



World Energy Council  
CONSEIL MONDIAL DE L'ENERGIE

# **Alleviating Urban Energy Poverty in Latin America**

## **Three Cities – Three Approaches**

### *Synopsis*

**February 2006**

*Alleviating Urban Energy Poverty in Latin America: Three Cities –  
Three Approaches*

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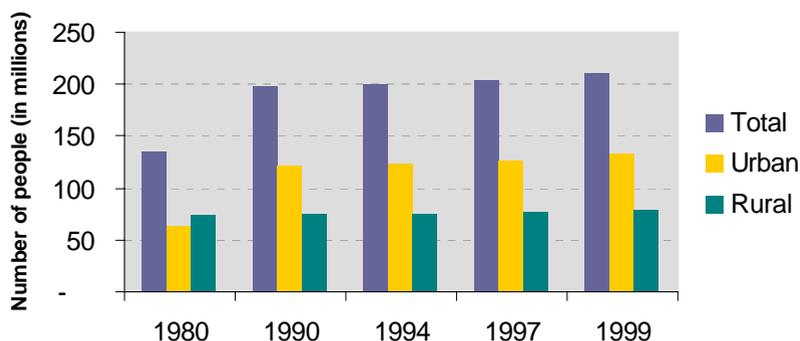
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## 1. Introduction

Since the 1990s urban energy poverty in Latin America has notably surpassed rural poverty, both in quantitative and qualitative terms. This problem has deep systemic, economic, political, structural and cultural roots. While in 1980 the total number of people living in poverty in the region was 136 million, of which 46% were considered urban population, by 1999 the total number of poor people increased to 211 million with more than 63% living in large cities. Figure 1 shows that urban poverty figures have doubled in the last two decades, while the number of rural poor remained fairly stable.

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



**Source:** United Nations, World Statistics Pocketbook

Rural poverty, can be defined as a traditional lifestyle lacking the equipment and devices that provide the comforts of a modern life. Urban poverty is best defined as the inability to earn a sufficient income to meet the most basic needs, access to energy being a significant element of these needs. Using consumption expenditure as a measure of wellbeing, general poverty is defined as a household where the family income runs short of meeting basic living costs such as food, housing, health, education, transportation, clothing, water and energy services.

The 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 results 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.

It is important to prevent these measures from becoming a disincentive to the rest of the population, or from extending benefits inappropriately. This could result in “welfare losses” and lead to even deeper problems such as an erosion of the “culture of work”.

Among the challenges facing societies in the 21st century are: 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!”, demonstrates the advantage of focusing on a range of solutions that facilitate the WEC 3 “As”:

- Accessibility*** to provide access to commercial energy for all
- Availability*** to secure a constantly high quality in the supply of energy services
- Acceptability*** to ensure the least possible negative impact on the environment.

The three case studies undertaken for the report: Buenos Aires, Caracas and Rio de Janeiro are analysed and summarised in the final report. They focus on urban poverty, energy availability for people living in poor conditions and policies to raise living standards from an energy perspective.

The report presents a range of approaches to and viewpoints on the same problem and provides a valuable contribution to the ongoing debate about the strategies needed to address energy poverty in urban areas. Table 1 summarises the demographic, social and economic data collected in all case studies. These 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.

The **Buenos Aires** case study was prepared by the Fundación Bariloche with support of the Argentine Member Committee of the World Energy Council (CACME). It focuses, in particular, on the problems associated with subsidy provision to poor customers in Greater Buenos Aires.

The **Caracas** case study was prepared by two electric utilities (CVG Edelca and C.A. La Electricidad de Caracas) together with the Institute for Social and Economic Research of the Universidad Católica Andrés Bello in Caracas, with support of the WEC Venezuelan Member Committee. It examines the energy problems of the urban poor in Caracas.

The **Rio de Janeiro** case study on energy poverty was prepared by the Instituto de Economia of the Universidade Federal do Rio de Janeiro with support of the Brazilian Member Committee of WEC (CBCME)

and funding from ESMAP. It analyses the problems in the city's favellas around the Caju shantytown, in Rio de Janeiro.

## 2. Greater Buenos Aires Case Study

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

### Poverty Profile

In 2002, 27% of the Argentine population, approximately 10 million people, were living below the poverty line. 8.8 million poor people live in urban and 1.2 million in rural areas. Taking into consideration only those living in extreme poverty, the figures falls to 2.3 million people in urban areas and 300,000 in rural areas. In Greater Buenos Aires, 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 nearly all figures reflect the impacts of the 2002 devaluation the levels of structural poverty linked to unemployment and inadequate incomes have increased systematically since the 1980's. Temporary

improvements during short periods of economic growth 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.

At the beginning of privatisation, between 1992 and 1994, the electric power sector benefited from the introduction of important regulations concerning illegal users and customers in arrears. Since 1999 the number of customers, who cannot pay their bills has increased, thus threatening to cancel out the positive impacts of the regulations. Even when the poor are willing to pay for electricity services, the inadequate income and the lack of genuine and stable employment, in practice makes it difficult for them to pay their bills.

### **Energy Profile**

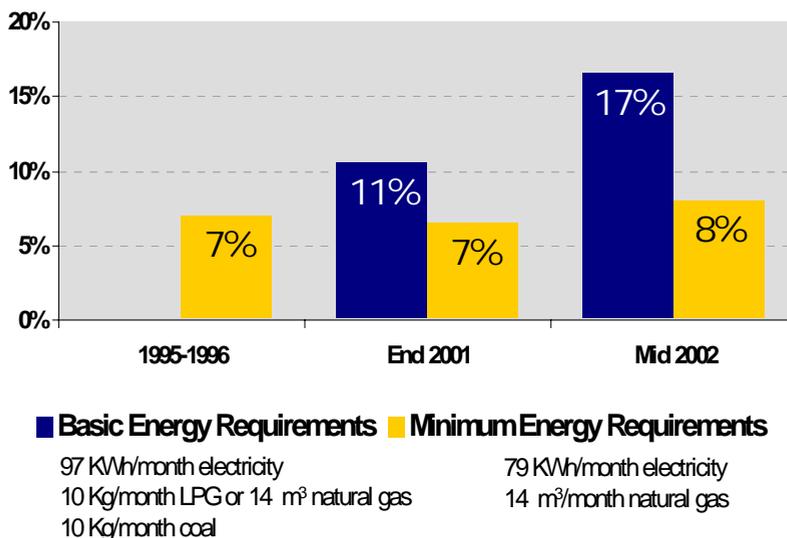
Two sets of energy requirements have been defined for low-income households: basic and minimum, which helps establish baskets of energy products associated with several support options. These baskets, based on the prices until the end of 2001 and in June 2002, can be compared to family income of poor households. This helps highlight 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.

Monthly energy consumption includes 97 kWh electricity, 10 kg LPG cylinder (or 14 cubic meters of natural gas per month) and 10 kg of firewood. Total consumption is 215 kWh per month for the basic option.

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.

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**



## Policies

Two categories of measures have been identified for the alleviation of urban energy poverty in Greater Buenos Aires.

### Measures based on subsidies:

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.

### **Measures based on “market solutions”:**

1. Adapting electricity consumption to the user’s payment capacity through the use of prepaid meters.
2. Billing for shorter periods (e.g. monthly billing).
3. Provision of the services of different quality to match the user’s payment capacity.

Analysis and evaluation of these alternatives is summarised below:

- The best option is the “social tariff” applied for consumption between 200 and 300 kWh every two months. High-income consumers 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.

### **Lessons to consider**

Mechanisms to monitor usage and reduce energy losses can be successful but not sustainable after severe economic downturns. Subsidies could be needed. A “social electricity rate” could be a way to mitigate economic impact, but it is crucial to limit its range (around 100 kWh/month) and geographical limits (i.e., exclude second residences). However, there are no subsidies without negative effects.

Energy prices below production and delivery costs can encourage energy waste and become a heavy burden on the public budget, energy suppliers and the environment.

Meeting the cost of energy is difficult with insufficient and/or unstable family income. This income is linked to the educational profile in most low-income families. Subsidies can be set inversely proportional to economic growth, as long as more employment is generated for all social categories.

The analysis of the causes of urban poverty demonstrates that there are several possible reasons, all of them linked to insufficient job opportunities – both in terms of quantity and quality. The younger generations have fewer job opportunities than their parents; moreover, the young are ill-prepared and lack the necessary basic skills either to engage in productive rural activities or fully integrate into urban life.

### 3. Caracas Case Study

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

#### Poverty Profile

In 2002 Venezuela had 3.26 million families with 54% of those families, a population of approximately 14 million people, living under general poverty conditions.

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 surrounding Caracas.

Generally, the families 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 conduct activities in the informal economy.
- The head of the family is typically under 25 years, with no more than six years of formal education.
- Approximately 60% of these people have completed only primary school.
- They live in shantytowns located on top of hills or in land depressions.

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 what is required for basic living costs.

A survey carried out in 2002 by the National Institute for Statistics establishes the following details of low-income households in Venezuela:

- 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

## **Energy Profile**

The average consumption of electricity is 220 kWh/month for low-income families. These households pay, on average, a bill of 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.

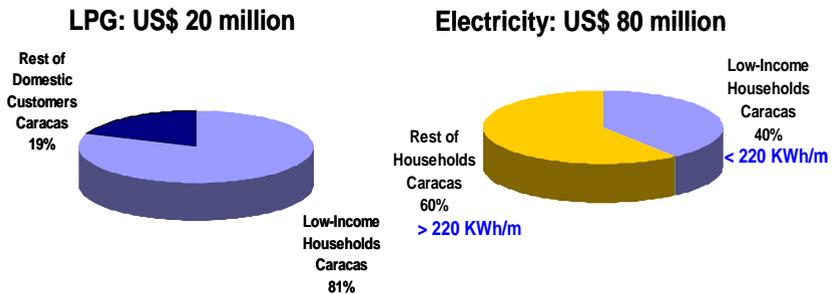
This calculation shows an uneven distribution of subsidies among domestic users. Residential subsidies are actually regressive. Of the total subsidy amount (about US\$80million in 2002) only 40% is received by low-income households in Caracas.

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 was 3.3 US\$/month in 2002 prices for low-income households. 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 are targeted at low-income households in Caracas. This is simply because the rest of domestic households in the city are usually connected to distribution grids.

**Figure 3. Distribution of Energy Subsidies for residential users in Caracas**



## The Qualitative Dimension of Energy Supply Problems

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

**Figure 4. Users and Local Distribution Company Perspectives about supply problems**

### **From supply companies perspective**

#### **Problems**

- ❖ *Vandalism*
- ❖ *Illegal land tenure*
- ❖ *Illegal connections*
- ❖ *Violence (facilities & workforce)*
- ❖ *Absence of coordination with local councils*

#### **Opportunities**

- ✓ *Market growth*

### **From lowincome users perspective**

#### **Problems**

- ❖ *Low service reliability*
- ❖ *Poor customer service*

#### **Opportunities**

- ✓ *Enables legal housing*
- ✓ *Access to financial services*
- ✓ *Improves life quality*
- ✓ *Encourages economic activities*

From the distribution company perspective, energy supply problems arise mainly from the continuous population migration from rural to urban areas, squatting and the inability of to gain formal work.

Resolving the problem of illegal connections would be beneficial for both suppliers and users. The provision of legal property rights and the creation of linkages between education and subsidies is a solution. As legal housing provides an opportunity to access financing, it could be used to increase the willingness to pay for energy services.

There is a strong link between education and income levels. Electricity utilities can help children remain in primary education by providing subsidies to their families. The achievement of higher education levels could in turn be rewarded more generously, thus acting in favour of completing elementary, basic education and even higher levels. In the long term, this would have a positive impact and mitigate other energy supply related problems such as violence and vandalism.

## 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.

- Facilitate the understanding and acceptability of energy prices by customers through education. This would allow distribution companies to deal with customers who understand cost reflective energy pricing and make more informed decisions about their use of energy.
- Define direct and explicit subsidies, which would allow companies to allocate subsidies to well-identified groups of customers, and subsidise the low-income user, not the energy.

### Lessons to consider

The main factor for increasing energy prices is not affordability, but the willingness to pay. This cultural problem can be tackled by effective customer education programs, subsidies discouraging children from leaving schools and legal land tenure.

Energy prices do not reflect the full cost of supply, and this has led to underinvestment and degradation of service quality.

Access to modern energy sources is crucial for pulling 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.

## 4. Rio de Janeiro Case Study

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

## Poverty Profile

A methodological approach that combines quantitative data with qualitative information has been used to examine a specific area in the city: the Caju Shantytown. As a part of the qualitative approach, Caju inhabitants were interviewed. Five focus groups were formed (leaders, youths and entrepreneurs) to debate the socio-economic and energy situation of Caju.

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.

In 2000, Rio de Janeiro had 5.9 million inhabitants and 1.8 million households. Today, the shantytown population in the city of Rio de Janeiro stands at around 1.1 million people in 307,000 households.

What is the typical profile of a shantytown resident? Very young, around 20% are under 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 elderly (3.6%) that is substantially higher in Rio as a whole (8.4%). Children and young people living in “shantytowns” have a lower rate of school attendance.

Almost all Rio de Janeiro shantytowns have access to water mains, garbage collection and electricity. Thus the availability of these services cannot be interpreted as evidence of discrimination in shantytown communities.

Approximately 30% of the population over 16 years of age are unemployed and 35% of the people living in low-income households have no formal education.

## Energy Profile

Caju homes use liquefied petroleum gas (LPG) for cooking and electric power for lighting and domestic appliances, and practically all homes are connected to the electric power grid of *Light* (local distribution company in Rio de Janeiro, privatized in 1996).

The figure below shows real expenses for energy consumption in low-income households of the Caju shantytown.

**Figure 4. Energy Expenditure as % of Family Income for low-income households in Caju**

Situation by year	R\$/mont	Shar
Average Family	334,2	
<b>Electricity</b>	24,8	7,42
<b>LPG consumption +</b>	27,2	8,15
<b>Total Energy</b>	52,0	15,57

Energy prices are considered to be very high by Caju householders, compared to their income. 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. 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 Caju 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, groups connected to local gangs control the LPG market in the shantytowns of Rio. These groups impose a surcharge of approximately 20% on the market price of LPG charged by the authorised suppliers.

*Light's* energy losses amount to 40% of the electricity supplied in Caju shantytown. This surprising figure is the result of the use of “gatos” (name given by the population to illegal connections) as a strategy to balance energy expenses with the household income.

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

## Policies

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.

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 approach 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.

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”.

The Quinta do Caju, can be considered a good example, as it was the first shantytown where land ownership was legalized, benefiting 859 families. A similar action is expected in the cities of Rio de Janeiro and Vitória (state of Espírito Santo).

The Rio municipality has also implemented the “Morar Legal” (Legal Habitation), program that provided legal rights to 129 buildings, by far the most over the past years, declaring them “Areas of special social interest”. These measures tend to abate the feelings of exclusion of low-income communities but are not sufficient.

### **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).

To provide real support for the poor and destitute, such programs must be coordinated and backed by economic policy. They must be able to generate employment and 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 leverage 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 contained in the illegal connection mechanism.

As far as tariff policy is concerned, a solution might be to offer tax exemption and access to cheap energy available at the local generation facilities in order to reduce low-income consumers' tariff.

## **5. Comparative Analysis**

### **Energy Accessibility**

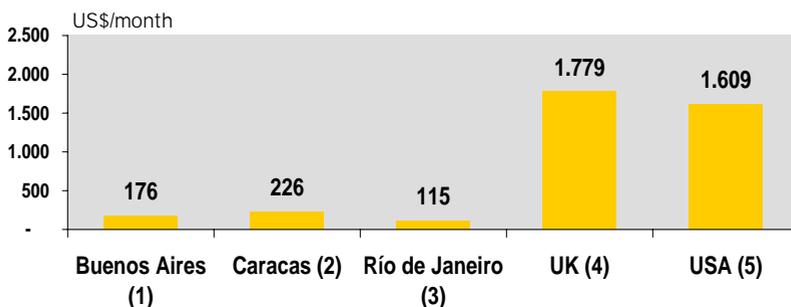
All three case studies demonstrate that high levels of access to modern energy services have been achieved in the cities and the respective countries, including low-income households

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 5 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 5. 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 10. 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 4. 2002 Prices

(3) Instituto de Economía -Universidade Federal do Rio de Janeiro, "Energy Poverty -Caju 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 Bureau's report published by The Wall Street Journal on August 31, 2005

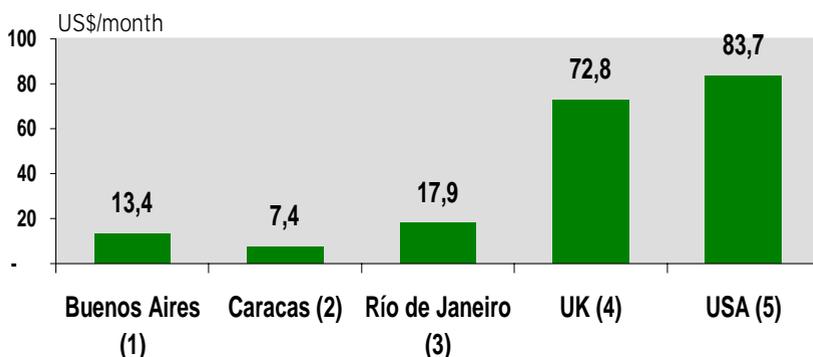
It should be noted that family income is calculated for a family unit of 4 in Buenos Aires (4.1 in of Rio de Janeiro and 6 in Caracas). This leads to a conclusion that family income is relatively similar among the 3 Latin American cities analysed in this report.

Education is the key factor for these family income results. 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 6 are based on 2002 prices. UK and the US data are included for reference purposes.

**Figure 6. 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 -Caju 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.

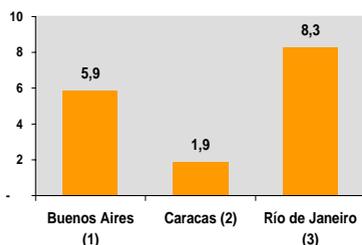
In all 3 case studies, energy needs are met by electricity and LPG, except for Argentina, where the use of coal is reported for cooking purposes. Energy consumption in low-income households in 2002, can be summarised as shown in Figure 7.

**Figure 7. Energy Consumption and Prices in all case studies by year 2002**

Case Studies	Prices	Average Consumption	Bill
<b>Electricity</b>	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
<b>LPG</b>	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

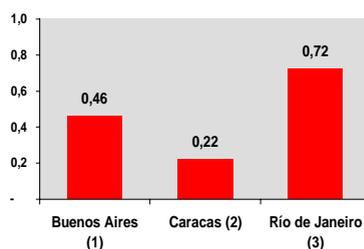
Electricity Prices (in Low-income Households)

cents US\$/KWh



LPG Prices (in Low-income Households)

US\$/Kg

**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 Caju 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.

Moreover, 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 5, 6 and 7 show the impact of energy needs on family income. The results are also compared to corresponding figures in the UK and the US. Resulting calculations are shown in Figure 8.

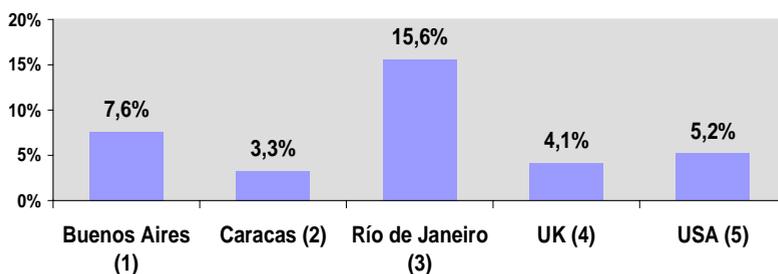
According to the UK Office of National Statistics, 17% of the population in the country is living in low-income households. In terms of household expenditure, by 2002 1 in every 5 households spent 4.1% of their income on fuel and power needs. Their income is also sufficient to cover costs of housing, food, clothing, transportation, communication and recreation.

In contrast, the Buenos Aires case study indicates 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 and payment problems in electricity as one of the simplest mechanisms to balance family budgets in shantytowns.

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.

**Figure 8. 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 -Caju 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), and results of the 2004 Census Bureau's report published by The Wall Street Journal on August 31, 2005.

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, 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 their training and better employment and policies facilitating their integration in the society. Subsidy policies should exclude sectors not requiring them.

## **6. Conclusions**

- The three cases show both differences and similarities, but they all emphasise the importance of the problem of urban poor in the large cities of this region.
- 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.
- This 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.
- Consequently, poverty and exclusion were becoming more and more relevant in relative and absolute terms.
- 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 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 allows 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.
  
- In spite of the differences among the three case studies, a common denominator of the problem of the urban poor can be summarised as follows:

<b>Problems from the point of view of the authorities and the companies</b>	<b>Problems from the point of view of poor users</b>
<ul style="list-style-type: none"> <li>• Precarious employment situation, irregular income, unemployment, lack of opportunities and education.</li> <li>• Illegal land tenure</li> <li>• Vandalism</li> <li>• Organised crime and violence</li> <li>• Favourable environment for bossism and political clientelism</li> <li>• Clandestine connections</li> <li>• Lack of governability</li> <li>• Urban planning, lack of safety and illegality problems</li> <li>• Energy theft</li> <li>• Losses due to energy not billed</li> <li>• Adulteration of subsidy programmes (political management of the subsidies, subsidies seized by organised crime, etc)</li> <li>• Frequent delayed payments</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of training and education</li> <li>• Culture of “political clientelism” and perception of injustice</li> <li>• Personal and family lack of safety</li> <li>• Precarious land tenure</li> <li>• Lack of legal access to energy</li> <li>• Supply interruptions</li> <li>• Prices and tariffs unsuitable to make the service sustainable</li> <li>• Lack of access to efficient equipment</li> <li>• Excessive consumption in relation to performance</li> <li>• Low quality service</li> <li>• Feeling of exclusion and marginality due to the lack of attention to their problems, translated into resentment and an environment favourable for social violence.</li> </ul>

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