centres, among other community infrastructures.</p> <p>Objectives include:</p> <ul style="list-style-type: none"> • Improving habitat conditions for vulnerable groups located in small and medium-scale rural and urban areas and helping them access to a basic housing unit or to finish recoverable houses • Improving basic community infrastructure, thus ensuring social 	<p>The program strictly focuses on improvement in habitat conditions for vulnerable groups (including the urban poor). The housing improvement program does not recognise electricity as a component of physical infrastructure. Thus energy access for urban poor is not addressed by this program.</p>

	<p>participation, training, support and protection to groups under emergency, risk or social exclusion conditions</p> <ul style="list-style-type: none"> • Reinforcing vulnerable group's subsistence and self-management abilities to satisfy their basic needs, by developing and strengthening the social, productive, technological and working organization of residents and beneficiary intermediary associations 	
Thailand	<p>In January 2003, the Thai government announced two new programs for the urban poor that aim to reach 1 million low-income households. The first is the Baan Mankong (,secure housing') program, which channels government funds in the form of development subsidies and housing loans to upgrade existing urban poor communities. The fund is directed to the urban poor organizations who plan and carry out improvements to their land, housing, environment and basic services with the help of community development organizations such as Community Organizations Development Institute (CODI) (Boonyabanha, 2005). To explore new approaches, 10 Baan Mankong pilot projects were supported initially in 2003 (in Bangkok region).</p> <p>The second program is the Baan Ua Arthorn program, in which the National Housing Authority (NHA) designs, constructs and sells ready-to-occupy flats and houses built by contractors at subsidized rates to low-income households.</p>	Both the programmes (either through upgrading of the old houses or by building new units) ensure access of electricity, as residents under these programmes do not need to make separate arrangements for electricity connection themselves.

2.2 Policies for promoting Energy Access to urban poor

Governments formulate policies at national level to facilitate and regulate the provision of energy services. It is interesting to examine whether these national level policies promote energy access to the urban poor. Whereas a handful of policies do address clean energy access, they do so partially and lack robust ecosystems to support efficient implementation through consecutive programs and schemes.

For LPG, despite there being policies focusing on subsidies it was observed that the poor are unable to afford it. For instance, in Senegal, the government initiated the subsidy based LPG national program ,Butanization Program` in 1974 aimed at addressing the deforestation problem by replacing charcoal consumption with LPG in urban areas. This program initially faced some constraints on account of the high costs associated with switching to LPG.

Rural Electrification has also been a priority in the Energy Policy of Senegal since the implementation of the Power Sector reforms in the 90s (*See Box 1*). Similarly, Kenya has an energy policy (Sessional Paper No.4 of 2004 on Energy) that outlines the government's aspirations for the energy sector till the year 2024. Although, the energy policy strongly supports increased supply and access to LPG and electricity but the focus remains on rural electrification.

Box 1: Senegal's energy policy- focus on rural electrification

Since 2003, the focus of Senegal's energy policy has been on the contribution of the sector towards provision of basic social services, education, health and water to increase well-being and eradicate poverty, while taking into account environmental issues. Senegal is targeting providing half of its rural and peri-urban population with access to modern energy services by 2015, in order to achieve the Millennium Development Goals (MDGs). Such an objective will only be achievable in Senegal if the access to electricity is raised at 100% in urban and peri-urban areas and 36% in rural areas. But many of the current energy policies and programs are focused on rural electrification, for instance a National Energy Sector Development Strategy was introduced in the form of *The Lettre de Politique de Développement du Secteur de l'énergie* (LPDSE) in 2008 and reviewed in 2011. It focused on development and usage of domestic energy resources, particularly biofuels and renewable energy; increasing the electricity supply in rural areas, especially pro social and productive uses; reducing the energy demand and increasing the energy efficiency among others.

In Kenya, the government has not been including slum electrification in its national policies and programs (UN Habitat, 2009). **This is attributed to a fear that providing infrastructural investments in slums will be seen as legitimizing slums and informal settlements.**

In South Africa, The White Paper on Energy (DME, 1998) sets the overall policy approach for the energy sector in South Africa. It includes key objectives relating to energy access for poor households and supports the achievement of a range of social objectives including economic development, affordability, health and environmental protection. These objectives are given effect in the Energy Act (2008), which outlines the mandate given to the Minister of Energy to increase access to affordable energy services as well as minimize the negative effects of energy use on health, the environment and personal safety. The Minister of Energy announced in 2011, its intentions to provide LPG to 1.5 million households by 2016 (Peters, 2011), and there has been discussion around the potential for subsidies on appliances and cylinders to address affordability constraints (DoE, 2012c) (*See Box 2*).

In Argentina, in the area of Great Buenos Aires there is no integral energy policy for the poor to account for their energy requirements.

Box 2: South Africa- Transitioning households to use LPG

In 2006 the electricity utility, Eskom launched a program to incentivise households to switch from electricity to LPG for cooking. This program was developed in response to the electricity supply shortages that the country was experiencing at that time. One hundred thousand low-income households were targeted through a stove-switching program whereby households could bring in their (working) electric stoves and would receive a 2-plate gas stove, a 5kg gas cylinder and 4 refill coupons. The program was successful in the short-term in terms of transitioning households to using the LPG fuel. A survey after a year of its roll-out found that 89% of the surveyed households were still using LPG (Mohlakoana and Annecke, 2009). Long term sustainable outcomes were compromised however by ensuing national shortages in the supply of LPG.

Achieving universal access to energy is a challenging policy target given the funding and capacity constraints. In South Africa, the date for achieving universal access to energy has been revised several times and has most recently been set at 92% of all households by 2014 (DoE, 2012a). The viability of achieving this target appears low (Tait and Winkler, 2012) and Department of Energy (DoE) has acknowledged that it will likely take many more years to achieve universal access (DoE, 2012b).

The Brazilian Government has fixed specific goals for energy access per utility and per Municipality through the indication of the year by which the universalization should be concluded. Each local electricity concessionaire has to present a Universalization Plan, containing Annual Programs for Service Expansion. Resolutions have been drafted to guide consumers and distributors, defining how the initial service (supply solicitation, connections deadlines, budgets for supply works, charge re-handling) should be handled. This has helped Brazil to achieve an electrification rate of almost 99% (See *Box 3*).

The periodic National Economic and Social Development Plans (NEDPs) of Thailand have been crucial in addressing the problems of low income families and have played a greater role in upgrading their wellbeing and quality of life. These national plans have taken initiative for rigorous housing development programmes for low income families by building/upgrading slums and by finding solutions to their property rights. The NEDPs have also played an important role in addressing and managing energy production, consumption, distribution and pricing. Throughout the duration of plans, energy pricing of all forms of energy was restructured to cover the true cost, and subsidies were devised to help the poor and vulnerable group, thereby directly affecting the access and affordability of energy services to the poor.

Box 3: Brazil's Luz Para Todos („Light for All“) program

Launched in 2003, the Luz Para Todos program aims to achieve universal access to electricity in Brazil by 2014. The program helped to provide access to an estimated 14.5 million people by late 2011 and Brazil can now boast an electrification rate of almost 99% (Ministry of Mines and Energy, 2010). The program is directed by the Ministry of Mines and Energy, co-ordinated by Electrobrás (the holding company of the Brazilian electricity sector) and executed by the utilities and rural electrification co-operatives. It provides an electricity connection free of charge, together with three lamps and the installation of two outlets in each home. Tariffs are regulated at a „social“ rate, with a 65% discount for monthly consumption below 30 kWh, a 40% discount from 31-100 kWh, 10% discount from 101-220 kWh and no discount above this level.

Those people who remain without electricity in Brazil represent a particular challenge, as they mostly live in the Amazon, where the population is thinly spread (about four inhabitants per square-kilometre) and where extension of the power grid is difficult. Recognising this, the Luz Para Todos program has created a handbook including ideas for setting up decentralised renewable energy systems, such as collective action by citizens to install solar and biogas power systems. The Ministry of Mines and Energy estimates that the Luz Para Todos program has generated nearly 300 000 new jobs and a survey reported an increase in income in more than one third of households after receiving electricity access (Ministry of Mines and Energy, 2009). Access to electricity stimulated social programs providing health services, education, water supply and sanitation in Brazil. (Gómez and Silveira, 2010)

Source: World Energy Outlook 2012

2.2.1 Social tariffs for low income dwellers

Many governments provide subsidised tariffs on electricity to urban poor energy consumers. For instance, Brazil has adopted a performance-based regulation to ensure affordable and fair tariffs for the low income customers. The discount provided varies with the electricity consumption (See *Table 2*).

Table 2: Discounts included in the Electric Power Social Tariff in Brazil

Range	Discount
Monthly consumption of up to 30kWh	65%
Monthly consumption from 31 kWh to 100 kWh	40%
Monthly consumption from 101 kWh to 220 kWh	10%
Monthly consumption above 220 kWh	0%

Source: ANEEL 2011

In Thailand, there are two different kinds of electricity tariffs for residential users: (1) Normal tariff with consumption not exceeding 150 kWh per month; and (2) Normal tariff with consumption exceeding 150 kWh per month. The fixed monthly service charge and the per unit electricity charge is significantly less for the first category. The pricing policy also exempts charges on power usage to small-sized residences installed with 5-ampere meters and using less than 90 kWh per month. However, effective from the first quarter of 2012³, the government lowered the threshold of those entitled to free electricity support from 90

³ Cabinet Decision, Energy Policy and Planning Office. <http://www.eppo.go.th/nepc/kpc/kpc-139.htm>

kWh per month to 50 kWh per month⁴. This has been done in order to minimize the number of non-poor, who benefit from the existing policy.

In 2003 the government in South Africa introduced the Electricity Basic Services Support Tariff (EBSST) otherwise known as Free Basic Electricity (FBE) funded by the national government. The tariff aims to assist poor households with a record of using less than 150kWh per month by providing them a subsidy of 50kWh free electricity units per month. However the implementation of EBSST is fraught with difficulties like the various pricing and delivery limits imposed by the plethora of distribution agencies. For instance, in Cape Town households can use up to 450kWh and receive 50kWh for free. Additionally, the subsidy is unable to reach backyard dwellers⁵ and other households ineligible for the services like those on unproclaimed land (Parnell, 2007).

In order to address this, in 2011 the City of Cape Town (CoCT) adopted a Backyard Essential Services Improvement Program. This program seeks to provide backyard dwellers with toilets and running water as well as electricity.⁶

In India, the National Tariff Policy, 2006, aims at ensuring availability of electricity to consumers at reasonable and competitive rates and promoting transparency, competition, and private sector participation. However, the policy targets the rural households in particular and does not include any mandate for urban and peri-urban areas.

2.2.2 Subsidies in cooking fuel prices

In order to make clean energy fuels like LPG more affordable, various schemes and policies providing subsidy to the urban poor are launched from time to time.

In the study area in New Delhi, India, the government announced a new scheme⁷ in the 2012-13 budget under which over 3,50,000 below poverty line (BPL) and poor families will get free LPG cylinders⁸ and gas stoves to end the use of kerosene. The cost of the scheme is INR 1 billion (USD 18 million) out of which INR 227.5 million (USD 4 million) is borne by the central government, while the rest is being spent by the city government.⁹ Apart from this, the Union Budget 2012-13 for India announced a direct cash transfer of subsidy for BPL families for kerosene and LPG.¹⁰ In addition, the government has capped the number of subsidised cylinders to nine cylinders in January 2013. Henceforth only nine cylinders of domestic LPG (14.2kg) will be available to each family at subsidized rate (USD 7.60) per year and extra cylinders will have to be purchased at the market price (USD 17).¹¹

In 2001, the South African government exempted the sale of kerosene from value added tax (VAT) to make it more affordable to the poor. In 2007, the Free Basic Alternative Energy Policy (FBAE) was introduced. The policy provides a subsidy to poor households for

⁴ This new scheme is expected to help the poor who use only necessary electric appliances including three light bulbs, TV, electric fan, and rice cookers.

⁵ Formal houses rent out areas of their backyards to families to erect shacks from which they can earn an income

⁶ This plan is still in pilot stage

⁷ The scheme is part of the extension of Centre's *Rajiv Gandhi Gramin LPG Vitrak Yojana*

⁸ One set costs the Government Rs 3,049 and the kit comes with all accessories like regulator and pipe

⁹ <http://www.thehindubusinessline.com/news/states/article3803331.ece>

¹⁰ Under direct transfer, the difference between the market price and subsidized price is directly transferred to the beneficiary's bank account in the form of cash in proportion to the quantity uplifted from the market.

¹¹ <http://newindianexpress.com/nation/article1426519.ece>

alternative fuels or technologies to support a household's energy needs and covers fuels like kerosene, LPG, renewable energy, etc. This policy is applicable to unelectrified areas which are predominantly in rural municipalities. Urban municipalities are largely electrified and are therefore not eligible for this subsidy.

The South Africa study also notes that LPG compares more favourably with electricity in terms of expense and in this regard has a strong potential to benefit households with a modern energy source for thermal applications at a cheaper cost. However, for most poor households LPG is still inaccessible.

In Thailand, local LPG prices have been capped for many years based on a wholesale price of USD 333 per ton¹². This implies that there is approximately 64% (i.e., USD 601) subsidy per ton of LPG (See *Box 4*).

In Brazil, the program *Bolsa Família* (Family Allowance) was instituted from the unification of some social programs for income transference. Among them, the "vale gás" ("gas voucher") provided a subsidy to help poor families to purchase LPG, used mainly for cooking. This direct support has been contributing towards the replacement of highly pollutant solid fuels such as firewood with LPG.

Box 4: LPG prices in Thailand

According to National Statistics Office (NSO), in 2009 over 76% of the households in Thailand used LPG for cooking indicating that the majority of population gained from the government's subsidy of LPG price for the residential sector. The Thai government uses the oil fund to subsidize the price of LPG for all sectors including industrial, transportation and household sectors. The (distorted) price of domestic LPG (USD 333 a ton) since 2007 which is about a third of the cost of imported LPG (USD 934 a ton) has probably lead to an increase in total LPG consumption in Thailand from about 2,284 thousand tons in 2000 to 5,943 thousand tons in 2010 (MOE, 2012; EPPO, 2012) . However the government floated the price of LPG for industrial and transportation sector in 2011. Although the price of LPG for transport sector increased to Baht 21.13/kg, and in the industrial sector to Baht 30.13/ kg, the price of LPG for residential sector has not increased and has remained the same since 2008 at Baht 18.13/kg (The Nation, 2013).

Apart from the financial incentive, there are also other initiatives that have improved the access of LPG to the poor. LPG cylinders are available in small sizes (3- 4 kg) suitable for small and congested settlements. Not only the authorized LPG distributors, but local grocery shops are also allowed to sell LPG cylinders. Other services offered include doorstep delivery, allowing swapping of different brand of cylinders and assistance for first time users to install LPG cylinder, have been crucial for high rate of access of LPG in Thailand.

¹² Exchange rate January 2013, 1 US Dollar = 30.13 Thai Baht

2.2.3 Mistargeted subsidies

In South Africa, the urban poor who connect backyard dwellers or neighbours without a connection to their electricity meters use more than 150kWh generally (or 450 kWh in Cape Town) and are therefore not eligible for free basic electricity. There is also some leakage to small mid- and high-income households who use less than 450kWh per month and therefore receive free basic electricity. In Senegal, the government subsidies were introduced to help the poor access clean energy sources but it is observed that the subsidies have not been properly channelled to this vulnerable part of the population.

In India, most of the subsidies (USD 0.02/unit¹³ for electricity and USD 9.40¹⁴ per LPG cylinder) are universal in nature and not targeted specifically to the urban poor. According to the 2011 census, 65% urban households use LPG while only 11% rural households are able to secure LPG. Overall, only 28.5% Indian households use LPG for cooking.¹⁵

In Senegal, to address the problem of deforestation, environmental degradation and increasing scarcity of traditional fuels, the Senegalese Government decided to launch a 'butanization program' (1974) aimed at eventually replacing 50% of fuel wood (charcoal) consumption with LPG in major urban areas. From July 1999 onwards, the subsidy on LPG was gradually reduced by 20% each year. The first phase of reduction of LPG subsidies prompted an increase in the LPG price of the 6 kg cylinder from 158 FCFA (USD 0.32) before July 1999 to 249 FCFA (USD 0.5) in 2001. To dissuade people from shifting towards the use of traditional fuels, the last 20% of LPG subsidy was maintained until 2010. After that in 2011, the subsidy was totally removed.

Due to the informal nature of their livelihoods, most of the urban poor in Senegal were unable to afford the required infrastructure, such as the initial appropriate stoves, and sustain the refill of the gas container. The subsidized 2.75 and 6 kg cylinders, that were to benefit the poor, have instead been profusely used by the middle and upper middle class, which have sustained purchasing power.

Interestingly, in Argentina it is observed that sometimes even after the subsidies, LPG remains to be an expensive cooking fuel for the urban poor. In 2004, the Buenos Aires City Government launched the Social Gas Cylinder Plan with the aim of subsidizing the price of 10kg LPG gas cylinders for low-income households with no access to natural gas grids. By the end of 2008 the National Program on Household Consumption of Bottled Liquefied Petroleum Gas [*Programa Nacional de Consumo Residencial de Gas Licuado de Petróleo Envasado*] was created, with the main purpose of amending gas price asymmetries between households with access to the natural gas grid and those without it. It established a maximum price for 10, 12 and 15 kg cylinders of ARG\$16 (USD 4.00), ARG\$20 (USD 5.00) and ARG\$25 (USD 6.25) respectively, applicable in the entire country. But even with these subsidized prices LPG is still 3 times more expensive than the natural gas equivalent.

¹³ Under the Delhi Electricity Subsidy Scheme, the government of Delhi has been providing a subsidy of USD 0.02/unit (normal charge for electricity up to 200 units is USD 0.06/unit) to all those domestic consumers whose monthly consumption of electricity does not exceed 200 units.

¹⁴ USD 7.60 is a subsidized price for LPG cylinder, the market price of an LPG cylinder is USD 17. LPG is a subsidized fuel and hence all the domestic users enjoy a subsidy of USD 9.40.

¹⁵ <http://www.moneylife.in/article/lpg-a-mockery-of-subsidy-reduction-efforts-or-unadulterated-politics/30315.html>

For the same reason, in the study area in Kenya, kerosene and charcoal are the commonly used sources of fuel mainly for lighting and cooking. The main reasons for using kerosene as compared to biomass are that it is easy to use, easily accessible and affordable to a majority of the residents. (Karekezi S, et al., 2008)

2.3 Conclusion- Energy planning for the urban poor partially addressed in policies

Section 2 gave an overview of urban development and energy policies, programs in the study areas. It was observed that the existing urban development policies for the urban poor broadly focus on:

1. Creation of slum free cities by up gradation, redevelopment and relocation of all existing slums so as to provide access to basic amenities, shelter, property and land titling and a decent quality of living
2. Access to affordable housing, and
3. Poverty reduction by convergence of different programs and services related to skill development, creation of livelihoods, social security and services.

It was observed from the various examples that slum upgrading programs and housing policies can play a crucial role in addressing energy access needs of the urban poor. They not only improve living conditions and quality of life but have the potential to reduce energy poverty as well. This was observed in Thailand, where electricity was included as one of the basic physical infrastructures of housing schemes developed/redesigned for urban poor.

Though, it was observed that energy planning for the urban poor is nowhere addressed in the plans/policies related to either urban poverty alleviation or urban development/planning. Examples of a few progressive policies also show us the way forward and prove that it is possible to attempt to increase energy access of urban poor by recognising energy as a basic service. For example, the periodic National Economic and Social Development Plans (NESDPs) of Thailand were crucial for constructing houses for low income groups and upgrading slums to provide basic services such as water supply, electricity, etc.

The various national level energy sector policies have prescribed certain targets for electrification but these primarily are focussed on rural areas or are universal in nature. There is a lack of vision for the urban and peri-urban poor population. There is an absence of robust planning and guidelines that define the nodal agencies responsible for energy service delivery. Though, many policies have focussed on increasing affordability of energy services by means of subsidised tariffs, it is difficult to define how successful have they been. It was observed that despite the subsidies, significant section of the urban poor population still struggle to accommodate the cost of clean energy (electricity and LPG) in their household budgets. In other cases, it was noted that the subsidies have not been channelled to the intended beneficiaries. It is in these cases, when the urban poor households have to resort to secondary fuels like kerosene and charcoal which are unclean sources of energy and major

sources of poor indoor air quality¹⁶. Thus, it is essential to include clean energy sources, electricity for lighting and LPG for cooking as an integral part of basic physical infrastructure services for the urban poor.

There is a link between energy access and poverty alleviation. Provision of energy infrastructure and services to the poor communities enhances their income generation capacity which further enhances their quality of life. Thus, this co-benefit must be given weightage during the policy planning process for urban poor and for any energy sector reforms.

¹⁶ Indoor air pollutants (CO, SO₂, NO₂, RSP) result in range of health problems, importantly contributing to chronic respiratory diseases. Indoor pollutants can reach dangerous levels as dilution in the space is often minimal from poor ventilation (which is often a characteristic of urban poor settlements)

3. Barriers to energy access

Despite the efforts to increase energy access to urban poor, there still exist barriers at both the demand and supply side that affect access and dissemination of energy services. For the scope of this study two clean sources of energy- electricity for lighting and LPG for cooking have been considered.

For LPG the following experiences are common: shortages and high prices for subsidized cylinders and lack of dependable supply. The electricity market has its own problems that include: user non-payment; illegally connected customers, and low quality service.

The following section summarizes the main demand and supply side barriers to LPG and electricity by urban poor communities. The aim was to explore some of the key barriers in more detail and identify potential areas of intervention that could be followed up with barrier specific recommendations.

3.1 Supply Side Barriers

The most common barriers faced by agencies provisioning energy services to the urban poor population are associated with rules and regulations that the dwellings need to comply with. The combination of requirements and conditions for the authorization of the electrical installations, with the legal and safety requirements related to the dwellings constitute the principal hurdles for legal access to energy.

Detailed interviews and discussions with supply agencies in all study areas helped in identifying a few common barriers. These were substantiated by consultative meetings with stakeholders influencing the provision of energy access and services to the urban poor. Stakeholders consulted included representatives from the government agencies, local authorities, energy suppliers; housing authorities, regulatory agencies, NGOs, academia and consumer's associations.

In effect, the most common barriers confronting the distribution company, while providing electricity and LPG connections to the urban poor are discussed in the following sections.

3.1.1 Key issues related to electricity access

i) Lack of tenureship

Tenureship refers to legal recognition of settlements. Tenureship is a critical condition for supply agency to be able to provide energy services. These conditions are required to be met by households to access clean energy services legally like electricity for lighting and LPG for cooking. However, given the informal nature and poor quality of habitats of urban poor and a general lack of recognition of their settlements by local urban authorities, urban poor communities face obstacles in accessing energy through legal means. Moreover, since unauthorized settlements usually encroach upon public land, they are always at a risk of being evicted. Hence, the electricity supply agency in such cases is reluctant to supply electricity to these settlements.

Also, provision of electricity requires laying of infrastructure in terms of electricity poles, etc. which is a challenge for urban poor settlements given the nature of development. The houses are temporary structures, devoid of any masonry walls which make it difficult for the supply agency to install meters and laying wires for supplying electricity connections.

- In South Africa, households located on private land or on municipal land i.e. unproclaimed land for housing such as conservation land, road reserves, pylons or banks of rivers and wetlands are not eligible for electrification.

ii) Location specific barriers

- In India, the illegal status of the urban poor settlements prevents energy suppliers from providing energy services to urban poor households. For instance, the squatter settlements located close to the railway tracks, interferes in the signalling and communication system of the railway lines. Hence, the Railway Department prohibits electrification of these settlements. The supply agency is rendered helpless in such a scenario and is unable to provide electricity connection in these settlements.
- In Brazil some settlements are located in protected natural areas, next to water sources or protected water supply areas, in risk areas such as train routes or areas with landslide danger, making legal energy supply impossible for these settlements
- In Argentina, the barriers of prime importance are based on the rules and regulations that the dwellings need to comply with so as to acquire authorized connections. A long list of documents and technical requirements impedes electricity access in Argentina.

iii) Lack of proper planning and coordination at the institutional level

The electricity distribution companies do not expand the capacity of the distribution grids, in response to the rising population in the slums, improvements in income levels and the subsequent increase in electricity consumption per household. This leads to major interruptions of power and a decrease in the general quality of the service. In such cases, the low quality of the energy service proves to be a deterrent for energy demand. In other cases, lack of planning and coordination among institutions responsible for electricity supply proves to be a barrier.

- In South Africa the distribution of electricity falls under the auspices of a range of different actors including around 185 municipalities and Eskom.¹⁷ Attempts to reform the distribution industry into Regional Electricity Distributors (REDs) failed, because this move has been fiercely fought by municipalities, for whom electricity sales provide an important (and sometimes the only) revenue stream. The result of this fragmented approach is that even within one city area, distribution and pricing may be under Eskom in some areas and local municipalities in other areas. Some of the challenges associated with this fragmented distribution industry include substantial differences in the financial status of different distributors, disparities in prices paid by customers, efficiency losses in terms of economies of scale, skills and

¹⁷ The National Electrification Program (NEP) housed by the utility, Eskom, ran from 1994 to 2000, but is now under the remit of the Department of Energy as the Integrated National Electrification Program (INEP)

lowering the average cost of supply and a lack of human capacity in many municipalities

- Reforms in the electricity sub sector in Senegal in the 90s resulted in a blurring of institutional status. The reforms resulted in the creation of two zones of influence. The urban zone remained under the responsibility of the national electricity provider (SENELEC) and the rural areas under the responsibility of the new rural electrification agency (ASER). But the peri-urban zones were not classified under either of the zones and thus they fail to fall under the management of either of the two above listed companies and are not subject to any specific energy policy. Moreover, SENELEC, lacks an efficient organizational structure and investments in the power plants and in transmission lines in order to cope with the increasing demand (an average of 8 % annually) from the growing population and economic activities especially from the new peri-urban settlements.

iv) Lack of security for electrical and maintenance workers

In some cases, the hostile conditions prevailing in urban poor settlements prevent the supply agencies from providing energy services to urban poor.

- In Brazil the lack of security of electrical and maintenance workers due to the high criminality rate in *favelas*¹⁸ proves to be a barrier in providing energy services. In some low-income communities, there are criminal groups that control access to services such as electricity, cable TV and LPG, by imposing additional fees and restricting the low-income population's access to these services.
- In Kenya, the utility workers witness incidences of hostile residents hampering their work when performing routine checks on electricity supply lines. In addition, due to political interference, the hostility within Kibera (study area) is sometimes instigated by grassroots political arms which rally residents against the utility workers. The situation is further complicated in areas where some local politicians motivated by their personal interests incite residents against government interventions.

3.1.2 Key issues related to LPG access

i) Lack of address proof

One of the pre-requisites for acquiring a legal LPG connection is availability of proof of residence. Since in some cases, this product needs to be delivered to a consumer's address, availability of relevant documents becomes critical. Even when LPG cylinders need to be picked up from the distribution agencies, an ID proof becomes a necessity.

Given that, it is important to highlight that in most of the cases the supply agencies are well aware of the inability of an urban poor household to furnish a legal address proof and hence accept other documents like voters ID, or ration card to issue new connections. Thus, availability of tenureship may be regarded as more of a procedural/bureaucratic barrier.

ii) Lack of compliance with safety requirements

¹⁸ They are precarious inhabited sites, with self-built households, formed from the occupation of public or private estate. They are characterized by the low indexes of infrastructure, absence of public services and low-income population.

For LPG, there are concerns regarding safety with respect to handling of LPG in urban poor households. The lack of space and proper ventilation cause safety hazards. The hot plate utilized for cooking is often placed on the ground level in these households; this is not advisable because, LPG being heavier than air settles down and may cause an accident.

- In South Africa, *Kayagas*, a local LPG distributor faces difficulties in operating in low-income settlements particularly due to safety compliance reasons. Complying with municipal fire safety regulations is a major barrier for *Kayagas* in Cape Town. In order to store and sell gas, fire safety regulations require that spaza shop owners need to get a flammable substances certificate (SANS 087). This is impossible to obtain as spaza shops in Imizamo Yethu have space constraints and are not suitable for storing gas cylinders.

iii) Inefficient supply/distribution chain

A general observation is that in comparison to LPG, charcoal and kerosene have elaborate distribution networks and this has contributed to their usage share being higher among the urban poor. The inefficient supply and distribution chain of clean fuels like LPG impedes its access to urban poor.

- In Kenya, shortage of LPG means hike in prices of cylinders. If the residents opt to purchase LPG from nearest supermarkets they incur additional transportation costs.
- In South Africa, only one supplier (in Cape Town) supplies LPG to the low-income market through *spaza*¹⁹ shops. In the study area, *Imizamo Yethu*, there is no formal distribution network. LPG is available to residents only at a petrol station (in 9kg cylinders) and at a supermarket in *Hout Bay* which reduces access to this clean source of energy, since there are transport costs involved.
- In Argentina, for the *social gas cylinder program known as „garrafa social“*²⁰ it was observed that there were an insufficient number of points of sale for total coverage. It was also observed that the program had insufficient exposure and diffusion thereby reducing the quantity of beneficiaries. There was a lack of technical quality control, safety and maintenance of the cylinders and according to statements, the cylinders were not found in the neighbourhoods, and the sales price is higher (UPEA II findings).

3.1.3 Overcoming the supply side barriers to energy access

This section presents the interventions undertaken to address some of the identified barriers from the previous section. These have been addressed by the service providers and communities to get legal access to cleaner energy forms. The barriers were addressed through different approaches which have been summarized below.

i) Relaxation in tenureship requirements

¹⁹ Imizamo Yethu has a number of informal shops, known locally as „spaza“ shops selling a variety of goods

²⁰ “*Garrafa Social*” is a subsidized cylinder of LPG, now known as the “*Cylinder for all*” with a price fixed by the Government

In several cases, tenureship requirements are negotiated between the local authorities and communities in order to facilitate energy access (specifically electricity) for urban poor populations. The physical location of urban poor settlements, which is usually narrow, overcrowded and unsafe, poses challenges for supply agencies with respect to delivery and monitoring of energy resources like electricity and LPG.

In Thailand, temporary registration numbers are issued to the poor households since 1995, and these quasi household IDs have substantially reduced the number of illegal electricity connections in Thailand (See *Box 5*).

Box 5: Quasi household IDs in Thailand

Thailand introduced compulsory household registration in 1956. A household registration (document) is a prerequisite for obtaining a connection to the electricity distribution utility. The Thai government began to issue temporary registration numbers or 'quasi-household IDs' around 1995 (Cook et al., 2005) as a result of campaign for better recognition of the living conditions for the urban poor which started in 1987. These quasi-household registrations allow their owners to apply for a legal electricity connection with the relevant utility, besides other benefits. Since the late 1990s, the government policy on the slum communities has also focused on upgrading slum and squatter settlements within the city through options such as securing tenure rights, and expansion of services and infrastructure and/or relocation.

ii) Ensuring the safety of electrical and maintenance workers in hostile areas

An indirect mean to address the barrier of security was identified in the form of a public policy initiative by the State government of Rio de Janeiro. Under the initiative, police pacification units were installed in *favelas* which helped to check trafficking, militias, and other crimes by police presence.

iii) Improving the distribution chain and enhancing the reach of LPG service

In Bangkok, to address shortage of LPG supply, rules were relaxed to enable grocery stores to sell LPG cylinders. This expanded the consumer base significantly (See *Box 6*).

Box 6: Permitting grocery shops to sell LPG cylinders

LPG distribution shops in Thailand are required to obtain permission from local Department of Energy Business (DOEB). According to Decree of Ministry of Energy 2006, the LPG distribution shops need to be isolated (300 meters away from adjacent buildings) and built from refractory materials. However, this permission process is not required for grocery shops. This system helps the owners of grocery shops to avoid complex process of application and to have less investment cost. The availability of LPG cylinders in the grocery shops have led to increased and easy access of LPG to the population, including the urban poor.

The statistics from Energy Policy and Planning Office (EPPO) showed that there were over 600 retail LPG outlets in Greater Bangkok (Energy policy and planning office) in 2001 indicating easy access of LPG through grocery shops, which are extensively distributed in Thailand.

In Senegal, a private company improved its distribution network, thereby increasing the availability of LPG to address the issue of shortages (See Box 7).

Box 7: Increasing the availability of LPG in peri urban Zones of Dakar Senegal by strengthening the LMDB distribution network

Background

Lobou Mame Diarra Bousou (LMDB-Touba Gaz) is a private company based in Senegal that specializes in the distribution of liquid petroleum gas (LPG). The company holds 8% of the country's market share with a sales volume of 10,000 T per year.

Innovative approach

The initiative falls under an approach that aims to transform the supply line in a way that will contribute to efforts that improve access to clean energy services in peri-urban areas. It uses an appropriate financing mechanism in supporting the development of companies specializing in the provision of energy services and also incentivizes energy demand in suburban areas.

It involves actors such as:

- AREED (African Rural Energy Enterprise Development) for its low-risk financing strategy
- ENDA Energy Environment for its technical support
- LMDB the refilling and wholesaler of LPG
- BRS (*Banque Regionale de Solidarite*)
- UNAGAZ (Known as National Union of LPG traders): Association of wholesale distributors of gas approved by LMDB

Result and impacts

By strengthening the LMDB distribution network, the project has increased the availability of LPG in peri-urban zones. This project aims to add a stock of 3,000 cylinders for each of 10 wholesalers who work with LMDB so that they can enhance their ability to provide LPG to customers.

3.2 Demand side barriers

The barriers faced by the poor households in accessing clean energy access were identified using the information from previous phases as well as through fresh household surveys conducted in the current phase. The sample size was selected as per the aims, objectives of the survey and availability of time and resources.

3.2.1 The case of illegal connections

The high upfront cost and lack of proof of residence are the main drivers for urban poor households to resort to illegal electricity connections. Majority of the houses connected to electricity in the study areas either had illegal connections or were tapped from a single point which posed serious safety implications.

- In South Africa, in order to earn an income, households rent out their backyards to other poor families known as '*backyard dwellers*'. Informal structures are thus erected in the backyards of formal households. This practice exacerbates problems of overcrowding and puts pressure on existing services, due to increase in demand from these informal electricity connections on the supply network beyond the original network load capacity design. This means that a household cannot make a full transition to electricity but must also use 'backup fuels', commonly kerosene and candles, to meet their energy needs when electricity is unavailable.
- In Thailand, the practice of connecting to a neighbour's meter is still prevalent in some slum communities. The users of these services pay their neighbours monthly around Baht 5 to 8 per kWh consumed, while the current average tariff charged by Metropolitan Electricity Authority (MEA) to residential customers starts from Baht 1.86 for first 15 kWh to maximum of 3.9 Baht for over 400 kWh of electricity consumption. The households getting electricity connections through their neighbours/relatives do not pay the upfront cost and were charged only for their consumption (at a higher rate). The main reason for getting electricity connection through neighbours was found the lack of household registration, which is one of the prerequisites to get a connection from MEA, and one main reason for households not applying for temporary household ID was found to be lack of awareness. Even within the same slum community, the level of awareness regarding the temporary ID varied between individuals/households.
- In Kenya, individuals with legal connections from the Kenya Power use the connection to supply electricity to un-electrified houses as means of generating income. The connections are not laid properly since it is not authorised by the utility company and this leads to rampant electrical-based accidents.
- In Senegal, as per the survey findings, the average fee paid for illegal connections is around USD 8 (3700 FCFA), which is a fifth of the USD 45 legal connection fee charged by the utility company for the households that are close to the grid. For households that are located far away from the grid, the power company adjusts the fee to include network extension costs. It was observed that this extension cost increased the connection fee to a great extent and proved to be a barrier to legal

connections. On the other hand, around 48% of the illegally connected households do not pay any connection fee. In many cases, the bill is charged on the basis of a pre-agreed monthly lump sum making this a more lucrative arrangement for the urban poor.

Some of the measures to address this problem have been highlighted in *Section 3.2.4*.

The other demand side barriers as observed in different study areas are discussed below.

3.2.2 Key issues related to electricity access

i) Lack of Affordability

The key factors to the poor households' high cost of electricity compared with their total household income are due to high upfront cost of electricity connection, cost of electricity tariff that has increased gradually, high upfront cost to use high energy efficient appliances, and the social characteristics of comparatively larger sizes of urban poor households making them unable to benefit from the subsidised tariff structures.

Affordability, both in terms of one time upfront cost and the recurring cost of bills is the most evident barrier in access to electricity.

- In Brazil, the surveyed households have limited incomes and are not paying anything for their electricity use prior to the regularization, thus almost all of them find the addition of a monthly expense to be a hardship.
- In India, the urban poor households are not able to afford the electricity bills. This leads to levy of late payment surcharge and the bill amount keeps on increasing. Finally the supply agency has to resort to disconnection of electricity connection in such cases.

ii) Lack of awareness and knowledge on energy efficiency measures

There is an important link between energy efficiency and affordability which is often not acknowledged by the supply agencies. Clubbed with lack of awareness on energy efficient practices and the high upfront cost to invest in energy efficient appliances, this becomes a significant barrier that prevents the poor to use energy efficiently and hence escalates their energy bills.

- In Thailand, Demand Side Management (DSM) efforts are mostly focused on industry and commercial sectors and the residential users, the urban poor do not benefit from such awareness building efforts.
- In Thailand, NHA and CODI are the two main organisations related to housing development and living status up gradation of the poor. They require technical support and financial resources to help low income households to become more energy efficient.

iii) Lack of trust towards authorities

If there is a lack of trust between the energy service providers and the urban poor, it can impede energy access.

- In India, although initially electricity provision without presence of a meter was allowed, the National Tariff Policy stipulated 100% metering of consumers and accordingly, the new tariff order for FY (financial year) 2011-12 issued by Delhi Electricity Regulatory Commission (DERC) directed the supply agencies to install meters for all un-metered connections.

Initially these consumers had to pay a flat charge of USD 4-5 for electricity. The consumers were not made aware of the rationale behind this change and hence they developed mistrust for the supply agency. This resulted in non-payment of bills and consecutive late payment charges. In this case, the households were getting bills as high as USD 250-300. The logical explanation behind these high bills was not communicated to the consumers from the grievance departments of supply agencies.

3.2.3 Key issues related to LPG access

i) Lack of affordability

The initial cost of a new connection (Security deposit for an LPG cylinder) is a barrier even if an address proof and a permanent structure are in place. LPG requires upfront payments when purchasing the fuel, rather than being able to buy in smaller incremental amounts. Since most of the urban poor are daily wage earners, their household budget does not allow them to spend at the beginning of the month, the cost for the month's supply.

- The surveyed distributors in Kenya indicate that they do not have any procedure for selling LPG to urban poor. All distributors/stockists being profit-making businesses treat all customers equally in spite of their different income brackets. Sale of LPG cylinder is dependent on cash payment, thus they do not have credit facilities for their customers. This limits some potential LPG users due to their low income.
- In Senegal, secondary fuel of choice for peri-urban households is charcoal because it is easy to use and widely available. It is more affordable when compared to LPG since there is a possibility to buy it in small quantities. Thus, charcoal replaces LPG during shortages or when the family budget is unable to accommodate the purchase of a new cylinder.
- In India despite the presence of universal subsidy on LPG, the urban poor households are unable to afford a LPG connection. Even those households, who use legal LPG for cooking, usually have to resort to illegal LPG (5 kg) and other fuels like kerosene, firewood/other biomass as they are unable to pay for legal LPG refills.
- In South Africa, making large outlays of money in one go may be difficult, especially for poor households. In contrast kerosene can be bought a litre at a time for approximately R13²¹ (USD 1.4) whereas households must pay approximately R100 (USD 11) at one time to pay for a month's supply of LPG
- In Thailand, although the government has regulated the ex-refinery price of LPG through subsidy, the retail price of LPG varies with brands and cylinder sizes. Smaller size cylinders are popular with urban poor, and the price per unit of small cylinder was considered as significant barrier. The average retail price of LPG since January 2008, for small cylinder (4kg) was up to Baht 25-29/kg, whereas for larger

²¹ South African rand (currency)

cylinders, it was around 18-20/ kg²². The surveys in the slum areas reveal that the poor households prefer having small cylinders (3-5 kg) as they easily fit into their small rooms and are also cheaper to purchase. This, however, puts the poorest households at a disadvantage, because they cannot afford to buy LPG in a standard (15 kg) cylinder and eventually end up paying substantially higher price (unit price) than the average retail price of LPG.

ii) Lack of awareness and concerns on safety

Both perceived and real concerns on safety and health hazards associated with usage of various energy sources impede access to clean energy sources.

Kerosene is a commonly used fuel mainly due to its cost and convenience, and although people are aware of the safety hazards related to stoves and accidental ingestion, there seems to be low consumer awareness of alternatives available, for example safe appliances. There are also misperceptions related to safety of different fuels, for example many households are afraid of using LPG because they consider it to be dangerous. The prevalence of these notions becomes a barrier to clean energy access among poor households.

- In South Africa, gas has historically been perceived as more expensive than either kerosene or electricity as a cooking option, however research undertaken on relative costs of cooking with kerosene, LPG and electricity suggests that kerosene is the most expensive fuel and electricity and gas are roughly equivalent. These perceptions play a major role in shaping fuel demands.
- In South Africa, despite relative safety of LPG over fuels such as kerosene, demand is suppressed by strongly held perceptions by poor households that it is dangerous and that there are risks of cylinders exploding. There is a general lack of awareness amongst households about safe appliances. Consumers lack knowledge about what safety features or labels to look for when purchasing appliances, for example an approval number by the National Consumer for Compulsory Specifications (NRCS).
- In Kenya, for kerosene and LPG users, the safety issues related to the use and storage of these fuels have raised a lot of concern amongst users owing to the numerous incidences and cases of electricity based accidents within informal settlements.
- In Argentina, very few slum dwellers are aware of the LPG Price agreements enabling them to buy cylinders at a lower price. As a consequence, they do not demand that the authorities ensure proper enforcement of the program (*social gas cylinder program known as ,garrafa social²³*).

iii) Low quality of energy service

²² Retail LPG Prices, Energy Policy and Planning Office. Available online at: http://www.eppo.go.th/retail_LPG_prices.html

²³ "Garrafa Social" is a subsidized cylinder of LPG, now known as the "Cylinder for all" with a price fixed by the Government

- In Kenya, for LPG, persistent shortages at the refinery have threatened the availability of the commodity. In addition, at the retail level, substantial variation in volume of gas found in each cylinder is a matter of great concern among the urban poor population.
- In Argentina, the slum dwellers prefer to pay more and use the branded cylinders rather than using the subsidized one. 16% of the surveyed households stated that the social LPG cylinder does not contain the prescribed 10kg quantity. Thus they find it more convenient to buy popular branded cylinders and pay a higher price for the 10kg cylinder since it lasts almost twice as long as the subsidised one.

iv) Lack of willingness to shift from traditional cooking fuels

Owing to certain traditional choices, the urban poor have developed specific cooking habits and taste preferences which are not satisfied while using LPG. Thus, they opt to use traditional energy sources like kerosene, firewood and other biomass for the purpose of cooking. This hinders the process of changing habits and behaviours towards selecting or investing in energy efficient appliances or making the decision to finance clean energy costs.

- In Thailand, some poor households prefer the taste of certain types of food cooked (e.g. barbequed meat) in charcoal than in LPG.
- In India, the low demand for LPG is attributed to 'traditional practices'. Most of the urban poor in India are the ones that have migrated from rural areas. In rural areas due to ample availability of firewood and other biomass like cow dung, etc. the HHs are habituated to use these sources of fuel for the purpose of cooking.

3.2.4 Overcoming the demand side barriers to energy access

Besides addressing the supply side barriers to accessing clean and modern energy sources legally, there are several other interventions and approaches that can overcome the demand side barriers and lead to the successful access of energy services by the urban poor. These involve: increasing affordability of poor, building trust between supply agencies and consumers and promoting awareness on safety and energy efficiency measures. These have been addressed by the service providers and NGOs in partnership with communities to get legal access to cleaner energy forms.

i) Energy policies focusing on reduction of illegal connections

In Brazil, electricity access is no longer a problem; the new difficulty is the high number of illegal connections that cause accidents like electrical shocks, fires, and considerable economic losses. In India, as per findings from the household survey, 41% LPG users rely on illegal sources for their LPG needs. Around 85% of the households relying on illegal LPG, use 5kg cylinders. Overall, the household surveys reveal that households sought to illegal connections due to high upfront cost of legal connections.

In September 2002, the Argentina government introduced an agreement known as the 'New Framework Agreement'²⁴ between the National Government, Buenos Aires Province and GBA electricity utilities. The main objective of the deal was to 'regularize' the large number of users with illegal connections, as well as those cases of low-income households with important delays in payment of their electricity bill.

Following this, common meters were installed in slums, identifying the number of users consuming from each measuring point and establishing a limit to the supplied power for each point according to the number of connected households. A special fund was created as a joint action of the National Government, the Buenos Aires Province and the local town councils, to cover the deficit of user payments.

According to information supplied by the distribution companies, a major reduction in illegal consumption has been achieved, partly as a result of this program and partly by the initiative of the slum inhabitants since having an electricity bill in their name brings several advantages: identification of their household, possibility of access to other services such as water grids or landline phones, access to credit, etc.

However, the field work undertaken in *Budge* and *Fiorito* slums and in *Villa Carcova* in Argentina during the study reveals that the quality of the service continues to be very poor as power outages are too long and frequent.

This was also observed in Kenya, where low income settlements suffer from sudden and frequent blackouts, making electricity a very unreliable source of energy.

ii) Increasing affordability of urban poor

In order to tackle the high upfront costs of legal energy access, it was acknowledged during the policy dialogue panels²⁵ that for an urban poor household, 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.

For instance, Kenya has introduced 6kg gas cylinder which has reduced the upfront cost of the cylinder and associated gas burner and also allowed the poor to purchase gas in a smaller quantity that is commensurate to their income level (The East African, 2012). Introduction of low quantity refills to a minimum of 1 kg, has made it possible for low income earners to access cooking gas. Similarly in Thailand, cylinders of size up to 3 kg are available and some brands of small cylinders come with a small metal stand as a stove attached on the top, making it easier for people having less space to cook.

For electricity, prepaid connections for urban poor would help in recharging the connections as per consumption needs and affordability of the households. The existing bi-monthly billing cycle for electricity, if reduced to monthly, or even fortnightly, would allow for fewer defaults by making payment of bills affordable.

²⁴ The First Framework Agreement, at national level, was developed during the nineties, after the privatization of the power system, with the same objectives.

²⁵ A policy dialogue panel was organized by all participating member centres with stakeholders influencing the provision of energy access and services to the urban poor.

- Prepaid electricity meters were introduced for all new connections under the Integrated National Electricity Program (INEP) in South Africa. Earlier, credit meters were generally mounted on external walls of dwellings, which were accessed by unauthorised users. Prepaid meters are now mounted inside the dwellings, offering security while also offering the opportunity for consumers to monitor the consumption of the appliances they use. These meters also reduce the problem of non-payment. Virtually all connected households in the study area, Imizamo Yethu, rely on pre-paid electricity. Electricity units can be purchased from supermarkets and petrol stations and also through independent Flash agents. Flashcow is an innovative system developed by a local cell phone operator whereby electricity can be bought via cell phones.
- In Kenya, a program known as *Stima Loan* (an electricity loan) allows new customers to pay 20% upfront connection fee and the balance in monthly instalments (ranging 12 to 36 months) at an annual interest rate of 15% (Nyabundi D, 2012). Although this approach does not specifically target the urban poor, it has enabled more households to access electricity. In addition, the survey in Kenya identified a *'lifeline tariff'* which subsidizes the cost of electricity where end users who consume less than 50 kWh of electricity are billed at a lower rate.
- Kenya Power has initiated a *'transformer maximization'* program whereby it is charging connection fees lower than the normal rates to households living in close proximity (600m) to electricity distribution lines and transformers (Mohammed S., 2009). During the survey, it was noted that the utility company had introduced a pre-payment metering program to make it easier for consumers to plan and pay for units of electricity commensurate to the amount of money they can set aside for electricity consumption. To sensitize the public, the company is carrying out extensive customer awareness on pre-payment method. Kenya Power Utility has encouraged communities to organize themselves into self-help groups (group schemes) for electrification projects whereby communities pool financial resources to meet the upfront cost of electrification at an affordable cost to group members.

iii) Promoting awareness and education on energy efficiency measures to address the affordability barrier

Education on energy efficiency measures to reduce consumption in households and commercial entities can address the barrier of affordability to some extent by reducing the billed costs of the electricity service for the customer. These initiatives can be undertaken by the suppliers themselves as demonstrated in the case studies below.

- In Brazil, the electricity utility AES Eletropaulo in *São Paulo* initiated a program in 2004, called Transformation of Consumers into Customers'. Under the program, AES Eletropaulo contributes to reducing energy consumption, replacing incandescent light bulbs with compact fluorescent ones, as well as refrigerators in a precarious state, installing smart showers and also renovating internal electric installations in houses in poor condition. By 2010, the company had regularized 411,039 connections, benefiting 1.64 million people in 991 of the 2.2 thousand low

income communities in its concession area. A similar initiative was introduced in the target area of *Paraisópolis* in 2005, through a Global Development Alliance partnership with the International Copper Association (ICA) and USAID. Known as the 'Slum Electrification and Loss Reduction (SELR) program', **the project undertook a number of measures to increase household efficiency including energy audits of every household to identify energy efficiency opportunities.** Total project cost was \$2.52 million.²⁶ The energy efficiency measures taken in the households and distribution network are expected to yield annual energy savings of over 2 million kWh.

- Argentina addressed the barrier of affordability and energy in-efficiency significantly by introducing pre-paid meters in 2002. (See *Box 8*)

Box 8: Prepayment Meter Project- Argentina

In Argentina, the distribution company *Empresa Distribuidora y Comercializadora Norte S.A.* (EDENOR) implemented the Prepayment Meter Project in the areas of Escobar and Merlo during years 2002 and 2003 respectively. Each user purchases a certain amount of electricity units (kWh) that he wishes to consume and can pay for. He can fraction the purchase in small amounts too, so that the payment scheme is affordable to him. Once this quantity has been consumed, he recharges. Around 5,000 prepayment meters were installed (this is 1% of slum households in GBA), with wide acceptance among the system users (96%). Electricity consumption was reduced by 35% in relation to users under the same socioeconomic conditions, partly due to a more rational use of energy and partly due to unsatisfied needs.

iv) Building trust between the supply agencies and consumers

In order to build trust, the actors involved in provision of energy access must collaborate and work closely with the community by promoting a participatory process. In India a project adopting this approach resulted in the legal electrification of roughly 200,000 urban poor households in the city of Ahmedabad in Gujarat (See *Box 9*).

In Brazil, the electrical distribution company COELBA financed and coordinated a '*COELBA Community Agent*' project for reducing the number of illegal connections and promoting energy-efficient initiative for low income areas in the city of Salvador. It was facilitated by a local NGO, *Cooperação para o Desenvolvimento e Moradora Humana* (CDM). The overall goal was to establish a balanced relationship of mutual trust between customers and the company. The objectives comprised of reducing number of illegal connections and adjusting energy consumption (bills) of low-income consumers to their ability to pay, together with increased utilisation of government subsidies (social tariff) through increased awareness.

²⁶ AES-Eletropaulo picked up the bulk of the project costs, including the distribution network upgrades, metering, consumer registration, and new refrigerators (with ICA); ICA paid for the efficient transformers, rewiring of households, and preparation of a financial model; USAID covered the community campaign costs, audits of each household and selected commercial customers, purchase of CFLs (with AES-Eletropaulo), post-project survey, and efficiency recommendations to targeted commercial customers.

Box 9: Best Practice to address 'lack of trust' barrier- Slum electrification through multistakeholder partnership in Ahmedabad, India.

Energy type: Electricity

Description:

In 1998, the Ahmedabad Municipal Corporation (AMC) initiated a slum networking project (SNP) called *Parivartan* (literal meaning change), with a view to providing physical infrastructure to the slums, including sanitation, road, and water facilities. Following the success of the SNP, the beneficiary slum communities demanded electricity connections. To facilitate this, NGOs SAATH and Gujarat Mahila Housing SEWA Trust (MHT), already deeply involved in slum upgrading programs in the city, approached the Ahmedabad Electricity Company (AEC) and others to launch the slum electrification program.

The pilot phase initially targeted 700 households of five slums from the *slum networking program* of the Ahmedabad Municipal Corporation. Each household in the selected slum areas was provided with a legal private meter and a compact fluorescent bulb. Bill collection centres were set up in: CBO offices, post offices, *Panchayat*¹ office, gas agency's offices, civic centres, and so on. Mobile bill collection centres were also started. After the pilot phase, USAID provided additional grant to electrify another 2,000 slum households. This objective was accomplished by the end of 2003.

The project involved a collaborative stakeholder engagement where AEC, the utility, provided electricity connections and supplied the electricity while the two NGOs, SAATH and MHT, led the project by facilitating community engagement in the project and acted as primary coordinators between AEC and AMC. The CBOs supported the project as chief communication channels and enabled development of a rapport between the utility and the community, by acting as nodal points for exchange of information. USAID provided financial assistance in the pilot phase of the project, and AMC provided the certificate of non-eviction to the slum communities, a pre-requisite for slum communities for receiving electricity connections.

Impact:

To date, all slum dwellers in Ahmedabad—a total of over 200 000 households in 710 slums— have gained legal electricity connections. They receive and pay electricity bills on monthly basis. These bills are routed through regular collection centres set up by the utility to collect electricity bills in the city.

Source- The World Bank (2011), Energy Sector Management Assistance Program (ESMAP) and Cities Alliance

v) Promoting safety

South Africa's Consumer Protection Act 68 of 2008 (Department of Trade and Industry, 2008) places responsibility for safety of the consumer on the entire supply chain. For instance, in case of a mishap resulting in fire, the supplier would be culpable under the Consumer Protection Act.

A local LPG distributor in South Africa- *Kayagas* conducts promotional days in townships with cooking competitions and awareness programs on informing people about the merits and safety of gas.

vi) Promoting awareness among urban poor

In New Delhi, India an NGO called INDCARE Trust empowered the urban poor communities by increasing their awareness through creative methods. They were taught how to voice their demands and negotiate their requirements to the service providers (See *Box 10*).

Box 10: Best Practice for Addressing lack of awareness barrier- Raising awareness on safety risks of illegal electrification and benefits of legal connections in New Delhi

Energy type: Electricity

Description:

In New Delhi, INDCARE Trust worked with the slum community to raise awareness on the safety risks of illegal electrification and the benefits of legal connections. Following their empowerment through education and awareness, the community recognized the risks of illegal electrical access and was taught to voice its demands and take the necessary steps to overcome issues such as illegality in order to achieve legal electrification—recognized as a right and not a luxury. Innovative means were used to engage and raise awareness in the community surrounding the risks of illegal electrification. Creative methods were also used to conduct community based research and included tools like knowledge, attitude and performance (KAP), participatory learning and action (PLA), and the mainstreaming of urban poor women in design for resource assessment (MUDRA) tool that helped the program effectively target the needs of the community to ensure engagement and success. Street performances and poster campaigns were also used to raise awareness and help teach the community how to negotiate to demand and achieve their rights.

Impact:

The project resulted in overcoming barriers of illegality and demand to provide electrical connections in two slum communities. In the first few months of implementation, almost 50% households (400 out of 850 households) in the selected slum had requested legal electricity connections. By the end, 100% connectivity was ensured, including a total of 481 connections.

Source: The World Bank (2011), Energy Sector Management Assistance Program (ESMAP) and Cities Alliance

4. Recommendations

Access to electricity infrastructure does not, in itself, guarantee that poor people will have sustainable access to electricity, since monthly recurrent charges at cost-reflective rates can still be unaffordable to the poor. Similarly, poor network of LPG distribution in the urban poor settlements is not the only issue, as the upfront cash outlay required for purchasing the cylinder is also a significant barrier. The recommendations outlined in this section are a result of active engagement with key stakeholders by all the member centres. This led to obtaining a broader consensus on various challenges with respect to clean energy access for the urban poor. Some of the recommendations emerging as a result of the study are highlighted below.

4.1 Barrier specific recommendations for improving access to electricity

Drawing from the suggestions and best practices documented by all the member centres, the recommendations for addressing the demand side and supply side barriers to electricity have been synthesised in *Table 3* and *Table 4*.

Table 3: Supply side barriers- Recommendations for improving access to electricity

Supply side Barriers	Recommendations/suggestions to overcome the barrier
<i>Lack of tenureship</i>	Urban development and slum upgradation can be complimentary as both improve the quality of housing. Integrating slum up-gradation and urban habitat policies with energy policies can help to address this barrier. The electrification of poor households should be integrated into the housing schemes, giving a legal recognition as seen in Thailand. Implementing a program for the permanent regularization of low-income electricity consumers as a contractual obligation of distribution companies should be introduced.
<i>Inefficient electricity supply</i>	The local authorities (provincial and municipal) should be involved to implement an effective program of slum upgradation, creating conditions for a better energy supply, especially network-based supplies. Efforts to improve or develop the grid and electrical infrastructures to adapt it to the demand and the context of urban and peri-urban areas should be undertaken. This will also require substantial investment to support the replacement and maintenance of the utility company equipment.

Table 4: Demand side barrier specific recommendations for electricity

Demand side Barriers	Recommendations/suggestions to overcome the barrier
<i>Lack of affordability</i>	The barrier needs to be addressed from many perspectives, since it has a lot to do with not only the ability of the households to pay the upfront cost and bills, but also the general lack of trust between the households and the supply agency.

	<p>Awareness regarding energy efficient practices should be generated among the households to help them reduce their bill amount with the help of NGOs or specially trained ‘community agents’. There are investments required for legal connections, for instance: stoves, formal equipments required for using LPG for cooking, these should be subsidised.</p> <p>Another approach to addressing the barrier can be prepaid electricity cards. Weekly recharges should be allowed. Consumers can purchase prepaid cards depending on their financial capacity. Since the card is prepaid, the supply agency would not have to worry about collection and the consumers too can keep a tap on electricity used and avoid issues like overbilling, etc. This was seen in the case of South Africa.</p> <p>It is recommended to install a community meter at a commercial/ institutional settlement or any other permanent structure nearby after consulting with the community. A group of community members can be made responsible for maintaining the meters, distribution of bills to the individual households, collection of the bill amount and payment to the supply agency. Alternatively, individual persons like in the case of Brazil’s ‘community agents’ can be identified and entrusted the responsibility.</p> <p>Timely payment of bills can be incentivized. For instance a utility- NDPL (New Delhi Power Limited) in India provides life insurance policy worth Rs. 0.1 million to those consumers who have not defaulted bill payment for a year.</p>
<i>Lack of trust towards authorities</i>	<p>The barrier can be overcome by involving NGOs and facilitating the interaction of the urban poor community with the supply agencies. Special cells in the slum communities can also be set up to provide information regarding new connections or sorting out grievances with respect to over billing, faulty meters, etc.</p> <p>Frequent awareness programs need to be organized with strong community participation.</p>
<i>Lack of awareness</i>	<p>NGOs and community organizations can be involved to raise awareness in each slum community informing and helping them to legally acquire the electricity services through the various subsidy/social programs available. Particularly, in the case of Thailand and Brazil, it was observed that access to modern energy in terms of ‘availability’ to the urban poor is not a problem. Now, these countries are in need of efforts to scale and improve the access in terms of affordability, efficiency and services. Thus, awareness generating activities and campaigns for energy efficiency should be extended to these slum areas.</p> <p>Since the initiatives related to energy efficiency are usually expensive in the beginning with benefits accruing only over the time, it is recommended that flexible and combination of financing structures including subsidies on capital equipment, project loans, end user micro- credit is provided particularly for projects dealing with energy efficiency in low income communities.</p> <p>Awareness regarding the methods of calculation of bill amount should also be spread in order for the HHs to understand various charges, surcharges, etc. Example: BSES (Bombay Suburban Electric Supply Ltd), one of the electricity</p>

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4.2 Barrier specific recommendations for improving access to LPG

The recommendations for addressing the demand side and supply side barriers to LPG have been synthesised in *Table 5* and *Table 6*.

Table 5: Supply side barriers- Recommendations for improving access to LPG

Supply side Barriers	Recommendations/suggestions to overcome the barrier
<i>Lack of address proof</i>	The Thailand model of issuing temporary registration numbers or quasi household IDs can be replicated. There should be an amendment in the relevant act that the issuance of such IDs is solely for the provision of basic services and does not lead to legal entitlement of land by the urban poor.
<i>Safety hazards</i>	Physical nature of the slum areas which are generally over-crowded and located in narrow and congested areas causes safety concerns on supplying LPG. Often, Strict storage and safety guidelines for suppliers and distributors discourage them to operate in the urban poor settlements.
<i>Supply chain</i>	The distribution chains should be enhanced by allowing independent gas retailers to operate in several low-income settlements. For instance, by allowing grocery stores to sell LPG cylinders, as seen in Thailand. Opening outlets near slum areas ensures access to legal and safe LPG without the interference of middle men who tend to increase the cost and also compromise the safety measures.

Table 6: Demand side barriers- Recommendations for improving access to LPG

Demand side Barriers	Recommendations/suggestions to overcome the barrier
<i>Affordability</i>	Price control mechanisms should be established to curb exploitation and over-pricing of LPG by middle men. Introduction of small sized cylinders (e.g.: 5kg) with upfront and refill costs less than the conventional cylinders is another way to address this barrier. Along with this, the associated costs

²⁷ Literal meaning- „key partners“

	<p>accessories such as valves, regulators, burners etc. should also be reduced thus making LPG an affordable energy source among the urban poor.</p> <p>Another option is to introduce a card entitling users to buy the gas cylinder at the price fixed by the government (through the subsidy policy) at any distribution outlet. India for instance, is looking at introduction of 'Adhar Card'²⁸ to facilitate the targeting of subsidy to the urban poor households.</p>
<i>Safety hazards</i>	<p>There is a need to increase the frequency of awareness building programs; the LPG companies should use innovative ways and means to sensitise the consumers on the safety aspects.</p>
<i>Quality of service</i>	<p>The supply of high-efficiency LPG appliances at a subsidized price is essential to replace unclean sources of energy like charcoal and kerosene.</p> <p>Introduction of weighing scales at LPG refilling stations protects consumers from fraudulent suppliers offering under-filled LPG bottles as seen in Kenya where distributors are doing so to restore consumer confidence. All LPG bottling companies should practice standardization and quality labeling measures. (Energy Regulatory Commission, 2009).</p>
<i>Lack of willingness to shift from traditional cooking fuels</i>	<p>Work with the local groups and community networks to promote awareness on economical and health benefits of using LPG instead of kerosene.</p>

²⁸ Aadhaar is a unique 12 digit number issued by the government as proof of identity and residence in India. It collects demographic and biometric information to establish uniqueness of individual.

5. Lessons learnt and Key messages for policy makers

The UPEA III study analysed energy and urban development policies from the perspective of energy access to the urban poor and identified barriers to energy access both from the supply side and from the consumer's perspective. The research was undertaken with the aim of exploring potential solutions for making energy access to urban poor a reality.

The identification of supply and demand side barriers was aided by household surveys and consultations with various stakeholders including the supply agencies to study the current approaches and major challenges in providing energy services to the urban poor. The study besides pointing out the key barriers has also identified potential solutions and best practices that have improved energy access in some way or the other.

Whereas, barrier specific recommendations have been provided to directly address the challenges associated with clean energy access, there is a need for a strong backing at a macro level in terms of strategic energy planning policies and action plans. This concluding section recommends key messages and major action points as an input for policy makers and other key stakeholders working on the goal for improving energy access of urban poor.

Recognise electricity as a basic service and provide enabling conditions for clean energy access

The focus of most of the urban policies, plans and programs for the poor is on improvement of urban poor settlements and provision of housing. But this does not include the provision of electricity. There is a need to include electricity as a basic urban service and provide enabling conditions for its provision in urban poor settlements. This can be made possible with progressive housing policies and slum upgrading programs. These slum upgrading projects should be formulated with the aim of removing the physical and structural barriers to provision of legal energy supply.

Relax tenureship requirements for new electricity/LPG connections

Since lack of land tenure and illegal status of the slum-dwellers have been identified as major barriers to access clean energy, it is recommended that ways to overcome this barrier must be devised. Alternatives like voter ID card, affidavit from a local ward councillor, etc. should be recognized as address proofs for getting electricity and LPG connections. Issuance of temporary residential proofs (quasi-household IDs) in Thailand made the urban poor eligible for access to clean energy sources. Similar approaches can be replicated elsewhere.

Increase affordability

Currently, the high upfront costs of a legal energy connection clubbed with the recurring monthly costs (electricity bills and LPG refills) impede access to energy. In the case of electricity, the recovery of the upfront costs in the form of easy instalments on a monthly basis and arrangements like prepaid connections is recommended. For LPG, smaller

cylinders with low refill costs should be introduced as this would help in recharging the connections according to the consumption needs and enhance the affordability of households. These measures will not only reduce illegal connections but also support the urban households to continue using the cleaner sources of energy once they have made the switch.

Promote safety and energy efficiency by conducting awareness programs involving NGOs and local community

Provision of a legal energy connection alone is not sufficient to overcome the barriers to energy access. Efforts to scale up energy access in terms of affordability, efficiency and services should be made. Awareness programs on energy efficiency measures are necessary to ensure that the expenditure on legal energy access remains affordable to the urban poor. NGOs have a crucial role to play in terms of building awareness and developing trust between the supply agencies and urban poor. It is recommended that the supply agencies undertake information campaigns to educate urban poor about efficient electricity consumption by involving the local community and NGOs. Similarly, LPG suppliers must undertake safety awareness programs for urban poor consumers.

Clearly define roles and responsibilities of nodal agencies responsible for energy provision

Policies need to do much more than just recognize electricity as a part of physical infrastructure. They need to carve out institutional mechanisms and appoint nodal agencies to fulfil the energy requirements for both cooking and lighting as a part of the policy itself. These nodal agencies should be entrusted with the responsibility of supporting the urban poor families in acquiring new legal energy connections using innovative approaches. This should be accompanied with capacity development of local authorities, service providers, community development organizations to improve their energy access and energy efficiency services to the urban poor.

Expand and maintain supply infrastructure

It is necessary to undertake substantial investment to maintain and expand the existing electricity grid and LPG supply chain to adapt it to the growing demand of urban and peri-urban areas. The distribution chain of LPG can be improved by innovative means as demonstrated in Bangkok where rules were relaxed to enable grocery stores to sell LPG cylinders which expanded the consumer base significantly.

Utilities should recognise urban poor population as potential energy customers

Energy sector structural reforms should adopt innovative approaches to promote increased energy access especially among the poor population. One approach could be through making electrification targets a pre-requisite for attractive distribution rights. For example, city distribution rights can be linked to the mandatory electrification of low-income urban settlements. Where the rights already exist, such obligations should be included at the time of contract renewals or when tariffs are revised. This will ensure that private investors are

simply not cherry-picking the most profitable portions of the electricity industry and leaving the unprofitable portion (e.g. urban poor electrification) to the state.

Promote renewable energy sources

Alternative options like off-grid renewable energy programs could also be undertaken in urban poor settlements. Low cost and solar efficient appliances such as cooker, heater, battery charger, electricity capacitor should be provided to the urban poor at subsidised rates. This will reduce the consumer-end billed charges and reduce the frequent power blackouts experienced as a result of unreliable energy generation sources.

However, there will be upfront costs and the government will have to incorporate subsidy mechanisms for such schemes.

Create a database on urban poor

In order to formulate any kind of targeted plans, policies and programs for the urban poor, it is first necessary to build a strong database about the urban poor in terms of their coverage; available services and infrastructure; actual consumption; share and pattern of utilities usage, etc. For instance, there exists huge population (approximately 4 million) in Bangkok who are not formally registered and there is lack of information on what percentage of urban poor is included in that figure. Similarly, there is lack of data on what fraction of urban poor in Bangkok gets energy supply from Metropolitan Electricity Authority (MEA) and from neighbours.

Having a realistic urban poor database would help in quantifying energy services requirements of the urban poor, and help develop adequate financing schemes, price policies and subsidies.

Revisit Social tariffs

It has been observed that the threshold limit of social tariffs has not changed since a long time, while the usage of appliances has increased. For instance, in South Africa, the subsidy policy has been criticised by several NGOs and civil society groups (e.g. Earthlife Africa, 2010) for being insufficient to meet a households daily electricity requirements. Research to estimate the typical daily consumption requirements of households for essential energy services (defined in the study as space heating, lighting, hot water for cooking, cooking, warm water for washing, and refrigeration) concluded that the monthly consumption to meet these essential services would exceed the current units of electricity offered by the subsidy.

But, given the scale of poor households, increasing the subsidy would have significant fiscal implications. It is questionable from a national perspective whether further increasing a direct consumption subsidy would be the most cost-effective means of achieving overall social and economic objectives relating to energy access. Addressing this issue thus requires careful assessment and as recommended earlier, educating urban poor on energy efficient measures and assisting them to invest in suitable energy-saving appliances seems to be one of the ways forward in this respect.

Include Monitoring and evaluation mechanisms in policies

Introducing policies, plans and programs for energy access partly solves the problem as policies may not always be implemented in the desired manner. In Argentina, monitoring and controlling mechanisms to verify quantities, qualities and prices, fixed by the resolution that regulates the *‘Cylinder for all’* program were never put in place. The absence of policing has enabled evasion of fixed-pricing, fraudulent content in the cylinder, and in compliance with the volumes on offer adequate to guarantee universal access at the stipulated prices. Moreover, the authorities did not implement an adequate information system oriented on the subsidised prices towards the users which meant they continued to pay higher prices for the cylinders in absence of checks. It is recommended that monitoring, evaluation and verification mechanisms must be defined in the policy itself to control the prices, quantity and quality of energy service.

6. Way forward

In addition to the recommendations in the preceding sections, the UPEA III study also identified some issues that were outside the scope of this research but nevertheless important enough to put forth for future efforts in the direction of improving energy access of the urban poor population.

One of the key take-away from this study has been the recognition of importance of issues and policies beyond energy which are equally important for addressing all the barriers identified till now. Field experiences during the course of the study indicate that there is a difference between having access to an energy service and being able to use that service optimally because it involves other parameters like being able to afford the appliances, using it efficiently, etc. This disparity in use of energy services is not reflected in the official access figures. While this study lists out the common barriers to energy access, it must be noted that the study areas also grappled with different issues based on their different energy access levels. It was observed that while in countries like Kenya, Senegal, Argentina there were supply issues and significant amount of the urban poor population had minimal access to clean sources of energy, in other countries like Brazil, Thailand, India and South Africa, though the access to clean energy by urban poor has increased but still the underlying issues of affordability, informal connections, quality of the service continue to prevail.

This indicates a need to move away from an ‘**energy-only**’ approach to improve the supply and consumption of energy in the slums and settlements to an ‘**energy plus**’²⁹ approach which focuses on poverty alleviation and socio-economic development to deal with the problem on a structural level.

The concept of energy plus is not merely providing access to a clean energy technology but also ensuring that the energy service is maximised for productive uses and income generation, in such a manner that it contributes to the broader developmental goals. To aid this, urban development policies and programmes need to account for energy planning and recognise the urban poor as key targets so as to develop progressive policies for their upliftment. Thus adopting an energy plus approach at the policy level with the non-energy inputs (for example, supportive housing and slum upgrading policies) gives an opportunity to address the situation of energy poverty with a larger perspective of improving the livelihoods and status of socio-economic development of urban poor.

Implementing this approach will involve reconsidering inter-ministerial coordination and adopting institutional and governance mechanisms to develop energy plus initiatives. It calls for a gradual shift in focus from a single sector approach to a holistic multi-sectoral approach. As depicted through this study, positive and innovative initiatives are now being undertaken by supply agencies. There is a need to learn from the lessons and scale up these best practices.

²⁹ UNDP (2011) defines energy plus approach as that, in which energy access programmes go beyond a „minimalist“ service delivery approach, and instead adopt a broader view of programme design and delivery that aims to improve socio-economic outcomes of energy interventions. It notes that energy poverty is more than just lack of access to modern energy services but also about the inability to generate sustainable livelihoods and income generating activities.

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