World Energy Council

CONSEIL MONDIAL DE L'ENERGIE

Alleviating Urban Energy Poverty in Latin America

REPORT

April 2006

Alleviating Urban Energy Poverty in Latin America

Alleviating Urban Urban Energy Poverty in Latin America

Published April 2006 by:
World Energy Council
5th Floor, Regency House
1-4 Warwick Street
London W1B 5LT
United Kingdom

ISBN: 0-94612-121-4

Officers of the World Energy Council

André Caillé
WEC Chairman

Majid Al-Moneef
WEC Vice Chair - Special Responsibility for Gulf States & Central Asia

Dr Francisco Barnés de Castro
WEC Vice Chair - North America

Asger Bundgaard-Jensen
WEC Vice Chair (Finance)

Norberto de Franco Medeiros
WEC Vice Chair - Latin America/Caribbean

Alioune Fall
WEC Vice Chair – Africa

Pierre Gadonneix
WEC Vice Chair - Europe

C.P. Jain
Chair, Studies Committee

Younghoon David Kim
WEC Vice Chair - Asia Pacific & South Asia

Chicco Testa
WEC Vice Chair (Rome Congress 2007)

Ron Wood
Chair -Programme Committee

Zhang Guobao
WEC Vice Chair - Asia

Gerald Doucet
WEC Secretary General

Member Committees of the World Energy Council

Algeria
Argentina
Australia
Austria
Bangladesh
Belgium
Bolivia
Botswana
Brazil
Bulgaria
Cameroon
Canada
China
Congo (Dem. Rep.)
Côte d'Ivoire
Croatia
Czech Republic
Denmark
Ecuador
Egypt (Arab Rep.)
Estonia
Ethiopia
Finland
France
Gabon
Georgia
Germany
Ghana
Greece
Guinea
Hong Kong, China
Hungary
Iceland
India
Indonesia
Iran (Islamic Rep.)
Ireland
Israel
Italy
Japan
Jordan
Kenya
Korea (Rep.)
Kuwait
Latvia
Lebanon
Libya/GSPLAJ
Lithuania
Luxembourg
Macedonia (Rep.)
Mali
Mexico
Monaco
Mongolia
Morocco
Namibia
Nepal
Netherlands
New Zealand
Niger
Nigeria
Pakistan
Paraguay
Peru
Philippines
Poland
Portugal
Qatar
Romania
Russian Federation
Saudi Arabia
Senegal
Serbia & Montenegro
Slovakia
Slovenia
South Africa
Spain
Sri Lanka
Swaziland
Sweden
Switzerland
Syria (Arab Rep.)
Taiwan, China
Tanzania
Thailand
Trinidad & Tobago
Tunisia
Turkey
Ukraine
United Kingdom
United States
Uruguay
Venezuela
Yemen

ACKNOWLEDGEMENTS

The WEC greatly appreciates the efforts of its Member Committees in the Latin American region, particularly in Argentina, Brazil and Venezuela, and the support of all the experts who have contributed to this groundbreaking report which examines the phenomenon of urban poverty.

Thanks go to Carlos Pierro, WEC Honorary Officer for taking the initiative to launch and fund the research of this exciting topic and to Norberto de Franco Medeiros, Vice Chairman for the Latin America/Caribbean (LAC) region and Chairman of the Brazilian Member Committee who supported the Brazilian part of the Study and saw it through to successful completion.

Special thanks to the Chairman of the Steering Committee, Efraín Carrera Saúd, assisted by Eduardo Alvarez, Andrés Matas and Gloria Piña, for taking on the job of integrating the three Case Studies into a single report.

Finally we would like to thank the World Bank / ESMAP for providing funding for the Rio de Janeiro Case Study.

TABLE OF CONTENTS

FOREWORD

Unlike other developing regions in the world, the problem of energy poverty in Latin America has been concentrated increasingly in the large cities and urban areas. This problem has deep systemic, economic, political, structural and cultural roots.

Since the 1990s, the phenomenon of urban poverty has become increasingly more important than rural poverty, both in quantitative and qualitative terms, affecting nearly all Latin American countries. While in 1980 the number of people in the region living in poor conditions was 136 million, of which 46% were considered urban population, by 1999 the total number of poor people had increased to 211 million, with more than 63% living in Latin American cities. As a result, urban poverty has doubled in the last two decades, while the number of rural poor has remained stable.

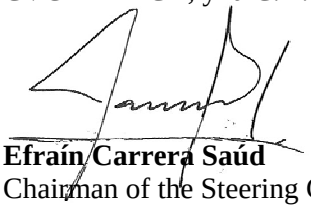
Providing basic energy services to the urban poor is an issue that requires far more attention and expertise than it is receiving today, and therefore the World Energy Council (WEC) has taken the initiative to address this issue, and the results of their study are presented in this Report. The report highlights three case studies with a particular focus on the analysis of specific aspects of urban energy poverty, energy availability for people living under poverty conditions and policies to improve living conditions from the energy point of view.

I would like to express my deepest appreciation to all those whose efforts and contributions made this Report possible: Joaquin Tredinick, former WEC Vice Chair for Latin America and the Caribbean, for his commitment and enthusiasm in setting up the Study and chairing the Steering Committee that developed the Terms of Reference for the Study; Carlos Pierro, Chairman of the WEC Argentine Member Committee, for launching and supporting the initial phases of the study and producing the Buenos Aires Case Study together with the Foundacion Bareloche; Norberto de Franco Medeiros, Chairman of the WEC Brazilian Member Committee, who led the work on the Rio de Janeiro Case Study; and also Andrés Matas and Eduardo Alvarez for managing the Caracas Case study.

On behalf of the WEC, I would like to thank the World Bank and ESMAP, in particular Dominique Lallement, Director, and Robert Bacon, Oil and Gas Policy Division, for sharing their expertise, providing continuous support, and for funding the Rio de Janeiro Case Study, and also Prof. Adilson de Oliveira and his team for producing it. Special thanks are due to Eduardo Alvarez who spent a great deal of time analysing the three Case Studies and putting together the draft Report.

I would also like to thank the WEC Director of Programmes, Elena Nekhaev, for her guidance and support during the final phase of the Study work, and Gloria Piña, WEC Regional Coordinator for Latin America and the Caribbean, for her tireless efforts throughout the various stages of the Study and for encouraging commitment from all concerned. My deepest gratitude goes to the late Jan Murray, WEC Deputy Secretary General whose enthusiasm and support were instrumental in setting up the Study, and who will be greatly missed by her colleagues and associates.

Finally, our appreciation goes to all institutions that contributed to the Case Studies: Fundación Bariloche de Buenos Aires, Instituto de Economía de la Universidad Federal de Rio de Janeiro, Instituto de Investigaciones Económicas y Sociales de la Universidad Católica Andrés Bello de Caracas, LIGHT, CVG EDELCA, y la C.A. Electricidad de Caracas.



Efraín Carrera Saúd
Chairman of the Steering Committee

INTRODUCTION

Argentina, Brazil and Venezuela Case Studies

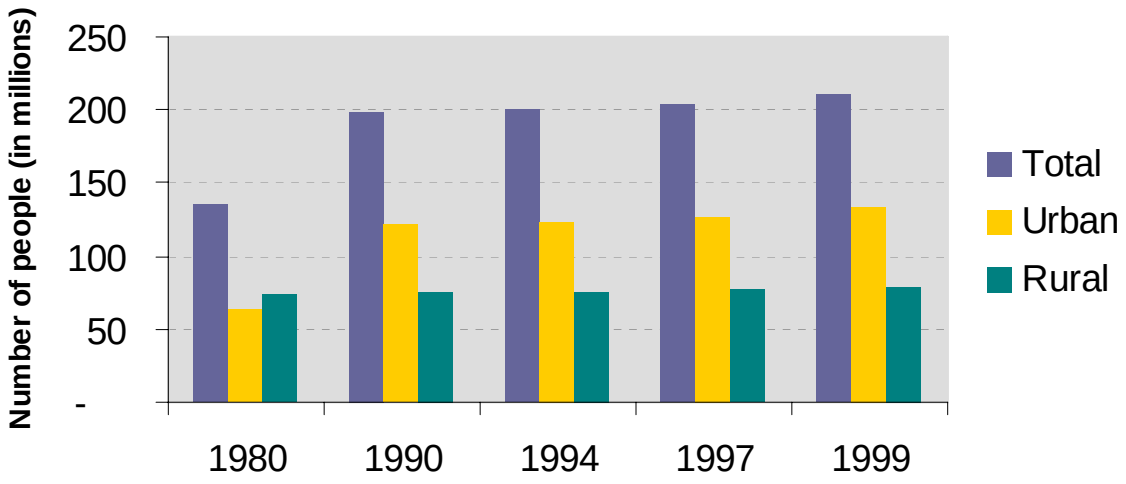
"Providing adequate, affordable energy is essential for eradicating poverty, improving human welfare and raising living standards world-wide"
(World Energy Assessment, 2000, pg.31)

Unlike other developing regions in the world, Latin America's problem with poverty has been increasingly concentrated in its largest cities and urban areas. This problem has deep systemic, economic, political, structural and cultural roots.

Since the 1990s, urban poverty throughout Latin America has increasingly surpassed rural poverty, both in quantitative and qualitative terms.

In 1980 the total number of poor people in the region was 136 million, of which 46% were living in urban areas. By the end of 1999, however, this number had increased to 211 million, with over 63% living in large cities. This shows that while the number of rural poor remained almost stable over the last two decades, the number of urban poor more than doubled.

Figure 1: Evolution of the number of people living in poverty conditions in Latin America



Source: United Nations, World Statistics Pocketbook

This is because unlike rural poverty, which is defined as a traditional lifestyle that lacks the equipment and devices for providing the comforts of modern life, urban poverty is best defined as the inability to earn an income sufficient to meet the most basic needs, access to energy being a significant element of these needs. Using consumption expenditure as a measure of well being, general poverty is defined as a household where the family income is lower than needed to cover basic living costs such as food, housing, water and energy services, health, education, transportation, and clothing.

Lack of access to energy services reinforces feelings of social injustice and exclusion. It strengthens resentment among the poor towards those who enjoy access to services and goods, and this can result in feelings of isolation and despair.

Although it is obvious that energy poverty is merely one aspect of overall poverty, it is also true that providing universal access to energy is an important way of increasing income generating opportunities and alleviating social distress. Universal access to electricity is a core objective of public policy and this is widely acknowledged across social divisions.

Against this background, introducing real cost-based tariffs will require measures to reduce the negative social impact of such tariffs on the poorest population groups. Public policies aimed at poverty alleviation - for example the introduction of subsidies - should be designed with the consent, participation and understanding of the private sector, and those who will benefit most.

At the same time public policies need to be implemented with care to avoid becoming a disincentive to the rest of the population, or from extending benefits inappropriately. Losing sight of the policy process could result in "welfare losses" and lead to even deeper problems such as an erosion of the "work culture" itself.

The challenges facing societies in the 21st century include: raising public awareness of the role of energy for socio-economic development, encouraging cooperation among relevant stakeholders, and fostering technical solutions that adequately address energy poverty.

The way forward outlined by the World Energy Council (WEC) in its report "*Energy for Tomorrow's World - Acting Now!*[1]", demonstrates the advantage of focusing on a range of solutions that facilitate the WEC goals of the three "A's":

Accessibility to provide access to commercial energy for all;

Availability to secure a constantly high quality in the supply of energy services; and

Acceptability to ensure the least possible negative impact on the environment.

This report comprises three case studies. The first was carried out by Fundación Bariloche and sponsored by the Argentine Committee of the World Energy Council (CACME). It focuses on the problems of subsidies to the poor customers of Greater Buenos Aires (GBA). In the second case study the WEC Venezuelan Committee examines energy problems affecting the urban poor in Caracas. Finally, the third case study has been developed by the Instituto de Economia of the Universidade Federal de Rio de Janeiro and it analyses energy supply problems around the area of Cajú in Rio de Janeiro.

[1] Cf. WEC, Energy for Tomorrow's World-Acting Now! - April 2000

Thanks to the diversity of approaches, topics and viewpoints taken in these case studies, this Report provides a valuable contribution and guide to the discussion of the strategies needed to address the problem of energy poverty in urban areas, not just in the Latin American and the Carribbean region but elsewhere in the world.

Table 1 summarises the demographic, social and economic data collected in all case studies. The indicators demonstrate the magnitude of poverty as an urban issue in these countries.

Table 1: Demographic and social indicators for the studied cities (2002)

Indicators	Argentina (Buenos Aires)	Brazil {Rio de Janeiro}	Venezuela (Caracas)
Urban population (of the total)	90.1%	83.9%	88.1%
Population in the analysed city	33.6%	3.5%	13.1%
Population in the analysed city (millions of inhabitants)	13.0	5.9	3.3
Population below poverty line	27.05%	31.9%	64.1%

Source: United Nations, World Statistics Pocketbook, New York. Results from three case studies.

CHAPTER 1
The case of Greater Buenos Aires

Buenos Aires – Basic Data (2002)	
Total number of residents	**13.4 million**
Residents on low incomes	**5.6 million (42%)**
Average family income per month	**US$242.00**
Average income of poor families per month	**US$176.00**
Average number of family members	**4.0**
Proportion of unemployed	**20%**
Level of education	**Only 30% of main earners have completed high school**
Monthly Income per capita	**US$44.00**
Cost of basic food	**90% of the income**
Average energy expenditure	**7.6%**
Average electricity consumption	**97 kWh/month**

1.1 Poverty Profile

In 2002 about 10 million people (27% of Argentina's total population) lived below the poverty line: 8.8 million poor lived in urban and 1.2 million in rural areas. Taking into consideration only those living in extreme poverty, the figures fall to 2.3 million people in urban areas and 300,000 in rural areas. In Greater Buenos Aires (GBA), with more than 13.4 million inhabitants, 42% currently live in poverty. This represents 5.6 million people and 1.5 million low-income households. The cost of the basic food basket accounts for about 90% of the average income of the families below the poverty line.

Although these figures reflect the impact of the currency devaluation in 2002, the levels of structural poverty as a result of unemployment and inadequate income has increased systematically since the 1980s. Temporary improvements during short periods of economic prosperity and the recent recovery of industrial output, have so far had little impact on this critical structural situation. In terms of employment and educational profile in low-income households, more than 75% of working-age residents have unskilled jobs and less than 30% of family heads have completed high school.

The Argentine electricity sector achieved an important milestone with the regulation aimed at illegal users and users in arrears at the beginning of privatisation between 1992 and 1994. However, the number of customers in arrears has risen since 1999, threatening to undo the benefits gained from this effort. Even when the poor are willing to pay for electricity services, inadequate income and the lack of genuine and stable employment in practice makes it difficult for them to afford these public services.

Quantifying and characterizing the GBA urban poor

Some of the fundamental questions considered in this section included:

- how many households need to be subsidized, and their location;
- whether these households could be identified and whether this would be useful for allocating subsidies, and
- the households' typical socio-economic indictators.

Consumption patterns were examined and considered relative to the consumption patterns of the rest of GBA's residential sector.

Approaches to determine the importance of poverty through secondary indicators

A number of factors were analysed, including information about households living below the poverty line; households with unemployed breadwinners; households included in the Framework Agreement; and the characteristics of underprivileged neighbourhoods in relation to their payment arrears.

The Permanent Household Survey (PHS): It was calculated that 298,000 households are below the indigence line and 917,000 are below the extreme poverty line. Both figures increased after the 2002 currency devaluation. Current calculations show GBA poor households total 1,479,000, while the average level of income is close to the indigence line.

The PHS and employment problems; analysis per sub-areas: An analysis of employment problems revealed a certain geographical overlapping with the areas in critical payment arrears.

Comparisons between aggregate data from the PHS and the Framework Agreement at the sub-area level: From the comparison between households registered in the Framework Agreement census and those detected below the indigence and extreme poverty line, about 76% are from poor households. This figure correlates with calculations of unemployment and employment difficulties when the households are grouped by district.

Households included in the Framework Agreement and total number of users: Almost all of these are located in GBA 4 where unemployment and structural poverty problems appear to be most serious.

1.2 Energy Profile

Qualitative profile of GBA's poor sectors and problems with paying electricity bills

Evolution of the number of users in default and spatial concentration guidelines indicate that the number of users with more than two service interruptions per year grew rapidly in 2001 and may have worsened during 2002 to reach a total of 297,689 households. Although the hypothesis of a geographical overlapping of service interruptions and households regulated by the Framework Agreement cannot be ruled out, it does not explain all of the problems. 'Conjunctional' poverty threatens to become a new structural poverty spread across the urban fabric of GBA. The most likely conclusion is that registering poor consumers will do little to help prevent supply interruptions and/or manipulation by government authorities, and can pose definition difficulties.

The employment and educational profile of poor households: Better education is key to mitigating energy and poverty in general, particularly in urban areas. Without the necessary skills and qualifications, people face unemployment, irregular and insufficient income and payment difficulties. The most important cause of payment difficulty is the lack of stable and sufficient income, which could be considered a direct consequence of the educational and occupational profile of poor households.

Based on case analysis of the neighbourhoods of Mariló and La Salada in the districts of Moreno and La Matanza, it is possible to infer some qualitative characteristics for poor households. The group of unskilled employment categories represented 80% in Mariló and 76.4% in La Salada. Only 18% of the breadwinners in Mariló had a secondary school or higher educational level, while 29% of the wage earners in La Salada had attained an educational level equivalent or higher than secondary school. There appears to be a correlation between the development of skilled activities and education levels.

The electricity consumption of Framework Agreement users: There is a lack of homogenous information about the Framework Agreement users. However, WEC has concluded that average consumption is equivalent to 97% of that for the period 1994-2000. This is surprising, but is reflected in average consumption data per district.

Despite what statistics suggest, the data revealed no strict correlation between poor households and consumption levels. This might indicate the difficulty of trying to establish policies that provide indiscriminate access at below economic cost, if these measures are not paired with rational energy use measures and changes in equipment and consumption habits.

Subsidy and access policies introduced to reduce excess consumption should be limited according to a defined maximum level of consumption, and may include the installation of power limiters, and access to other efficient equipment should be provided. What comprises the effective consumption level of poor households should be analysed using distribution company data and field work, or conceptual modeling in the absence of this information.

Energy requirements of GBA's poor and indigent households

Basic needs and determining energy requirements: Two sets of energy requirements - basic and minimum - have been defined for low-income households, which helps establish baskets of energy products associated with several subsidy options. These baskets, based on the prices until the end of 2001 and in June 2002, can be compared to the family income of poor households. This highlights the implications for payment ability and its significance for family income and in particular in relation to the indigence and poverty thresholds, as they are usually defined in the official statistics.

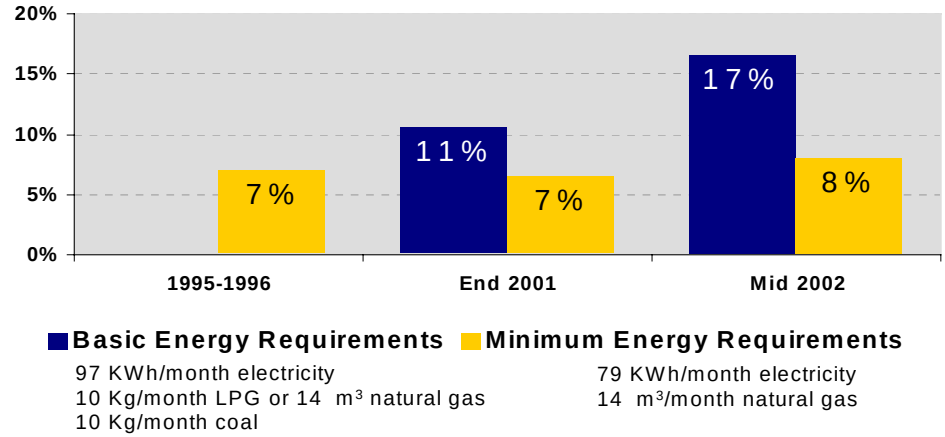
Basic monthly energy consumption is typically 97 kWh electricity (excluding thermal usage), one 10 kg LPG cylinder (or 14 cubic meters of natural gas) and 10 kg of firewood. In the alternative that includes thermal usage of electricity, total basic consumption is 215 kWh/month. However this case, called All Electric, is extreme and considered a distortion because it cannot account for users who are illegally connected to the grid.

To meet minimum requirements - which do not include the use of televisions, washing machines and ironing - electricity demand would be reduced to 79 kWh/month in the "all fuel" combined option, and to 197 kWh/month in the "all electric" option.

Monthly energy expenses and the relationship to family income

Energy expenditure represents between 13% and 21% of an average unemployment benefit income at 2001 prices and half of this proportion for the average income of an unskilled worker[2]. Fig. 2 shows the relationship between basic and minimum energy expenditure of the different options.

Figure 2: Energy Expenditure as % of Family Income for low-income households in GBA



In October 2001 the indigence line was 217 US$/month and the extreme poverty line was 528 US$/month. These figures have subsequently risen to US$310 and 726 US$/month respectively.

Figure 3: Insufficient incomes to pay electricity bills declared by interviewees

	Moreno		*La Matanza*	
Income level	Frequency	%	Frequency	%
Sufficient	264	27.5	207	28.8
Insufficient	684	71.3	502	69.8
Not recorded	3	0.3	2	0.3
No answer	8	0.8	8	1.1
Total	959	100.0	719	100.0

Source: calculations based on data from EDENOR, Project UREC: Rational Use of Energy in Underprivileged Neighbourhoods. Final Report. Barrio La Salada and Project UREC: Rational Use of Energy in Underprivileged Neighbourhoods. Final Report. Barrio Mariló, Buenos Aires, May 2002.

The case studies infer a strong correlation between the lack of a stable job, insufficient incomes and energy payment problems. However, the problem of insufficient incomes is not restricted to employment instability. About 70% of the people interviewed in both neighbourhoods show insufficient incomes.

[2] Based on specific studies of the Permanent Household Survey, the incidence of the expenses on EE and NG in 1995-1996 represented between 7% and 7.4% of the expenses of households located in the poorest deciles, Cf. C. Arza, El impacto social de las privatizaciones. El caso de los servicios públicos domiciliarios, Flacso, Documento de Trabajo Nº 3 del Proyecto "Privatización y Regulación en la Economía Argentina"(BID 1201/OC–AR PICT 99–02–07523)

Consumption levels detected by the surveys

In poor households studied by Edenor, and in those recorded in the Framework Agreement, average consumption is higher than in those cases where electricity and fuels are used, and similar to the All Electric case. These higher consumption levels do not depend so much on the calorific uses of electricity as they do to on the diversity of equipment, uses and output related to the average consumption pattern assumed in this survey.

Establishing a relationship between high consumption and the definition of 'poor' consumers is difficult, especially because a follow-up of specific cases showed that a reasonable threshold for the 'poor' user would be a maximum 100 kWh/month, without thermal use of electricity. It should be highlighted that residential consumption of up to 100 kWh/month accounts for 29.4% of the bills in Edesur and 22% in Edenor. This represents 9.8% of the total energy billed in residential tariffs for the former and 5% for the latter, based on 2001 billing information. Overall, this involves 25% of the users and 7.1% of residential energy.

It should be emphasised that the results of prior analysis or field work based on statistically representative samples should be used when making decisions about limiting the size of the sector to be subsidised. The sample analysed herein does not fulfill this condition. One of the greatest difficulties of evaluating access of the poor to energy in Latin American studies is finding systematic and reliable statistics that represent the average conditions.

1.3 Policies

The 2002 devaluation depressed electricity tariffs and led to below cost pricing, especially at the level of generation, although there was also some impact on other stages of the electricity supply chain.

This issue has not been definitively resolved despite ongoing adjustments and negotiations between authorities and service providers. The challenge is to design a price and tariff policy that ensures the recovery of economic costs for the electricity service, whilst improving access to electricity for the poor—a challenge that requires complex tariff engineering and management.

Since this study is the first to have been conducted in the region, important conclusions can be drawn for similar studies in other WEC Latin American countries. The GBA study reveals the complexity involved in devising subsidies that are not necessarily reflective of production costs, especially if those costs are part of a macroeconomic programme that is vulnerable to political cronyism. The following issues need to be explored:

Poverty economics

- Can the extent of 'poor' consumers be adequately defined?
- Can a spatial guideline be developed for the GBA poor?
- Can the poor sectors be categorised by low educational and occupational standards and can these standards be linked with the problem of paying for public services?
- Is such categorisation limited by registers and does it run the risk of encouraging political cronyism?
- What is known about consumption patterns of the poor and is existing data sufficient to analyse this?

Government Policy

- Are there elements in current legislation that are linked to energy consumption subsidies, guaranteeing access to energy sources for all citizens, or other issues related to the subject of this study?
- Mechanisms and solutions to alleviate or mitigate energy poverty must be examined, as should the visible characteristics, advantages and disadvantages of these mechanisms.
- Current tariff structures must be analysed for their fairness and to establish whether they respond to the unique characteristics of each user category.
- There are also questions about what potential solutions would cost and what the solutions imply in terms of tariff modifications, provided a cross-subsidy mechanism is chosen.
- Finally, what conclusions and recommendations can be drawn from the analysis and can these conclusions be applied to other countries in the LAC region, or are they valid only for Argentina?

The survey was carried out between April 2002 and January 2003. The first stage involved collecting information on existing subsidies and analysing current legislation. The geographical location of the poor and needy areas in GBA was also considered. In the second stage, energy consumption, particularly electricity, of poor households was analysed, and theoretical examples of minimum and basic requirements were developed. The third stage involved designing subsidy alternatives and an analysis of potential market solutions.

Results of legislation analysis

Regulations of varied duration, application scope, explicit or implicit character, general and sectorial have been identified, but two main groups should be mentioned. The Framework Agreement, which was a specific instrument for regulating illegal users and providing funds to this end, and general legal regulations of any kind that addressed the issue of access to public services.

The Framework Agreement and its results

A new system called the Framework Agreement was devised to regulate electricity supply to the shantytowns and underprivileged neighbourhoods of GBA, incorporating irregular users in four-year periods. The neighbourhoods included in the Agreement were classified under four categories: A, B.1, B.2. and C, related to the urbanisation of the area and the individual nature of the dwellings in question.

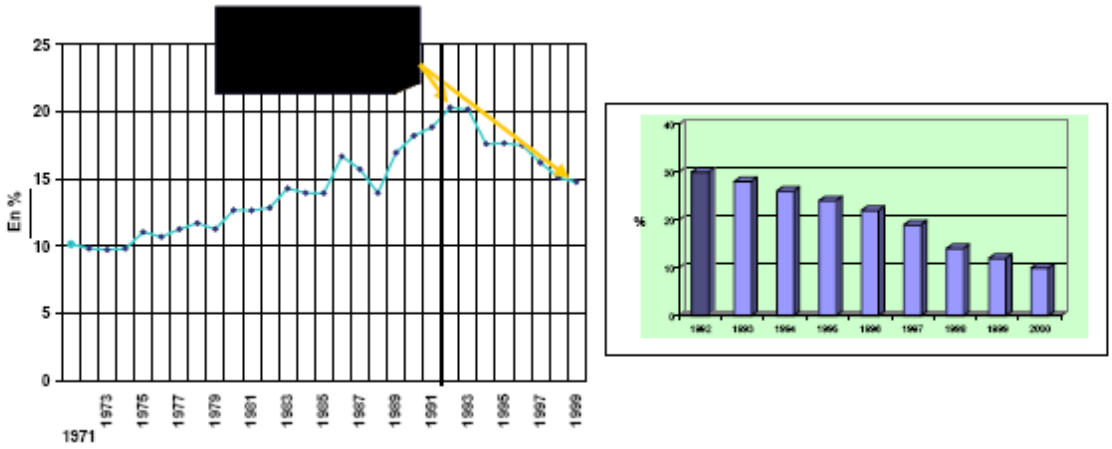
Thus, in the shantytowns (categories A and B.1.), distributors measured electricity consumption by joint meters, since neither plots nor streets were legally regulated. In underprivileged neighbourhoods (categories B.2. and C), each user paid for consumption after a census conducted by distributors and after signing an agreement that remained in force until an individual meter was installed. This was seen as a way of adhering to the Agreement.

Supply companies were required to construct streets and install for free about 150,000 meters per year until the work was completed on all non-regulated households. Funding for this programme came via the national government and the government of the Province of Buenos Aires, using taxes collected from the bills paid by regulated users. The national and provincial

governments compensated supply companies against non-technical losses that occurred from the beginning of privatisation until the Agreement was enforced.

In 1996 about 650,000[3] illegal supplies became clients and taxes increased from 9.5% to 15.5%.

Figure 4: Results of the Framework Agreement: total electricity losses in Argentina and in the EDENOE



Source: based on data from the World Bank, WDI online, 2003, and data provided by EDENOR.

The validity of the Framework Agreement has been extended by four years until August 2002. The original range of contributors has been extended and their taxes have begun to flow into the municipal, provincial and national treasuries. Regulation of the remainder has been proposed. The 2002 economic crisis sparked an increase in delayed payments, a rise in shantytowns and more illegal electricity supply connections. It has become clear that successful regulation is not sustainable in the long term unless there are corresponding subsidies that take into account the real economic situation facing the system's most underprivileged users.

Results of analysing remaining regulation

The analysis led to two key conclusions. The first is that there is a need to provide fair and decent treatment and access to services without discrimination. The second is that no subsidies have been detected for electricity consumption in GBA's low-income sectors. The Framework Agreement is considered a sensible regulatory approach to the problem, but is not a subsidy to the poor sectors of population.

Identification of solutions for or alleviating the energy problems of the urban poor

The problem of urban poverty and the role of subsidies: An analysis of the causes of urban poverty produces several hypotheses, all of which are linked to insufficient job creation, both in quantity and quality, at a certain stage in the development.

The poor adaptation of education to the situation of the urban poor is another essential factor. It should be noted that economic development is closely linked to urbanisation, and that the latter in the beginning entails internal migration that feeds economic growth which however end when urbanisation has matured. Thus, the structural situations of urban marginality arise, especially in developing countries.

[3] This amount exceeds the one determined in 1998 census and arises from the reports of the ENRE (National Energy Regulator) and the Energy Secretariat.

Younger generations have fewer job opportunities than their parents had, leaving them unable either to return to the country and rural activities or to achieve full integration in urban life.

Without adequate institutions and active public policies, market solutions may lead to the practical denial of essential rights and the institutionalisation of poverty. This undermines democratic principles and leads to productivity losses throughout society. According to Okhum's Law, those losses are about 2% of GDP for each unemployment point.

It is in this context that different strategies must be analysed for solving and/or alleviating the energy problems of the urban poor. Some basic options are identified in 3.5 below. However, before starting with this subject, it is appropriate to introduce concepts related to subsidies and price policies that appear in the 2001 WEC Statement.

One of the main challenges of price policy is to achieve a suitable balance between the benefits derived from applying market prices to energy products and simultaneously fulfilling social targets. While general and badly designed subsidies create serious economic distortions, well-targeted subsidies that are limited in scope and time can be fully justified and will play a positive role.

The WEC has supported the simultaneous focus on price policies related to the cost of energy production and its delivery to different kinds of users to facilitate the three key goals defined in its report "*Energy for Tomorrow's World -Acting Now*!"[4], namely:

Accessibility for the almost two billion people in the world who do not have access to commercial energy;

Availability which means ensuring a reliable and adequate supply of energy in view of the fact that nearly one-third of the world's population has no access to services required for economic sustainability.

Acceptability which is related to reducing emissions and other environmental impacts.

Within this framework, the following factors should be considered:

1. The importance of appropriate price and subsidy policies.
2. Regulation and competition.
3. Analysis of the different elements affecting prices, including efficiency; technical and non-technical losses; and the role and types of subsidies.
4. The impact of these factors on the three WEC goals.
5. Transparency of regulation and management processes.
6. The nature of general recommendations about subsidies and their suitability.

In relation to points 1 - 4 above, energy prices set below production and delivery costs can both encourage energy waste and become a heavy burden on the public budget, energy suppliers and the environment.

A starting point for analysing price and subsidy policies is to establish whether price and public service tariff regulations take account of the cost of being connected to the grid, the costs of metering and billing fixed charges, and the variable cost of energy consumed compared to production and delivery costs.

[4] *Cf. WEC, Energy for Tomorrow's World-Acting Now!, April 2000*

Subsidy definition is key to the transparency of regulation, i.e. who benefits from the subsidy. In this sense, a flat tariff is discouraged because it neither limits consumption, nor takes account of supply costs in the energy system.

In addition to adjusting price policies to reflect real costs, there is the problem of non-technical losses, or theft. This is the most complicated situation as it leads to uncontrolled consumption, the lack of system predictability, undesirable social practices and rising costs that cannot be recouped.

Taking these points into account, the WEC recommends:

- Adopting price policies that allow total costs to be recouped, including a reasonable rate of return on invested capital.
- Tariffs for each category of user to be set according to the costs each individual user causes its supply system to incur.
- Consideration of the total cost for each energy source, including those associated with reduction of greenhouse gases and other damaging environmental implications.
- Avoiding cross subsidies between different user categories.
- Designing suitable strategies to eliminate non-technical losses.

Producer subsidies are discouraged, but consumer subsidies could be justified if applied to basic consumption at a reasonable and affordable tariff. In this sense, neither marginal nor opportunity costs can be totally ignored.

WEC's position regarding subsidies is that they must be targeted at the consumer groups that require them. These subsidies have to be programmed, transparent and temporary, their rates and scope must be explicit and the beneficiaries should be defined as precisely as possible.

Alleviating the energy problem of GBA's urban poor

Measures to alleviate the energy problem of GBA's urban poor, based on some kind of subsidy, which have been considered in this study include:

1. Public services provided by private utilities, with subsidies coming from the government budget or "tariff engineering" for certain consumer groups.
2. Public services provided by private utilities, with subsidies coming from the government budget or "tariff engineering" for users identified on the basis of a periodical survey.
3. Public services provided by private utilities, with subsidies coming from a stratification of the population where the richest strata subsidise the poorest, using a progressive scale, which requires surveys and classification of 100% of the users.

The study analysed three market solutions, including prepaid meters that adapt consumption to the user's payment capacity and shorter billing periods, such as one month. The study also looked at service provisions of different quality to users according to the user's ability to pay, e.g. power limiters, the acceptance of difference of service provision quality regulation, and others.

After analysing and evaluating the pros and cons of these alternatives, several conclusions emerge.

The most convenient option appears to be the so-called "Social Tariff", applied for consumption between 200 - 300 kWh every two months, though high-income users living in 'gated' communities and weekend houses should be excluded from this benefit. A

comprehensive programme focussed on rational energy use should be developed and implemented, including replacement of inefficient equipment following the installation of power limiters. Subsidies based on social records should not be encouraged given the risk of political cronyism. Market solutions may institutionalise energy poverty and result in high costs for users without guaranteed service supply.

1.4 Recommendations

Further analysis is necessary to identify more precisely the subsidies that meet the minimum or basic energy requirements of poor households, and alternative market based solutions. Subsidies should cover the essential needs of a poor household but not lead to overconsumption. This means that consumption levels above those qualifying for the subsidy should be billed at increasing tariffs, even at the risk of spreading the tariff list.

A reasonable limit for the subsidy should also be determined, keeping in mind the relationship between energy costs and family income. Past experience can be a yard-stick to evaluate what improvements in family income can be expected during a steady economic recovery. Otherwise the poverty scale, with growing immigration to GBA due to the lack of other alternatives, could become much worse.

Clearly, there are many alternative methods for subsidising poor consumers, although all have undesirable side-effects. A technical analysis of full tariff revisions should include more real cost charges to users with the highest consumption levels. Thus cross subsidies for those enjoying the same residential tariff will be moderated. It should be remembered that in previous schemes, these users had tariffs that were lower than for some industrial categories.

1.5 Lessons to Consider

Even ignoring structural causes, it is clear that Argentina's high poverty levels are a direct result of the country's weak public institutions.

There are a number of elements lacking, including a real commitment to change from political, union and business leaders; the implementation of protection mechanisms to prevent structural change measures from having a negative impact on the most vulnerable sectors; clear and simple legislation; progressive tax systems; legal security and reliable and efficient juridical authorities; and an education system that provides the poor with the skills needed to leave behind their poverty and their marginalisation from the rest of society.

Access to energy reduces social conflict and the sense of injustice that grows in a society where some have access to sophisticated goods while others cannot hope to access even the most basic ones. It is nearly impossible to imagine an urban household without electricity. Even when the study has not explicitly dealt with the need to move forward on distribution issues and relative prices, the approach used clearly shows the small cost, and a relatively large impact, that can arise from solving the energy problem of the urban poor. A social cost-benefit analysis would surely be categorical, showing the advantages of providing subsidies as an immediate means of reversing this untenable social situation.

Although it is obvious that energy poverty is merely one aspect of overall poverty, it is also true that providing universal access to energy is an important way of increasing income generating opportunities and alleviating social distress. Universal access to electricity is a core objective of public policy and this is widely acknowledged across social divisions.

An analysis of concrete options has shown that all have weak points - perhaps implementation is seen as a problem, or the scope is too limited as it fails to suggest how to mitigate poverty in households facing the greatest difficulties. For example, market solutions would not require subsidies. But market solutions are considered unsuitable to improve the conditions of poor households, unless a creative combination of options is introduced. In the case of prepaid meters, this could be a pre-selection mechanism to identify which households should benefit, together with a preferential tariff.

The Social Tariff is convenient from an operating point of view. However it would not be a suitable solution to mitigate the negative social impacts of the cost adjustment if it were applied as a general tariff review. Nevertheless, as the selection of beneficiaries is determined by consumption, those users living in gated communities or country clubs should be excluded from those benefits. Subsidising these users would deepen inequalities in energy supply distribution.

On the other hand, considering the difficulty of reliably calculating the steps required to re-adjust the utilities' mean tariff, hypothetical modelling should be carried out to understand in quantitative terms the impacts of applying different social tariffs to mitigate urban energy poverty in the GBA area.

There were about 917,000 households in GBA living below the extreme poverty line in 2001 and 298,000 living below the indigence line. About 700,000 electricity users were included within the Framework Agreement, which helped reduce non-technical losses in the period immediately following electricity privatisation. But service interruptions due to non-payment have increased in recent years and the geographical dispersion of the poverty map is also increasing.

It is advisable to define some characteristics that condition what real alternatives can be considered in Argentina and other Latin American countries. When poverty levels become as high as those evident in this region, and when this is not due to natural disaster or war, the cause can be assumed to be structural and economic, and affects all of society. Unclear legislation also distorts the democratic system. The deficiencies of institutions that respect and enforce society's internal and external governing rules need to be addressed, to prevent a collusion of interests between those who administer, legislate and enforce the law.

Since urban poverty lacks basic services, in this case electricity, and creates permanent marginalisation, it seems sensible to avoid subsidies that could encourage discrimination by customer group. The temporality of the subsidy must also be taken into consideration and the current situation is complex. On one hand, gas and electricity tariffs have lagged far behind the levels in other countries, while the cost of capital goods and national and imported inputs has increased. However, the mean income of the different productive and social sectors has been irregular. While the situation became worse for the poor after the 2002 currency devaluation, those sectors linked to production and the commercialisation of goods and services have been able to adjust, at least partially, to changes in relative prices.

It will be necessary to revise tariff levels and to progressively reduce poverty levels. This requires steady economic growth, job creation and policies geared toward mitigating poverty in the short term.

It has been agreed that the Social Tariff alternative is the most effective and simple so long as it is not made available to high-income users, who can be easily identified. This takes into account the importance of adequate prices and subsidy policies; current regulations; an analysis

of the different elements that affect price levels; the role and nature of the subsidies and the transparency of the regulation and management process.

Subsidies will be inversely proportional to the growth of the economy provided this growth is coincident with higher employment and fairer distribution of benefits. If subsidies are to be a successful mechanism for alleviating urban energy poverty, they must be targeted and have a clearly defined framework and specific guidelines. They must also be designed with the collaboration of energy stakeholders—primarily government policy makers and service providers. Under these guiding principles, the "social tariff" programme in Buenos Aires was designed as a win-win solution for improving the urban poor's access to energy without disrupting the operation of the broader market or causing gross distortions.

Lessons learned from the analysis of the GBA case that can be applied to other countries in the LAC region and to other parts of the world include the following:

1. Carry out systematic field research of the poor in large cities to determine their consumption standards.
2. Study the economic costs of electricity services for different categories of users, and review their adequacy before defining a subsidy policy, except for short-term and emergency measures.
3. Consider the historical, political cultural, social and economic circumstances of each country, even when uniform basic ruling principles for the type and scope of subsidies can be recommended. Standardising subsidies can lead to serious distortions.
4. Consider the structure of internal relative prices with reference to external ones when analysing service costs and prices since these prices can seriously affect the macroeconomic and political viability of the tariff schemes and the price policies of energy services and products.
5. Continue to work on reducing the problem of the rural poor, which represents a large sector in some countries in the LAC region, while working on resolving the problems of the urban poor. The questions posed in the introduction may or may not be valid for all countries, so each one should be reviewed to determine its applicability.

A valid lesson for all countries is that subsidies must be defined according to cost and payment capacities and they must be temporary and easily enforced to avoid the possibility of political powers using them arbitrarily. On the other hand, price and subsidy policies should encourage the rational use of energy and ensure the long-term sustainability of the companies that provide the service, as well as of the environment.

1.6 Bibliography

Alexander, M. (2000) 'Privatizaciones en Argentina' In Baima, M. and Rofman, A.B. (eds.) Privatizaciones e Impacto en los Sectores Populares, Banco Mundial, Grupo de trabajo de ONGs sobre el Banco Mundial, Instituto de Investigaciones del Nuevo Estado, Editorial de Belgrano, Buenos Aires.

Arza,C., El impacto social de las privatizaciones. El caso de los servicios públicos domiciliarios, Flacso, Working Paper Nº 3 belonging to the "Privatización y Regulación en la Economía Argentina" Project (IDB 1201/OC–AR PICT 99–02–07523).

BID-BIRF-CEPAL-MECOVI ,Programa para el mejoramiento de las encuestas y la medición de las condiciones de vida en AlyC,. Noviembre de 1999. "4to. Taller Regional – Medición de la pobreza: El método de las líneas de pobreza. Buenos Aires, 16 al 19 de noviembre de 1999".

CAMMESA, Annual Report 2001

CEPAL, Anuario Estadístico de AL&C 2001, Santiago de Chile, 2002.

CEPAL, Panorama Social de América Latina 2000-2001, Santiago de Chile, 2002.

Consultora Equis. Abril 2002. "Distribución y concentración de ingresos desagregados por tipo. Según aglomerados urbanos y provincias de referencia con datos de la última EPH/INDEC, Octubre 2001".

Consultora Equis, Artemio López. Abril 2002. "Desempleo y pobreza en el último año. Datos INDEC y MTSS evolución período marzo 2001-2002".

Consultora Equis, Artemio López. Febrero 2002. "Pobreza e indigencia en el Gran Buenos Aires. Evolución octubre de 2000/2001. Para la población general, evolución en el Gran Buenos Aires, Período años 2000/2001 según la onda del mes de Octubre de la Encuesta Permanente de Hogares del INDEC, desagregado por cordones". Febrero de 2002.

Consultora Equis, Artemio López-Martín Romeo. Julio de 2001. "Informe semestral sobre situación ocupacional. A nivel nacional y por aglomerados urbanos y provincias de referencia. Evolución período mayo 2000-mayo 2001, según EPH-INDEC".

Consultora Equis, Artemio López. Mayo 2001. "El ojo de la tormenta. El actual perfil socioambiental de La Matanza. Pobreza, indigencia y mapa ocupacional actualizado. Situación de la niñez y escolarización adolescente. Datos del MTSS y la EPH-INDEC".

Consultora Equis, Artemio López. Febrero 2001. "Evolución de la pobreza en el GBA. Desempleo y caída salarial en el último año. Pobreza, indigencia, desempleo y tramos salariales con datos de la EPH, MTSS y la Secretaría de Programación Macroeconómica y Regional para el aglomerado Gran Buenos Aires".

Consultora Equis, Artemio López-Martín Romeo. Diciembre de 2000. "Los adolescentes del Gran Buenos Aires. Situación ocupacional, pobreza e inactividad absoluta de la población entre 15 y 19 años del GBA, según EPH-INDEC. Evolución en la última década.

EDENOR. Documentos elaborados durante el año 2001.

- Síntesis ejecutiva: resultados de las encuestas realizadas.
- Proyecto UREC: Uso Racional de la Energía en Barrios Carenciados. Informe Final. Barrio La Salada.
- Proyecto UREC: Uso Racional de la Energía en Barrios Carenciados. Informe Final. Barrio Mariló.

EDESUR

- Presentación Nuevo Acuerdo Marco y Carpeta con antecedentes.
- ENRE, datos de facturación de las empresas prestadoras del servicio eléctrico en el área del gran buenos Aires, archivos solicitados, años 2001 y 2002

FIEL. Año 2000. "La economía oculta en la Argentina".

IIERAL. Llach y Montoya. Junio de 1999. "En pos de la equidad: la pobreza y la distribución del ingreso en el Area Metropolitana de Buenos Aires. Diagnóstico y alternativas políticas".

INDEC. Febrero 2002. "Incidencia de la pobreza y de la indigencia en el aglomerado Gran Buenos Aires". Octubre 2001.

Kozulj, R. 2001, People, Cities, Growth and Technological Change: from the golden age to globalization, en Technological Forecasting and Social Change, 70 (2003) 199-230, Elsevier Science, NL.

Kozulj, R. 2002, Los desequilibrios de la economía Argentina: una visión retrospectiva y prospectiva a diez años de la Convertibilidad, Revista Comercio Exterior, Banco Nacional de México, México, agosto de 2002.

PRINEM. Año 2000. “Programa de Información Estadística y Apoyo a los Municipios”.

UNEP, 2003 Energy Subsidies: Lessons Learned in Assessing their Impacts and Designing Policy Reforms, draft Report, United Nations Environment Programme Division of Technology, Industry and Economics Economics and Trade Branch.

V. Foster, Measuring the impact of energy reform-practical options, en World Bank, Energy Services For The World's Poor, Washington, 2001

WB-WDI online, 2003.

WEC, Energy for Tomorrow’s World-Acting Now!, London, April 2000

CHAPTER 2
The Caracas Case Study

Caracas – Basic Data (2002)	
Total number of residents	**2.9 million**
Residents on low incomes	**2.2 million**
Average family income	**US$244.00**
Average income of poor families	**US$220.00**
Number of family members	**6.0**
Proportion of unemployed	**28%**
Level of education	**60% only have primary school education**
Cost of basic food	**81%**
Average energy expenditure	**4.2%**
Average electricity consumption	**220 kWh/month**

2.1 Poverty Profile

Access to modern energy sources is no longer an issue in Venezuela's urban areas. Today, the challenge is energy *sustainability*, which means long-term security of supply for customers and business opportunities for energy suppliers.

Energy suppliers have to deal with a large number of low-income customers in cities like Caracas. These customers have increased their energy needs and also changed consumption patterns over recent decades, with virtually no growth in income. As a result, economic feasibility for suppliers and energy users is being undermined.

Cross subsidies, where energy prices are higher for commercial users to cover lower rates for domestic users, have been the traditional way to offer low-income users affordable rates to access modern energy supplies. But these subsidies are regressive, as high-income users get more benefits than low-income users; misleading, because users do not know the real cost of energy supply; and have forced a number of industrial customers to look at self-generation options.

Frequent economic downturns have led low-income customers to stop paying their energy bills and resort to illegal actions. Despite this, some energy suppliers have created novel ways of motivating low-income customers to maintain formal access to energy sources and services. The study of these measures is of significant interest for the energy sector as a means to ensure sustainability for energy business in an urban setting such as Caracas.

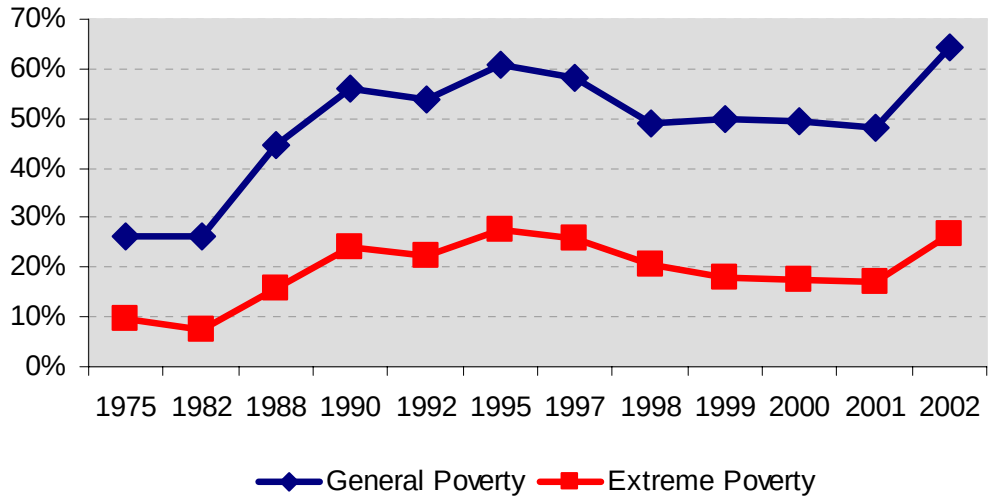
Characteristics of urban poverty in Venezuela and in Caracas

Given its multidimensional nature, the concept of poverty does not have a universal and single definition. In general, poverty is held to be a condition in which a household has a level of comfort inferior to what is accepted as a basic standard of modern life. According to Venezuela's National Institute for Statistics, the definition of urban poverty is related to the inability of family income to meet basic needs, such as food, housing, water and energy services, health, education, transportation and clothing. Given the poor economic performance of the country since the end of the 1970s, the number of people living in poverty has increased. Using consumption expenditure as a measure of comfort or well being, it is possible to break down poverty, and particularly urban poverty, into two categories:

- *general poverty:* applied to households whose family income is lower than needed to cover living costs or basic needs.
- *extreme poverty:* applied to households whose family income is lower than required to cover food needs.

Historical data in Venezuela, reported by the Institute for Social and Economic Research (ISER) of the Universidad Católica Andrés Bello, shows socio-economic indicators from 1975. Since then the number of households below the general poverty threshold has increased from 26% to 64% of total households by the year 2002, as shown in Figure 5 below.

Figure 5: General Poverty in Venezuela (as a % of total households)

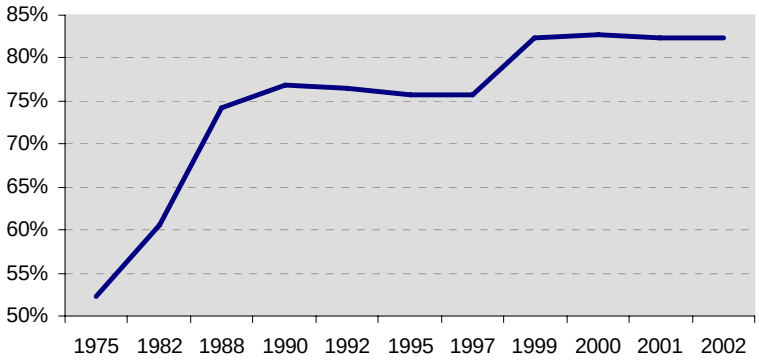


Source: ISER, National Institute for Statistics 56

In 2002 Venezuela had 3.26 million families (the total population of approximately 14 million people) whereof 54% were living under general poverty conditions. Households living under extreme poverty conditions increased from 10% in 1975 to 27% in 2002, representing 1.3 million households.

Households with incomes below the general poverty level are increasingly concentrated in the largest cities. By 2002, poor households in urban areas represented 82% of total households in poverty. About 280,000 low-income households are located in a poverty belt of slums and shanty-towns surrounding Caracas.

Figure 6: Venezuela's urban poverty (as a % of total households in poverty)



Thus, in general terms, families living in low-income households have the following characteristics:

- Average family size of six persons, where income is earned by two of them.
- Working age members typically work in the 'black' economy.
- The head of the family is typically under the age of 25, with no more than six years of formal education.
- Approximately 60% have completed only primary school.
- They live in shantytowns located on top of hills or in inaccessible narrow valleys.

The average family income in low-income households in Caracas is estimated at 220 US$/month, while the national average was 244 US$/month in 2002. The average family income in poor households is only half of that required to meet basic living costs.

These significant differences in income and socio-economic factors have a direct bearing on the inequalities of income distribution among the Venezuelan population. Household comparisons (see Fig.7 below) in education, unemployment and informal economic activity help to identify the relevant factors involved in the growth of poverty. Poorer households usually have the lowest levels of education and the highest rates of unemployment, as well as the highest participation in the black economy.

Figure 7: Comparative characteristics of Venezuelan households

Socio-economic Features of Households in Venezuela by 2002	High-income Households	Intermediate Income Households	Low-Income Households
	5% richer households	35% non-poor households	65% poorer households
Average Income (US$/month)	1440	696	218
Average size of families (persons)	4	4	5
Number of Households	290.401	2.257.858	3.259.798
Housing charateristics	Large Houses/Flats and vacation houses	Flats with all services	Small-deteriorated flats, shanty towns
Level of Education (years of formal education)	10,60	8,30	6,40
Unemployment	4,0%	7,7%	14,9%
Informal or "off the books" Employment	25,9%	37,6%	53,2%

Source: ISER

These results are supported by a recently published media analysis (see Fig. 8 below)

Figure 8: Comparative Analysis of households in Venezuela in 2004

Socio-economic Features of Households in Venezuela by 2004	High-income Households	Upper-Intermediate Income Households	Lower-Intermediate Income Households	Low-income Households
Average Income (US$/month)	> 2300	740	400	230
Average size of families (persons)	4	4	5	6
Number of Households	260.000	975.000	1.196.000	2.513.000
Housing charateristics	Large Houses/Flats and vacation houses	Flats with all services (electricity, water and natural gas supply)	Deteriorated flats, social interest housing	Shanty Towns
Level of Education	54% with university degree 19% tecnicians 19% with secondary school 9% with elementary school	29% with university degree 36% tecnicians 22% with secondary school 13% with elementary school	12% with university degree 18% tecnicians 33% with secondary school 37% with elementary school	4% with university degree 9% tecnicians 28% with secondary school 54% with elementary school

Source: Pulso Sociodemográfico 2004, Empresa Datos, Diario El Nacional, 04/04/2005, A-18

A survey into Venezuelan low-income households carried out in 2002 by the National Institute for Statistics established that :

- More than 90% have kitchens with gas burners
- 87.5% have a least one TV
- 78.5% have refrigerators
- 44.3% have washing machines
- 21.0% have mobile phones
- 12.2% have vehicles, mostly damaged and very old
- 11.4% have access to cable or satellite TV
- 8.5% have installed air conditioning equipment

Since there are no significant changes in weather or daylight conditions, consumption patterns do not change for clothing or food.

It is difficult to understand when looking at these figures how preferences operate in low-income households since it is possible for some households to have access to satellite TV and still be classified as living in general poverty. The answer lies in the fact that poverty is a relative concept that is highly influenced by the social and cultural context in which people interact.

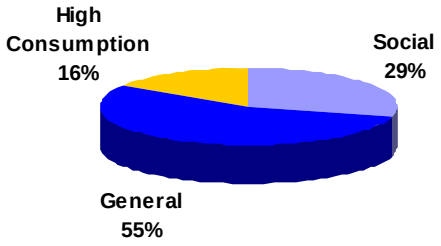
2.2 Energy Profile

Energy availability for domestic use

There are three sources of energy supply for domestic use in Venezuela—electricity, natural gas and LPG, and kerosene. In practice, however, electricity and LPG are the main energy supply options for Caracas' low-income households. This is because natural gas distribution networks are limited to four cities in the country. Although Caracas is one of these, low-income households are located on the top of the hills surrounding the city or in narrow valleys, both of which are difficult areas for construction of gas distribution grids. Moreover, kerosene consumption for energy purposes has nearly disappeared because this fuel has been unsubsidised since 1996.

There are about 866,000 domestic electricity customers in Caracas. Nearly 225,000 of these customers, whose consumption is less than 200 kWh/month, pay a 'social' rate. Another 471,000, whose consumption is between 200-500 kWh/month, pay a 'general' rate. The remaining 140,000 pay a rate based on consumption that is higher than 500 kWh/month. Customer distribution by price category is given below.

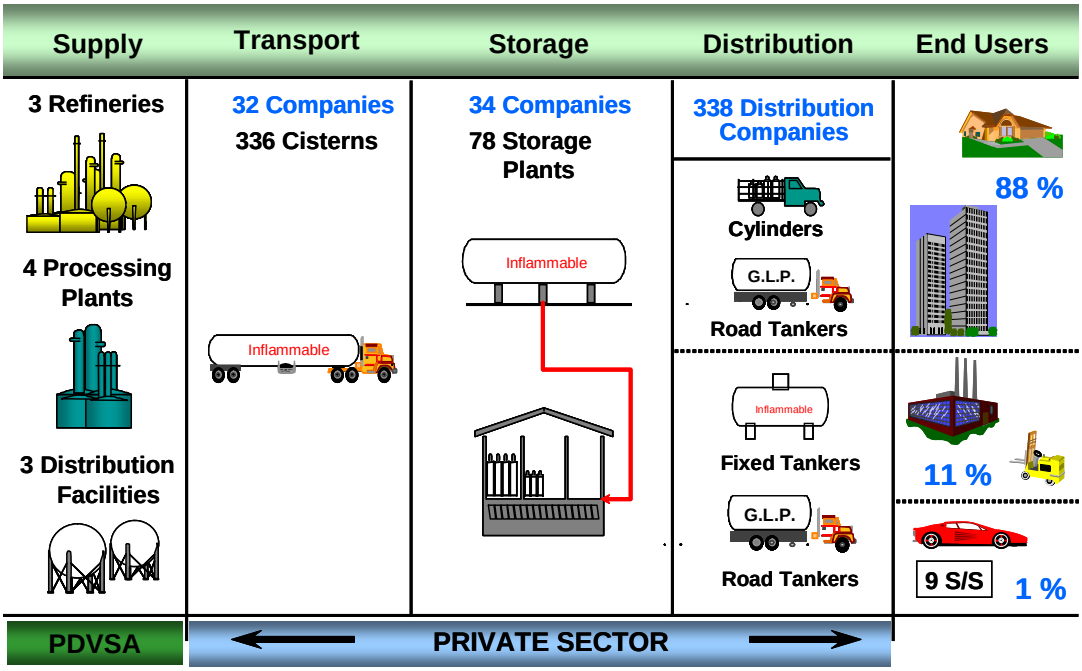
Chart 1: Customer distribution in Caracas by price rating



Furthermore, some 6% of Caracas' domestic customers have 'low' (less than 50 kWh/month) electricity consumption, comprising uninhabited houses and flats located in the city, which should not be included as low-income households.

LPG supplies to the city's domestic, industrial and commercial markets are provided by private companies that transport the fuel from processing facilities to storage plants by road tankers and filled cylinders. The use of cylinders is of particular interest for this study since most of the LPG consumed by low-income households is delivered this way. The figure below illustrates how the LPG commercial chain operates in Venezuela.

Figure 9: : The LPG commercial chain in Venezuela



LPG consumption can be discussed in terms of cylinder size and capacity. At present, the LPG market has three preferred sizes -10, 18 and 43 kilograms (kg) - with a variety of capacities available. The next figure shows LPG consumption in cylinders by size.

Table 2: LPG cylinder average sales in Venezuela

Cylinder Capacity	# of Cylinder Sales (monthly)	(%)
43 Kg	339,968	6.93
27 Kg	39,727	0.81
21 Kg	386	0.01
18 Kg	929,669	18.96
15 Kg	114	0.00
10 Kg	3,587,088	73.14
9 Kg	7,133	0.15

A survey carried out among local LPG distribution companies determined that low-income households in Caracas favour the use of 10 kg cylinders, mainly because of delivery access difficulties. This does not necessarily apply to low-income households based in more accessible areas of the city.

Since LPG is used mainly for cooking, and given the fact that over 90% of low-income households have kitchens with gas burners, it is possible to estimate LPG consumption for domestic use. The national association of LPG distribution companies (FEDEMGAS) estimates that typical consumption in low-income households is about 15 kg/month, or one 10 kg-cylinder every 20 days. On these figures, estimated total LPG consumption (for some 330,000 low-income households in Caracas using 10 kg cylinders) was 2.21 thousand barrels per day[5] in 2002.

The share of energy costs in family budgets and the quantitative dimension of energy supply problems

The study objective was to determine how much low-income households pay for their energy supplies, relative to family income. This was done by evaluating income levels, energy consumption patterns and energy prices.

The following figure illustrates current electricity prices, differentiated by customer type. From these results, the effect of subsidies for consumption levels within social and general rate categories can be seen.

Table 3: Caracas' domestic electricity market in figures (year 2002)

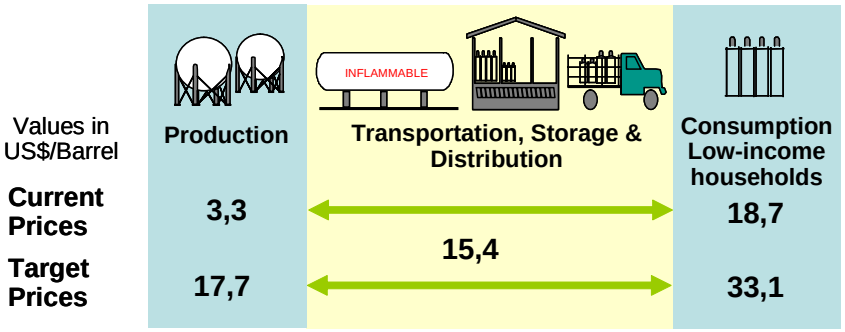
Customer-Type	Current Situation			Target Situation		
	Bill (US$)	Consumption (KWh/month)	Rates (US$/MWh)	Bill (US$)	Consumption (KWh/month)	Rates (US$/MWh)
Social	1,0	126	7,9	8,8	126	70,0
General	10,0	279	35,7	19,5	279	70,0
High consumption	58,9	839	70,2	58,7	839	70,0

[5] 1 litre volume capacity in LPG cylinders is equivalent to 0.531 kilograms

Average consumption of electricity is 220 kWh/month for low-income families. According to local company, C.A. La Electricidad de Caracas, the average total bill to these households amounts to 4.1 US$/month in 2002 prices. This is equivalent to 1.8% of the family income. When compared to cost reflective billing a significant gap emerges, since the "real" electricity bill would be 12.5US$/month. This calculation shows an uneven distribution of subsidies among domestic users. Residential subsidies are actually regressive. Of the total subsidy amount (about US$80million in 2002), only 40% is received by low-income households in Caracas.

The LPG and electricity markets differ because LPG supplies are subsidised, as illustrated at Fig.10 below:

Figure 10: LPG market prices by the year 2002

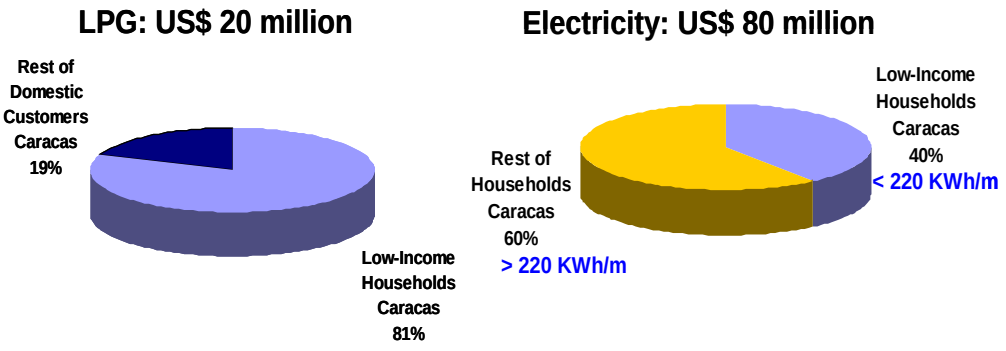


There is a general subsidy extended by PDVSA at the beginning of the commercial chain. Transportation, storage and distribution of cylinders are an additional cost for low-income households.

Taking into account an average monthly consumption of 1.5 LPG cylinders (10 kg cylinder size), LPG expenditure for low-income households was 3.3 US$/month in 2002 prices. This is equivalent to 1.5% of the average family income. When this expenditure is compared with LPG export prices, the result is 77% higher LPG cylinder prices. The LPG expenditure without subsidies would be 5.9 US$/month.

The majority of LPG subsidies for residential customers in Caracas are targeted at low-income households. This is simply because the rest of the domestic households in the city are usually connected to distribution grids. The total amount of subsidies allocated for LPG residential consumption in Caracas was estimated at US$20 million in 2002 prices, with the household distribution shown below.

Chart 2: Distribution of Energy Subsidies for residential users in Caracas



Energy cost as a percentage of family income for low-income households is 3.4%, representing US$7.4/month based on an average family income of US$226/month. This is nowhere near the actual bill, which is equivalent to US$18.4/month, or an 8.1% share of average family income.

These findings illustrate the quantitative dimension of energy supply problems in Caracas, although it should be noted that energy costs relative to transportation are not included due to the lack of information on these costs. Thus, the gap between what is actually paid by low-income households and what would be needed to cover all energy costs is larger than reported, and assumes that LPG transportation subsidies in Venezuela will remain significant, alongside those for gasoline and petrol.

The qualitative dimension of energy supply problems

A 2004 survey conducted by the distribution company produced the following results:

Table 4: Users and Local Distribution Company Perspectives about supply problems

From supply companies perspective	*From low-income users perspective*
Problems	**Problems**
❖ *Vandalism*	❖ *Low service reliability*
❖ *Illegal land tenure*	❖ *Poor customer service*
❖ *Illegal connections*	
❖ *Violence (facilities & workforce)*	**Opportunities**
❖ *Absence of coordination with local councils*	✓ *Enables legal housing*
	✓ *Access to financial services*
Opportunities	✓ *Improves life quality*
✓ *Market growth*	✓ *Encourages economic activities*

No significant obstacles or barriers were reported for LPG supply services. However, from the distribution perspective, energy supply problems arise for several basic reasons, e.g. continuous population migration from rural to urban areas; squatting; and the inability to gain formal employment.

These features are reflected in the high crime rates seen in these areas, with illegal connections to the electricity grid, vandalism and violence against energy supply facilities and the work force, though solving such issues cannot be entirely the responsibility of the electricity supply companies.

Resolving the problem of illegal connections would be beneficial for both suppliers and users. Granting legal property rights to squatters and the creation of linkages between education and subsidies is a potential solution. As legal housing provides an opportunity to access financing, this could encourage a greater willingness to pay for energy services.

While some domestic customers have taken steps to become legal users, they almost immediately return to fraud or to making illegal connections once rate increases are imposed. Part of this is due to the lack of a payment culture with certain customers, which the supply

company can address with effective educational and social efforts. There is evidence to support the positive impact that these programmes can have on such households.

There is a clear relationship between education and income. Electricity utilities could discourage children from leaving basic and primary education by providing them or their families with subsidies, keeping in mind that abandoning education is the problem, not education *per se*. The achievement of higher education levels could in turn be rewarded more generously. In the long term, this would have a positive impact and mitigate other energy supply related problems such as vandalism.

2.3 Policies

The following policy measures have been identified:

- Establish a rational structure for energy prices that would help energy users avoid fuel waste and prevent supply deficits.
- Educate customers to allow them to understand and accept cost reflective energy pricing, so helping them to make more informed decisions about their use of energy.
- Define direct and explicit subsidies, which would allow companies to allocate subsidies to well-identified customer groups, thus subsidising the low-income user, not the energy.

2.4 Lessons to Consider

Unwillingness to pay: The main factor against increasing energy prices is not affordability, but the willingness to pay. This is a particular problem in Venezuela where there is a culture of belief that energy supplies should be virtually free due to the country's significant energy resources and its position as a large energy exporter. This attitude can be challenged through effective customer education programs, subsidies discouraging children from leaving schools, and legal land tenure.

Full Cost Tariffs: Energy prices do not reflect the full cost of supply, and this has led to under-investment and degradation of service quality.

Access to energy to help alleviate poverty? The case study suggests that access to modern energy sources is *not* crucial to bringing low-income families out of poverty. Low-income households have had access to premium energy services in Caracas for many decades, making no impact on the evolution of general and extreme poverty indicators.

2.5 Bibliography

BANCO CENTRAL DE VENEZUELA. “Encuesta de Presupuestos Familiares”. Caracas, year 1997 and first quarter 1998.

C.A. LA ELECTRICIDAD DE CARACAS. “Distribución del Consumo de Energía Eléctrica Residencial en el Área Metropolitana de Caracas”. Caracas, year 2003.

CENTRO DE DOCUMENTACIÓN Y ANÁLISIS PARA LOS TRABAJADORES (CENDA). “Evolución del Costo de la Canasta Básica y el Ingreso Familiar Mensual de Referencia”. Press article taken from “El Nacional” newspaper, page A-14, Caracas, Saturday 05 June 2004.

COMISIÓN ECONÓMICA PARA AMÉRICA LATINA (CEPAL). “Anuario Estadístico de América Latina y el Caribe 2002”. Santiago de Chile, year 2003.

CISOR. “Procesamiento Especial de la Encuesta de Hogares por Muestreo para IIES-UCAB: Primer Semestre 1975 1997”. Caracas, July 1998.

CISOR. “Procesamiento Especial de la Encuesta de Hogares por Muestreo para IIES-UCAB: Primer Semestre 1999, 2000,2001”. Caracas, November 2002.

DATOS INFORMATION RESOURCES. “Pulso Sociodemográfico 2004”. Press article taken from “El Nacional” newspaper, page A-18, Caracas, Monday 04 April 2005.

ENERGY INFORMATION AGENCY (EIA). Official Energy Statistics from the US Government. http://www.eia.doe.gov/emeu/mer/prices.html.

FEDEMGAS. “Estadísticas de la asociación correspondientes a las compañías de distribución de GLP”. Caracas, year 2003.

GACETA OFICIAL DE LA REPÚBLICA BOLIVARIANA DE VENEZUELA. “Resolución del Ministerio de Energía y Minas y del Ministerio de Industria y Comercio sobre la aplicación del Factor de Ajuste de Precios a las Tarifas de Energía Eléctrica de las Empresas de Servicio”. Gaceta # 37.415, Caracas, 03 April 2002.

INSTITUTO NACIONAL DE ESTADÍSTICA (INE). “Encuesta de Hogares por Muestreo”. Caracas, year 2002.

INSTITUTO NACIONAL DE ESTADÍSTICA (INE). “Reporte Social: Resumen Semestral Primer Semestre 1997 – Segundo Semestre 2002”. Caracas, year 2003.

INSTITUTO NACIONAL DE ESTADÍSTICA (INE). Monthly Report. Caracas, April 2004.

MINISTERIO DE ENERGÍA Y PETROLEO. “Petróleo y Otros Datos Estadísticos (PODE) 2002”. http://www.mem.gov.ve/

ORGANIZACIÓN LATINOAMERICANA DE ENERGÍA (OLADE). Sistema de Información Económica Energética (SIEE).

PDVSA. Venezuela: Natural Gas. Gerencia General de Gas de Corcoven S.A. Caracas, year 1996.

RIUTORT, M. Instituto de Investigaciones Económicas y Sociales, Universidad Católica Andrés Bello. Caracas, year 2003.

CHAPTER 3
The case of Rio de Janeiro - Cajú

Rio de Janeiro – Basic Data (2002)	
Total number of residents	**5.9 million**
Residents on low incomes	**1.4 million**
Average family income	**US$173.00**
Average income of poor families	**US$115.00**
Number of family members	**4.1**
Share of unemployed	**30% of all over 16 years old**
Level of education	**35% have no formal education**
Cost of basic food	**77% of income**
Average energy expenditure	**15.6% of the total income**
Average electricity consumption	**103 kWh/month**

In the sixties and seventies, income distribution was subject to a large debate in Latin America, and especially in Brazil. During the "lost decade" of the 1980s, this issue was shelved for a time, to be revisited later by the Brazilian authorities, but this time focusing on poverty and social exclusion. Currently, energy poverty is emerging as crucial to this debate since the general consensus is that adequate supplies of energy are essential for improving quality of life.

The changes of the 1990s prompted a profound review of the policy for universal access to modern energy sources. Cross subsidies that in the past had charged rates compatible with the income of the poor were reduced or eliminated. Programmes for expanding distribution networks to connect low-income consumers were decelerated or closed down.

Obviously, there is no scope for the use of traditional energy sources in urban areas. Moreover, it is impossible to prevent the poor population from having access to energy networks. Therefore, the policy of universal access to modern energy sources needs urgent review.

The latest Demographic Census (IBGE, 2000) identified approximately 300,000 homes in Rio's low-income communities. Although these communities are located in different parts of the city, their context is similar to that described in the Cajú section 2.1 below.

Based on a *reduced* set of indicators, data from the census for the set of Rio shantytowns and from the FIRJAN/IETS survey for the Cajú shantytown was analysed to identify energy poverty in Rio's low-income communities.

Table nº9 illustrates the extrapolation of electric power consumption. The annual electricity consumption of Rio's shantytowns totals about 580 GWh, of which about 37.4%, or 216.7 GWh, is not invoiced. As a result, Light loses about R$168.2 million per year.

A substantial share of this loss is due to Type A (see Part 1 overpage) households (17.8%), although these households cannot be considered poor from an energy point of view. Households that can be characterised as indigent do not affect the utility's finances, although homes in the poverty class account for 37.2% of the utility's losses. The largest share of Light's financial losses is produced by the energy poor type C and B households.

Table 5: City of Rio de Janeiro – Electric Power Consumption & Loss

Homes	%	Number	Consumption (GWh)		Loss (GWh)			
			Monthly	Annually	Monthly	Annually	Millions R$/year	%
A	14.60%	42509	11.1	133.2	6.6	78.7	30.0	17.80%
B	27.80%	80913	15.5	185.7	6.3	75.6	75.6	44.90%
C	36.00%	104883	15.7	188.5	5.2	62.6	62.6	37.20%
D	21.70%	63257	6.0	72.2	0.0	0.0	0.0	00.00%
Total	**100.00%**	**291562**	**48.3**	**579.6**	**18.1**	**216.9**	**168.2**	**100.00%**

Source: IBGE Census 2000. Special Tabulations.

Extrapolation of LPG consumption shows that Rio's low-income communities spend about R$81.1 million on LPG. Of this, about R$13.5 million goes to organized crime from shantytown households. Unlike electricity expenses, the highest share of this transfer of funds to organised crime comes from poor (36.9%) and indigent (25.5%) homes. The Gas Voucher scheme would help minimise this impact, but it only benefits a small section of poor homes (3%) and of homes in absolute poverty.

3.1 Poverty Profile

Brazil experienced a period of strong economic growth and urbanisation between 1930 and 1980. The concentration of income in urban areas accelerated this process and brought about the creation of shantytowns in Brazilian metropolitan areas. Economic growth has been low since the 1980s, but urbanisation and the concentration of income have continued. As a result of these economic and social developments, poverty, which was primarily a rural problem up to the 1980s, is now primarily an urban problem, as evidenced by the rapid expansion of shantytowns in these metropolitan areas.

Most Brazilian studies measure poverty by income levels[6]. Using this methodology, Melo (2004) estimates that 14.7% of the Brazilian population is poor and 8.25% is indigent (Table 6)[7]. Roughly 29% of the population (23% of the families) falls below the indigence line.

[6] This income is calculated by adding the entire income of family members.
[7] This estimate is based on the minimum wage in effect at that time: R$180.00.

Table 6: Brazil, 2001

	TOTAL		POOR		INDIGENT	
	Absolute	%	Absolute	%	Absolute	%
Families	50,465,099	*100*	7,408,689	*14.7*	4,152,718	*8.2*
Persons	169,369,557	*100*	29,165,246	*17.2*	19,782,440	*11.7*
Male	83,576,015	*100*	14,130,507	*1.9*	9,734,508	*11.6*
Female	86,223,155	*100*	15,034,739	*1.4*	10,047,932	*11.7*
Persons in the family	3.34		3.94		4.76	

Source: PNAD/IBGE, 2001.

A methodological approach that combines numerical data with qualitative information has been used to examine a specific area in the city: the Cajú shantytown. As a part of the qualitative approach, Cajú inhabitants were interviewed. Five focus groups were formed to debate the socio-economic and energy situation of Cajú.

The quantitative part of the analysis considered micro-data from the "Socio-Economic Survey of the Low-Income Communities of Cajú"[8], the Demographic Census of 2000 and the National Surveys by Residence Samples (PNAD), as issued by the Brazilian Institute of Geography and Statistics (IBGE). In addition, data provided by the electric power company (Light) enabled the analyses of electricity consumption.

The data divided Cajú householders and their energy consumption into four profile types—A,B,C and D. Type D covers households with a per capita income below the traditional poverty line used in Brazil. This is defined as an insignificant market value for the house, few durable goods, and practically no access to credit. Type A is the opposite of Type D because it shows a per capita income close to three minimum wages, a significant market value for the house, a relevant number of durable goods, and fair access to credit. B and C are intermediate types with B households significantly above the traditional poverty line and C households classified as relatively close to the line.

Cajú Past and Present[9]

Settlement of the area known as Cajú in Rio goes back to Colonial times. Located close to the centre of Rio and overlooking Guanabara Bay, the region has been a port since the early days, an aspect that is still important today. The Cajú Complex contains shantytowns and urban areas, as well as industrial, port and other activities and services.

In the early 19th century, the Quinta do Cajú (Cajú Residence) was a private property located on the edge of the Cajú beach. Don João VI purchased it in 1817, donated a chapel and a quay, and changed its name to Quinta Real do Cajú (Royal Cajú Residence).

In the 20th century, the area of the Cajú Complex was extended by sizeable landfills and today the former Cajú beach is simply the name of a road. During this period, a number of facilities were built in the area, such as a harbour, the Air Force Centre for Electronic Material

[8] Federation of State of Rio de Janeiro Industries (FIRJAN) System and Institute of Labor and Society Studies (IETS)

[9] This section was prepared based on information obtained from five focal groups, formal and informal leaderships, a youth group, and two groups of entrepreneurs. Each group had eight to 10 low-income residents from the Cajú community. The formal leadership group consisted of directors of community associations. The informal leadership was selected by the research team and was comprised of people with recognised leadership activities within the community. The remaining groups consisted of people indicated by the associations.

(Portuguese acronym PAME) and the Ishikawajima shipbuilding yard (PMRJ, Favela-Burough, 1996).

In the 1980s, the Brazilian shipyards underwent a profound crisis. Although enjoying a prime location in the central area of the city of Rio, Cajú suffered the effects of this crisis. Formal jobs disappeared and the abandoned areas *"became parking lots and container depots"* (says a resident). Bankruptcy of the home mortgaging system[10] and increases in taxes and the price of public services (urban property tax, water and electricity rates) led to a migration from the formal urbanised areas to the city's shantytowns. As a result of disorderly settlement and closure of the naval shipyards, Cajú rapidly became one big shantytown.

The Rio de Janeiro Municipality divides the substandard clusters of houses in Cajú into eight communities. These communities contain 6,605 homes housing approximately 17,500 people.

For residents, Cajú has long been in decline. The focal groups expressed great nostalgia for the past, especially in relation to places of leisure and the cultural traditions that have been lost. This included two cinemas, parks, football fields and the local fishing industry. The past is referred to as a time of many opportunities when a large number of residents helped maintain the social fabric of the city. Cajú is no longer considered a borough that is "**good to live in**".

Today, organised crime has become an everyday part of the social fabric of this community, and it has a decisive impact on the everyday life of its residents, especially on the young, who say: "*It is terrible when they invade us … we cannot stay up late on the streets because a gunshot can come from anywhere… On weekends, at night, there is nothing to do, not even a small open-air party; we have to go home.*"

"*To live in Cajú is to be forgotten by the authorities that govern our state and our city*." There is much dissatisfaction with the poor social and economic infrastructure available in Cajú[11], which has produced a strong feeling of exclusion: "*When you go into a poor community, a shantytown, you find that everything is dirty, everything is disorganised. Then you go to the centre, to Barra da Tijuca or Copacabana, and you find that everything is clean. Why is it like that? It's obvious! People produce garbage here as well as there; residents in Copacabana are not going to leave their luxurious apartments to clean their pavement. The street cleaner goes there and does it.*"

The desire for education is so strong that the first request made during a meeting between the research team and directors of the residents' associations was for the creation of a local pre-college entrance course. The Federal University of Rio de Janeiro (UFRJ) granted that request and the project's team persuaded the electric power utility, Light, in partnership with the Federation of Rio de Janeiro Industries (FIRJAN), to co-finance a pre-university entrance course for 100 Cajú students, starting in 2005.

Income and other relevant indicators for energy consumption

A major obstacle to studying poverty is insufficient information on people's assets and their survival strategies. Income is usually the basis for assessing well-being, despite its methodological limitations, i.e. the income of the poor is sporadic and almost always underestimated. This survey attempts to overcome this problem by adding information ranging

[10] Between 1970 and 2000, the percentage of financed homes dropped from 11.6% to 7.8% (O Globo, March 10, 2004).

[11] *"The bad thing about school are teachers, because they are not given conditions to teach; they miss classes most often because they don't live here; they are terribly scared; any little thing and they leave the children and decamp; the children are abandoned; it is dreadful. School is horrible."* (quoted by a resident).

from the quantity of durable consumer goods owned by the household, their job security and creditworthiness, to the income declared by Cajú inhabitants.

Five indicators have been used:

- **Monthly per capita income of householders**. The income of individuals aged 10 or over from the following sources was taken into consideration: main job, pension, rent, other work activities, assistance from non-resident family members, donations and other income. The total revenue was divided by the number of residents in the household to produce a figure of per capita revenue.
- **Ownership and value of property**. The following were taken into account: no ownership, properties owned without information on their value and properties owned with a declared value.
- **Ownership of durable consumer goods**. Points were allocated to durable consumer goods used by the household.
- **Credit availability of household members**. Ownership of a bank account, savings account, credit card, and store-card were taken into account.
- **Household members with work documents signed by employers**. The number of members of the household with a formal job.

Five strata were established for each variable and points were allocated to each. Adding up the points for each household in the sample allowed for the alphabetic classification of households under four ever-decreasing poverty ratings - A, B, C and D - as below:

Classification of Households	
TYPE	**POINTS RATING**
A	26 to 40
B	20 to 25
C	14 to 19
D	8 to 13

The sample showed that:

1. The average per capita income of 42.4% of households in Cajú was higher than the minimum wage (R$ 200,00) at the time of the survey.
2. Roughly 15% of the households displayed the characteristics of a social group **not** classified as poor — a per capita income close to three times the minimum wage, significant property assets, relatively diversified ownership of durable consumer goods and some access to credit.
3. Type B households (27.8%) are relatively far from the poverty line as their per capita income is 50% higher than the minimum wage. They own reasonably valuable property assets and a fair amount of durable consumer goods, but their access to credit is limited and there are more children living in the household.
4. Type C (36%) and D (21.7%) reflect households with incomes lower than the minimum wage (R$ 200,00). Poverty is intense in Type D homes where per capita income is less than half the minimum wage. The value of their property assets is insignificant, credit is practically non-existent and ownership of durable consumer goods is minimal - a television, stove, refrigerator and radio. It is no surprise that the number of children in these households is large and that labour is essentially casual.

6. Type C homes are slightly better off than those of Type D, but householders are still close to the poverty line. Per capita income is slightly more than half the minimum wage, but there is little access to credit and durable consumer goods are scarce. Again, there are many children in such households and casual work is the norm.

Table 7: Cajú – Types of Homes according to their Characteristics, 2002.

CHARACTERISTICS	A	B	C	D	TOTAL
Number	963	1,833	2,376	1,433	6,605
% of the Total	14.6	27.8	36.0	21.7	100.0
Nº of people per Household					
Total	2.9	3.2	3.5	4.1	3.5
Age 10 and Over	2.7	2.7	2.8	2.8	2.8
With Work document	1.2	1.0	0.7	0.3	0.8
Per Capita Income of the Household*	584.39	297.83	175.62	88.84	250.31
Value of the Property	19188.99	10925.31	7177.19	2759.60	9010.23
Goods**	61.00	41.90	28.30	16.90	34.40
Credit	10.30	5.90	2.50	0.80	4.20

** Points

*Reais (R$) at September 2002.

Source: FIRJAN/IETS

Approximately 70% of Type D households are classified as indigent (20.4%) or poor (49%), according to the traditional poverty line criterion.

Although not formally legalized by the municipal authorities, the financial value of shantytown properties is anything but irrelevant[12]. The better built houses are priced at about R$ 400.00/sq.m.[13], which is substantially below the approximately R$ 1200.00/sq.m. property price in Rio's other poor districts. These figures suggest that formal property rights to shantytown dwellers would provide legal security for their property and financially increase the value of their properties. In fact, in November 2004, Quinta do Cajú was the first shantytown where land ownership was legalized, benefiting 859 families[14]. The cities of Rio de Janeiro and Vitória (state of Espirito Santo) expect to implement similar programmes. The Rio municipality has also introduced the "Morar Legal" (Legal Habitation) programme that provided legal rights to 129 buildings, far more than over past years, declaring them "Areas of special social interest"[15]. These measures tend to abate the feelings of exclusion of low-income communities but are not sufficient.

Another variable used in the assessment was the number of durable consumer goods used in each household (Table 8). The data suggests that Cajú householders choose their goods using two criteria—purchase cost and whether it is considered essential for social and cultural reasons.

[12] The majority of houses are built of stone and were self erected.

[13] Based on homes with an area of 50sq.m.

[14] Site www.vivafavela.com.br , accessed on 2/1/2005 at 1:15 p.m.). This development immediately caused the property value to double (site www.gabeira.com.br/cidadesustentavel , accessed on 2/1/2005 at 1:15 p.m.

[15] www.cidades.gov.br , accessed on 2/15/05.

Table 8: Cajú Shantytown – Households by Ownership of Durable Goods (%), 2002.

GOODS	A	B	C	D	TOTAL
FOOD					
REFRIGERATOR	68.7	81.1	88.3	90.0	83.8
DUPLEX REFRIGERATOR	31.9	18.1	9.0	6.6	14.3
VERTICAL FREEZEER	26.8	11.7	6.7	2.8	10.2
HORIZONTAL FREEZER	6.9	5.0	3.4	2.6	4.2
WATER FILTER (CANDLE, ACTIVE CARBON)	73.2	64.6	51.5	41.5	56.1
WATER FILTER (OZONE)	9.3	4.7	4.4	3.0	4.9
MICROWAVE OVEN	33.7	18.9	8.4	2.5	13.7
LEISURE					
COLORED TV	98.1	95.3	93.5	89.5	93.8
RADIO	92.0	93.3	85.6	79.6	87.4
VCR	58.8	45.6	29.3	16.7	35.4
DVD	2.5	2.1	1.2	0.0	1.4
CABLE TV	15.2	11.1	5.1	1.9	7.5
COMMUNICATION AND TRANSPORTATION					
CELL PHONE	59.7	45.5	33.5	20.4	37.8
TRADITIONAL PHONE	81.4	65.6	48.1	20.6	51.8
MICROCOMPUTER	18.2	8.0	4.3	1.9	6.8
AUTOMOBILES OWNED	32.1	14.7	5.5	0.7	10.9
COMFORT					
VACCUM CLEANER	11.7	4.9	1.8	0.4	3.8
SEWING MACHINE	31.8	23.9	16.5	6.9	18.7
AIR CONDITIONER	45.2	27.0	15.0	4.5	20.4
WASHING MACHINE	68.8	48.8	34.2	20.4	40.3
ELECTRIC SHOWER	68.1	53.6	39.9	26.4	44.9

Source: FIRJAN / IETS, 2002

Figures for televisions, radios and refrigerators owned by the shantytown population are not much different from households in other parts of Rio. However, it is interesting to note the popularity of cable TV, even among the poor and indigent. This is probably the result of illegal connections.

Poverty is clearly associated with unemployment and unstable job prospects. Several social programmes have been created to help mitigate poverty, but the focus groups criticized their effectiveness. They believe these programmes do not change the social condition of poor families but rather they promote dependency. Government subsidies are no substitute for measures that confer citizenship through employment. Employed individuals earning an adequate wage do not need government assistance. *"I know a family that collects a staple food basket from a church here, another up there, and spends the whole month like that. When work is mentioned: - "Gee, man, no way can I work today!!!"*

Marginalisation and Poverty

The state of Rio de Janeiro enjoys a privileged position within the country. The seat of the capital of Brazil until 1960, the state is home to the third largest population in the country. Its per capita GNP (R$10,160.00) is only lower than that of the Federal District and the state of São Paulo. However, its economic structure is extremely unbalanced.

The service sector accounts for 73.2% of the regional economy. The city of Rio de Janeiro is considered to be the energy capital of Brazil[16]. Light Serviços de Eletricidade distributes energy in the city of Rio, whereas piped natural gas is distributed by the Companhia Estadual de Gás (CEG).

Like all metropolitan regions in Brazil, Rio de Janeiro saw a reduction in poverty during the 1990s. However, between 1999 and 2001 there was a change in this trend, with increasing numbers of poor and indigent in the region (IETS, 2003). This was reflected in social-economic indicators and is visible in both the reduction of per capita income of its households[17] and in an increase in urban crime.

Shantytowns

In 2000, Rio had 5.9 million inhabitants and 1.8 million households (IBGE, 2000). Comparing figures from the 1991 and 2000 censuses, Rio's average population growth rate was 0.74% annually, which is below the national average. Various neighbourhoods, such as Copacabana, Tijuca and Méier, lost residents, but the city's shantytowns grew even in those neighbourhoods where the population had decreased. Currently, the shantytown population of the city of Rio stands at around 1.1 million people who live in 307,000 homes (IBGE, 2000). In other words, approximately 19% of the population (17% of the homes) lives in the city's shantytowns.

What is the typical profile of a shantytown resident? Very young - around 20% are below 10 years of age and another 10% are between 10 and 16 years. The lower life expectancy among shantytown families explains the low percentage of the poor elderly (3.6%)[18], which is substantially higher in Rio as a whole (8.4%).

Almost all Rio de Janeiro shantytowns have access to water mains, garbage collection and electricity. Thus, the utilities do not consider they are discriminating against shantytown communities.

Table 9: Percentage of Population with Piped Water in Rio's Communities, 2000

	Water	Light	Sewage	Garbage
RJ	99.1%	99.5%	93.5%	98.5%
S-S Housing	97.9%	99.9%	83.2%	96.7%

Source: Brazilian Census 2000, IBGE

The share of the shantytown population over 16 yrs old who are unemployed is around 30% and is particularly high (around 40%) among young people entering the job market. These figures confirm a pattern of socio-economic insecurity where those in uncertain job situations are likely to end up living in shantytowns. (IETS, April 2002). Children and young people living in shantytowns also have a lower rate of school attendance. Around 35% of the people living in low-income households have no formal education.

Illiteracy is a serious problem among the poor and indigent. In 2001, roughly 45% of the indigent population and 35% of the poor had no formal education whatsoever. A high percentage of indigent children do not attend school. Although it cannot be said that the low

[16] The main energy companies (Petrobrás, Eletrobrás, Furnas and Eletronuclear) are headquartered in Rio.
[17] This reduction was estimated on a poverty line calculated on monetary revenues.
[18] Considering individuals over 65 years of age.

rate of school attendance is sufficient alone to explain poverty (Santos, 2002), it is generally accepted that education is essential to improve this situation.

Another factor linked to the problem of poverty is racial:

Table 10: Brazil – Population by Color/Race (%).

	TOTAL	POOR	INDIGENT
White	53.4	38.6	29.2
Black	5.6	6.9	6.8
Mulattos	40.4	54.2	63.7
Others	0.6	0.3	0.3
Total (millions)	169	29.2	19.8

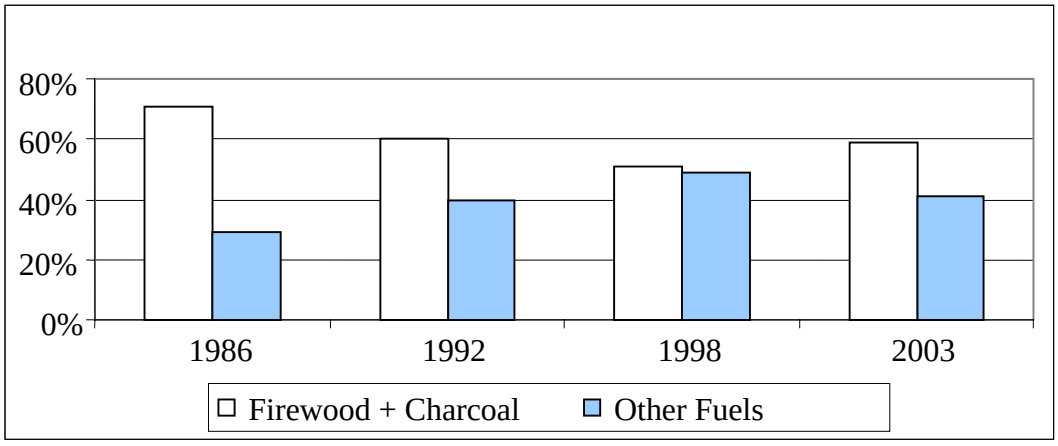
Source: PNAD/IBGE, 2001

Although poverty in Brazil is more intense in rural regions, most of the indigent population lives in urban areas, especially in metropolitan regions.

3.2 Energy Profile

In 2003, approximately 84% of Brazil's population lived in urban areas (IBGE, 2003).
The use of modern sources of energy that substituted traditional sources was a constant in Brazil's energy policy in the second half of the last century (de Oliveira, 1998). The use of liquefied petroleum gas (LPG) as a substitute for firewood was encouraged by substantial cross subsidies (Figure 11). Cajú homes use LPG for cooking and electric power for lighting and domestic appliances[19], and practically all homes are connected to the electric power grid of ***Light*** (local distribution company in Rio de Janeiro, privatized in 1996).

Figure 11 - Brazil – Evolution of Residential Fuel Consumption



Source: BEN 2004

A survey was conducted to determine energy consumption in three Rio shantytowns[20]

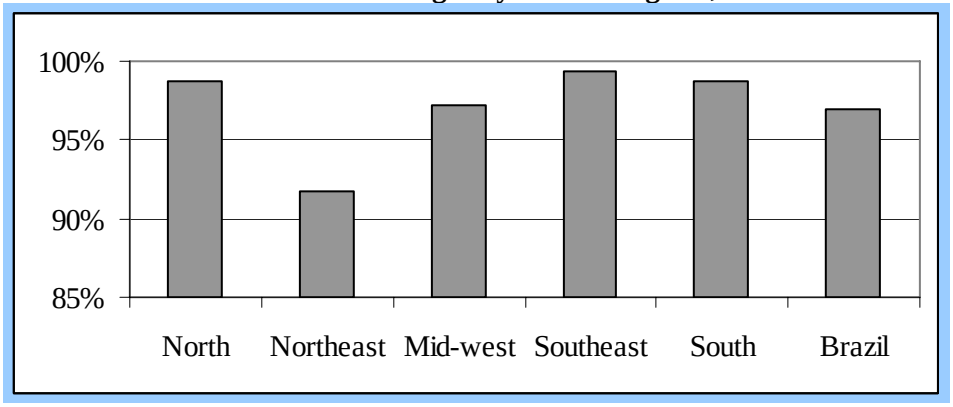
[19] At that time, televisions, refrigerators and electric showers were the most prevalent appliances in the surveyed homes.
[20] Field surveys of 330 homes (random sample), using a previously prepared questionnaire (Behrens, 1985).

- *Electric power consumption was high due to inefficiency, including defective wiring, the use of second-hand appliances, near empty refrigerators and little natural light.*
- *Monthly domestic energy consumption was approximately 250 Mcal, with around one third of energy needs supplied by electricity.*
- *LPG was used in shantytowns located in urban areas while firewood was used in outlying shantytowns where this fuel was locally available. The survey noted that firewood consumption reduced in proportion to increased rural income, while energy consumption rose in proportion to an increased income of urban shantytown dwellers. The author estimated that shantytown families with an income lower than one minimum wage allotted approximately 25% of their income to buying energy.*

The Light programme[21] for shantytowns and unregistered plots of land, known as the Social Benefit Electrification Programme, started in 1979 and was intended to extend electricity services to all shantytowns located within the limits of the utility's concession. The programme produced 150,000 new connections[22] in 443 communities from 1979 to 1984.In the 1990s, the Light programme foundered because of the worsening income levels of the poorest shantytown population. Tariffs escalated and consumption by the low-income population was relatively high, due in part to the poor quality of electrical installations and the inefficiency of the electrical appliances being used. These problems, exacerbated by irregular and decreasing family income, led to suspended supplies and to fraud, making the programme financially unviable.

This use of electricity by the poor population was encouraged by an aggressive policy to link consumers to supply networks and provide tariffs with cross subsidies and the substitution of traditional energy sources was reversed (Figure 12). There was a rapid increase in defaulting and in using illegal connection methods to get electricity supplies, as is demonstrated in the following case of Cajú community.

Figure 12: Brazil – Private Permanent Homes Access to Electric Light by Macro-Regions, 2003



Source: PNAD/IBGE, 2003.

To ease the social impact of these changes, new mechanisms to subsidise energy supplies for low-income families were implemented. Despite the high rate of access, utilities report that consumer payment default is rising and there is also an increase in the use of illegal connections to energy supplies. Even with significantly higher connection levels, it is estimated

[21] At that time, the utility was state-owned.

[22] In this same document, Behren (op. cit) asserted that the estimated number of connections still to be made would be approximately 25,000, "a figure easily carried out in 1985".

that about 8.5 million Brazilians remain unconnected to modern energy supply networks[23], most of them in rural areas in the country's north and northeastern regions. As already noted, these people still use firewood for cooking,[24] which has harmful effects for their health (WEA, 2000) and is environmentally unsound.

Under the new Constitution (1988), energy markets were liberalised and utilities were compelled to introduce competitive prices for their energy supplies.
These new competitive rules made the use of cross subsidies for the poor difficult and complex. In order to provide subsidies for low-income consumers, utilities increase prices for other consumers, so reducing competitiveness. The new energy policy has brought about an alignment of energy prices and tariffs with international market price levels, but this has caused a considerable increase in the price of LPG and electric power tariffs. Between 1995 and 2003, the Brazilian Institute of Geography and Statistics (IBGE) measured inflation at 72.5%, which was much lower than the increase in energy prices over the same period. This generated a considerable increase in the cost of energy supplies for poor families and prompted a new trend.

The Gas Voucher was created for LPG, providing financial assistance to consumers able to provide evidence of a per capita income of up to half a minimum wage. This programme was intended to assist approximately nine million people, more than half of whom were in the north-eastern region. To be eligible for the subsidy, poor families had to prove insufficient income and register with the government. The Gas Voucher was recently incorporated into the subsidy provided by other government social projects, such as the Family Aid programme.

Progressive electricity tariffs, in which prices become higher as consumption levels rise, were limited to consumers who could provide evidence of financial need. In this case, the eligibility of families to get subsidised tariffs was delegated to utilities under the supervision of the National Electric Energy Agency (ANEEL), the regulatory entity of the Brazilian electrical system. As for the Gas Voucher criteria, the families should have a maximum per capita income equivalent to half a minimum wage and evidence of this has to be provided to the utility. It has been extremely difficult to implement this new regulation for those people whose consumption stands between 80 kWh and 220 kWh/month due to the limited resources available to compensate utilities for the subsidies they provide. The effect of this change in price policy can be seen in Table 11 below. The number of low-income consumers eligible for subsidies was drastically reduced. Moreover, Aneel identified a reduction in the number of registered low-income consumers from 34% in 1997 to 17.2% in 2001.

Table 11: Families Eligible for Subsidies*

Consumption (kWh/month)	Before	After
0 – 30	82%	65%
31 – 100	55%	40%
101 – 200	24%	10%
>200	0%	0%

* Before and after the new tariff regulations

Source: DIEESE Bulletin, #06, 1997.

[23] Connection to a supply of piped gas has only just started, but the LPG distribution network covers all urban regions.
[24] Firewood is mainly used by the poor population in rural areas and on the outskirts of urban areas. The consumption percentage is high, due primarily to the inefficiency of woodstoves.

Energy in Cajú

Cajú homes use LPG for cooking and electric power for lighting and to supply domestic appliances. LPG supplies reach the communities and practically all homes are connected to Light's power grid. The main problem facing the Cajú population is an inability to pay their energy bills. Table 12 shows real costs for the Cajú shantytown energy consumption.

Table 12: True Energy Expenses, 2002 (in monthly R$)

	A	B	C	D	TOTAL
Average Income by household	**1,541.37**	**870.59**	**567.73**	**334.23**	**743.07**
Billed Electric Power (LIGHT and IETS)	26.18	29.18	21.71	24.80	25.56
Estimated LPG + 20%	19.69	21.10	23.76	27.23	23.18

Source: FIRJAN/IETS.

Estimating electricity consumption was more complex. An analysis of consumption data billed by Light showed an unexpected result—**there is no significant difference between the electric power consumption of Cajú households**. This result prompted a comparison of consumption billed by Light with estimated consumption based on ownership of domestic appliances in the households[25].

Two data bases were used for this purpose. Light provided information on the physical consumption in kWh and the monetary outlay in Reais (R$). The questionnaires provided information on declared electricity costs and the number of domestic appliances used by the households, but the databases of the sample (Firjan/IETS) and of Light do not completely match. Around 21% were identified in both data bases.

Table 13 shows estimates of electric power consumption based on a reduced sample (Light/IETS) and a large sample (Firjan/IETS).

Table 13: Cajú – Households by Type and kWh
(Estimated and Computed), 2002

	A	B	C	D	TOTAL
Estimated kWh	261.10	191.25	149.76	95.13	176.39
Estimated kWh (Firjan/IETS)	232.98	169.14	129.73	95.13	148.21
Invoiced kWh (LIGHT)	106.69	113.43	99.99	103.19	106.28

Source: FIRJAN/IETS. Special Tabulations

Estimates of the reduced sample (Light/IETS) and the large sample (Firjan/IETS) show consistent results. Type D households whose consumption is minimal showed practically the same estimate on both samples[26].

Light's energy losses amount to 40% of the electricity consumed in the Cajú shantytown[27]. This surprising figure is the result of the use of "gatos"[28] as a strategy to balance energy

[25] Estimated by multiplying declared domestic appliance ownership by the average electricity consumption indicators of such appliances obtained by the National Electric Power Conservation Programme (PROCEL) through a national survey.

[26] The disparities between the two estimates can perhaps be explained by the fact that households of the Light/IETS sample have a higher reported level of income.

[27] Figures provided by Light, based on energy is measured in the transformers that supply the Cajú shantytowns, are, at 70%, a little higher than this estimate.

[28] The popular name for illegal connections to the distribution grid.

expenses with household income. The case study estimated the annual financial losses of the electric utility at R$168.2 million. Cajú householders are losing another R$13.5 million from paying higher prices for LPG services. Together, these losses total about R$180 million, which if properly collected could provide benefits to families living in indigence (Type D) and poverty (Type C). This raises two problems: how to collect these funds and to whom they should be assigned.

Cajú householders consider energy prices to be very high compared to their income[29]. The focus groups pointed out that shantytowns are not offered the same quality of service provided by the utility in other parts of the city[30]. They feel that emergency situations are not dealt with quickly, especially at night; the quality of electricity supply is poor; in summer, supply does not keep up with demand; and requests for increasing the supplies to commercial establishments are not met in time. In the Cajú shantytowns, there is a willingness to pay when electricity bills are affordable. These bills are proof of residence and allow householders to access credit services.

Moreover, local criminal gangs[31] control the LPG market in the shantytowns of Rio. These gangs impose a surcharge of approximately 20% on the market price of LPG charged by the authorised suppliers.

The state government, responsible for combating criminal activities, receives a substantial amount (about R$400 million per month in 2004) from oil producers operating in Rio[32] to compensate for the fossil resource depletion.

The community believes these funds should benefit low-income groups. "*There was a time when they established the price of gas and I could buy one cylinder for R$13,00. Well then, why this nearly 400% increase? I believe that the producers and the government that does not control this are responsible. Well then, there should be a fixed rate for gas. Yes, R$15.00; R$15.00 is OK, at least for the communities*". All the groups consider the maximum of R$20.00 a "good" price for LPG.

Since launching the **Efficient Community Project**[33], the utility's image has improved. This project offered technical support to 172 homes identified as indigent[34] and implemented changes to help them reduce consumption and improve their quality of life.

Using funds made available by Aneel[35], the regulating body, the Project improved lighting, ventilation and electric wiring[36] in 79 homes. It also taught methods of reducing energy

[29] *"The price is very high. Usually wages are not compatible with the price and the bill is really very high".*

[30] Light employees make friends with inhabitants by providing technical knowledge and teach them what to do if there are problems.

[31] Daily O GLOBO, 10/18/04,10/14/04, 10/11/04, 09/28/, 09/25/04, 09/22/04.

[32] The largest oil producing basin is in Rio de Janeiro. In 2003, 1.3 million barrels per day were extracted from its sedimentary basins.

[33] Outstanding bills could be paid by installment. This was well received by the community, as reported by a youth who owed R$2,000.00 and who is now paying about R$100.00 per month to pay down his debt.

[34] Denker/Light, Final Report, Efficient Community, No date

[35] Brazil's tariff system includes an additional 1% to the rate for fostering technological innovations (0.5%) and improving the electrical system (0.5%). To use the funds available for electrical efficiency, utilities must receive approval from the regulator.

[36] The homes of the Cajú communities were built without technical support.

consumption[37]. As a result, consumption dropped and households brought bills up to date. The focus groups want this demonstration project to be an ongoing programme.

An important aspect of Brazil's electrical system is the popular use of electric showers for heating the daily bath, producing heavy demand during peak evening hours. Greater investment in electricity transmission and distribution lines is necessary to meet this demand for a few hours per day.

The use of solar energy to warm up water would drastically reduce peak demand and provide significant economic benefits for all consumers[38]. However, this technology is little used in Brazil. Solar heat collectors were considered a clean energy solution and Cajú householders welcomed the idea of implementing a solar heating system in their community.

LPG price is higher than its market value, and as a result low-income households in Cajú pay nearly 10% more for their energy needs than households in other residential areas of Rio.

3.3 Policies

Some Definitions: Energy, Poverty and Exclusion Concepts[39]

The literature on this issue, [Rowntree, (1901); Townsend, (1993)[40]; Gough (2000); Sen (1992); Estivill (2003); Raveaus and Salais (2001) and Lavinas (2003)], discusses the suitability of using economic criteria to define the limits classifying a poor and indigent population. Although this is the prevailing criteria, it does not fully take into account the complexity of the poverty phenomenon, nor its genesis and dynamics.

Estivill (2003) classified strategies to combat poverty and exclusion, with the goal of increasing the empowerment and autonomy of individuals to reduce their vulnerability. This last paradigm has been the basis for a new generation of policies to combat poverty. In this respect, it is essential to move from an approach centered on overcoming needs (freedom from want) to an approach that focuses on freedom to act, as proposed by Raveaud & Salais (2001).

Programmes in implementation

The challenge is to avoid limiting social policies to the priorities defined by the urgency of poverty and to take into account the structural dimensions of exclusion at a later date. It is necessary to devise a strategy that simultaneously considers the needs of consumption and the job market, expanding the scope for citizen participation. These two exclusions cannot be disassociated; they should be dealt with concurrently.

In Brazil, the government of President Luiz Inácio Lula da Silva has blended distribution of services in natura (Zero Hunger) with a programme for the transfer of financial support to

[37] Three light bulbs were donated to each home.

[38] Light is undertaking a pilot project (*The Era of Solar Energy*) that will install solar collectors in the low-income communities of Duque de Caxias and Nova Iguaçu. The utility estimates that the resultant demand reduction can reduce dwellers' light bills by up to 30% (site www.light.com.br , accessed on 02/01/2005, mid-day).

[39] This text freely quotes Lavinas (2003) Poverty, Inequality and Exclusion: current contexts, São Paulo, São Paulo City Hall and European Union, Network URB-AL 10, 2003. With thanks to the Secretariat for International Relations of the City Hall of São Paulo for their permission to use it in this study.

[40] The European Union classifies as "poor" individuals whose resources are insufficient to allow them to enjoy the lifestyle, habits and activities that are normal for the society in which they live. The target for compensatory assistance policies is individuals whose per capita income is less than 66.7% of the available median income.

families that can provide evidence of financial hardship (Family Aid). It is too early to estimate the impact of this programme, but demand for it far outweighs its supply! Its benefit does little to close the income gap that deprives the most destitute from their basic rights. Dependent on limited financial resources, this programme is unable to provide much more than a safety net (a social minimum).

It is necessary to rethink the policy for combating poverty and exclusion, expand its scope beyond material needs, identify the causes of poverty and exclusion, and the disruption to social networks.

Policies to combat poverty must aim at eliminating these causes to create the right conditions for social inclusion. The goal of the project is to understand the role of the energy sector in assisting this process.

Modern society, especially in urban areas, became strongly dependent on energy supply to guarantee quality of life for its population. The lack of energy availability has a direct impact on social lifestyles, as Brazilians found out in 2001 (Oliveira, 2003). A shortage of energy not only reduces quality of life for everybody, it limits the opportunities to raise income levels to cover basic needs.

This led governments to adopt energy policies aimed at broadening access to energy supplies. Governments and multilateral financial organizations channeled substantial resources into developing the energy infrastructure with the aim of accelerating economic development and social progress.

As a result of this energy policy, the populations of developed countries gained universal access to the network of modern energy sources. In developing countries as well, this policy has permitted a rapid increase in the number of households linked to energy supply networks in urban areas, but connection remains a remote reality for the population in rural areas (WEA, 2000). Allocating tax resources to subsidise low-income consumers, as in developed countries, could solve this problem. However, the fiscal situation of the majority of developing countries (especially in Latin America) has deteriorated severely over recent decades. Government budgets have little leeway to provide fiscal resources to subsidise energy for low-income consumers.

It is, therefore, not surprising that actual energy tariffs for these social groups have increased significantly in recent years (Barnes & Toman, 2001). Even when the income of the poor experiences moderate growth, the rise in energy prices has outstripped this increase.

Brazil's energy policy changed radically in the 1990´s. The trajectory of growing costs in a competitive setting led to an increase in electricity rates and higher fuel prices. This new situation coincided with the stagnation of economic growth and resulted in increased unemployment and a growing informal labour market. Energy became more costly at a period when poverty increased and there was a large expansion of low-income communities in Rio de Janeiro[41].

Utilities are currently forced to adopt implicit cross subsidies to recover their costs. At the same time, the regulator of the electricity market (Aneel) does not accept this because it results in an unfair surcharge for other consumers. Due to Aneel's policy, utilities are not motivated to make the necessary investments to expand their services. This has a lasting negative impact on the economic development of the city.

[41] This situation was general throughout all Brazilian metropolitan regions.

Literature suggests that the poor resent the difficulty of accessing infrastructure, especially energy, as a determinant of social exclusion (Asian Development Bank, 2001). This policy has led to an acute increase in payment defaults by the poor and in their use of illegal methods to obtain access to energy supplies.

In formulating policies to provide universal access to energy, it is fundamental to acknowledge that this does not guarantee that the poor communities can access other essentials (food, health, education, jobs, information, independence). Nevertheless, energy supply, if properly linked to other social programmes, can help to develop these communities through the emergence of micro and small business enterprises that provide goods and services appropriate to the social-economic conditions of the low-income population (Wasiki & Kimenyi, 2001).

Energy companies could introduce innovations, such as:

- cooperating with government agencies to legalise local business and stimulate an entrepreneurial spirit within the poor community;
- offering tariff schemes that allow families and small businesses in the poor communities to address social and economic insecurity;
- encouraging the use of renewable energy sources and energy efficient techniques in order to reduce the environmental impact of fossil fuels, and as an incentive to local entrepreneurs as well.

The prevailing feelings of resignation and social exclusion encourage illegal connections (Gatos) to other network services, such as water supply, and this slows down the development of infrastructure needed to improve the quality of life in shantytowns. This situation is further aggravated by the perpetrators of organized crime in these communities who see the opportunity to control certain economic activities without interference from the authorities.

The Ministry of Cities recently implemented a National Program of Support to Sustainable Land Legalization. It aims to break "the administrative and patrimonial barrier that has previously separated shantytown dwellers from other urban inhabitants"[42]. Legalisation of land ownership in Quinta do Cajú and implementation by the Rio municipality of the "Morar Legal" (Legal Habitation) programme are good beginnings in the process of social inclusion of low-income communities.

Furthermore, experience indicates that poor families tend to make decisions based on the basic cost of energy appliances, ignoring the added real costs of providing their energy services[43]. Therefore, poor families tend to choose low-cost equipment, though it may be less energy efficient.

A decision based on the low cost of an appliance, often a second hand acquisition, turns out to be much more expensive when the cost of energy to run it during its useful life is included. This situation increases energy costs unnecessarily for poor families and, most importantly, represents a significant portion of their income[44].

[42] www.rio.rj.gov.br/habitação , accessed on 2/15/05, at 4:30 p.m.

[43] The discount rate to the poor population is much higher than the discount rate used in the formal economy. This difference is more accentuated in countries like Brazil that experienced a long period of high inflation.

[44] These expenditures can be as high as 17% of the family income in the case of Brazilian indigent families.

3.4 Lessons to Consider

The government's main priority in the social field is to address hunger, the worst aspect of poverty. Several methods of income transfer were incorporated in the Family Aid Program that offers R$50.00 per month to families with a monthly per capita income of up to R$100.00; families with children under 15 receive additional R$15.00 per child (for a maximum of three children). This policy is one of several measures to ensure access to basic social rights, such as health, food, education and social assistance. It can be classified as palliative (Estivill, 2003), but its ambition is to achieve independence.

To provide real support for the poor and destitute, such programmes should be coordinated and backed by economic policy, be able to generate employment and also revenue in the community. The energy sector can and must play a leading role in this process. Reducing the number of illegal connections and the surcharge on LPG is a complex task. The energy policy on its own cannot bring about a required change, but together with other government policies, the energy sector can be a lever for social inclusion of poor communities in society. This will help address both illegal connections and LPG surcharges.

It is important to stress that the corresponding rate increase will be largely offset by a reduction in the permanent tariff due to the elimination of the implicit subsidy caused by illegal connections. As far as tariff policy is concerned, a solution might be to offer tax exemptions, and access to cheaper energy from local generation facilities to reduce the tariff of low-income consumers.

3.5 Bibliography

ASIAN DEVELOPMENT BANK (2001). Global Poverty Report. Manila, Philippines: Asian Development Bank.

BARNES & TOMAN (2001). Assessing the impact of Transport and Energy Infrastructure on poverty reduction. Asian Development Bank.

BARROS, R. P de; HENRIQUES, R.; MENDONÇA, R. (2002). Pelo Fim das Décadas Perdidas: Educação e Desenvolvimento no Brasil. Text for Discussion (857). RJ: IPEA.

BEHRENS, A.E. (1985). De casas-mãe a Casas-filha: Impacto das Relações de Parentesco no Consumo Domiciliar de Energia em Favelas. Colégio da América Latina, Julho, Série Estudos. Rio de Janeiro.

BRASIL, Instituto Brasileiro de Geografia e Estatística (IBGE), Censo Demográfico de 2000, Contas Regionais do Brasil, Pesquisa Nacional por Amostra de Domicílios [PNAD (vários anos)], Rio de Janeiro, 2002. Site www.ibge.gov.br , accessed several times.

_____, Ministério das Minas e Energia, Balanço Energético Nacional, BEN 2000 & 2001, Brasília, Secretaria de Energia, Departamento Nacional de Política Energética. Site: www.mme.gov.br, accessed on 01/21/2005.

_____, Ministério da Educação, "Estatísticas Básicas", INEP, site www.mec.gov.br , accessed on 12/4/2004.

_____, Ministério do Planejamento, Orçamento e Administração (2001). Evolução Recente das Condições e das políticas Sociais no Brasil. Brasil, Brasília, (mimeo).

BURGOS M.B. (2003) Dos parques proletários ao Favela-Bairro: as políticas públicas nas favelas cariocas. In Zaluar A. & Altivo M. (org) Um Século de Favela. Rio de Janeiro: FGV, 3rd edition.

CAMARANO, Ana Amélia (org), (1999). Muito além dos 60 – Os novos idosos brasileiros, Rio de Janeiro, IPEA.

CASTELLS M. (1971). Problemas de Investigación en Sociologia Urbana. Mexico : Siglo XXI.

DIEESE, Departamento Intersindical de Estatística e Estudos Sócio-Econômicos, "BOLETIM", São Paulo, n. 206, 1997.

DTI/UK (2001). The causes and effects of fuel poverty. Department of Trade and Industry. United Kindom. In: htpp://www.dti.gov.uk/energy/consumers/fuel_poverty/strategy.shtml.

ESTIVILL, J. (2003). Concepts and Strategies for Combating Social Exclusion. An Overview. STEP, International Labour Organization (ILO).

FIRJAN, Federação das Indústrias do Rio de Janeiro & IETS, Instituto de Estudos do Trabalho e Sociedade, Microdados da Pesquisa sobre Comunidades de Baixa Renda do Rio de Janeiro, Rio de Janeiro, 2003.

GOUGH I. (2000). Global Capital, Human Needs and Social Policies. Selected Essays: 1994-99. Cap. I. London: Palgrave.

IETS, Instituto de Estudos do Trabalho e Sociedade, Ministério do Trabalho e Emprego, FIRJAN, Rio de Janeiro Trabalho e Sociedade, Favelas, N.3, April 2002.

----------, Dez anos depois: Como vai você Rio de Janeiro?, Rio de Janeiro, N. 5, March 2003.

O GLOBO Newspaper, of 09/22/04, 09/25/04, 09/28/04, 10/11/04, 10/14/04, 10/18/04, site (www.agenciaoglobo.com.br) accessed on 01/31/2005.

KOWARICK L. (1975) Capitalismo e Marginalidade na América Latina. Rio de Janeiro: Ed. Paz e Terra.

LAVINAS, Lena (2003) Pobreza, Desigualdade e Exclusão: contextos atuais, São Paulo, Prefeitura do Município de São Paulo e União Européia, Rede URB-AL 10. Site http://www.prefeitura.sp.gov.br/arquiv/urbal/documento/documento_de_base_portugues.pdf

LIGHT, Cadastro da Comunidade do Cajú, May 2004. Site: www.light.com.br , accessed several times.

_____ , DENKER. Planejamento e Consultoria Ltda. Relatório Final do Projeto Comunidade Eficiente. RJ,undated – (mimeo).

MALAN, Pedro & WELLS, John. (1975). "Distribuição de renda e desenvolvimento econômico do Brasil", em TOLIPAN, R. & TINELLI, A.C. (orgs), A controvérsia sobre a distribuição de renda e desenvolvimento, Rio de Janeiro, Zahar Editores.

MELO, Hildete Pereira (2004). Gênero e Pobreza no Brasil, Brasília, Secretaria Especial de Políticas para as Mulheres e CEPAL, Relatório de Pesquisa (mimeo).

OLIVEIRA, Adilson de. (1998). Energia e Desenvolvimento Sustentável. Rio de Janeiro, IE/UFRJ, Ministério de Minas e Energia, Eletrobrás, Relatório de Pesquisa, (mimeo).

_____ (2003). The Political Economy of the Brasilian Power Industry Reform. Working Paper, Programme on Energy and Sustainable Development, IIS, Stanford.

OLIVEIRA, Francisco. de (1975). Economia Brasileira. Crítica a Razão Dualista. Sâo Paulo: Editora Brasiliense e CEBRAP, página 69.

PAIXÃO, Marcelo (2003), "A hipótese do desespero: a questão racial em tempos de frente popular", Observatório da Cidadania, Relatório 2003, IBASE, vol.7.

PREFEITURA DO MUNICÍPIO DO RIO DE JANEIRO, Diagnóstico do Favela-Bairro (Comunidade da Quinta do Cajú), Rio de Janeiro, January 1996. Site: www.rio.rj.gov.br.

RAVEAUD, G. e SALAIS, R. (2001). Fighting against Social Exclusion in a European Knowledge-based Society: what principles for action? In Mayes, Berghman & Salais (editors). Social Exclusion and European Policy. Globalization and Welfare. UK: Edward Elgar Publishing Limited.

RIO DE JANEIRO, Secretaria de Estado de Ciência e Tecnologia, Balanço Energético do Estado do Rio de Janeiro 1980/1995, Rio de Janeiro, 1998.

_____, Centro de Informações e Dados do Rio de Janeiro, Fundação CIDE, site www.cide.rj.gov.br , accessed on October 13, 2004.

ROCHA, Sonia. Pobreza no Brasil – Afinal, de que se trata?, Rio de Janeiro: FVG.

ROWNTREE, B.S., (1901), Poverty. A study of town life, MacMillan, London. Recently re-published in 2000 by The Policy Press (see htpp://www.bris.ac.uk/Publications/TPP/Pages/at 036 htm).

SALAMA, Pierre & DESTREMAU, Blandine. (1999) O Tamanho da Pobreza – Economia Política da Distribuição de Renda. RJ: Garamond.

SCHWARTZMAN, Simon, As causas da pobreza, Rio de Janeiro, Editora da FGV, 2004.

SEN, A.(1992), Inequality Reexamined, New York: Cambridge.

SINGER, Paul, "Desenvolvimento e repartição de renda no Brasil", em Tolipan, R. & Tinelli, A.C. (orgs), A controvérsia sobre a distribuição de renda e desenvolvimento, Rio de Janeiro, Zahar Editores, 1975.

SMITH, P.(1993). Fuel Consumption, Air Pollution Exposure and Health: The Situation in Developing Countries. Anual Review of Energy and Environment.

TAVARES, Maria da Conceição, "Distribuição de renda, acumulação e padrões de industrialização: um ensaio preliminar", em Tolipan, R. & Tinelli

A.C. (orgs), A controvérsia sobre a distribuição de renda e desenvolvimento, Rio de Janeiro, Zahar Editores, 1975.

TOWNSEND, P., (1993), The international analysis of poverty, Harvester Wheatsheaf: Milton Keynes.

VALLADARES, L. (1991). Cem anos pensando a pobreza (urbana) no Brasil. In: Boschi R. (1991). Cooperativismo e Desigualdade. A Construção do Espaço Público no Brasil. Rio de Janeiro: Rio Fundo Editora.

VASCONCELOS, R. T. M. (1985). Luz nas Favelas. In: Anais do Seminário Crise Urbana, Energia e Desenvolvimento Alternativo: o caso do Rio de Janeiro, vol II, Rio de Janeiro: SEI-IUPERJ-FINEP, p.269-308.

WASIKE, W. S; KIMENYI, M. S. (2001). Infrastructure Service Entitlements and Urban Poverty: Improving Policy for Alternative Delivery in Kenya. Kenya: Kenya Institute for Public Policy Research and Analysis (KIPPRA).

WILSON W. JULIUS (1987). The Truly Disadvantaged. The inner city, the underclass and public policy. Chicago: The University of Chicago Press.

Sites accessed:

www.cidades.gov.br , accessed on 02/15/05.

www.gabeira.com.br/cidadesustentavel , accessed on 02/1/2005.

www.aneel.gov.br , accessed on 01/21/2005.

www.vivafavela.com.br, accessed on 2/1/2005.

www.conedh.mg.gov.br/trabalhos/bolsa. accessed on 02/14/05

CHAPTER 4
Comparative Analysis

The objective of the study was to offer practicable recommendations to policy makers and businesses on how to make energy accessible and available to the urban poor. Little work has previously been done in the area of understanding poverty alleviation within the context of energy in urban areas. In an attempt to shed light on this growing issue within the LAC region, WEC has explored the living conditions of the urban and rural poor in three large cities.

The common denominator of all three cases is that relief measures for energy poverty are insufficient, although they may, in varying degrees, constitute an important step towards mitigating urban poverty and improving the quality of life of the poor.

4.1 Overview

All three case studies show options that could resolve this situation, and which would help both the urban poor and the utilities. The correct coordination of government policies will play a key role as long as companies and users participate. This requires education for the poor and the cooperation of the decision-makers and those social sectors most favoured by the unfinished modernisation processes in Latin America and the Caribbean.

Argentina

The Argentine case study highlighted the successful implementation of a solution to regulate illegal users through a programme that provided legal access to energy supplies for about 700,000 poor households. However, the lack of a comprehensive policy for urban poverty alleviation, tariff distortions, obsolete equipment and the lack of subsidy policies created new problems, such as an increase in delayed payments and new illegal connections. The number of illegal connections, the high cost paid by the poorest users and the opportunity to regulate service through a programme that takes into consideration utility losses, highlights how successful the Argentine programme has been.

The regulatory programme shows that users are willing to pay for energy services provided the bills represent a reasonable proportion of their income. One obstacle to this can be seen in the case of Venezuela where, for historical reasons, there is a culture of belief that energy should be free. This simply emphasises how education is an essential policy variable that must be addressed, from job training to an awareness of the rights and obligations of citizens.

The Argentine case showed that a social tariff would be a suitable solution to help regulate access to energy for the urban poor, so long as a policy is in place to ensure LPG supplies will be available at costs in line with low-income household earnings.

Brazil

The Brazil study dealt with various concepts and approaches to combatting energy poverty. The results are particularly relevant to the Latin America region since the problems with the urban poor have similar roots, despite each country's individual cultural characteristics. The study has also revealed the problem of organised crime and its obstructive effect on subsidy policies for LPG supplies. A practical solution would be a social tariff to enable regulated access to energy for the urban poor, provided a price policy is put in place that assures them

affordable access to LPG. Another suggested solution suggested is to emphasize rational energy use through access to more efficient equipment.

The historical trend points to the need for more selective lines of action and concludes that price policies do not greatly affect the poor. The policies actually lead to generalised distortions between energy prices and costs, affecting investment and the quality of the service. Attempts to charge prices for energy that are closer to the actual cost of supply have resulted in an increase in illegal connections. Therefore, regulatory programmes need to be implemented with sustainable tariffs.

Venezuela

The Venezuelan study explored different subsidy mechanisms and market solutions and suggests that further work is needed to quantify the amounts required and their impact on those economic sectors with the lowest payment capacity. This philosophy should not be mistaken as indiscriminate praise for cross subsidies. It must be based firmly on a political and social policy for the progressive integration of poor users with the rest of society, so avoiding social unrest and ensuring lower costs for utilities and society alike.

Emphasis should be placed on education policies that increase the economic independence of the poor, through training, employment and growth strategies enabling their integration with society. Meanwhile, subsidies should not be extended to sectors that do not need them. Price policies should be designed to solve the problems of sustainability and quality of supply at the same time. A suitable combination of tariff engineering and comprehensive policies for rational energy use is needed to facilitate access by the poor sectors to efficient equipment.

4.2 In Summary

Though clearly there are differences and similarities, the three Case Studies all reveal the scale and significance of the problem of the urban poor in the region's large cities. This is an increasingly influential structural phenomenon with numerous negative consequences, including:

- energy losses
- inefficient energy use, and
- an increased sense of marginalisation among the urban poor that threatens social peace and creates a breeding ground for political opportunism.

By linking urbanisation and industrialisation when the rural-urban migration process began, it became possible for large numbers of the population to enjoy the benefits of a modern lifestyle. Although the degree of social integration was different in each country for historical and cultural reasons, the effectiveness of job-creation by the respective governments was a decisive factor in improving living standards of the urban areas, compared to those of rural areas.

This integration went hand-in-hand with the notion of a right to access to public services and was generally stimulated by the state through its public utilities, regardless of the cost-tariff relationship. It became increasingly hard for the poor to keep pace with higher income households as urbanisation proceeded and industrialisation underwent a global transformation that was less dynamic, more competitive and based on profound technological changes. Consequently, the twin problems of poverty and exclusion became more relevant in both relative and absolute terms. Ensuring employment will be one of the greatest challenges.

Energy Accessibility

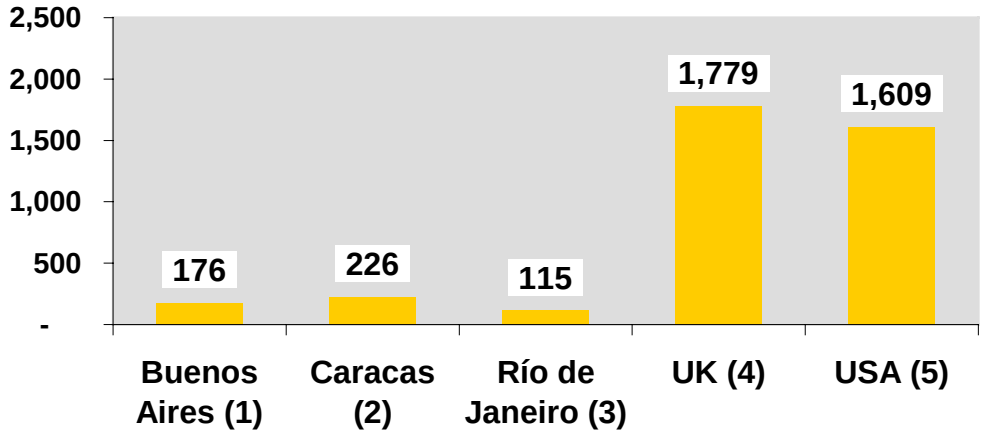
All three case studies demonstrate that high levels of access to modern energy services have been achieved in the cities and the respective countries, including low-income households.

Energy needs are met by using LPG for cooking and electricity for lighting, food conservation and heating and/or cooling. By 2002, the number of low-income households with access to electricity reached nearly 100% in Buenos Aires, 99.5% in Rio de Janeiro and at least 97.3% in Caracas. When both urban and rural low-income households are considered, the general electrification rate is 87.7% in Venezuela and 84.3% in Brazil.

Average Family Income

The income in households in all case studies has certain common features, such as being earned through irregular, "off the books" economic activities or in unskilled jobs. Figure 12 demonstrates the average family income for the case studies, and for comparison, the corresponding figures for low-income households in the UK and the US.

Figure 13: Average Family Income for low-income households



Sources:

(1) WEC Argentine Committee and Fundación Bariloche, "Methodology and Criteria to analyze energy subsidies in electricity for urban poor people in Greater Buenos Aires", June 2003, page 38, table 3-A2. Exchange rate used: 3.00 Arg$/US$.

(2) CVG Edelca, C.A La Electricidad de Caracas y Universidad Católica Andres Bello, "Alleviating Urban Urban Energy Poverty in Latin America: The Caracas Case Study", December 2004, page 4. 2002 Prices

(3) Instituto de Economía -Universidade Federal do Rio de Janeiro, "Energy Poverty -Cajú Shantytown Case Study", September 2005, page 27, table 15. Exchange rate used: 2.90 R$/US$.

(4) Calculations based on average income 2003-2004 for the bottom fifth of households in UK, available in UK National Statistics website (http://www.statistics.gov.uk). Exchange rate used: 1.80 US$/£.

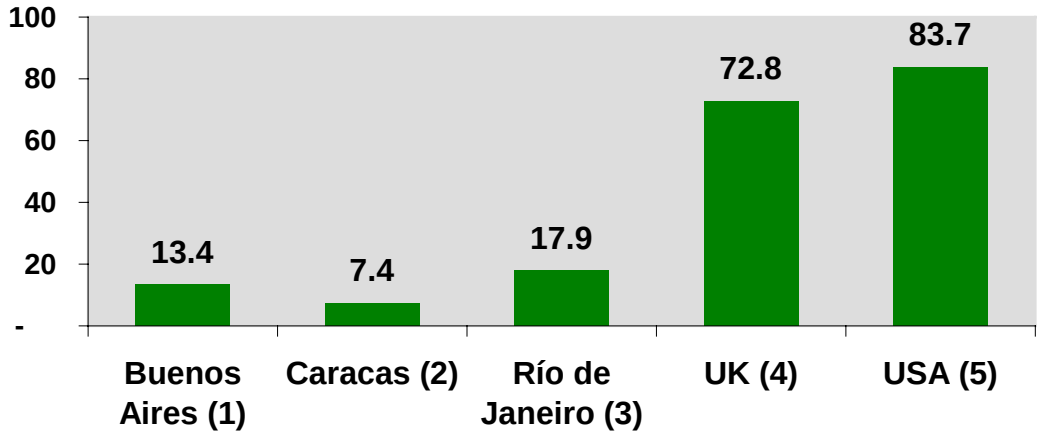
(5) Results from the 2004 census published by The Wall Street Journal on August 31, 2005.

It should be noted that family income is calculated for a family unit of 4 in Buenos Aires (4.1 in Rio de Janeiro and 6 in Caracas). This leads to a conclusion that family income is relatively similar among the 3 Latin American cities analysed in this report. Education is the key factor for family income. Due to low education levels and lack of professional qualifications, people living in shantytowns have fewer opportunities to get regular and stable jobs, and this results in high unemployment and the inability to afford living costs.

Energy Expenditure

A comparison of the energy expenditure in low-income households, on the other hand, shows significant differences between case studies. The data presented in Fig. 13 are based on 2002 prices. UK and the US data are included for reference purposes.

Figure 14: Average Energy Bill for low-income households



Sources:

(1) WEC Argentine Committee and Fundación Bariloche, "Methodology and Criteria to analyze energy subsidies in electricity for urban poor people in Greater Buenos Aires", June 2003, page 15, table 4.3.1. Exchange rate used: 3.00 Arg$/US$.

(2) CVG Edelca, C.A La Electricidad de Caracas y Universidad Católica Andres Bello, "Alleviating Urban Energy Poverty in Latin America: The Caracas Case Study", December 2004, page 11.

(3) Instituto de Economía -Universidade Federal do Rio de Janeiro, "Energy Poverty -Cajú Shantytown Case Study", September 2005, page 27, table 15. Exchange rate used: 2.90 R$/US$.

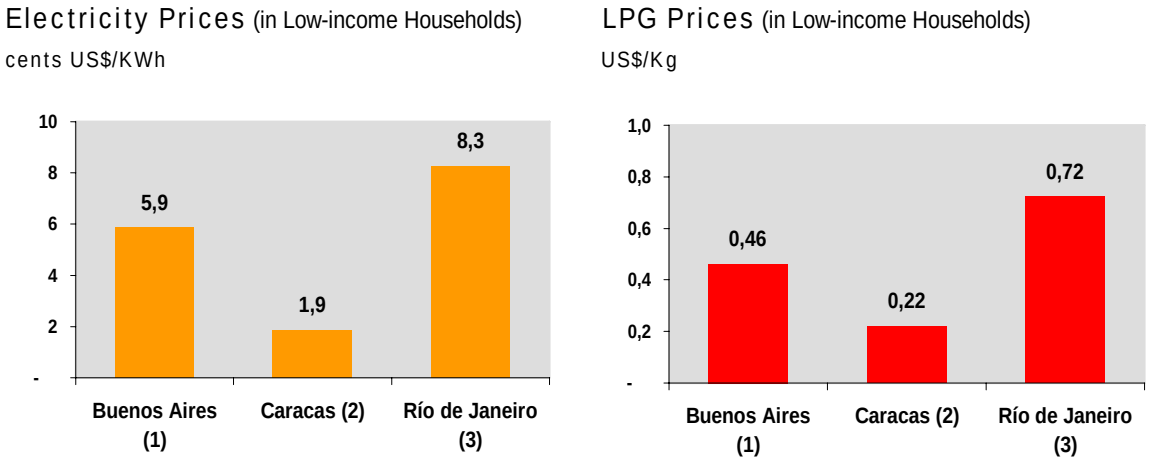
(4) Calculations based on UK National Statistics document "Family Spending 2002/2003 Expenditure and Food Survey, page 20 (http://www.statistics.gov.uk). Exchange rate used: 1.80 US$/£.

(5) Calculations based on data from the Energy Information Administration (EIA), Official Energy Statistics from the US Government.

In all three case studies, energy needs are met by electricity and LPG, except for Argentina, where the use of coal is reported for cooking purposes. Energy consumption in low-income households in 2002, can be summarised as shown in Figure 14.

Figure 15: Energy Consumption and Prices in all case studies by year 2002

Case Studies	Prices	Average Consumption	Bill
Electricity	centsUS$/KWh	KWh/month	US$/month
Buenos Aires	5,88	97,00	5,71
Caracas	1,86	220,00	4,10
Río de Janeiro	8,29	103,19	8,55
LPG	US$/Kg	Kg/month	US$/month
Buenos Aires	0,46	10	4,61
Caracas	0,22	15	3,30
Río de Janeiro	0,72	13	9,39



Sources:

(1) WEC Argentine Committee and Fundación Bariloche, "Methodology and Criteria to analyze energy subsidies in electricity for urban poor people in Greater Buenos Aires", June 2003, page 15, table 4.3.1 and table 3-A2. Exchange rate used: 3.00 Arg$/US$.

(2) CVG Edelca, C.A La Electricidad de Caracas y Universidad Católica Andres Bello, "Alleviating Urban Energy Poverty in Latin America: The Caracas Case Study", December 2004, pages 9 and 10.

(3) Instituto de Economía -Universidade Federal do Rio de Janeiro, "Energy Poverty -Caju Shantytown Case Study", September 2005, pages 26-28. Exchange rate used: 2.90 R$/US$.

It is clear that higher consumption figures reported in the Caracas case study are primarily the result of heavy subsidies. When prices are adjusted to cover full supply costs, the resulting energy bill would be close to the average for Rio de Janeiro, assuming that energy consumption remains constant, or closer to the average for Buenos Aires in case electricity demand is reduced in response to changes in prices.

In contrast Cajú householders consider energy prices to be very high, claiming they do not receive the same service quality provided by utilities in other parts of the city. Conclusions based on interviews show that there is consensus that energy prices should be comparable with households income.

The Buenos Aires case study indicates that energy bills have increased because of the economic crisis in 2002 after which 1:1 convertibility between the Argentine Peso and the US dollar was abandoned.

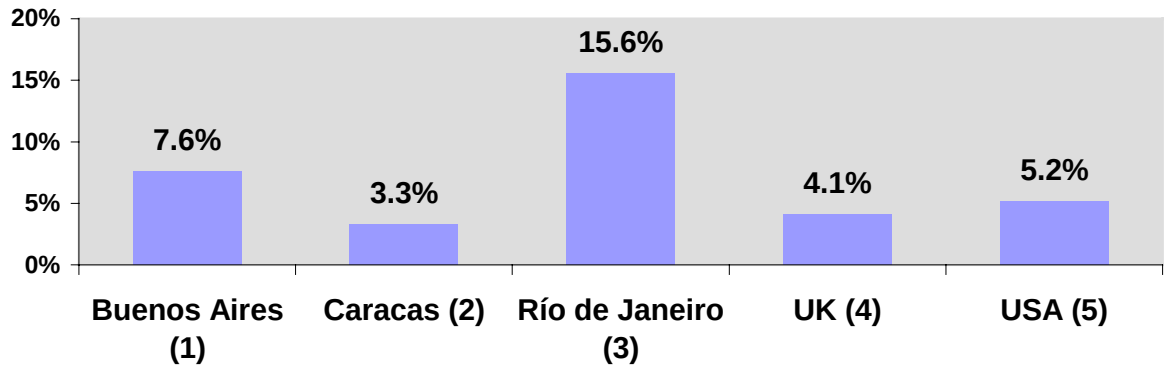
In all case studies there is evidence of a strong relationship between the lack of stable employment and energy losses in electricity or payment collecting problems. Increases in electricity prices, and low service quality, are driving the increase in illegal connections or fraud. The main problem faced by all low-income householders in the examined cities is not access to supply but the inability to pay their energy bills.

Another important issue is the surcharges on LPG sales to shantytowns in Rio de Janeiro, controlled by local gangs. As a result, low-income householders actually pay more for their energy needs than households in well-established residential areas of Rio. Here, illegal electricity connections are the strategy used to balance energy spending.

Energy Expenditure within Family Income

The combination of indicators reported in Figures 12, 13 & 14 show the impact of energy needs on family income. The results are also compared to corresponding figures in the UK and the US (Figure 15).

Figure 16: Energy Expenditure as percentage of family income in low-income households



Sources:

(1) WEC Argentine Committee and Fundación Bariloche, "Methodology and Criteria to analyze energy subsidies in electricity for urban poor people in Greater Buenos Aires", June 2003, page 15, table 4.3.1.

(2) CVG Edelca, C.A La Electricidad de Caracas y Universidad Católica Andres Bello, "Alleviating Urban Energy Poverty in Latin America: The Caracas Case Study", December 2004, page 11.

(3) Instituto de Economía -Universidade Federal do Rio de Janeiro, "Energy Poverty -Cajú Shantytown Case Study", September 2005, page 27, table 15.

(4) Calculations based on UK National Statistics document "Family Spending 2002/2003 Expenditure and Food Survey (http://www.statistics.gov.uk), and Final Household Income for the lowest quintile group.

(5) Calculations based on data from the Energy Information Administration (EIA), Official Statistics from the US Government, and results of the 2004 census published by The Wall Street Journal on August 31, 2005.

According to the UK Office of National Statistics, 17% of the population in the country is living in low-income households. In terms of household expenditure, by 2002 one in every five households spent 4.1% of their income on fuel and power needs. Their income is also sufficient to cover the costs of housing, food, clothing, transportation, communication and recreation.

In contrast, the Buenos Aires case study indicates that the cost of meeting basic needs was more than twice the average family income of low-income households at the end of 2001. This is, to some extent, the same situation as in Rio de Janeiro and Caracas. It explains illegal connections due to electricity supply payment problems as one of the simplest mechanisms to balance family budgets. The widespread use of illegal connections brings certain benefits. For example, it allows householders to have more appliances without altering energy consumption, thus keeping electricity bills affordable. In all case studies, these bills are an important proof of residency, allowing householders access to credit.

If energy prices were adjusted to cover full production and supply costs of energy in Caracas, the energy expenditure would rise to 8.1% of the average family income for low-income households.

The common denominator for the three cases is that the relief measures against energy poverty are insufficient on their own, although they may constitute an important step towards mitigating urban poverty and improving the quality of life of the poor.

The emphasis should be placed on educational policies that increase the economic independence of the poor, through training, better employment and policies to facilitate their integration in society. Subsidy policies should exclude those sectors that do not require them.

4.3 Lessons to Consider

- Growing rates of urbanisation are an increasingly important structural phenomenon and its consequences include high energy losses, inefficient energy use, and the increasing sense of marginalization of the urban poor. This threatens social peace and is the breeding ground for political opportunism.
- When the migration from rural to urban societies began, social structures with high urbanization and industrialization levels succeeded in integrating large masses of population in the modern urban lifestyles. Although the degree of social integration was different in each country - in accordance with their own historical and cultural background, at the first stage of urbanisation, the ability of the socio-economic system to hire new labour was a decisive factor in improving living standards in urban areas.
- The integration went hand in hand with the notion of the right to universal access to public services, and was generally stimulated by the State through its public undertakings, regardless of the cost-tariff relationship.
- However, the chances for integration became increasingly lower as the urbanization processes continued and industrialization gradually moved into a global context that was more competitive and based on profound technological changes.
- Integration and social cohesion will be increasingly problematic, and in the context of global development, the issue of employment is seen as one of the greatest challenges, both in developed and developing countries.
- In this context, the Argentine, Brazilian and Venezuelan case studies can be considered as a pioneering effort regarding energy and poverty. In the past this issue was mainly focused on rural not urban poverty.
- The Argentine and Brazilian cases demonstrate a number of similarities: energy theft is considered justified since the poor cannot pay tariffs they consider too high compared to their payment abilities.

- Educational problems underpin unemployment, low income, violence, lack of safety, and fuel feelings of injustice.
- In the Argentine case a relatively successful model of controlling illegal users has been suggested through the Framework Agreement, in Brazil the study reveals that the amount of billing losses leaves room for similar solutions.
- In both cases the monitoring should go hand in hand with well-targeted subsidies that benefit only those who really need them.
- In case of Brazil, subsidies have been assigned by a record system ("poor record method"). In Argentina the use of such methodology is discouraged because it provides opportunities for "political cronyism".
- Nevertheless, the comprehensive fight against poverty including legalisation of property seems to bring good results in Brazil, and it is considered essential for legal access to public services.
- In the case of Venezuela the problem is somewhat different: the general attitude is that energy should be freely supplied because the country has large energy resources and is a major energy exporter.
- Effort is still required to gain a better understanding of energy matters and promote further education to modify the widespread perception of energy as a free public good.
- In Argentina and Brazil the reforms greatly contributed to the development of a "willingness-to-pay" culture, when payment is viable and reasonable.
- Greater efforts are required to change consumption habits and facilitate the provision of efficient equipment, which are the origin of high consumption, as the Brazilian and Argentine cases show. In this sense, the lack of rational energy use programmes in this region, is evident.

4.4 Conclusions

The Argentine, Brazilian and Venezuelan case studies represent a pioneering effort as regards energy and poverty, since in the past this effort was mainly focused on rural, rather than urban, poverty. Although the focus of each of the case studies was different, some common themes emerged.

Collaborative solutions: Governments and business need to cooperate to ensure solutions that allow business and consumers alike to 'win'. To be sustainable, solutions must take into consideration that a business needs to generate profits. Only by doing this will companies be able simultaneously to offer quality service and reasonable rates to consumers to ensure they can continue paying their bills. These solutions need to state clearly the mutual expectations and responsibilities of business and households with respect to sustainable energy development.

Socio-economic issues: Energy decision makers should design solutions that address the socio-economic issues of the urban poor. These include education, employment, financial assistance and land tenure. Due to the causal relationship between poverty and education, it would be counterproductive to create solutions that only address the effects of poverty without addressing its causes. Energy, therefore, should not be examined in isolation but in conjunction with all other socio-economic issues.

The comprehensive assault against poverty through the regulation and legalization of property seems to be on track in Brazil, and is considered essential for legal access to public services. Venezuela faces a different predicament with its culture of belief that energy supplies should be virtually free due to the country's significant energy resources and its position as a large energy exporter. Reforms in Argentina and Brazil have contributed significantly to creating an ethos of 'willingness to pay' for energy supplies, so long as the costs appear viable and reasonable.

Education: Education is key to influencing energy and general poverty, particularly in urban areas. When lacking the necessary skills and qualifications, people are prone to unemployment, irregular and insufficient income and payment difficulties. Educational problems are at the heart of unemployment, low and unstable income, violence and crime, lack of safety, and resentment fuelled by feelings of injustice and victimisation. There appears to be a relationship between the development of skills and educational level.

Subsidies: For subsidies to be sustainable, they must be designed carefully so they do not disrupt the operation of the broader market or cause gross distortions. They must be programmed, transparent and temporary, their rates and scope must be explicit, with the beneficiaries defined as precisely as possible.

As a mechanism for alleviating urban poverty, subsidies should be targeted and integrated with other socio-economic programmes to encourage education and employment. Furthermore, energy decision makers should devise strategies to reposition subsidies as a 'privilege' rather than a 'right' in order to change the mindset of the urban poor and facilitate the transition to a market-based pricing model. Brazil's subsidies have been allotted by a record system. In Argentina that method is discouraged due to the vulnerability of the system to political cronyism.

Consumption: There is significant work to be done in modifying consumption habits and providing energy efficient equipment to users to decrease consumption levels, as the Brazilian and Argentine cases show.

Understanding illegal connections: Illegal connections are the urban poor's way of bridging the gap between their energy costs and needs, and in dealing with the financial demands made by the local crime gangs controlling the grid and LPG systems in the urban poor communities. Identifying and addressing the root cause of these illegal activities is critical to the success of alleviating urban energy poverty.

Despite the differences highlighted in the three case studies, the common denominator of the problems facing the urban poor can be summarised as follows.

Problems from the point of view of the authorities and the companies	**Problems from the point of view of poor users**
• Precarious employment situation, irregular income, unemployment, lack of opportunities and	• Lack of training and education • Culture of "political clientelism" and perception of injustice
education. • Illegal land tenure • Vandalism • Organised crime and violence • Favourable environment for bossism and political clientelism • Clandestine connections • Lack of governability • Urban planning, lack of safety and illegality problems • Energy theft • Losses due to energy not billed • Adulteration of subsidy programmes (political management of the subsidies, subsidies seized by organised crime, etc) • Frequent delayed payments	• Personal and family lack of safety • Precarious land tenure • Lack of legal access to energy • Supply interruptions • Prices and tariffs unsuitable to make the service sustainable • Lack of access to efficient equipment • Excessive consumption in relation to performance • Low quality service • Feeling of exclusion and marginality due to the lack of attention to their problems, translated into resentment and an environment favourable for social violence.

ANNEX A

List of Abbreviations/Acronyms

bcf	billion cubic feet
bcm	billion cubic meters
CNG	Compressed Natural Gas
CO_2	Carbon Dioxide
DOE	Department of Energy
ESMAP	Energy Sector Management Assistance Programme
EU	European Union
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GNP	Gross National Product
GW	gigawatt
HV	high voltage
ICT	Information and Communications Technologies
IEA	International Energy Agency
IPP	Independent Power Producer
km	kilometre
kV	kilovolt
kWh	kilowatt hour
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
mcf	million cubic feet
MDG	Millennium Development Goal (United Nations)
Mtoe	million of tonnes oil equivalent
MW	megawatt
NO_x	Nitrogen Oxide
ODA	Overseas Development Assistance
OECD	Organisation for Economic Co-Operation and Development
p.a.	per annum
PV	Photovoltaic
PDVSA	Petróleos de Venezuela S.A.
r/p	Reserves to Production Ratio
SO_2	Sulphur Dioxide
tcf	trillion cubic feet
tcm	trillion cubic meters
toe	tonnes oil equivalent
TWh	terrawatthours
UN	United Nations
UNDP	United Nations Development Programme
US$	United States dollar
USAID	United States Agency for International Development
WEC	World Energy Council
WTO	World Trade Organization

ANNEX B

TABLES, FIGURES AND CHARTS

LIST OF TABLES

LIST OF CHARTS

LIST OF FIGURES