

# **Urban and Periurban Energy Access – UPEA II**

## **Buenos Aires Case Study**

### **Final Assessment Revised Draft Report**

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***List of Acronyms and Abbreviations***

ACIJ	Civil Association for Equity and Justice
BR	Biomass Residues
CH	Vegetable Charcoal
EE	Electricity
ENARGAS	Natural Gas Regulating Agency
ENRE	Electricity Regulating Agency
FB	Bariloche Foundation
FOC	Foundation for Community Organization
GNESD	Global Network on Energy for Sustainable Development
INDEC	National Institute of Statistics and Censuses
INTI	National Industrial Technology Institute
IRAM	Argentine Materials' Standardization Institute
KE	Kerosene
LPG	Liquefied petroleum gas
MDG	Millennium Development Goals
NG	Natural gas
NGO	Non Governmental Organization
RETs	Renewable energies technologies
RUE	Rational Use of Energy
TOE/KOE	Ton /Kilogram of Oil Equivalent
UBEN	Unfulfilled Basic Energy Needs
UPEA	Urban and Peri Urban Energy Access
WEC	World Energy Council

## 1. INTRODUCTION TO THE UPEA STUDY

This report describes the living conditions of the poor-stricken section – destitute - of the community, widely known as *Slums or Shantytowns* (“*Villas Miseria*” or “*Villa de Emergencia*”)<sup>1</sup>; it features an investigation on energy use and access to energy sources by poor inhabitants.

One of the first difficulties involved was the identification and demarcation of the adequate universe of study. There is little accurate information regarding “the slums”, and that is why it is so hard to set the applicable parameters. It is presumed that even though “slums” represent a relatively homogenous problem, they are heterogeneous due to the fact that they tend to evolve, and according to age and location, they present different characteristics of consolidation or potential consolidation. All of these matters should not be left aside when studying energy rules and the energy problem, since they strictly relate to the access or lack of access to modern sources of energy, such as electricity and natural gas, which must meet certain requirements to be installed.

The case study features a 106 surveys operative of poor households in the southern Buenos Aires, broadly considered the most disfavoured area of the metropolitan area. The precise locations were Villa Fiorito and Budge<sup>2</sup>, two of the poorest neighbourhoods of the GBA<sup>3</sup>. The former is very renowned for being the first home of Diego Armando Maradona, then he became probably one of the best two football players in the world.

The help and guidance provided by the Foundation of Communities (FOC) was substantive. The work performed in stages, by close cooperative activities between an academic institution and a community based institution, proved a successful team. Details will be further presented in respective section.

### 1.1 Objective of the Research

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<sup>1</sup> In this Report the term **slum** defines very poor marginal neighbourhoods or areas; **shantytown** is a sort of formal synonymous. The difference from the more specific term **settlement** is presented in section 3.2 Research Framework. **Neighbourhood** means the usual territory shared by a number of families, these areas usually receive informal names, which do not always coincide with maps, moreover different people uses different names to refer to the same or approximately the same geographical area. This issue of denominations reflects the complexity of the socio-cultural nature involved in site-specific studies

<sup>2</sup> It was not possible to maintain our initial target: Villa Itatí, described in former report, due to political instability of the slum. We were professionally advised by the FOC, mentioned NGO with broad field work in the area. The assistance of this organization was a key to perform a field task, where public institutions do not have fluid communication and contacts.

<sup>3</sup> In fact the specific denomination for Fiorito would be “*Village*” but following foot note 1 discussion, we prefer to call both study areas *neighbourhoods*, because the limits or borders of them are clearly more ambiguous than those of a village, which is found more appropriate for slums’ description.

As a first necessary analysis the living conditions and relative situation of the poor-stricken section of the Argentine community are assessed and described. The core objective is to analyze the energy use and access to energy sources by poor inhabitants, basically by the identification of unsatisfied energy needs of slum inhabitants, and then propose policy measures towards their fulfilment.

A primary data collection or survey was carried on in order to enrich the very little existing information and detail of consumption patterns by this society segment.

Specifically the objective of the survey is gathering information on energy needs fulfillment levels, in Poor homes of the case study GBA area. Minimum and basic energy requirements by uses are estimated, adjusted to the environmental and climatic conditions of the studied population, and then these parameters are contrasted against those obtained by the survey. Finally the compiled information would be the basis for policy and programs design aimed at improving the energy access of poor urban homes, and thus their quality of life.

## **1.2 Limitations of the study**

The conception of this work faced the usual lack of information of consumption patterns, in particular the main official survey for the household sector – INDEC's permanent survey on homes - does not collect the key data of physical consumption of energy.

Although the survey developed includes many slum households consumption patterns, some of the profiles surveyed, reveals a bias towards middle class families. This shows basically the difficulties founded by field staff in addressing and approaching the poorest households, as well as the mixture of all sort of houses and inhabitants that lives within and around the slums. Nevertheless the slum's patterns of consumption are identified, as well as the main problems regarding energy. Probably a more rigorous exercise, would require several times the sample size, and then a delicate selection of real slum households.

The quantitative approach to the problem is far from being simple. On the one hand we find the hardship associated to access to the slums, due to social segregation and the lack of frequent visits from investigators to different aspects of poverty which have triggered adverse reactions among settlers. On the other hand, the level of education and the diversity of cultural and linguistic rules of the people making surveys and those who are being surveyed might make it difficult to reach mutual understanding. Besides, access to the settlements and direct contact with the people living in them, might be made harder by the existing diversity between internal power structures -

which need to be contacted after being correctly introduced. (E.g. official and unofficial communitarian leaders, head politicians, churches, non governmental organizations, etc.)

### **1.3 Organization of the report**

Initially, within this section, the analysis' framework is developed in order to describe structural poverty and the process of creation of the "slums", starting with a long range hypothesis to further conclude by summarizing its genesis in the Greater Buenos Aires (GBA) Area, followed by the world context of slum and the MDG. Next section presents an update of the energy access by urban and peri urban poor households, it has a policy driven focus intended to identify the most important weaknesses of current situation.

In section three the methodology is presented, emphasizing difficulties in order to properly evaluate the results obtained, and presenting the final questionnaire and its objectives. For providing context to the reader an introduction to the slums situation is included.

The fourth part develops the main finding and description of Argentine Households sector, particularly poor families of Buenos Aires, then section 5 address the case study, presenting extensively the localization of field work, including some very useful satellite images.

Finally, section six presents the conclusion obtained and policy consideration in order to overcome the problems identified along the study.

### **1.4 Background and rationale of the study**

Because of the specificity and complexity of the subject a broad background and rationale is presented below. Readers searching just the case study description and findings should go straight to section five and six. In order to properly assess study background and rationale, interpretation of the Genesis of Urban poverty is presented. Before approaching the case study and the energy dimension of slums, a brief description identifying some necessary elements in order to approach the slums' phenomena in the context of the Millennium Development Goals (MDG), are also described.

#### **1.4.1 The genesis of urban poverty, its connection to the "slums"**

The urban areas poverty issue is threatening to become one of the biggest challenges to governance and the design of public policies, such as those related to energy matters. While rural poverty manifests itself as a lack of monetary income complemented by production and pre-modern means of life, poverty in urban areas manifests itself not only through the lack of income necessary to have access to basic goods and services, but mainly through subjective perceptions and factual situations of social exclusion.

According to the UN-Habitat<sup>4</sup> team, one out of every three inhabitants of the cities will live in inadequate housing conditions, finding it hard to access basic services. It is predicted that the 21<sup>st</sup> century will be identified by the rich coexisting with the poor. This tendency, darkened by the view of certain organizations, like the World Bank<sup>5</sup>, on the matter, which seem to emphasize that the poverty problem is focused on rural areas and monetary income indicators, have interfered on potential reliable academic debate on extreme poverty, which every day becomes more important at a global level.

Evidently, high levels of urbanization are not the same, neither at a spatial level, nor in first-world countries as opposed to the so-called third-world countries. Thus, a great portion of Asia and Africa still faces an enormous rural poverty problem. However, due to Asia's fast urbanization process (China and India being the most remarkable cases), the world's urban poverty problems will become more and more relevant due to the fact that figures shown will be higher than the rural poor figures in only a few decades.

Explanations for the reasons and mechanisms triggering urban marginality are far from being unique. However, some analytical works elaborated by FB (Kozulj, 2003, 2005b and 2007b), argue that it is a structural phenomenon and a consequence of the same urbanization and modernization process at different stages. During the first stage, or constructive stage, of the cities, the rural-urban migration process coincides with an elevated demand of qualified workers. During that stage, emigrant workers are usually hired under working conditions that, in terms of income and lifestyle, are better than those they used to have in their agrarian areas of origin. Even though at first these emigrants can only access precarious houses, their working conditions allows them to consolidate these houses or to acquire new ones in consolidated working class neighbourhoods.

Further, the value of urban land tends to increase as a city's population increases. However, as the urbanization process at a specific place tends to be overwhelmed, both the first wave emigrants and new inhabitants who traveled from the countryside to the city found themselves with little

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<sup>4</sup> State of the World's Cities Report 2006/7.

<sup>5</sup> See for example Verter, D, 2006.

chance of finding of full-time jobs and with more expensive pieces of land. The lack of legal employment generates unstable income, which is one of the main reasons for poverty. Besides, higher housing and land costs reduce the opportunity of settling in non-marginal areas. The relationship between unemployment and poverty has been approached in the first world, while the decreasing social mobility phenomenon an marginality is a feature of these regions and mainly, but not exclusively affects immigrants from third-world countries working in developed countries.<sup>6</sup>

In addition, the dynamics of economy in advanced stages of the industrialization phase is seen in those sections in which we find high technologic sophistication, in fast changing scenarios, product's shorter useful life, and in formal services sectors, which require skilled employees.

The lack of legal employment demand, along with the high education requirements, make it difficult for this situation to change within the short-term, especially due to the lack of qualified institutions providing the specific kind of training required by poor people. Furthermore they suffer form cultural disadvantages, due to the fact that they come from families with no education and no knowledge on modern life's rules. On the contrary, thinking that society must make citizens equal through the educational system, without taking into account the implied differences, leads to early school drop-out and to social and cultural exclusion, which is the opposite to what the universalized education system's "good intentions" consist of. Much more universalized systems, due to the fact that the conditions of a global society based on education requires higher education standards and standardization of minimum contents at a worldwide level.

Reasons that apply specifically to each country are also found, for example, macroeconomic policies applied to third-world countries, often imposed by international financial organisms, such as the International Monetary Fund and the World Bank, and implemented by local governments. These policies, focused in public costs adjustment as an instrument to control inflation, external debt payment control and other policies which aim at improving productivity in microeconomic terms that are expressed more in monetary terms than in physical terms, lead to serious consequences related to unemployment, poverty and growing illegality, poverty and destitution.

That was the case in Argentina, where the general trends of global economy in respect of the lack of participation of income within the creation of added value, the growing fall rate of salary for skilled and unskilled sections and rising structural unemployment; the macroeconomic policies that have been applied to unbalanced contexts have lead to an increased rate of poverty and destitution in an alarming way (Kozulj, R, 2002).

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<sup>6</sup> Gallie, D. and Paugman, S., 2002.

Even before 2002's devaluation – when the price of the basic needs family products' package increased – Argentina's global poverty and destitution rates increased in an alarming way, given that the country was, during the 70's, the nation with the lowest inequality rates in Latin America, and with one of the highest education level rates along with an adequate coverage for services of any kind. Thus, in 2001, according to poverty and destitution rates assessment, the total percentage of poor people living in urban areas represented at least 41% of the population, the urban population of 2001 being 89.3% over the country's population (see Table N° 1 below). Curiously, the poverty rate for urban and warm weather areas, where main urban sections are located, including the GBA, is the highest.

Therefore, the current situation is a consequence of historical and cultural facts, poverty and destitution became a stable part of the life system. Moreover, it can be considered an outcome of the transition from “*fordism*” to “*flexible accumulation*”, in terms of worldwide industrial societies' stages, with different characteristics in each specific case (Kozulj, 2003, 2005a and 2007a).

Before considering specifically the situation in the case study, additional structural issues are presented, because the identification of the socio economic dynamics where the slums are inserted is considered of core relevance. These visions of the same phenomena, contributes to draw a more complete picture of the situation, its causes and path for long term solutions.

Following the words of social experts<sup>7</sup>, existence and growth of slums is a **complex structural phenomenon**. In brief and very general terms, the main structural element is the capitalist urbanization conditions; this element combines a private property regime over urban lands and devices that allow extraordinary rent production and accumulation with the urbanization process. Slums are the visible way of a social-spatial complex process. The actual urban society is constantly growing under a private property regime which warranties permanence of existing propriety rights and production and reproduction of urban lands rents. There are three stable elements to add: a) The raise of the population rate, b) The tendency to live in large cities and c) The strengthening of capitalists relations, which fight over a limited asset (nature plus built space) generating an extended and growing commercialization process that can only be refrained by government intervention. In order to access an urban ground, government or privately-held pieces of lands are occupied, with the insecurity such possession implies, until the government intervenes to lead to a land tenure regularization. This implies a contradiction: private property must be violated in order to be accessed.

On the one hand, the slum gives access to vital resources to people with low income (“specific” social programs), resources that are hard to reach in the city. On the other hand, an appropriate

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<sup>7</sup> María Cristina Cravino and Raúl Fernández Wagner, INFO-HÁBITAT.

urban localization offers room rental opportunities to new immigrants or people that are “displaced” from the land market, in addition to these are the opportunities – provided in part by its spatial configuration – to sheltering criminal activities.

Furthermore, there is another problem associated to this framework. Both the post-crisis real estate market and the Government housing action make **major actors and agents be expecting profits** round about the intervention, either for the urbanization promise (urban consolidation) of the slums or, on the contrary, their eradication (by means of reimbursement) and the surrendering of those urban lands for other residential purposes<sup>8</sup>.

During the 90's, the intervention for programs and particularly those financed by credit multilateral organisms<sup>9</sup>, slowly increases. In the last years those performances that, in the name of the “fight against poverty” are been made focusing on irregular settlements, the most visible element emerging from urban poverty, will be definitively consolidated.

It was in the year 1990 when new laws on the matter were enacted: Two presidential resolutions – 1001 and 1737 – which authorized the selling of government lands to occupants. The jurisdiction transference was scored by the *Landed Property plan* (“Plan Arraigo”) in 1991; and a global assignment of occupied land of some slums was foreseen.

Due to the lack of division between plots, the settlers only have nominal jurisdiction. Thirty thousand people from “Ciudad Oculta”, “Slum 20” in Lugano, and Slums 21-24 were benefited. However, none of the initiatives were considering urbanization.

Urban services privatization played a critical part in this deterioration process. This change in the government intervention method, the transition of the social model of providing urban services to the concession of the services, has the commercialization of the government public services as its main element, and private companies playing the new economical and cultural leading roles. Those neighbourhoods and portions of AMBA territories inhabited by people with low income, who

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<sup>8</sup> Housing policies have gone in a way to not ignore what happened with the region's economical and political processes. The first actions pretended to emulate the government's housing provision system of the European welfare state with a proper version applied to the policies' characteristics and to the limited social insurance' consolidation system. Slowly, reality has imposed other approaches to the problem, resulting from different urban social movements' actions. However, when this started being accepted and processed in technical and political terms, the neo-liberal wave fell out conciliating the Government retirement from any direct action to become a market performance supplier assigning goods and housing services (María Cristina Cravino and Raúl Fernández Wagner, INFO-HÁBITAT).

<sup>9</sup> International organisms like BID have been involved in integral improvements of the irregular settlements and had made similar proposes to all the Latin-American countries. These were mainly aimed at recovering what was provided by the same people and provide infrastructure and security on land tenancy. The World Bank, in term, has urged on massive policies of property regularisation like the ones implemented in Peru, which are very difficult to evaluate, an at the same time implied in fact a parallel registry of the property (and therefore devaluated). Therefore they haven't improved life quality in this kind of neighbourhoods. The problem of the BID programs, is that they are focused, aimed only at a smaller percentage of neighbourhoods in that situation. While the WB has a passiveness feature that facilitates the introduction of market properties, instead of facing and solving the Poor life conditions (María Cristina Cravino and Raúl Fernández Wagner, INFO-HÁBITAT).

can't turn into an effective demand for the new privatized companies, are still isolated and segregated. Furthermore, this tendency is being weighed down due to coexistence (just a hundreds meters away) with private urbanizations such as country clubs, private neighbourhoods, etc., in which the privatization process has provided and extension of the services increasing the existent socio-spatial dissimilarity<sup>10</sup>.

In order to reach a better understanding of the genesis of the slums creation process in the **GBA work field**, it will be useful to briefly go back in history.

#### **Box Nº 1** **The Evolution of the Buenos Aires Urban Area**

In the 20th century, during the 80's, when the actual Autonomous City of Buenos Aires (CABA) became the Capital City of the Argentina Republic, the city development as a whole was the result of a public project. Urban planning by means of "The Square" ("*La Cuadrícula*") allowed the city to expand endlessly and was a matrix in which urban growing and social rise were installed (Gorelik, 1998).

In the 21<sup>st</sup> century, in the 30's, the city creates the "*General Paz Avenue*" which surrounds completely the City of Buenos Aires, and public plot division starts being developed in the suburbs. In a way, the "off-wall" urbanization is similar to the *pavillonnaires* suburban neighbourhoods (*small houses plotting*) of Paris between war periods (Fourcaut, 2000). Urbanization is the result of a mix between *laissez faire* and public intervention policies, between square plotting as well as self-construction and self-urbanization *bricolage*. Thus, this kind of urban growth has allowed massive access to property and house owning. That was made possible due to a series of Government implied policies (suburban transportation subsidies, low rate mortgages and unrestrictive legislation) and to the inhabitants' joint action (Torres, 1993).

During the period of cheap plotting expansion, between 1947 and 1967, the number of property owners in the suburbs of Buenos Aires went from 27% to 67%, an exception compared to other Latin American countries. Without a doubt, the existence of slums and poor plotting without infrastructure made the limits of the integration mechanisms evident. There was a lot of diversity in the city – even in the city borders – , but they were believed to be created due to the very high social change of the 50's and 70's, in a period with low unemployment rates.

After the 70's, promoters stopped plotting for low-income sections. In the 80's, big changes in poverty specialization happened, both in the capital city and the suburbs. For a long time, the term "Slums, or shantytowns" were the words used to describe the poverty problem, providing a dual side to the whole city. However, poverty today can't be thought in terms of "specific localization", but in terms of "relative degree", as a phenomenon that is expanding and trespassing borders between neighbourhoods and even small *islands*.

In the Capital City, after carrying out a cartographic analysis, Torres' work (1993) shows that even though between the 1947 and the 1980 census, a much stronger improvement in the Capital City and the suburbs is observed, this situation changes in the 1980's. Neighbourhoods of small

<sup>10</sup> Rodríguez, María Carla, et.al., 2007, pages. 38-39.

middleclass groups at both sides of *Rivadavia* Avenue are visibly demoted. Slums' populations of which have been "deported" to remote sections of the suburban areas during the *de facto* governments of 1976-1983, are inhabited again. Data from the 2001 census show increase of density. Squatters living in degraded central neighbourhoods and in the south of the city multiplied (to nearly 150,000 people.)

In the metropolitan area, as neither the private nor the public sections take into account the high level of demand for land and housing from popular sections and impoverished small middle classes (suffering more and more from unemployment), land occupation (settlements) is still taking place, as in all big cities in Latin America, by vacant land invasions (mostly in the metropolitan area). Land occupations in municipalities such as "*La Matanza*", show that occupants come from different sections, from slums and poor neighbourhoods in suburban areas. Most of them are young people living under unstable and vulnerable conditions who want to be normal, and not "slummers" "*villeros*", meaning slum inhabitants.

The strategic and community-like characteristics of the occupants' community practices show two sides of the same logic: the instrumental side (to obtain land) and the expressive side (to be acknowledged by society). Collective action's dynamics is focused on neighbourhood construction. This strategy was consolidated after twenty years as a response to the lack of employment, and to fill the spaces emptied by institutions, establishing day-care centres, dispensaries and community shelters. During hard times, neighbourhoods are the main places to retire to and assemble. Fifteen years after the occupations, remarkable progress is found by these settlements' urbanization which, until not long ago, were no different from typical poor lots that also try to become neighbourhoods.

This sort of "half of the way" found between former public land plotting, featured by "poor sections" slums and settlements - or sections perceived as such and the opposite situation reflected in closed rich neighbourhoods gives birth to an atomization process that is destroying the city (Prevot Schapira, Marie-France, 2002).

Described situation poses big challenges from the adequate policies design's point of view, such as the policy related to energy. However, before approaching this issue, it seems necessary to draft some specific hypothesis with regard to the conditions under which populations inhabiting the slums or marginal urban settlements of the cities are being developed.

**Table N° 1**  
**Argentina's population by classified climatic areas**  
**According to poverty and destitution percentages**

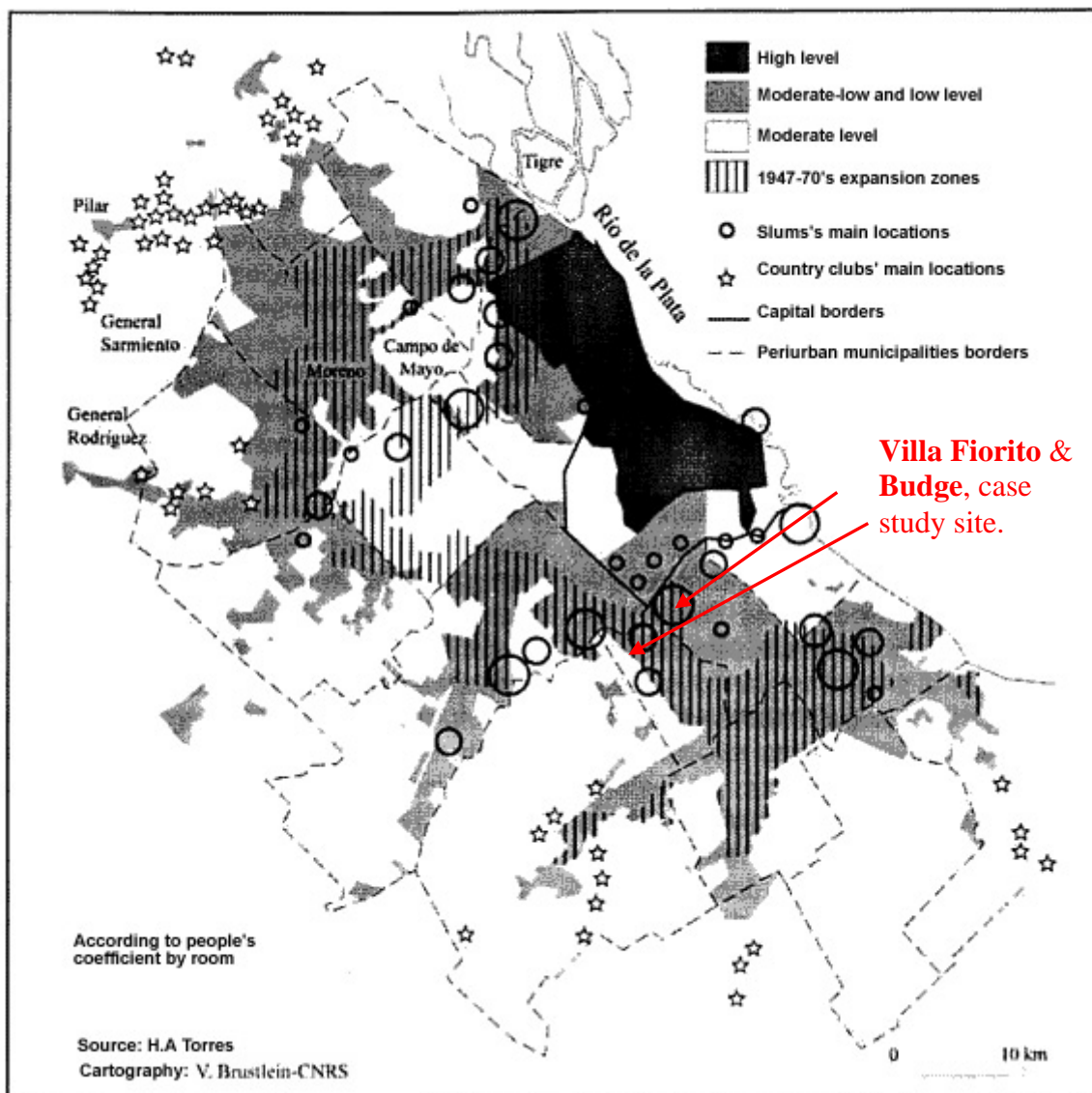
	Warm Weather		
Population	Urban	Rural	Total
<b>Climatic region population</b>	<b>6,468,137</b>	<b>1,790,220</b>	<b>8,258,357</b>
INDEC Destitution rate for 2001	19.60%	19.30%	19.50%
SIEMPRO Destitution rate for 2001	38.80%	38.70%	38.80%
INDEC Poverty rate for 2001	38.70%	38.40%	38.60%
SIEMPRO Poverty rate 2001	70.30%	70.20%	70.30%
	Mild Weather		
<b>Climatic region population</b>	<b>21,920,741</b>	<b>1,297,365</b>	<b>23,218,106</b>
INDEC Destitution for 2001	19.90%	19.50%	19.90%
SIEMPRO Destitution for 2001	23.30%	23.00%	23.20%
INDEC Poverty for 2001	41.50%	40.50%	41.40%
SIEMPRO Poverty for 2001	50.20%	48.30%	50.10%
	Dry Weather		
<b>Climatic region population</b>	<b>3,866,040</b>	<b>780,484</b>	<b>4,646,524</b>
INDEC Destitution for 2001	17.00%	17.90%	17.20%
SIEMPRO Destitution for 2001	24.30%	26.00%	24.60%
INDEC Poverty for 2001	43.70%	44.90%	43.90%
SIEMPRO Poverty for 2001	50.10%	53.30%	50.60%
	Cold Weather		
<b>Climatic region population</b>	<b>97,991</b>	<b>2,969</b>	<b>100,960</b>
INDEC Destitution for 2001	16.30%	16.30%	16.30%
SIEMPRO Destitution for 2001	17.10%	17.10%	17.10%
INDEC Poverty for 2001	43.10%	43.10%	43.10%
SIEMPRO Poverty for 2001	38.70%	38.70%	38.70%
	Country totals		
<b>Country Total</b>	<b>32,352,909</b>	<b>3,871,038</b>	<b>36,223,947</b>
INDEC Destitution for 2001	19.50%	19.10%	19.40%
SIEMPRO Destitution for 2001	26.50%	30.90%	26.90%
INDEC Poverty for 2001	41.20%	40.40%	41.10%
SIEMPRO Poverty for 2001	54.10%	59.40%	54.70%

Source: RET's Project (2005) - from INDEC and SIEMPRO' databases.

Optimistically assuming that by 2007 the 2002 pre-crisis conditions - in regard to the poor and destitute rate – were recovered, Table 1 would imply that at least 6.3 million people live under indigency conditions - “destitute” or “indigence” in urban areas. These people are defined as people whose income, at a given time, is not enough as to buy a basic needs basket – group of

consumption goods - in order not to consume their own body mass<sup>11</sup>. Destitute generally constitute the main population section inhabiting slums. In the case of GBA, slums were grouped as shown in Figure 1. During the last few years, not only precarious life situations have extended and consolidated, but slums started to appear even in the heart of the City of Buenos Aires. The term poverty - figures also exhibited by two different sources, INDEC and SEMPRO – technically refers to a household whose income is not enough to buy a somehow *bigger* basket of food plus basic goods and services.

**Figure N° 1**  
**Greater Buenos Aires Social – Slum's locations -**



Source: Prevot Schapira, Marie-France. "Buenos Aires in the '90: metropolis y inequalities". *EURE (Santiago)*, December, 2002, vol.28, no.85, p.31-50. ISSN 0250-7161.

Notes: high/ moderate/ low levels refers broadly to socio economic profile, proxy being coefficient by room.

<sup>11</sup> INDEC official source, this theoretical basket is defined as the cost of just the basic monthly food needed by a family in order to incorporate a minimum level of calories– without losing muscle mass.

It is interesting to notice the key localization of case study slums, as they are very close to the Capital City with the respective convenience in terms of localization. Furthermore is possible to identify the parallel growth of both slums and country club (as closed rich neighbourhoods). Case study site belongs to low level socio economic strata.

Although there were attempts to bring legality into the illegal electricity users' situation –as in the case of the so called “Framework Agreement”<sup>12</sup>, the situation between 2002 and 2007 confirms that those solutions were specifically designed to favour normalization of companies' bills, but without the necessary continuity to achieve legal and regularized access to in a permanent and inclusive way. Also, during 1997, “Aguas Argentinas” (*water supply Company in Argentina*) divided the city based on housing conditions, young inhabitants and income; with three different cost rates. But, it can be said that these categories cover an extremely wide range of people in relation to the level of poverty involved (Prévôt Schapira, 2002). A similar conclusion was expressed by WEC (2006) regarding electricity tariff categorization.

Thus before approaching the case study and the energy dimension of slums, a description identifying some necessary elements in order to relate slums' phenomena with the MDG is presented, finding many common points between the global phenomena and the Buenos Aires case study.

#### **1.4.2 Energy as a prerequisite, Millennium Development Goals & slums**

As a general framework it is relevant to refresh the Goal 7, target 11 on slums of the Millennium Development Goals (MDGs).<sup>13</sup> Regarding the energy issue the view shared here recognizes that the actions and policies enacted in order to achieve the MDGs must also provide a sound basis for sustaining the goals in the long term<sup>14</sup>. Furthermore three pillars are remarked: (i) access to modern sources of energy (e.g. LPG and electricity) is considered a prerequisite for achieving the MDGs, while providing the basis for sustainable growth; (ii) the importance of enacting proper policies for increasing modern energy access is substantive and; (iii) current path of energy system's development becomes non-sustainable.

Thus once the importance of providing clean modern energy to the increasing poor population of urban and peri urban regions is recognized, an update of the slums context is presented. It is interesting to take a look at the proceedings of the dialogue that took place at the Third Session of

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<sup>12</sup> Also Outline Agreement or “*Acuerdo Marco*” in Spanish, meaning a pact made between parts in order to provisory solve the irregular situation of electricity provision, see foot note 46

<sup>13</sup> Goal 7: *ensure environmental sustainability*, Target 11: *have achieved by 2020 a significant improvement in the lives of at least 100 million slum dwellers* - being the indicator for progress monitoring, the *proportion of households with access to secure tenure*.

<sup>14</sup> GNESD, 2007. p.12.

the World Urban Forum,<sup>15</sup> where the challenges and opportunities for expediting the implementation of the MDG, were addressed. Additionally the conclusions summarized here, are considered very useful in terms of elements compounding a general strategy for addressing the energy needs of Buenos Aires' Pooors.

The major issues approached were the need to promote the **role of local authorities**, provision of security of **tenure and access** to affordable land, provision of funds to developing countries for **slum upgrading** and **urban development** programmes, the need to **empower the urban poor**, and the promotion of an **inclusive approach**.

Regarding human rights' development, it was empathized that while land grabbing, forced evictions and homelessness are quite common, there is hardly any consultation with the communities concerned<sup>16</sup>. Furthermore, no alternatives to forced eviction – from which women suffer disproportionately - are provided and no human rights impact assessment is undertaken. It was concluded that government must implement their commitments regarding the right to adequate housing.

A need to devolve resources to local authorities so that they can provide access to secure land tenure and housing to people, were also identified. It was noted that relocations should be voluntary, and that security of tenure should be provided in relocation sites.

The necessity of empowering the urban poor, in order to create appropriate conditions for **participatory processes** was highlighted. Creating partnerships with the urban poor would strengthen democracy and local governance, as well as increase the capacities and skills of the urban poor. Communities should be endowed with resources, allowing slum-upgrading activities, following their own needs and priorities. Recognizing that jobs provision goes hand in hand with the production of homes, government should facilitate the organization of the communities, in case they need it.

Additionally, sustainable slum upgrading can not be left up to contractors and consultants, land use allocation must be determined by social and environmental considerations. Furthermore, allocation of fair, equitable, and targeted subsidies implemented by national governments might be necessary. Similarly the private sector and microfinance must joint the challenge. Communities should be empowered to participate both in decision making, as well as in sharing investments benefits equitably. Strong public policies are urging to facilitate engagement between urban poor

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<sup>15</sup> Vancouver, Canada, June 19-23, 2006.

<sup>16</sup> Report of the Third Session of the World Urban Forum, 2006, p 31.

communities and the private sector. A new sort of solutions implementation is devised, within a **collaborative relationship between slum dwellers and local authorities**, where the former are the leading development actors.

In order to fully understand social exclusion urban poverty should be brought back into the centre of discussions on development. Currently only around 2 to 12 per cent of donor funding is committed to urban areas, main help still goes to rural areas. Exclusion had worsened the poor situation, as they lacked access to services that directly affected their economic wellbeing. **There is an urgent need to ensure that all socio-economic programmes and activities is focused on meeting the basic survival needs of the most deprived groups**, resources should be redesigned in order to cope with the challenge. Greater collaboration between national and local governments, as well as inclusion of civil society in local decision-making is needed<sup>17</sup>. Even when this was said regarding Africa situation, the validity remains identical in Latin America.

Local governments are considered *“the closest public authority to the people with at least 70 percent of the responsibility for implementing the Millennium Development Goal.”*<sup>18</sup> But no clear resources are available to deliver basic services to the poor. Moreover inequality in cities is growing, highly visible amongst national and international migrants. Promoting diversity by offering equal opportunities for migrants in job opportunities and in political processes is a key strategy for inclusiveness.

Regarding the specific issue of **energy services and sustainable energy dialogue**, the key challenge of identifying reliable and affordable energy supplies and technologies for poor slum households was highlighted, while the paradox that poor paid disproportionately high prices for energy was remarked. Among the main constraints within the developing world, the absence of government leadership; the lack of long term planning and vision; the unreliability of energy service provision and consequent unwillingness to pay for the services; and finally the inadequacy of present systems to communicate the right information to stakeholders were mentioned<sup>19</sup>.

## **2. UPDATE OF NATIONAL SITUATION, ENERGY ACCESS AND POLICY**

One of the most important conclusions that can be drawn regarding policies aiming at mitigating energy poverty in urban areas is that no general policy has ever been specified or defined on the subject. However, certain public measures, as well as others stemming from private initiatives, have been taken in relation to specific aspects of this problem. None of them, though, seems to be

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<sup>17</sup> Report of the Third Session of the World Urban Forum, 2006, p 23/24.

<sup>18</sup> Report of the Third Session of the World Urban Forum, 2006, p 34.

<sup>19</sup> Report of the Third Session of the World Urban Forum, 2006, p 48- 49

part of a comprehensive strategy aiming at mitigating extreme poverty in an organic and coherent manner.

As has already been pointed out in this and other research, national policies have focused on two or three main topics: a) regularizing illegal electricity users in the Greater Buenos Aires area by means of the so-called Framework Agreement (Kozulj, R. 2003; Kozulj, R. and Di Sbroiavaca, N., 2005); b) attempts at defining and developing a “social tariff” for electricity users; and c) the so-called “Social Gas Cylinder Plan”, by means of which several sale points were set up throughout the country for a very limited number of subsidized LPG gas cylinders.

Besides these policies, other more specific ones have been implemented, which also need to be considered. On the one hand, prepayment meters have been installed by EDENOR, the electricity distribution company of GBA, in low income households; on the other, there have been initiatives by neighbour associations in order to access the natural gas grid.

Before succinctly describing the result of these policies, it is necessary to emphasize several interrelated aspects that reveal the lack of an organic approach to the problem of urban energy poverty, in the equally non-organic context of Argentine energy policy after the reforms of the 1990s and the situation after the year 2002 devaluation. The impact of the rules of the game, regulations, tariffs and subsidies implemented in order to mitigate the imbalance produced by that situation needs to be analysed.

## 2.1 Paradoxes of the Argentine energy policy

Since the reforms of the 1990s in the Argentine energy sector, electricity and natural gas transportation and distribution activities, traditionally natural monopolies, have been subject to state regulation by means of two bodies: ENRE and ENARGAS respectively. The frameworks and decrees regulating these activities establish criteria to determine tariffs for the different user categories, revision methodologies and periods, rules for the expansion of the systems based primarily on the hypothesis that proper private cost-effectiveness (also reflected on tariffs) leads in itself to an investment process coherent with the expansion of the demand. Such regulatory frameworks explicitly ban **cross-subsidies**, whether within the same user category or across categories, since it is considered that this practice distorts efficient resource allocation. In turn, electricity generation, and the production of natural gas, oil and its by-products are ruled by different laws and decrees, but they are primarily deregulated activities that may have border prices. Also, these activities are institutionally separated from regulating bodies, and they respond to CAMMESA (administrative company for the electricity wholesale market, which sets the rules for

electric generators), and the National Secretariat of Energy for liquid and gas hydrocarbons and their by-products.

After the year 2002 devaluation, keeping the cost of tariffs and fuels in American dollars would have meant a very marked impact on them – an increase of over 200% in real terms. Because of this, the government then decided to **freeze tariffs in Argentine pesos at the 2001 value** for regulated sectors, and to levy export duties on oil, natural gas and their by-products as a policy instrument aiming at mitigating the rise in prices of deregulated products. It also set a temporary wellhead price for natural gas for domestic market supply. As of 2004, accompanying the change in the context of world oil prices, the government started to adopt a series of *ad hoc* measures in order to improve electricity generators and oil and gas producers' incomes. It also offered **some tariff adjustments** for the sake of electricity and natural gas distribution and transportation companies on condition that they dropped their claims against the Argentine government at the request of the ICSID, under the agreements on foreign investment protection signed with the American and Spanish governments. Thus, partial deregulation and segmentation of the market took effect, so that consumers with the highest incomes as a consequence of the new economic context (that is, the industrial sector) started to pay higher tariffs than the rest, which improved the situation of gas producers. **Several financing mechanisms (*Trusteeship or communitarian financing*<sup>20</sup>) were implemented**, meant to carry out energy infrastructure works (high voltage transmission lines, extension of gas pipelines, investments in electric generation). **Compensation funds**<sup>21</sup> **were also generated**, and important amounts were devoted to **subsidies for electric generators** and for the urban, long-distance and freight transport sector.

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<sup>20</sup> These “public fiduciary funds of investment” were created by law in 1995 and are outside public budget. One example is the fund constituted with the 18% of the country’s diesel fuel sales, called the Transport’s Infrastructure System.

<sup>21</sup> For example the electricity tariff national fund, taxes final consumption of electricity and then it has different applications, although it is mainly aimed at equalizing the final tariff among different jurisdictions, it also provides resources for the electrification of the System outside Buenos Aires main area, and for the expansion of the electricity transmission sector. This last application of the fund is one of the main resources for funding additional investments in electricity transportation.

**Box N° 2**  
**Alternatives for Natural Gas Infrastructure expansion**

This successful story finds its roots on a novel implementation of a non profitable bus line extension, demanded by the neighbours of *Cuartel V*, a neighbourhood of the *Moreno* Municipality (next to the *Lomas de Zamora* Municipality, comprehended in the case study area). The description begins in 1985, two years after democracy returned to Argentina. The request of the neighbours - organized around a “Community Committee” - found a negative answer from the utility in charge of the public transport provision, due to lack of economic feasibility. Thus, *Cuartel V* citizens created their own social transport service, launching the AMEC “The Beehive Mutual Services Association”. A social structure for infrastructure based on solidarity principles was born by this first action. The Natural Gas Net Development was another project successfully implemented by this structure, in collaboration with other factors, within the same area: *Cuartel V*.<sup>22</sup>

The average availability of natural gas within the Greater Buenos Aires – broad zone under study - is around 80% of households, but in the most poor jurisdictions these figures comes down to 55%. The novel pilot program implemented in the *Moreno* Municipality was called “Solidarity Nets Trusteeship” and it is seen as a positive approach towards a new management system, where neighbours, local organizations, NGOs, and firms work together in order to cover basic services within poor areas. Specifically this program covers around 15000 people or 4000 families, comprehending 70 kilometres of households’ gas pipes. The external cost of the gas infrastructure is around 3.9 million argentine pesos (1.3 million dollars), while the cost of gas connections inside the households is around 2.4 million argentine pesos (800 thousands dollars). This last cost is faced by the trusteeship. On the other hand, around one million argentine pesos (320 thousands dollars) of annual savings – in terms of alternative fuels released - were calculated<sup>23</sup>.

The Trusteeship is a legal instrument that allows gathering a special fund with incomes from several kinds (money, machines, buildings, land or lots, tools, etc.) that could only be employed for a specific end. The *Cuartel V* Gas Net project is executed by the Solidarity Nets Trusteeship, administered by the Pro Social Home Foundation, a renowned institution working in the improvement of the *Cuartel V* neighborhoods infrastructure and housing.

The community organization is supported by important public and private entities. Among the later Gas Natural BAN outstands as the main sponsor, as it has the concession of gas distribution in the northern and western of Buenos Aires broad area. From the public side three institutions made additional contributions: the FONCAP S.A. - governmental organization who depends from the Social Development Ministry and whose objective is the promotion of micro projects in lower income social sectors - , the ENER GAS (National Gas Regulatory Entity) and the *Moreno* Municipality. The World Bank in turn, also gave financial support and recognition to the project; us\$250 thousand were allocated by the Development Marketplace international contest of 2002. Finally the Buenos Aires Province Government also contributed with some financial resources.

Nevertheless, this strategy must be carefully monitored, as the trusteeship is in risk of following the same path than the framework agreements for electricity provision to slums, the eventual lack of continuity in the households’ incomes. The structural issue of securing more permanent incomes remains as the most important issue.

As a result of this set of measures, the previous tariff and price system underwent major changes affecting its relative structure and its absolute level in dollars. Whereas hydrocarbon producers got

<sup>22</sup> Zanca, R. 2007.

<sup>23</sup> Gas Natural BAN, 2006.

substantial increases even with respect to those they got during the convertibility period, which meant a 1:1 parity between the dollar and the Argentine peso, tariffs for transportation and distribution companies were almost frozen. In spite of this, hydrocarbon producers limited their investment levels because the new rules prevented them from earning all the potential income derived from the new context of international prices.

Thus, global expansion of the supply system is jeopardized, given the paradox that, on the one hand, there is virtually a flat tariff for the different natural gas consumer categories (and a similar situation for electricity users), and that the gap between LPG and natural gas expenditure in the households has more than doubled, on the other. Again, it should be noted that the poorest users have almost no access to natural gas, as revealed by the case study.

**Table N° 2**  
**Natural Gas Tariff in GBA**

NG Tariff Summary in GBA (u\$s MBTU)		Household user relative tariffs (75 m3 / month)
Household 150 m3 / two-month period	1.76	100
Household 250 m3 / two-month period	1.58	89
Commercial P1, P2, 500 m3 / two-month period	1.41	80
Commercial P1, P2, 5000 m3 / two-month period	1.15	65
Commercial P1, P2, 15000 m3 / two-month period	1.05	60
Commercial P3, 5000 m3 / two-month period	1.87	106
Commercial P3, 15000 m3 / two-month period	1.78	101
General Service G Industrial 7000 m3 / day	1.71	97
Firm Industrial 100000 m3 / day	1.61	91
Non-firm Industrial all consumption	1.36	77

Note: cost paid by deregulated industrial users according to regulations as of 2004 not included.

Source: author's estimate using distribution company tariffs

It can be seen that the most expensive energy is paid by lower-income users, whereas household consumers connected to the grid are either subsidized in absolute terms, or at least earn an important part of the potential income. On the other hand, a considerable proportion of the hydrocarbon income earned by the National Government and the Provinces is devoted to financing current public expenditure and getting an important fiscal surplus, which has positively contributed to the 2002-2007 economic growth, after the 1999/2000 recession. This was one of the most serious recessions that the country ever went through, and as a consequence of it, the number of urban poor increased considerably (Kozulj, R., 2002) which justifies, to some extent, the policies implemented as of 2002. However, expense on **generic subsidies for the energy (and transport) sector** uses up an important part of that fiscal surplus, and it does not lead to a positive impact on energy sector investment (whether private or public). At the same time, tension grows regarding the likely inflationary impact of tariff adjustment, perceived as necessary, the possibility of even deeper energy shortages, and the fiscal and price sustainability as regulated by means of

duties. Export possibilities, in turn, are reduced as hydrocarbon production declines and its domestic demand grows (Kozulj, R., 2007).

To sum up, then, from the point of view of energy policies for the poor, it can be said that in practice, the situation has been regressive (even considering the price of the social gas cylinder). Also, whereas a clear cross-subsidy policy was implemented in an attempt at making the energy system feasible by avoiding negative macroeconomic effects, the complexity of the Argentine energy context after the privatizations, deregulation and subsequent change of regulations has privileged household users connected to the grid more than any other user category.

On the other hand, in the case of the urban poor, the benefits achieved through the regularization of illegal users after the Outline or Framework Agreement underwent several setbacks, mainly because these users cannot afford payment of their electricity bills, or have no real possibilities of becoming illegal users again. Precisely because of this, some distribution companies keep trying to set prepayment meters. As has been recorded in the chapter describing the results of the survey of 106 poor households, and also in the analysis of similar surveys (Endelli, M., 2002; Annecke, W. et al. 2004), the main problem that these users have to face is the lack of regular incomes coming from regular job positions. Therefore, the problem is more clearly identified with indicators such as Unfulfilled Basic Energy Needs than with lack of access to modern and efficient fuels.

Besides, the virtual interruption of tariff revision processes brought about by the mentioned problem, has also postponed implementation of the Social Tariff, with final tariffs for household users remaining practically unchanged since 2001 in local currency. This does not create a proper context for the implementation of a special tariff, which should be agreed upon with distribution companies in GBA. The methodology used by the regulating bodies in order to establish the parameters for household tariffs, is based on regressive regulations and criteria established by Regulatory Frameworks of the 1990s (National Electricity Regulation Law 24.065/1992, see <http://www.enre.gov.ar/web/web.nsf/TarifasCalculo?OpenPage>), which prevents the introduction of tariff adjustments according to consumption levels in order to favour low-consumption users, who are also, in general, those with the lowest incomes.

On the contrary, tariffs markedly favour users with the highest consumption levels, whereas the cost per unit of energy decreases as consumption level rises, which is not only unfair, but also a negative signal for the efficient use of energy. Since the correction of the distortions and paradoxes of the Argentine energy sector, and the implementation of explicit policies aimed at the urban poor should require a thorough rescheduling of the legal framework, it is highly unlikely that this should take place without strong social consensus. The difficulty in reaching such consensus not only lies

at the level of the policy-makers, but is also connected to the fact that all intervening actors at the different stages of the energy chains hold very diverse positions and objective interests.

## **2.2 Fragmentary policies for the urban poor and their results**

### **Prepayment meters**

Edenor carried out a survey (Annecke, W.; Endelli, M. y Carpio, C., 2004) that is quite similar to the one conducted by FB: in a deprived neighbourhood, on a relatively small sample and with a control group to determine the social impact of prepayment meters on aspects related to gender, fairness and environment. Such survey emphasizes the purported positive and negative aspects of this option.

Some of the positive aspects are, mainly, the possibility of consuming electricity in a legal manner without fear of service shortages through lack of payment or illegal connection, changes in the users' self-perception of social exclusion and the possibility of regulating consumption according to the availability of money. However, even though there is not a significant difference between the varied quantitative and qualitative aspects revealed by the survey on consumption patterns and other factors to be studied, affecting the situation before and after setting up those meters, a decrease in basic uses such as food conservation has been detected<sup>24</sup>.

On the other hand, even when the survey seems to reveal a perception that setting up prepayment meters reduces energy expenditure by poor consumers, the objective grounds for such perception remain unproven, since they were not even part of the research. Thus, stating that this policy is "a poverty mitigation measure" seems exaggerated (just as its purported impacts on other cultural patterns). To sum up, the evidence presented by such comprehensive study is scarce, and its conclusions go beyond that evidence so that they cannot be considered a likely policy measure aiming at solving or mitigating energy poverty.

However, certain useful conclusions can be drawn related to the design of policies affecting GBA urban poor.

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<sup>24</sup> The authors of the survey consider it positive to set up prepayment meters since it is an incentive for a more efficient use of energy, though they remark that lower consumption levels in basic uses such as the one already mentioned cannot be considered an achievement, and that campaigns aiming at educating people about issues related to the rational use of energy are necessary. This is why they suggest that, should a mass prepayment meter program be implemented, many deficiencies should be corrected: a) an EE purchasing ticket does not have the same value as an individual electricity bill – such as the one received by the householder in the home - for the sake of getting a loan from a financial institution; b) having a prepayment meter may stigmatize users, since it would deepen the dual view of "poor vs. non-poor households"; c) several sale points should be available, as well as recharge cards, etc.

1. Since distribution companies usually have a negative image, and any policy to be implemented requires their active participation, **an association with NGOs is recommended in order to implement programs in deprived neighbourhoods**. The survey carried out by FB has also shown the efficiency of such strategy, since being admitted in those neighbourhoods requires surmounting barriers related to trust, security and knowledge of the place. It seems that this strategy is also being used by other distribution companies in the region, as is the case with COELBA in Brazil<sup>25</sup>.
2. **Educating users** on the efficient use of energy is essential in order to help them reduce excessive consumption in non-basic uses and thus avoid shortages of basic uses.
3. In all cases, **campaigns should provide thorough solutions**, not partial ones. For instance, in the case of prepayment meters, sale points, card design, user information should be suitable, and solutions for emergency recharge should be well designed so that the sustainability and quality of the service are guaranteed, since this service is in itself considered a universal right.
4. **Direct contact with users** may lead to the design of programs aiming at replacing inefficient devices (low consumption lamps and fridges) so as to induce proactive RUE policies without affecting essential consumption uses.

### **The social gas cylinder**

As the survey has pointed out and confirmed, poor households have no access to natural gas grids, thus consuming large amounts of LPG. Since the price of this fuel is deregulated, users pay around 10 times as much per kcal, if they pay current market prices, and around 7 times as much if they have access to the social gas cylinder.

The program monitored by ACIJ (Civil Association for Equity and Justice) has detected that the number of sale points that should supply deprived neighbourhoods with this product is almost negligible. In the City of Buenos Aires, where NG covers 96% of the demand, for instance, for 130,000 dwellers of shanty towns there is only one sale point, which sold 15,500 gas cylinders in the last semester. This means 0.09 10 kg gas cylinders per household. The real consumption level detected by FB survey in households that could be considered equally poor ranges between an average 1.35 and 1.5 10 kg gas cylinders a month per household.

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<sup>25</sup> [http://www.gfse.at/fileadmin/dam/gfse/gfse7/Plenary6/4\\_GFSE7\\_Presentation\\_Bahia-Brazil\\_Mascarenhas.pdf](http://www.gfse.at/fileadmin/dam/gfse/gfse7/Plenary6/4_GFSE7_Presentation_Bahia-Brazil_Mascarenhas.pdf)

There are some 640 sale points all throughout the country, which means that only a very small proportion of poor households have access to the Social Gas Cylinder, which, besides, is quite expensive. The subsidies granted for this program are really meagre, and have a negligible effect on poverty mitigation.

After this brief review of fragmentary policies, the detail of the proposed study is presented, starting with the methodology employed.

The policy discussion will be continued in last chapters, enriching the analysis with case study findings.

### **3. METHODOLOGY APPROACH AND RESEARCH FRAMEWORK**

#### **3.1 Methodological Approach**

I In order to complement the analysis presented - which comprehends the main available information related to energy consumption by poor households - a combination of qualitative and quantitative methods was developed. Case study slums and poor residential areas were approached in order to collect primary basic information regarding (i) Home Features, (ii) Composition of Households and (iii) Energy Consumption. This was combined with other qualitative approaches to the subject of study, particularly in deep interviews with relevant informants in close contact with slum reality and having a high degree of integration with society in general. The information and descriptions obtained by these interviews allowed the adjustment of the questionnaire, and the proper focus of the survey. The FOC, Community based NGO already working within the slums, provided a unique opportunity for approaching the problems faced by households for fulfilling both, domestic energy needs, and a few productive uses. It was also a unique chance to leave the desk, and go to the study field.

The FOC works with young collaborators who belong to the slum, and have been successfully integrated to the society, by several activities coordinated by the NGO. Moreover the survey field work was done by three of these young collaborators, instead of the usual university students / survey staff. The sense of belonging to the slums was preferred to more complex formation, the survey was simplified and these people were more capable of getting the required information and moving within the slums.

The implementation of this strategy, involves the simultaneous definition of both: the methodology and the kind of information that will be use. Thus, instead of limiting or restringing the analysis to

just (some) **specific features** of the whole problem or phenomena under study, what is defined is **also the way to address** these relevant features.

The described strategy allows, on the one hand, the apprehension of the complexity of the phenomena under study, and on the other hand, the identification of new issues, interpretations or interactions unexpected that might prove relevant and pertinent. The justification for this qualitative and quantitative mix is the novelty of the subject of study, as there has not been identified any studies of energy consumption by slums dwellers.

### 3.1.1 Objectives of the survey on Energy Needs

The main objective of the operative was gathering information on energy needs fulfillment levels, in Poor homes of the Greater Buenos Aires area. As presented, minimum and basic energy requirements by uses are estimated, adjusted to the environmental and climatic conditions of the studied population, then these parameters are going to be contrasted against those obtained by the survey.

The compiled information will be the basis for policy and programs design aimed at improving the energy access of poor urban homes, and thus their quality of life.

### 3.1.2 Coverage and Scope

The studied population belongs to the slums and neighbourhoods of Villa Fiorito and Budge within the Lomas de Zamora District, in the south eastern border to the Buenos Aires City, Metropolitan broad area of Buenos Aires. As maps shows this district has very high levels of poverty, as well as neighbour districts of Lanús, Florencio Varela and Quilmes<sup>26</sup>.

Main thematic subject is the study of modalities and patterns of all sources of energy consumption and their relationship with basic needs of sum inhabitants. In particular:

Home features

- |                            |                             |
|----------------------------|-----------------------------|
| I. Energy sources employed | VI. Dwelling cooling        |
| II. Lighting               | VII. Food preservation      |
| III. Cooking               | VIII. Other home appliances |

---

<sup>26</sup> Please see foot note 3.

- |                     |                                      |
|---------------------|--------------------------------------|
| IV. Water heating   | IX. Productive activities appliances |
| V. Dwelling heating | X. Dwelling features                 |

Section II assesses not only the sort of energy source and quantities consumed, but also the problems and difficulties related with energy provision and energy and appliances use. Field work included a pilot survey (where survey questionnaire was adjusted) and took place in November - December 2007.

### **3.1.3 Interview Methodology**

Direct interview approach was proposed, with collaboration of properly trained assistants, who visited the selected homes during the operative.

### **3.1.4 Sample Design**

Sample size was established in 100 homes, considering the objective of the study, time table and available resources, finally 106 surveys were accepted.

To start with, there is no updated sample framework. On the one hand, after the last national population census of 2001 slums had registered a very significant population increment. On the other hand there is no information covering the whole universe under study (e.g. electricity consumption) due to the absence of ordinary addresses.

Nevertheless and based on similar surveys of urban population performed by the Fundación Bariloche, the share of homes interviewed would give an adequate level of confidence and acceptable degrees of (statistical) failure or mistake of the estimates. The representative issue becomes the most delicate ones; although every effort was done in order to secure random sample design, foreseen limitations biased the cases slightly towards medium strata households. This will be further developed in pertinent section.

### **3.1.5 Questionnaire and Instructive**

The definitive questionnaire survey is presented below. It was adjusted and enriched not only with qualified collaborators - including slum inhabitants - but also by a pilot survey action, in order to address the slum's energy consumption habits, avoiding questions resulting in adverse reaction of the interviewed.

## Greater Buenos Aires Slums, Energy Needs Study

### Household Sector

Survey N°:

---

**I. HOME FEATURES**

**1. House localization**

Street: \_\_\_\_\_ N°: \_\_\_\_\_

Parcel: \_\_\_\_\_ House: \_\_\_\_\_

Additional References \_\_\_\_\_

---

**2. Are there more than one home in the house?**

NO

YES  → How Many?: \_\_\_\_\_

---

**3. How many people live within the home?**

people

---

**4. Home leader:**

Gender :  Male:  Female: \_\_\_\_\_ Age: \_\_\_\_\_

Activity: 1.employee  2.construction worker

3.recycling  4.street sales  5.short daily jobs

6.handcraft  7.self small  8.informal weekend market

9.others  business  food sales

**5. For the rest of the house members:**

N°	Link (relative)	Age
2		
3		
4		
5		
6		
7		
8		
9		
10		

---

**6. a) Do you do any productive activity within the house?**

NO

YES  → Which one?: \_\_\_\_\_

**b) Do you do any productive activity within the /neighbourhood?**

NO

YES  → Which one?: \_\_\_\_\_

**c) does any home member get any social plan** NO  YES

---

**II. ENERGY SOURCES EMPLOYED**

**7. What fuels do you consume?:**

Electricity:

LPG

Kerosene

Wood

Charcoal

Residues, which ones?: \_\_\_\_\_

Other, which ones?: \_\_\_\_\_

---

**8. If Electricity is consumed:**

**a) If there is a self meter, state the N° :**

N°: \_\_\_\_\_

**b) do you share service with neighbours?** NO

YES

**c) do you have colective/community meter?** NO

YES

**b) Do you have any problems with Electricity usage:**

NO

YES  → What sort of problem?: \_\_\_\_\_

[e.identify if home is hooked, whitout asking] NO  YES

**b) Do you have any problems with LPG:**

NO

YES  → What sort of problem?: \_\_\_\_\_

---

**10. If kerosene is used:**

**a) Usually, what amount do you buy each time?:**

SEASON	Litres each time?	Every how many days?
SUMMER		
WINTER		

**b) Do you have any problems with Kerosene usage:**

NO

YES  → What sort of problem?: \_\_\_\_\_

---

**9. If LPG is used**

**a) Usually, what amount do you buy?:**

SIZE OF CYLINDER (Kg.)	AMOUNT	HOW MANY DAYS DOES THE CYLINDER LAST?	
		WINTER	SUMMER

**11. If Wood is used**

**a) Usually, what amount do you buy each time?:**

SEASON	Kg. each time?	Every how many days?
SUMMER		
WINTER		

**b) Do you have any problems with Wood usage:**  
 NO   
 YES  → What sort of problem?:

**12. If Charcoal is used:**  
**a) Usually, what amount do you buy each time?:**

SEASON	Kg. each time?	Every how many days?
SUMMER		
WINTER		

**b) Do you have any problems with Charcoal usage:**  
 NO   
 YES  → What sort of problem?:

**13. If residues are used:**  
**a) Usually, what kind and amount do you use?:**

Sort of Residue	KG, CONSUMED BY WEEK	
	IN WINTER	IN SUMMER
Paper		
Cardboard		
Wood		
Sawdust		
Others:		

**b) Do you have any problems with residues usage:**  
 NO   
 YES  → What sort of problem?:

**III. LIGHTING**

**14. Express the amount of electricity lamps:**

ROOK	INCANDESCENT	FLUORESCENT	LOW CONSUMPTION
Kitchen-Dinning Room			
Bathroom			
Bedroom			
Single room house			
Outside			

**15. Do you employ ON A DAILY BASIS any fuel lamp or appliance?:**  
 NO   
 YES  → express which one?:

SORT OF LAMP	ENERGY SOURCE	AMOUNT (N°)
Lantern	LPG	
Lantern	KEROSENE	
Lamp	KEROSENE	
Other:		

**IV. COOKING**

**16. Express the appliances employed for cooking:**

APPLIANCE	ENERGY SOURCE	AMONT. (N°)	USE		
			DAILY	WEEKLY	OCACNLY
Kichn Stve (3-4 brnrs)	LPG		D	W	O
Kitchen Oven	LPG		D	W	O
Burner	LPG		D	W	O
Burner	KEROSENE		D	W	O
Grill	WOOD		D	W	O
Grill	CHARCOAL		D	W	O
Adobe Oven	WOOD		D	W	O
Fireplace	WOOD		D	W	O
Fireplace	RESIDUES		D	W	O
Wood-burning cooker	WOOD		D	W	O
Burner	CHARCOAL		D	W	O
Burner	RESIDUES		D	W	O
Other:			D	W	O
			D	W	O
			D	W	O

**V. WATER HEATING**

**17. Do you use hot water for the bath or cleaning:**  
 NO   
 YES  → Express which appliance do you use for water heating

APPLIANCE	ENERGY SOURCE	AMOUNT (N°)	USE	
			A	C
Tank less Water Heater	LPG		A	C
Boiler	LPG		A	C
Boiler	KEROSENE		A	C
Electrical shower	ELECTRICITY		A	C
Electrical Tap Heater	ELECTRICITY		A	C
Kitchen stove	LPG		A	C
Kitchen stove	WOOD		A	C
Fireplace	WOOD		A	C
Fireplace	RESIDUES		A	C
Other:			A	C
			A	C
			A	C
			A	C

A: Whole year; C: Only Cold Months.

**VI. DWELLING HEATING**

18. Do you use any appliance for space heating:

NO

YES  ? Express which appliance do you use:

APPLIANCE	ENERGY SOURCE	AMNTH. (N°)	USE		
			PERM.	OCANLY	EVENTUALY
Kichn Stve (3-4 brnrs)	ELECTRICITY		P	O	E
Kitchen Oven	LPG		P	O	E
Burner	LPG		P	O	E
Burner	KEROSENE		P	O	E
Fireplace	WOOD		P	O	E
Fireplace	RESIDUES		P	O	E
Wood-burning cooker	WOOD		P	O	E
Burner	WOOD		P	O	E
Burner	CHARCOAL		P	O	E
Burner	RESIDUES		P	O	E
Other:			P	O	E
			P	O	E
			P	O	E
			P	O	E
			P	O	E

**VII. DWELLING COOLING**

19. Do you use any appliance for space cooling:

NO

YES  ? Express which appliance do you use:

APPLIANCE	ENERGY SOURCE	AMNTH. (N°)	USE		
			PERM.	OCANLY	EVENTUALY
Stand Fan	ELECTRICITY		P	O	E
Roof Fan	ELECTRICITY		P	O	E
Turbo Fan	ELECTRICITY		P	O	E
Other:			P	O	E
			P	O	E
			P	O	E

**VIII. FOOD PRESERVATION**

20. Do you have any sort of Fridge:

NO

YES  ? Express which appliance

APPLIANCE	ENERGY SOURCE	AMNTH. (N°)
Fridge	ELECTRICITY	
Fridge with freezer	ELECTRICITY	
Fridge	KEROSENE	
Other:		

**IX. OTHER APPLIANCES FOR HOUSEHOLD USE**

21. What sort of appliances do you have for home use exclusively?:

APPLIANCE	AMNTH. (N°)	USE		
		DAILY	WEEKLY	OCANLY.
Iron		D	W	O
Washing Machine		D	W	O
Sewing Machine		D	W	O
Hairdryer		D	W	O
Electricity Food Processor		D	W	O
Blender		D	W	O
Radio-tape recorder		D	W	O
Music System		D	W	O
Colour TV		D	W	O
B&W TV		D	W	O
Drill		D	W	O
Other		D	W	O
		D	W	O
		D	W	O
		D	W	O
		D	W	O
		D	W	O
		D	W	O
		D	W	O

**X. PRODUCTIVE ACTIVITIES**

22. Do you do any work for other people within the home: (question 6)

NO

YES  ? Express which appliance do you use:

APPLIANCE	ENERGY SOURCE	AMNTH. (N°)	USE		
			DAILY	WEEKLY	OCANLY.
Kichn Stve (3-4 brnrs)	LPG		D	W	O
Kitchen Oven	LPG		D	W	O
Fridge	ELECTRICITY		D	W	O
Fridge with freezer	ELECTRICITY		D	W	O
Sewing Machine	ELECTRICITY		D	W	O
Drill	ELECTRICITY		D	W	O
Power Saw	ELECTRICITY		D	W	O
Iron Soldering	ELECTRICITY		D	W	O
Rotary Peeler	ELECTRICITY		D	W	O
Other:	ELECTRICITY		D	W	O
			D	W	O
			D	W	O



### 3.2 Research Framework - *Villas de Emergencia* - Buenos Aires' Slums

The population subject of this analysis encompasses approximately 128,444 inhabitants in the City of Buenos Aires (CABA) according to the *Housing Institute* (Instituto de la Vivienda), and around 1,700,000 people in the Buenos Aires Greater Area ("GBA").<sup>27</sup> Besides, AMBA represents one third of the country's population (*more than 38 millions inhabitants, according to the last census carried out in 2001: 36,260,130*), and there is no doubt that these inhabitants stand for the most poor and needed segment of Argentina.

In the past 30 years, slum's inhabitants have been trebled in the CABA, while according to 2001's census; the general population rate did not change. However, while the amounts of homes that coexist in poor living conditions have decreased 16% between 1991 and 2001, the absolute decrease, of this kind of homes in GBA was almost none: 0.16%.

At the national level, after the 2001 crisis, cities with less than 50,000 inhabitants expanded more than large urban centers due the fact that the country was undergoing a de-industrialization process. Other Argentine cities that represent a major number of inhabitants living in slums are Córdoba, with almost 120,000 people (four times as much as inhabitants for 1991) and Rosario with around 70,000 inhabitants<sup>28</sup>

The **slums possess features that distinguish them from settlements**. Slums have been originally thought to be temporary homes and have a high population density. On the other hand, settlements are occupation of privately-held pieces of land by force; with houses or much precarious cubby-holes placed in lands with inadequate topographic characteristics for urbanization (*Train ramparts, under highways, abandoned pieces of land, etc*). They don't even have the minimum security levels. According to the Buenos Aires Rights Protection Department ("Defensoría de la Ciudad"), they lack infrastructure and most essential services (potable water, power, natural gas or sewages). Houses are often cubby-holes or shelters made of cardboard or sheets of metal; the ceilings are improvised by using plastic bags and cardboard and the floors are either made of soil or rammed rubbish.

Currently, **capital and suburbs slum's** inhabitants are a heterogeneous group. They lodge "old" slum inhabitants, new immigrants (*from other provinces and neighbouring countries*), and formerly working classes turned into "new poor". In some cases, after the 2001 crisis, many of those foreign

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<sup>27</sup> Area Metropolitana de Buenos Aires ("Metropolitan Area of Buenos Aires"), AMBA means the territory compound with the City of Buenos Aires (CABA) along with the Greater Buenos Aires Area (GBA).

<sup>28</sup> María Cristina Cravino and Raúl Fernández Wagner, members of INFO-HÁBITAT Team.

immigrants returned to their native countries, especially those from neighbouring countries. While the neighbourhoods in the city of Buenos Aires are more consolidated but more heaped up, the suburbs have more spacious lots, but with less access to infrastructure and urban services in general, and less access to employment in particular.

Access to the city (meaning to settle in it) implies being able to “buy lodging” and, consequently, land in which a house has been built. It means access to urban grounds (in the form of land, houses or apartments, whether for buying or renting). This will logically happen in a diversity of ways, depending on each home’s socio-economic situation. For some people, *regularity* (and sometimes *legality*) is unreachable, and therefore access is only a reality in very specific situations, embracing from land informal markets (via intermediaries) to factual situations; **“...some people, giving the rental prices in other places, now rent for 300 pesos (100 dollars) a month in poor neighbourhoods.”**<sup>29</sup> That is why ***irregular land occupation and settlement in areas with no access to public services, environmentally degraded or exposed to natural disasters, is the prevailing way of access to the city for most poor sections of the population***<sup>30</sup>

The solution is probably the design of housing policies to refrain consolidation of new settlements, the trigger that made this situation burst has been the lack of government policies to support the phenomenon when it first started to manifest.

At the moment, a balance of the different applied policies is needed. In Argentina, possession and regularization policies are a down falling because they have only solved a very small portion of the problem. Regarding the city of Buenos Aires, titles to property are never delivered. However, in other parts of the country some cases have been solved, tough just a few. In some other places, they started the processes, but it still remains unfinished after 10 years. Many suburban neighbourhoods of Buenos Aires have expropriation laws that fallen into disuse as they never become effective and are always at the starting point, so the process must start all over again, and the result is rights precariousness and possessions insecurity.

Powerful reasons, mainly due to the economic leadership that large cities have as a consequence of the globalization process, trigger policies that operate over the habitat and the reason of which is to attack the poverty problem, although their real essential purpose is to ensure urban governance. This fact generates new sources of tension around Latin-American’s housing problem in which the focused actions overrule the consequences of poverty and their territorial results, and meanwhile the intervention over these structural aspects of the problem is missing. Certainly, the need of a new government role with a much more profound intervention has been identified.

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<sup>29</sup> Pagina 12, local newspaper, Wednesday /July 25th, 2007.

<sup>30</sup> María Cristina Cravino and Raúl Fernández Wagner, INFO-HÁBITAT

## 4. SCOPING PHASE DESCRIPTION AND FINDINGS

For convenience of the exposition, this section will be described initially by energy source.

### 4.1 Electricity

The **framework** agreements – some of them designed in 1994 and renewed by 2003 - were signed between local or provincial; national governments; and the respective utilities, slums have a common meter for measuring the whole consumption -about 700,000 homes were “legalized” including slums from both GBA & CABA - resulting in sound reduction of non technical losses. Promises of urbanization of the slum were given, but as related in previous chapter there is not solid strategy for property allocation, neither for territory planning. Absence of long term plans, lack of structural measures, and the consequent stress on infrastructure is happening; resulting in further electricity service interruptions and worsened service provision to slums and surrounding area.

Additionally **high levels of electricity consumption are identified**, due to the inadequacy of household **equipment** (used, old generation devices or low-cost, low-efficiency ones) and to habits of consumption deriving from both, the culture of illegal connections and the features of the houses themselves. Additionally, as the consumption is provided without individual metering and *free charge* basis, limit is given by the point of infrastructure’s failure.

Government would pay the electricity, but sometimes Utility’s punishment fines or taxes are cancelled against this electricity consumption. Furthermore, there are claims from the Utilities for the lack of government payment. Nevertheless, utilities can negotiate better due to this irregular service provision situation. It is not a long term clear solution.

If the gross sales of the main two utilities operating in the whole area (Buenos Aires City and The Greater Buenos Aires) for year 2003 are analyzed, slums consumption reached around 300 million dollars for each one. The share on total electricity sold reaches 2.0% for EDESUR (poorest area including Villa Fiorito and Budge case studies) and 1.1% for EDENOR. Nevertheless this situation is worsening<sup>31</sup> within the metropolitan area the slum consumption of electricity increased between 32% and 53% from January to July 2007 - while household sector increased by 28%.

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<sup>31</sup> La Nación, September 9<sup>th</sup>, 2007,

## 4.2 LPG

The **social gas cylinder program** was implemented by the Government in 2004 and supported by the companies, was a palliative measure aiming at defusing the crisis in the poorest sectors. The program enabled the poor to buy 10 kg gas cylinders in 624 sales outlets throughout the country at a subsidized price<sup>32</sup>.

The Civil Association for Equality and Justice (*Asociación Civil por la Igualdad y la Justicia*), denounced in a March 2007 report, that the plan is not coping with its objective of cylinders' cost stabilization<sup>33</sup>:

- The number of sales points is not enough to cover those households without natural gas net service.
- Lack of public communication regarding the existence of the Action and conditions to benefit from it.
- Absence of technical controls over quality, safety and maintenance of cylinders<sup>34</sup>.

During the first half of 2007, sales of social cylinders totalled only a monthly average of 377,100, out of the 4,000,000 estimated units of consumption, according to the ACIJ. It must be bore in mind that out of 85% of the citizens without access to natural gas' grid connections consumes LPG in 10kg cylinders, whereas the remaining 15% uses firewood, paper, kerosene, plastic, vegetable/animal waste, etc<sup>35</sup>.

Additionally it is estimated that by the end of year 2004 LPG represented between 50% and 60% of the total basic services expenditure by low income household<sup>36</sup>.

The following figure shows the evolution in LPG consumption. It is evident the impact of year 2002 devaluation and following crisis on consumption due to the significant increase in canned gas

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<sup>32</sup> National law N° 26020 LPG Regulatory Framework, Resolution 792/2005 establishing a reduced price (30% reduction or 2 dollars) for the 10kg cylinder; and Buenos Aires City Local Law N° 1353 (Decree N° 2406/004) "Social Cylinder Program" (a 10\$ refund -3.3 dollars- for every 10kg cylinder bought by destitute households) both enacted within the framework of the National Socio-Economic Emergency Law N°25561.

<sup>33</sup> ACIJ, 2007.

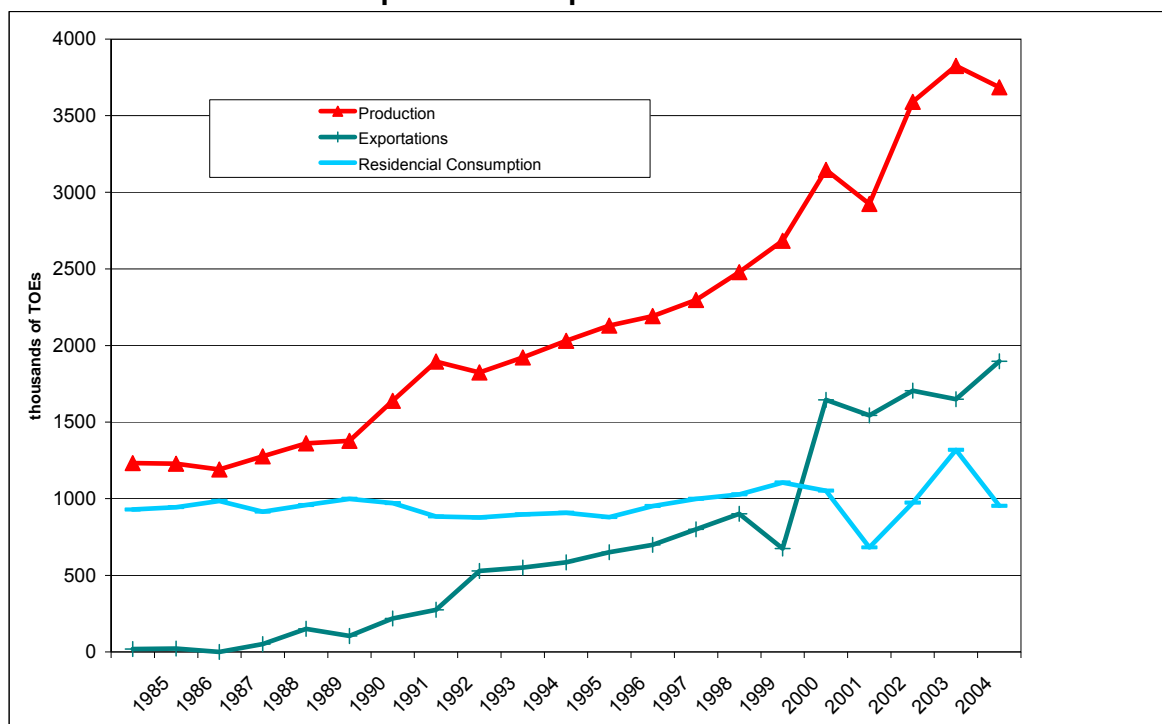
<sup>34</sup> After some inspections of cylinders' contents, a liquid residue was found, explaining its low caloric power. Problems with the pans or metal containers used in combination with the LPG cylinders - they got rapidly damage – were also found.

<sup>35</sup> EQUIS Consulting Agency, 2004.

<sup>36</sup> De Dicco, R. 2005.

price, explained because the market of the energy source lacks price regulation. The figure compares the performance of residential sales - that do not grow as demand does - against the explosive sales of cylinders to the external sector. Obvious commercial reasons lie behind this differential conduct. Despite the many factors behind the lack of smooth behaviour in both lines, the relation between increased production and external market is unambiguous, while unsatisfied domestic market is not addressed.

**Figure Nº 2**  
**Evolution of LPG consumption in the residential sector**  
**Compared with exportations 1985-2005.**



Source: Estimate on the basis of Energy Balances by the Secretary of Energy.

Since it is assumed that almost all homes consuming LPG at present are poor homes (about 4.5 to 5 million homes in the whole country), analysis should focus in investigating to what extent policies for this fuel help mitigate the Poor's energy situation.

### 4.3 Others

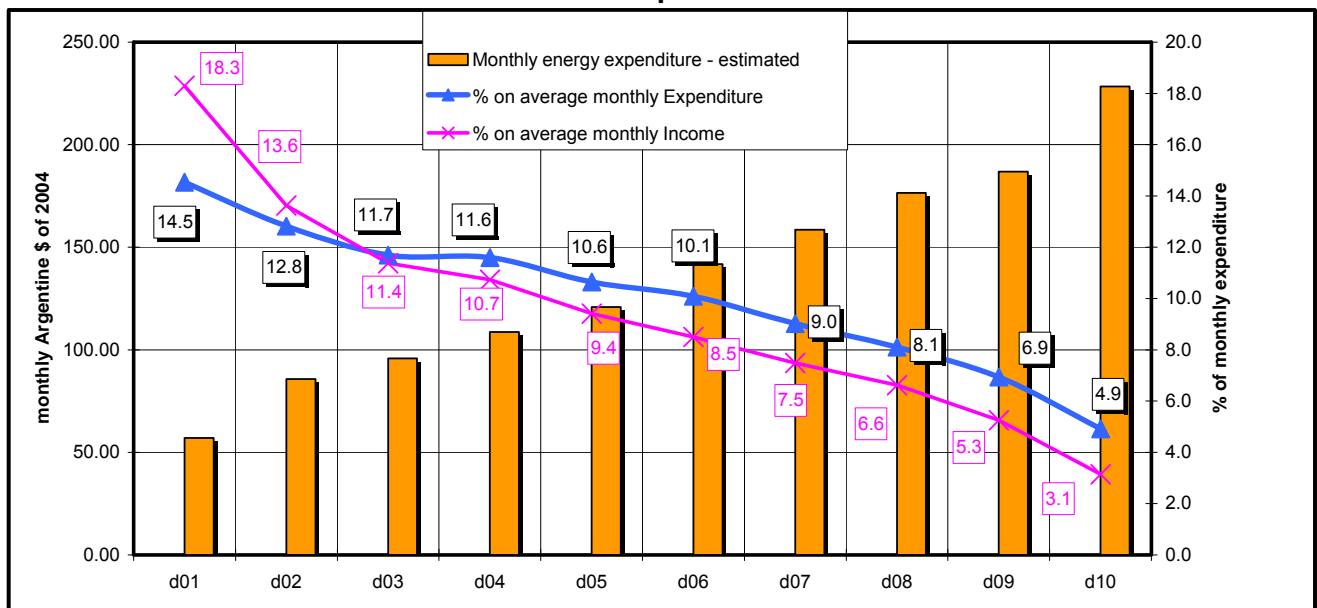
Regarding **Kerosene** a lack of availability was also denounced by Fuel Business Entrepreneurs Association. The main sales point are the gasoline stations, but in slums the sales point are ordinary homes that includes domestic products shops – most common productive activity. The situation of the provision of both fuels (Kerosene and LPG) reflects the market feature of “oligopoly” behind the supply, and the lack of monitoring and control by the regulatory entity. Additionally the **charcoal** price did increase constantly since 2002, drawing a delicate picture for

the poor households' energy access. These sources are mainly used by poor families for home heating and cooking in absence of LPG.

Figure number 3 below, shows an estimate based on an update of the energy consumption basket by decile (total population jointed in portions containing 10% each) of population income, in terms of current prices in the local currency, and its relation to the average expenditure and income of the households.

It should be stated, however, that these estimates refer to average households by decile and may not reflect the real situation of the population living in slums. Anyway, it is revealing to notice the negative saving of the first two groups concerning expenditure by household, and also the high share of energy expenditure in their average income.

**Figure Nº 3**  
**Average energy expenditure in year 2004 (\$ of 2004)**  
**Shares of household expenditure and income**



Source: FB estimates based on INDEC data.

**The national Energy Efficiency Campaign** to reduce household (Natural Gas & Electricity) consumptions in order to deal with '2007 energy crisis', did not succeed, anyway it does not reach slums. The only effect over objective population can be expressed as the Campaign's failure in diminishing household demand, resulted in additional pressures and intensive use of electricity infrastructure, with the consequent service cuts and interruptions.

EDENOR, one of the utilities - providing service in greater Buenos Aires - completed a preliminary evaluation of **pre paid meters** around 4500 devises were installed in low Income households, not

in slums. But the conclusions are useful as they include details of energy consumption patterns when distributed gas is not available.<sup>37</sup> Some of these consumption patterns are presented below.

Additional conclusions - from an electricity tariff study - point out the convenience of subsidizing low income households' gas or kerosene consumption - instead of electricity tariff (due to the encouragement of caloric uses originated on a low electricity price). Then it will be possible to give an additional reduction on electricity tariff just for small consumptions - around 150 Kwh a month (Bertero, R. 2004). Nevertheless further analysis is necessary to identify better which subsidies meet the minimum energy requirements of poor households, as well as alternative market based solutions. Subsidies should not encourage overconsumption, levels above the defined threshold should be billed at increasing tariffs, even at the risk of spreading the tariff list (WEC, 2006)

#### 4.4 Transition to thematic phase, Preliminary Household Consumption Patterns

From regional estimations of basic energy consumption needs, built by an analytical construction of household members; standard equipment and the respectively hours of use and efficiency, a structure of energy consumption is developed.

**Table N° 3**  
**Estimated Theoretical Minimum Energy Requirement to be confronted against slums' consumption**

Energy Use	KOE <sup>38</sup> (year)	(%)
Food conservation	42	15
Lighting	17.5	6
Cooking	90	31
House Cooling	4	1
Water Heating	73	25
House Heating	54	19
Others	9	3
<b>TOTAL</b>	<b>289.5</b>	

Source: FB

Additionally some interesting tables from a field study of 102 interviews conducted in June 2004 in Merlo, Greater Buenos Aires are shown. The Merlo prepayment project addresses the needs of 4,300 people; many could be defined as 'newly poor'. Although this population does not belong to slums and has a *better* socio-economic situation, it is useful to analyze a possible picture of a slum inhabitant's energy consumption pattern, if their condition is improved, additionally this population does not have access to distributed gas, alike slums.

**Table N° 4**  
**Type of fuel and appliance uses for cooking**

<sup>37</sup> Annecke, Wendy, 2004.

<sup>38</sup> Koe: kilogram of oil equivalent = 10,000 kilocalories.

**Merlo Case Study**

	Frequency	%
Wood stove	2	2
Electric stove	2	2
Kerosene stove	1	1
<b>LPG stove</b>	<b>95</b>	<b>95</b>
Total	100	100

Source: Annecke, Wendy, 2004.

**Table Nº 5**  
**Type of fuel used for heating water for baths**  
**Merlo Case Study**

	Frequency	%
<b>LPG</b>	<b>46</b>	<b>45</b>
Wood	3	3
<b>Electricity</b>	<b>50</b>	<b>49</b>
Kerosene	1	1
Do not heat	2	2
Total	102	100

Source: Annecke, Wendy, 2004

**Table Nº 6**  
**Type of fuel used for heating the house**  
**Merlo Case Study**

	Frequency	%
Charcoal	11	11%
Wood	15	15%
<b>LPG</b>	<b>10</b>	<b>10%</b>
<b>Electricity</b>	<b>19</b>	<b>19%</b>
Kerosene	12	12%
Do not heat the house	32	32%
Total	101	100

Source: Annecke, Wendy, 2004

If the basic use of cooking is addressed LPG is the prevalent fuel, once less basic uses are analyzed, electricity becomes the main source. At least two issues are relevant here; electricity appliances are more common for space and water heating (than for cooking) and apparently these uses are not saturated, which is more clear in space heating (32% do not heat the home).

Next table shows a picture of the expenditure in fuels; higher relevance for LPG is found again, while standard deviation is not too large.

**Table Nº 7**  
**Average expenditure in pesos per month on all fuels**

**Merlo Case Study**

	<b>Kerosene</b>	<b>Gas</b>	<b>Coal</b>	<b>Wood</b>	<b>Candles</b>	<b>Batteries</b>	<b>Electricity</b>	<b>All fuels</b>
Mean	3	<b>29</b>	2	0	1	1	<b>23</b>	<b>57</b>
Median	0	<b>25</b>	0	0	0	0	<b>20</b>	<b>52</b>
Mode	0	<b>25</b>	0	0	0	0	<b>20</b>	<b>40</b>
Standard deviation	14	<b>15</b>	8	3	3	3	<b>11</b>	<b>26</b>

Source: Annecke, Wendy, 2004

**5. THEMATIC PHASE DESCRIPTION AND FINDINGS**

As mentioned the intension is to identify unsatisfied energy needs, and then the most appropriate sources that should be encouraged in order to fulfil the most basic ones. Very little information was found regarding productive activities performed within the poor neighbourhoods, exhibiting a subject for further analysis. Nevertheless some hints for developing construction related activities appears among the most interesting community based alternatives. In this section the existing information regarding energy consumption by poor neighbourhoods in Greater Buenos Aires is presented giving – when possible – a notion of the relative importance of energy disbursement in terms of income and expenditure. However, the extent of data collected indicates the urgent need of further larger scale information gathering, in order to support public energy policies and initiatives towards urban poor dwellers well being.

As a natural continuation of scoping phase a survey operative in poor neighbourhoods was proposed, considering the lack of data on energy consumption patterns and expenditures, the need of further basic information was unavoidable. In order to have a real understanding of energy consumption patterns among poor dwellers in GBA shantytowns, expenditure levels and modality and employed fuels a small survey was successfully carried on. Then a preliminary diagnosis would provide an initial input for the identification of policy action.

In order to perform the operative, basic concept of the GNESD was adopted and even extended. Regional centres are required to work in collaboration with partners who can assist them in communicating the research results to a broader section of people including the civil societies, NGOs, academicians and policymakers. In the southern Buenos Aires slums case study - Villa Fiorito and Budge – the issue of *communicating results* was reinforced by a sort of alliance (a framework agreement was designed and signed for the occasion) between the Fundación Bariloche and the Foundation for Communities, FOC.

This NGO has deep roots in all the southern poor area of Greater Buenos Aires (metropolitans area), and performs a big number of actions in order to integrate people form slums to the society.

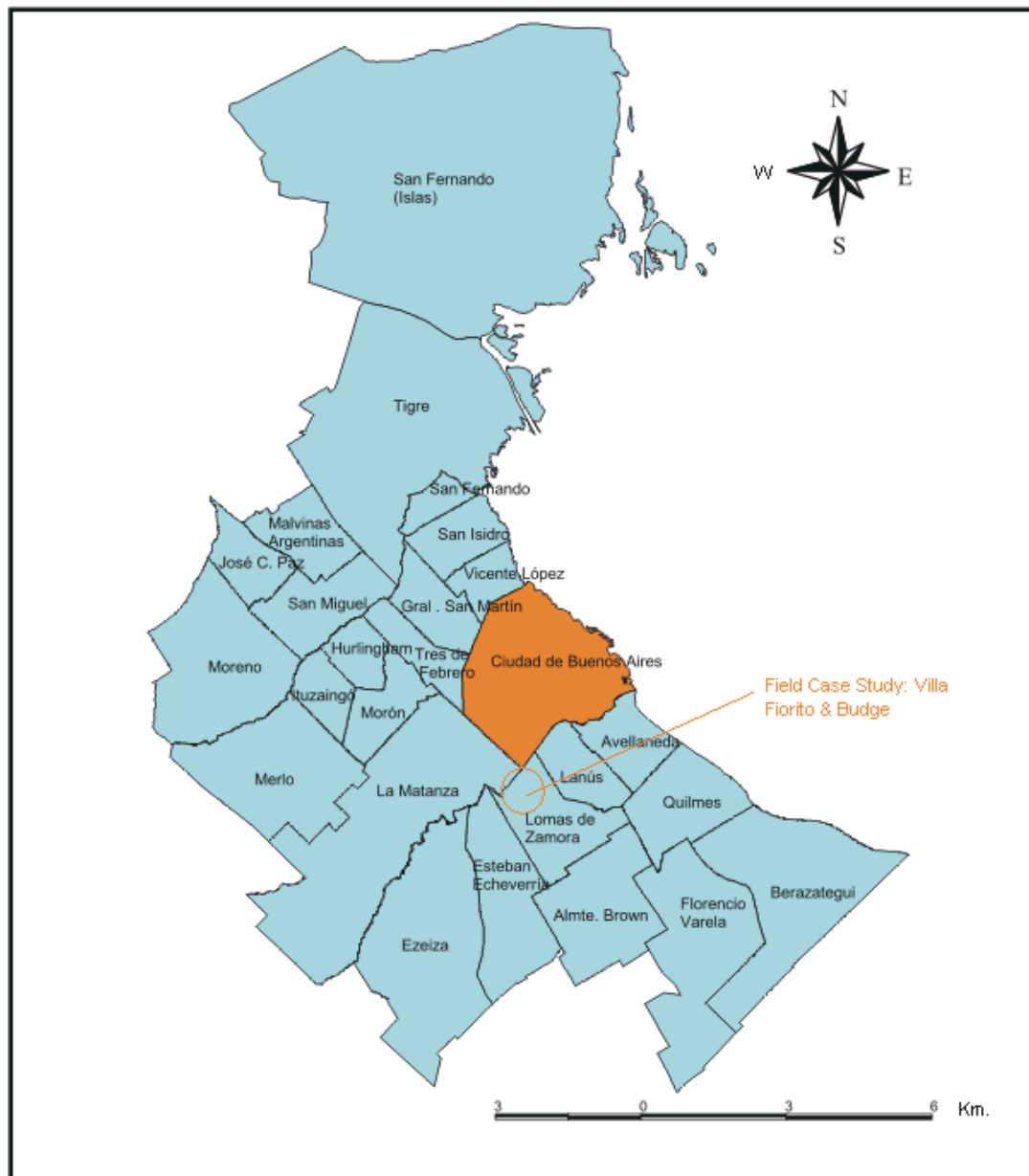
The joint work included the definition of site location for the operative, which proved to be a very short term politically conditioned action, contacts with relevant informants, logistic within the area during field operative and pilot questionnaire testing<sup>39</sup>.

Below some maps are presented in order to properly identify the working area. Furthermore, some additional satellite images are presented in order to situate the reader within the site study field.

**Figure N° 4**  
**Localization of Field Case Study within the Buenos Aires Metropolitan Area**

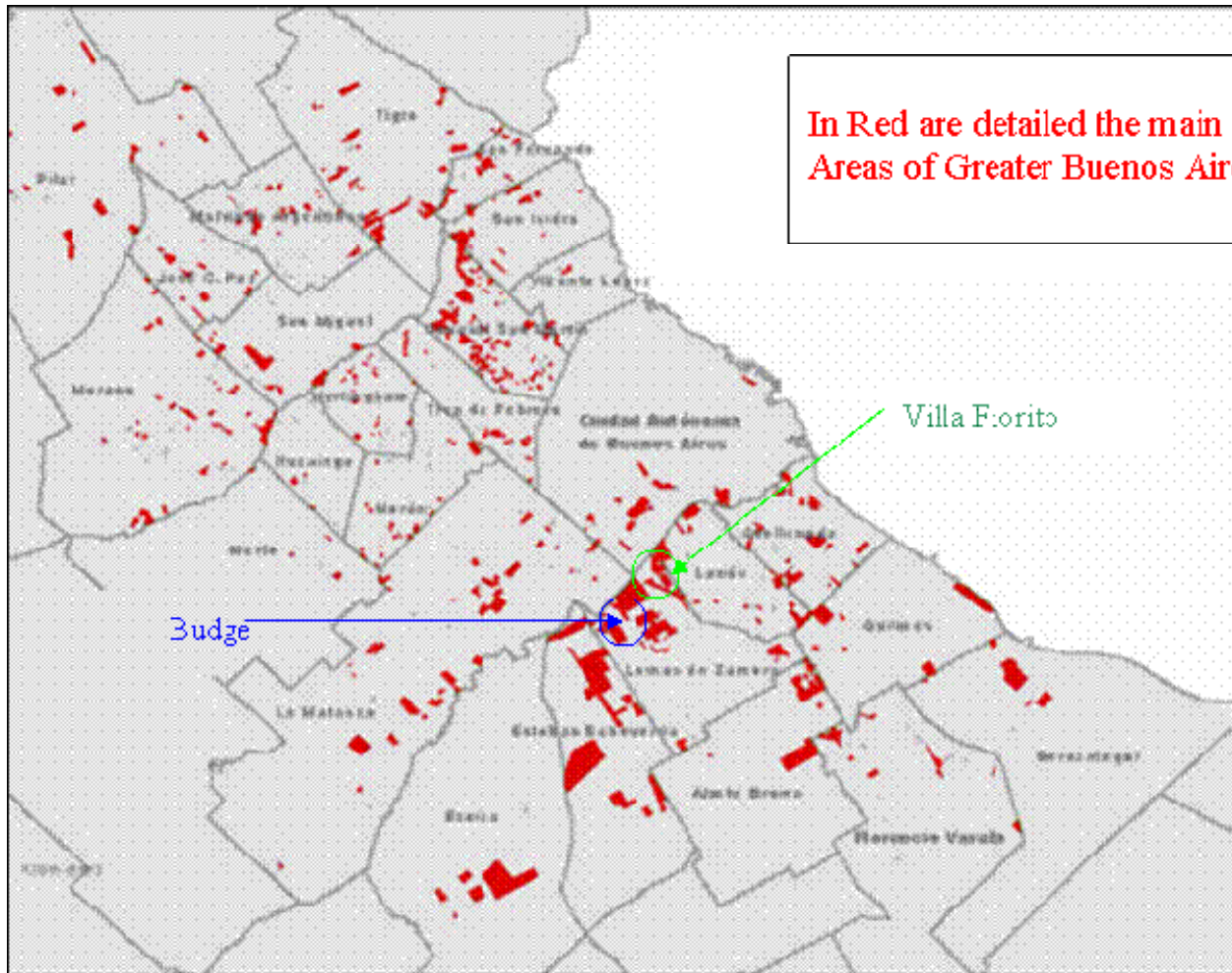
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<sup>39</sup> Thus, depending of a huge variety of issues, an appropriate place for gathering information, suddenly stops being advisable. The reason is very simple: many actors are working and interacting with slum organization – which are well organized in terms of representation – then promises are made, information is obtained – including videos and photographs. Most of the time these actors are one-time visitors, promises remain un-kept. Of course this is not the only problem within a vulnerable social sector, slums are permanent focus of attention,



Noticeably, the slums are located next to the southern limit of Buenos Aires City. This section of the Capital has the less density of population. Furthermore during the last 15 years many highway accesses were finished (already collapsed by the ever increasing number of private vehicles). These issues have a relevant outcome for our analysis: the convenience of living close to the city, but with cheap housing expenditure. That is also reflected in next map (slums location).

Figure N° 5  
Localization of Field Case Study within the Buenos Aires Metropolitan Area



Source: elaborated by Raúl Fernández Wagner from official sources: Dirección Provincial de Estadísticas, Secretaría de Transporte de la Nación, Ministerio de Salud de la Provincia y algunos municipios. informe digital Metropolitano N°42 - Septiembre de 2007 Se construirán o mejorarán 150 mil viviendas en la metrópolis Buenos Aires. Fundación Metropolitana. [www.metropolitana.org.ar](http://www.metropolitana.org.ar)

Next section presents some satellite images downloaded using the popular software © google earth. The first one presents the big picture, the area detailed is approximately the one circled within both maps above: Villa Fiorito and Budge, both belonging to the Local Government of Lomas de Zamora, which is a different contiguous district to Buenos Aires City. The borders of the slums are not clearly defined and are extended to neighbour districts.

Image 2 and Image 3 (exhibited in the final annex) are drafted on the first photograph, and constitute further approximations to the slum area. Image 4 is included in order to show the clear differences in texture, if a typical medium class neighbourhood is approached. Thus is possible to identify - in Image 3 in contrast to Image 4 – the lack of definition of streets (absence of pavement and square configuration) the diffuse houses limits, without demarcation between one and other.

### Satellite Image N°1 Case Study Broad Picture



The three images marked with squares, are presented in the Annex, they are a zoom image of picture above.

### 5.1 Energy problems faced by Slums - scoping phase issues confirmed

As previously mentioned, during economic crises the neighbourhood, as the home broad site, is the main place where to retire to, gather or meet. Slums, depending on their type and organization, provide community elements that act as a shelter in times of need, because fluid human communication and contact exists. Schools and community halls are the places where people can get food, basic medical care and assistance of all kinds for free. In fact, schools in poor neighbourhoods have also been feeding families, or at least the children, which plays against the main goal of such institutions, which is educate the children on an equal basis.

It is common to find different types of referents in schools, from the neighbourhood's church priest to evangelist preachers, politic organizations and *strike participants* (piqueteros<sup>40</sup>) school teachers, presidents of neighbourhood committees or born leaders. It is common to find wide social

<sup>40</sup> Referring to a situation where people motivated by self needs and organization – in the best occasions – or paid – in the worse of the cases – in order to be part of public hard impact manifestations. The main example is the cutting or interrupting of streets, avenues and routes.

heterogeneity: salaried workers; unemployed heads of family (official social aid plans), self-employed workers that work outside the neighbourhood; and also those working inside the neighbourhood.

From the point of view of energy supply, access to **electric power** is the most universalized service. However, quality and service continuity is absolutely uneven, even more depending on the number of illegal connections. In the case of slums where production activities are being carried out using domestic connections, which triggers installation inadequacy problems, it is common to find mechanic workshops that use welding machines and small electric engines that require three way applications and adequate power) as well as sewing workshops and kitchens for commercial purposes.

Regarding additional **productive activities**, some typical activities founded in slums includes repairation working-shops, basic household's consumption product shops, and prepared food. The urban wastes/ garbage recollection for separation and **recycling** deserves special attention, as it and involves pollution within the site (slums) with the consequent risk to population, specially the children. This activity has gained importance since the 2002 crisis, due to the increase in paper price and it could be considered the main productive activity within the slum, an average day of work can give around 1.5 or 2 dollars. No particular information has been obtained in connection with this core activity, but remarkably the few people that declared recycling as main activity exhibits the poorest profile.

The most popular fuel is **LPG**. However, given the inability to pay for the cylinders, other appliances – burners - for which firewood burning is necessary are used to burn abandoned woods, cardboard and other stuff from the garbage. During hard cold winters, the situation turns critical, when inside heating is of core importance. Acknowledgement by the authorities of this issue is very scarce. Since the installation of the so-called "Welfare Cylinder" ("*Garrafa Social*"), little improvement has been achieved on facilitating permanent access and, under economic viability's conditions, energy to the poor, specifically those living under extremely poor conditions.

Recently the mentioned NGO ACIJ together with neighbours' organizations from a Buenos Aires City slum (*Villa 31 bis* - probably the top 1 slum of the city regarding media impact and visibility due to its localization) succeed in the provision commitment of two public services: postal mail and telephone (provided by a public and a private firm respectively). This allows traditional post to be delivered to 6000 city inhabitants. Regarding telephone service, the firm started a general plan drawing for the installation of telephone wires and poles (ACIJ, see <http://www.acij.org.ar/esp/mostrarNoticia.php?id=385>). The best outcome of this action is allowing the households to have a postal address, one of the keys towards regularization of homes. This sound success must be monitored carefully, it has high impact on the media during elections time,

but it must prove permanence on time, gain effectively new customers and the most important it must give place to other slum regularizations – replication.

## 5.2 Case Study description

The definition of the sample was not an easy task. Once the site was decided – Fiorito and Budge neighbourhoods (or villages, see foot note 3) – the precise households to be surveyed had to be defined. An intuitive process was developed with a detailed map of the urban area (where slums area were very poorly drafted), and the local knowledge of FOC young collaborators, former inhabitants of both neighbourhoods. Then a large interaction and discussion took place, the intention was to identify the different socio-economic areas (sub-neighbourhoods) within each neighbourhoods. This partition excluded relatively better off residential areas in order to identify the variety slums and very poor places. Finally 10 sites were defined, and the hundred surveys were allocated.

**Table Nº 8**  
**Selected Neighbourhoods**

<b>neighbourhood</b>	<b>Site (sub - neighbourhood)</b>	<b>Number of samples</b>
Villa Fiorito	Camino Negro	6
	La Cava	18
	Villa Urbana	12
Budge	La Salada (*)	8
	Bajo de Budge	6
	Budge B	13
	Villa la Madrid	8
	Villa Albertina	20
	Villa Obrera, Santa Catalina	8
	Villa Albertina, Monoblocks	7
<b>Total</b>		<b>106</b>

Notes:

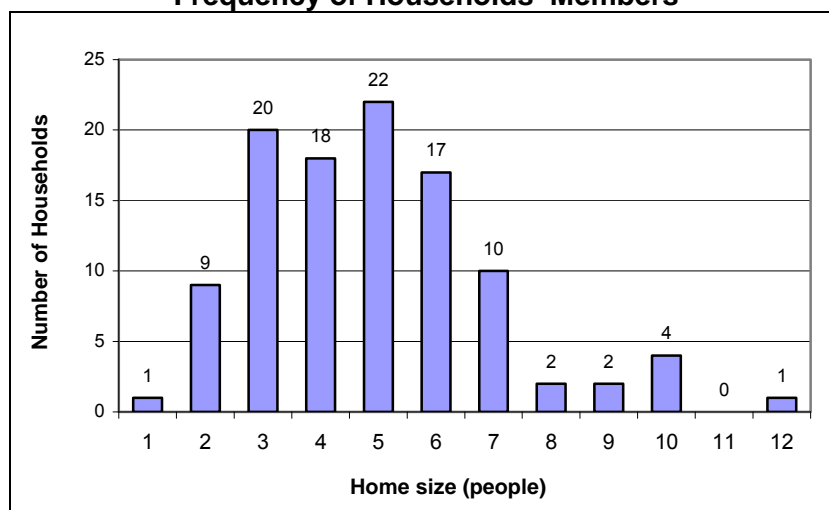
- Sub neighbourhood names are given by local inhabitants and do not match necessarily, maps names.
- The relative number of samples reflects size of sub-neighbourhood and the real chance of interviewing the households.
- The houses were randomly picked during the field study, and it must be recognized a bias towards more medium income families, was finally surveyed, for ease of

Initially two meetings for capacitating the survey collaborators on energy issues were held. Then three interviews were done in order to adjust preliminary questionnaire some problems were identified, and strategies for asking questions were discussed (e.g. do not ask if people are hooked or precise materials of the buildings, but to infer them by observation – the final form is attached at the end of section 3.

### 5.2.1. Characterization of neighbourhood and energy consumption

Below is a characterization of the energy consumed by the dwellers of deprived urban areas (shanty towns) in Budge and Fiorito, on the basis of data surveyed among 106 dwellings, inhabited by 109 households and 538 people (an average of 4.94 people per household).

**Figure Nº 6**  
**Frequency of Households' Members**



Source: Authors' estimates.

The climate in this area is warm and humid, with a wide temperature range across seasons. It may be as cold as 0° C in winter and as hot as 40° C in summer.

The range of works performed by the person that contributes with the most important share of family expenditure is presented below.

**Table Nº 9**  
**Main work activities of surveyed Households**

Main work	frequency
Employee	33
Construction worker	24
self small business	16
short daily jobs	10
informal weekend market food sales	7
Recycling	4
home tasks	2
unemployed	2
Others	8

TOTAL	106
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Source: Authors' estimates.

Employees represent the largest occupation, and it includes domestic work paid by hours. As expected, people working in the construction sector are very relevant, representing the second activity in importance. The third one is self business, generally food related shops within the home. Short daily jobs involve the traditional activity of slum inhabitants that are ready available for single day works 'changas' in Spanish.

Regarding productive activities performed within the slums, the sample presents the following detail:

**Table Nº 10**  
**Productive Activities of surveyed Households**

Productive activity	Frequency
Food related shops	14
Clothes related shops	7
Carpentry	2
House Cleaning articles	1
Souvenirs handcrafting	1
TOTAL	25

Source: Authors' estimates.

Main activity is the sale to neighbours of home products or articles; including prepared food (frequently charcoal or wood fuel is employed, because the taste and flavour are preferred). Clothes related shops include small handcraft finished leather products, cloth mending and sewing, both for minor sales to neighbours and for resale to bigger shops. Clearly no novel activity was found, neither a particular productive task that goes behind usual dynamic of a village.

If the main expenditure of these families are analyzed, food and travel related disbursements outstand with the 87% and 9%, respectively of the answers to 'what is the home's main expenditure?'. Other issues are medicines (just 4% of answers to second expenditure issue), nappies and cellular phone bill; energy sources like LPG, kerosene and electricity were mentioned only one or two times, although a frequently mentioned problem related with its consumption is its expensive price. Other problems related with the energy sources confirmed our preliminary notions of consumption, reflected in final summarizing table.

**Table Nº 11**  
**Money spent in the two main relevant households issues (local \$)**

	Minimum	Maximum	Medium	Standard Deviation
Daily expenditure in the MAIN issue	10	100	32,72	14,00
Daily expenditure in the	2,33	35	19,36	8,47

SECOND main issue				
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Source: Authors' estimates.

Note: 1 US dollar accounts for about 3.15 \$.

The information seems to be taking a mixture of the need of money for a particular item and the real expenditure in it (which was the idea to find with the survey). But it is helpful to identify money needs of these poor households.

Daily energy cost is around 6\$ for the bag of charcoal (used in the poorest households for covering very poorly main caloric needs). As a sort of second step, those families – the majority - with LPG spend around 2 daily pesos to cover caloric energy needs, which can be reduced to almost half a peso if natural gas is employed – third step of energy consumption. These three figures (6\$, 2\$ and 0.5\$) give a comparative idea of the effort needed by these families for energy provision. But if are compared with the average expenditure in two main home issues, an alerting result is found. Two reasons stand for this: mentioned “estimation of covering cost” (instead of real expenditure, a bias of the survey), and the distortion introduced by a few cases (e.g. cellular phones users) which put medium value to high. More Interesting is to compared the three estimated figures for energy expenditure with the minimum values collected, which reflects better a slum family situation, then energy just for basic caloric energy uses can reach as much as the half of the main two issues above (minimum values of 10 and 2.33 \$) within family expenditure. The obtained figures for the average household of the survey will be presented further on.

Now approaching the main objective of the survey, physical energy consumption is analyzed.

Although these are all low income households, their energy needs are mostly catered for by high quality fuels, namely Electricity and Liquefied Petroleum Gas (LPG). 100% of households use Electricity and 92% use LPG. The other fuels consumed are Charcoal (23% of households), Kerosene (7%), Natural Gas (4%)<sup>41</sup> and Biomass Waste (wood waste, 4%). No Firewood as such is used in this area.

Natural Gas and LPG use totals 96%, which shows that these households consume high quality fuels. Charcoal is used mostly to supplement LPG consumption. In the case of Cooking, using Charcoal is culturally determined; on the other hand, it is also used to prepare take-away food, which, in some households, contributes significantly to family earnings. In these cases, this fuel is then also used to cater for the household food needs.

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<sup>41</sup> It must be said that these homes are somehow outside the targeted population, as their consumption profile is clearly better than the average. Nevertheless it was decided to leave them among the studied sample, as the situation is representative, considering both the widespread of NG in Argentina, and also the viability and proximity of this energy source to slums' areas.

Firstly, useful energy<sup>42</sup> consumption in the households surveyed is described, since it is a better indicator – as compared with final or net energy – of energy use to fulfill specific needs.

Table below shows the useful energy consumption matrix by fuels and uses in the households surveyed. Useful energy annual consumption totalled 194.1 koe/household<sup>43</sup>, which represents an annual useful energy consumption of 39.3 koe/person a year. This annual consumption per person recorded a minimum value of 12.3 and a top value of 175.6 koe/person, the top value being 14 times higher than the minimum value.

**Table Nº 12**  
**Useful energy consumption by fuels and uses**  
**[koe/household per year]**

USES \ SOURCES	LPG	NG	KE	CH	BR	EE	TOTAL	
Lighting						1.0	<b>1.0</b>	0.5%
Cooking	61.3	2.2	0.8	2.0	0.1	0.4	<b>66.8</b>	34.4%
Water Heating	12.3	4.1	1.6	0.8		21.1	<b>40.0</b>	20.6%
Space Heating	1.9	1.1	1.0	6.7	0.03	12.6	<b>23.4</b>	12.0%
Food Conservation						41.7	<b>41.7</b>	21.5%
Ventilation						2.2	<b>2.2</b>	1.2%
Other Devices						19.0	<b>19.0</b>	9.8%
<b>TOTAL</b>	<b>75.4</b>	<b>7.4</b>	<b>3.5</b>	<b>9.6</b>	<b>0.2</b>	<b>98.0</b>	<b>194.1</b>	100.0%
	38.9%	3.8%	1.8%	4.9%	0.1%	50.5%	100.0%	

Source: Authors' estimates.

The main use of useful energy is Cooking, which accounts for 34% of household consumption, followed by Food Conservation (21%) and Water Heating (21%). Space conditioning uses – Heating and Ventilation – are relatively low: 12% and 1.2% respectively. Other Devices (mainly irons, washing machines, sound systems and TV sets) use 10% of the total, and Lighting, 0.5%.

The main fuel catering for useful energy needs is Electricity, which contributes 51% of the total useful consumption in the household, followed by LPG (39%). This means that these two fuels contribute almost 90% of useful consumption.

The use of Electricity for caloric purposes, mainly Water Heating and Space Heating, is relatively high. In Argentina this is not normally the case in the household sector, not even in high income households. The situation surveyed here is a consequence of the fact that in these settlements, many dwellings are illegally connected to the electricity grid, or do not pay the electricity bill. The distribution company cannot, then, discontinue the service without causing serious conflicts with

<sup>42</sup> Useful energy is the energy consumed once the losses derived from the use of devices has been deducted; that is, final or net energy minus losses derived from use.

<sup>43</sup> Koe: kilogram of oil equivalent = 10,000 kilocalories.

the dwellers. Nevertheless only a 15% of the surveyed homes declared directly or indirectly to be illegally connected to the grid..

Net (or final) energy consumption is the amount of energy reaching the dwelling. This means it has more to do with supply than with the fulfillment of users' needs. Net energy annual consumption in this sample totals 410.3 koe/household (see Table 13).

The main fuel accounting for net consumption is LPG, which accounts for 41% of the total. This is followed by Electricity (37%), Charcoal (16%), Natural Gas (3.6%), Kerosene (2.3%) and, finally, Biomass Residues (0.3%).

The difference between net and useful energy consumption across fuel shares can be accounted for by the differences in energy efficiency of the devices, depending on the fuel. It can be seen, for instance, that Charcoal share is reduced if measured in terms of useful energy due to its low energy efficiency (4.9% in useful energy, against 16.2% of net energy).

**Table Nº 13**  
**Net energy consumption by fuels and uses**  
**[koe/household per year]**

<b>USES \ SOURCES</b>	<b>LPG</b>	<b>NG</b>	<b>KE</b>	<b>CH</b>	<b>BR</b>	<b>EE</b>	<b>TOTAL</b>	
Lighting						18,5	<b>18,5</b>	4,5%
Cooking	136,1	4,3	2,3	31,1	1,3	0,5	<b>175,7</b>	42,8%
Water Heating	27,4	8,2	4,7	8,4		26,4	<b>75,2</b>	18,3%
Space Heating	4,1	2,3	2,6	26,9	0,1	15,7	<b>51,8</b>	12,6%
Food Conservation						64,2	<b>64,2</b>	15,7%
Ventilation						2,5	<b>2,5</b>	0,6%
Other Devices						22,5	<b>22,5</b>	5,5%
<b>TOTAL</b>	<b>167,7</b>	<b>14,8</b>	<b>9,6</b>	<b>66,5</b>	<b>1,4</b>	<b>150,3</b>	<b>410,3</b>	100,0%
	40,9%	3,6%	2,3%	16,2%	0,3%	36,6%		

Source: Authors' estimates.

Next table shows energy efficiencies of the devices by fuels and uses. The average efficiency of energy consumption totals 47.3%. This relatively high value, as compared with household consumption in Latin America, is a consequence of the high share of Electricity and LPG in the consumption pattern of the households surveyed. Biomass Waste and Charcoal are the fuels with the lowest efficiencies.

**Table Nº 14**  
**Energy efficiency by fuels and uses**  
**[%]**

USES \ SOURCES	LPG	NG	KE	CH	BR	EE	TOTAL
Lighting						5,3	5,3
Cooking	45,0	50,0	35,0	6,5	11,6	80,0	38,0
Water Heating	45,0	50,0	35,0	10,0		79,9	53,2
Space Heating	45,0	50,0	40,0	25,0	21,8	80,0	45,1
Food Conservation						65,0	65,0
Ventilation						90,0	90,0
Other Devices						84,4	84,4
<b>TOTAL</b>	<b>45,0</b>	<b>50,0</b>	<b>36,3</b>	<b>14,4</b>	<b>12,6</b>	<b>65,2</b>	<b>47,3</b>

Source: Authors' estimates.

### Unfulfilled Basic Energy Needs

In order to determine unfulfilled basic energy needs of the households, a set of devices and energy consumption level, considered necessary for a basic quality of life for the families, must be defined. Below this threshold deprivations or unfulfilled needs might be recorded. This basic level of energy consumption by uses is called basic energy requirements<sup>44</sup>, and it will be estimated in useful energy.

Unfulfilled requirements or needs for each use can be quantified, for each of the households and for the sample total, by comparing basic requirements and real useful energy consumption (as recorded by the survey). Next table shows, for each use, the devices necessary for the fulfilment of basic needs, and the power and number of hours of use per year for an average household.

**Table Nº 15**  
**Basic requirements of useful energy by use – Average Household**

<sup>44</sup> This is estimated on the basis of data from the paper titled “*Requerimientos básicos y mínimos de energía de los pobladores urbanos y rurales pobres e indigentes de América Latina y el Caribe*”, Víctor Bravo, Fundación Bariloche, Argentina, 2004.

USES AND DEVICES	Power	Unit	hours / year	kWh /year	Efficiency	useful koe /year
<b>Lighting</b>						
1 Bedroom	40	W	548	21,9	0,045	0,1
Kitchen/dining-room	120	W	1.278	153,3	0,045	0,6
Bathroom	40	W	548	21,9	0,045	0,1
Outside	80	W	1.095	87,6	0,045	0,3
Sub-total	280	W		284,7		1,1
<b>Cooking</b>						
LPG Cooking Stove	0,196	kg/hr	420		0,450	40,6
LPG Oven	0,224	kg/hr	130		0,450	14,3
Sub-total	0,420	kg/hr				54,9
<b>Water Heating</b>						
Useful Energy estimate						32,9
<b>Space Heating</b>						
LPG Stove	2.250	kcal/hr	315		0,450	31,9
<b>Food Conservation</b>						
Fridge	250	W	2.555	638,8	0,650	35,7
<b>Ventilation</b>						
Fan	75	W	360	27,0	0,900	2,1
<b>Other Devices</b>						
Iron	625	W	98	60,9	0,800	4,2
Washing-machine	250	W	130	32,5	0,800	2,2
Sound system	40	W	840	33,6	0,900	2,6
TV set	40	W	980	39,2	0,900	3,0
Sub-total	955	W				12,1
<b>TOTAL</b>						<b>170,7</b>

Source: Authors' estimates.

An average household comprises five people living in a house made of blocks or bricks and a corrugated iron roof, with a kitchen/dining-room, one bedroom and a bathroom. For the estimate of useful energy, a type of equipment technology as is normally used in the neighbourhoods surveyed has been considered. In the case of Lighting, incandescent lamps have been taken into account. For the estimate of basic useful consumption of Water Heating, a level of 30 liters/household-day has been taken into account, with an average water temperature range of 30° C throughout the 365 days of the year.

For an average household, basic annual requirements of useful energy total 170.7 koe/household. Then, these basic requirements for each household are adjusted according to the peculiarities of each of the households surveyed, according to the following criteria:

- Cooking and Water Heating, according to the number of people in the household.
- Lighting, Space Heating and Ventilation, according to the number of rooms (kitchen/dining-room and bedrooms) in the house.
- Food Conservation and Other Devices, with the same basic requirements as for the average household.

In this way, the basic requirements in terms of useful energy, for each of the households surveyed is estimated, which are then compared with real useful energy consumption as recorded in the survey.

### Useful energy basic requirements

Table below compares consumption levels and average basic requirements of useful energy for the sample surveyed. Average basic requirements total 193.6 koe/household, which is higher than average household requirements due to the adjustments according to the number of people and rooms.

Although total values of consumption and requirements are very similar (194.1vs.193.6 koe/household), important differences are recorded in the analysis by uses. Energy uses related to food, hygiene and communication in the sample surveyed reveal a level of useful consumption, average of the households, higher than the requirements. Cooking consumption levels exceed basic requirements by 12.3%; Water Heating, by 2.1%; Food Conservation, by 20.2%, and Other Devices, by 45.4%.

In turn, uses related to space conditioning show an important average deficit. Useful consumption for Lighting uses is 16.6% lower than basic requirements; for Space Heating, 44.3% lower, and for Ventilation, 45.8% lower.

When analyzing these data, it is necessary, on the one hand, to take into account that it is impossible to substitute human needs, and therefore, energy consumption levels by use, and on the other, that the values in the table presented below are average of the sample surveyed. There are households with more marked energy shortages than the average which will be analyzed below, when unfulfilled needs are estimated.

**Table N° 16**  
**Yearly consumption vs. basic requirements of useful energy by use**  
**Average of the households surveyed**  
**[koe/household]**

<b>USES \ SOURCES</b>	<b>Useful consumpt (A)</b>	<b>Basic Requir (B)</b>	<b>(A) / (B) - 1</b>
Lighting	1,0	1,2	-16,6%
Cooking	66,8	59,4	12,3%
Water Heating	40,0	39,2	2,1%
Space Heating	23,4	41,9	-44,3%
Food Conservation	41,7	34,7	20,2%
Ventilation	2,2	4,1	-45,8%
Other Devices	19,0	13,1	45,4%
<b>TOTAL</b>	<b>194,1</b>	<b>193,6</b>	<b>0,2%</b>

Source: Authors' estimates.

Energy expenditure dimension

A more detailed picture, using average tariff for electricity - without considering whether is it paid or not – and natural gas, and real field study prices for other fuels faced by slum households, would reveal a warning regarding the share of income necessary to fulfil energy needs.

**Table Nº 17**  
**Expenditure in Basic Energy Needs**  
**Total Survey [Argentine pesos, 1 us\$ = 3.15 \$ ]**

USES \ SOURCES	LPG	NG	KE	CH	BR	EE	TOTAL	
Lighting	0.0	0.0	0.0	0.0	0.0	23.2	<b>23.2</b>	3.3%
Cooking	372.7	1.5	3.1	20.2	0.8	0.6	<b>398.9</b>	56.2%
Water Heating	75.1	2.8	6.3	5.5	0.0	33.1	<b>122.7</b>	17.3%
Space Heating	11.3	0.8	3.5	17.5	0.1	19.7	<b>52.8</b>	7.4%
Food Conservation	0.0	0.0	0.0	0.0	0.0	80.5	<b>80.5</b>	11.3%
Ventilation	0.0	0.0	0.0	0.0	0.0	3.1	<b>3.1</b>	0.4%
Other Devices	0.0	0.0	0.0	0.0	0.0	28.2	<b>28.2</b>	4.0%
<b>TOTAL</b>	<b>459.0</b>	<b>5.0</b>	<b>12.8</b>	<b>43.2</b>	<b>0.9</b>	<b>188.4</b>	<b>709.4</b>	100.0%
	64.7%	0.7%	1.8%	6.1%	0.1%	26.6%	100.0%	

Source: Authors' estimates

## Notes:

- Lower caloric value was employed for comparisons
- For Biomass Residues same price per energy unit than charcoal was used, for simplicity
- Relative prices in terms of Argentine \$ per KOE are: LPG 2.74; NG 0.34; EE 1.25; CH and BR 0.65; and KE 1.33.

The real profile of poor families emerge, main use takes as much as 56% of total energy expenditure. Regarding the sources, remarkably, LPG represents 65% of expenditure while electricity takes 27%, and charcoal accounts for 6% of the total expenditure in energy. These shares must be considered with extremely care, as they are an average of not quite homogeneous households. But the general finding of which sources should be addressed in order to improve quality of life is unambiguous.

In terms of comparative figures, the total energy disbursement represents 10% of the governmentally defined indigence or deprivation basic basket of food<sup>45</sup>. Similarly it stands for the 6% of the official poverty basket – enlarged to include some basic goods and services. Moreover, this expenditure accounts for 39% of the most important – in terms of beneficiaries - social plan for people in charge of a home. Finally it can be contrasted with the unemployment subsidy: the beneficiary of the latter would need more than a quarter of this subsidy for paying the energy costs of the case study average home.

<sup>45</sup> INDEC official source, see foot note number 11.

Unfulfilled Basic Energy Needs

In order to estimate the Unfulfilled Basic Energy Needs (UBEN) of the households surveyed, the following considerations were taken into account:

- a) They are estimated by use, and by comparison with basic useful energy consumption standards that will cater for a quality of life considered basic or minimum.
- b) UBEN are determined for each use of energy, irrespective of the rest of the uses. This is so because there can be no substitution between needs or uses.
- c) The comparison is made with an amount of useful energy considered basic or minimum. Therefore, a level of real useful consumption higher than the level of the basic requirement does not mean that consumption has reached an optimum or desired level.
- d) Consequently, the UBEN of a household and of the sample total are estimated by adding up the differences between the levels of useful energy real consumption and basic requirements for each use only when consumption levels are lower than basic requirements.
- e) Basic energy needs are considered unfulfilled only when consumption levels are lower than 90% of the basic requirements for the use. This 10% margin of error was adopted in order to render the UBEN estimate more reliable.

Table y.3 shows useful energy basic requirements of the households surveyed, and unfulfilled requirements by use. It can be seen that UBEN account for 23.6% of the basic requirements.

The main uses with unfulfilled requirements are: Heating (55.2% of unfulfilled basic requirements); Ventilation (53.0%), Water Heating (31.1%) and Lighting (24.9%). Cooking, Food Conservation and Other Devices have considerably lower proportions of unfulfilled requirements.

**Table Nº 18**  
**Unfulfilled Basic Energy Needs**  
**Total Survey [koe]**

<b>USES \ SOURCES</b>	<b>Basic Requir (A)</b>	<b>Unfulfilled Requir (B)</b>	<b>(B) / (A)</b>
Lighting	128	32	24,9%
Cooking	6.480	508	7,8%
Water Heating	4.271	1.328	31,1%
Space Heating	4.571	2.525	55,2%
Food Conservation	3.785	286	7,5%
Ventilation	449	238	53,0%
Other Devices	1.423	58	4,1%
<b>TOTAL</b>	<b>21.107</b>	<b>4.975</b>	<b>23,6%</b>

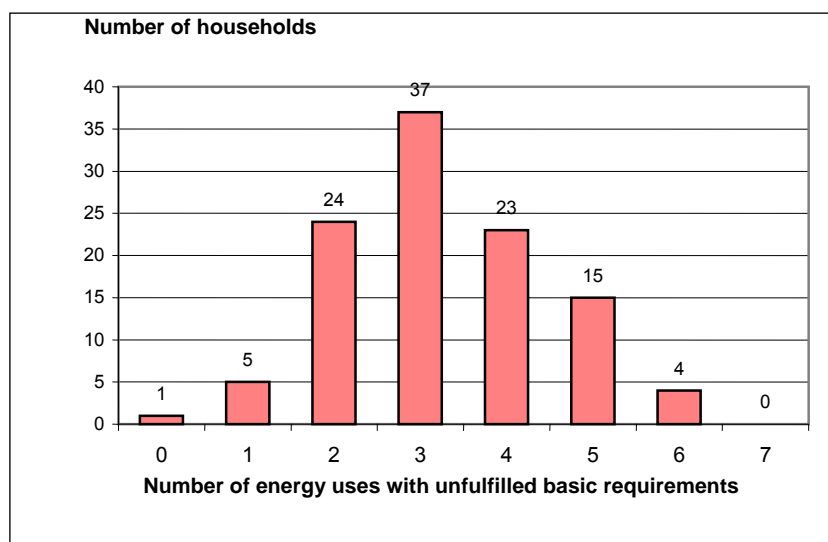
Source: Authors' estimates

Although total useful consumption and total basic requirements of useful energy for each household are not so valid as indicators, because they are not disaggregated by use, they do reveal, to a certain extent, the general situation of a household regarding energy shortages. Thus, the top value recorded in a household with unfulfilled total basic requirements is 74%.

5% of the households have unfulfilled requirements ranging between 50% and 74% of their basic needs; 36% of the households, between 25% and 50% of unfulfilled total requirements; and 59% of the households, between 10% and 25% of unfulfilled total requirements.

A household can have several uses with unfulfilled basic requirements. Next figure shows the number of households according to the number of uses with unfulfilled basic requirements.

**Figure N° 7**  
**Number of households surveyed according to the number of energy uses with unfulfilled basic requirements**



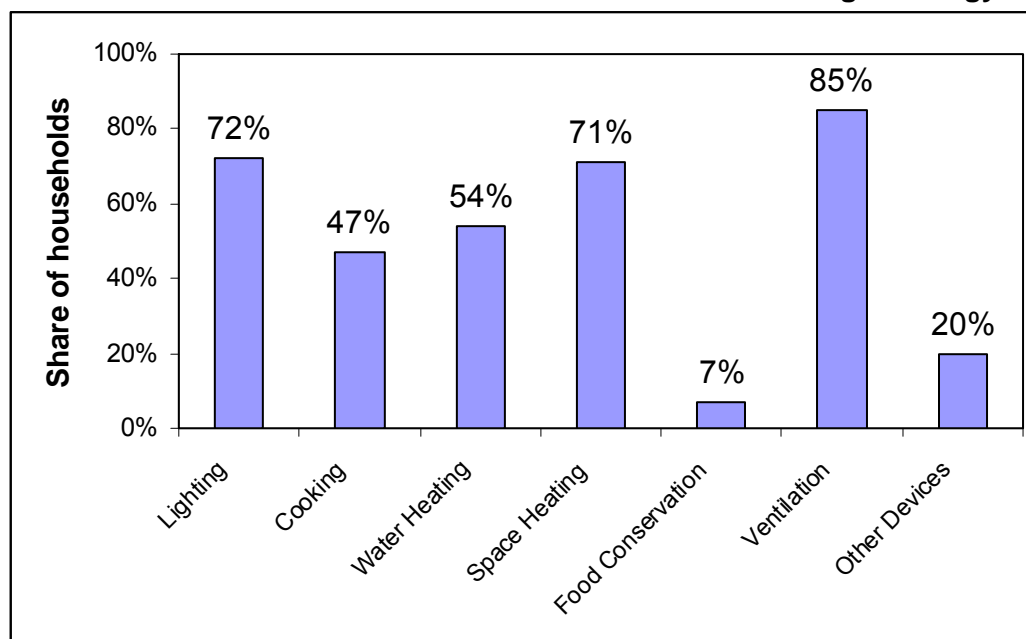
Source: Authors' estimate

It can be seen that only one of the households surveyed has no unfulfilled uses. Most of the households (37, that is 34% of the sample total) have three uses with unfulfilled basic requirements.

The analysis of unfulfilled needs by use as recorded in figure below reveals that Ventilation is the most unfulfilled use in most households (85% of the households), followed by Lighting (72% of the households), and Heating (47% of the households). There are fewer households with shortages related to other uses such as food, hygiene and communication-recreation.

**Figure N° 8**

### Number of households with unfulfilled basic needs according to energy use



Source: Authors' estimate

Below a brief analysis by neighbourhoods is presented. The order is given by the number of uses presenting unfulfilled basic energy requirements.

**Table N° 19**  
**UBEN Sub-Neighbourhoods' Detail**

	number of unfulfilled uses	useful energy consumption	useful energy requirements	Consp./Reqirim.	net unfulfilled needs
BAJO DE BUNGE	4,2	120	200	60%	-96
VILLA URBANA	3,7	196	213	92%	-53
VILLA LA MADRID	3,6	191	189	101%	-64
CAMINO NEGRO	3,5	166	207	80%	-49
V. ALBERTINA, MB	3,4	178	181	98%	-34
VILLA OBRERA	3,3	191	187	102%	-26
LA SALADA	3,3	230	237	97%	-68
BUDGE B	3,2	215	212	101%	-66
VILLA ALBERTINA	2,9	204	189	108%	-25
LA CAVA	2,8	231	189	122%	-33

Source: Authors' estimates.

Notes:

- All figures express the sub-neighbourhood **average**.
- **Useful energy requirements**, reflect as explained the particularities of each home, number of rooms, number of people, etc.
- Both **Consumption / Requirements** coefficient and **Useful energy consumption** must be seen carefully, as the large energy employed in one use (e.g. cooking) overlaps the not fulfilled need (e.g. water heating). Best indicator might be last column, as "**net**" **unfulfilled needs** means that the level of energy employed in each use is taken just up to the fulfilment level, and then it reflects better (weighting somehow) the lack of energy for unfulfilled uses.

### Possibilities of substitution between fuels and energy saving

In order to analyze likely substitution processes between fuels, it is necessary to rely on the consumption pattern of useful energy by fuels and uses, as shown in Table 20. It can be seen that uses such as Lighting, Food Conservation, Ventilation and Other Devices are Electricity-dependent, as is usually the case in urban households. Consequently, fuel substitution is not likely to take place by these uses.

Uses recording competition between fuels, then, are Cooking, Water Heating and Space Heating. As a whole, these uses account for 67% of useful energy consumption and 74% of net energy consumption of the sample surveyed. 91.7% of useful consumption is supplied by LPG, followed by Natural Gas (3.2%) and Charcoal (3.0%). The share of the rest of the fuels is not very significant.

In Cooking, substitution could be accomplished by the penetration of Natural Gas, a higher quality fuel, less costly than LPG and with less significant environmental impact. This could be feasible by building distribution grids in these neighbourhoods and subsidizing, partially or totally, investments in facilities and connections to the dwellings, these measures will be developed further on.

In Water Heating and Space Heating, the highest consumption corresponds to Electricity, with 52.7% and 53.9% of useful consumption respectively. In Argentina, the use of Electricity for these two caloric uses is not frequent because of its high relative price, as compared with alternative fuels. In the sample surveyed, there is a relatively high percentage of households that are illegally connected to the grid. Other reasons for this high electricity consumption level, though not fully recorded by the survey but confirmed by qualified informants – including the surveyors themselves - are related to the fact that many of these households do not pay the electricity bill.

**Table Nº 20**  
**Energy consumption pattern by fuels and uses**  
[%]

<b>USES \ SOURCES</b>	<b>LPG</b>	<b>NG</b>	<b>KE</b>	<b>CH</b>	<b>BR</b>	<b>EE</b>	<b>TOTAL</b>
Lighting						100	100
Cooking	91,7	3,2	1,2	3,0	0,2	0,6	100
Water Heating	30,8	10,3	4,1	2,1		52,7	100
Space Heating	7,9	4,9	4,4	28,8	0,1	53,9	100
Food Conservation						100	100
Ventilation						100	100
Other Devices						100	100
<b>TOTAL</b>	<b>38,9</b>	<b>3,8</b>	<b>1,8</b>	<b>4,9</b>	<b>0,1</b>	<b>50,5</b>	<b>100</b>

Source: Authors' estimate

As mentioned above, Water Heating and Space Heating record a high percentage of unfulfilled basic requirements. Natural Gas penetration could solve both problems. On the one hand, it could reduce Electricity consumption and solve the irregular situation of these households, apart from reducing the demand on distribution grids, which, in turn, would improve the quality of the service. On the other hand, it could cater for unfulfilled needs to a large extent.

Energy saving measures, in turn, are not considered to have a significant impact on the improvement of supply and energy consumption of these households. Solving unfulfilled basic energy needs would lead to a significant increase in energy consumption, both net and useful.

Using low consumption lamps would imply a relative energy saving. Although 88% of the lamps used are incandescent, Lighting represents only 4.5% of the total net consumption of these households, and 12.3% of net Electricity consumption.

The highest Electricity consumption level is recorded in Food Conservation (42.7%). Using efficient fridges is not considered to be very feasible given the low income levels of these households.

Substituting Charcoal in Space Heating would greatly improve the efficiency of energy consumption in this use and the quality of use. All saving measures in Space Heating and Ventilation must be closely related to improvements in construction characteristics of the houses, since these have a high incidence on the efficient use of energy in these uses.

### **5.3 Energy consumption patterns in Buenos Aires' slums**

Finally, a summarizing overall table presents a general description of Buenos Aires area slums, enriched and exemplified by the case study *Villa Fiorito* and *Budge* findings.

**Good practices** are shown in blue, while **Bad practices** are shown in red. Sometimes these are reasons for using or not the very source.

An issue that prove difficult to introduce in a single energy source is the absence of satisfaction of the very need. When parents do not have clean (warm) water, this prevents for

washing and cleaning the children. Health diseases (skin fungus and infections) are denounced by health professional working nearby slums. Similarly if no fuel at all is available for cooking, the most basic need of feeding the family is put in jeopardy. This core issue justifies the need of approaching the analysis in terms of energy needs, and then energy uses, instead of just restraining the study to some energy sources.

Information for the table comes from different sources, survey, testimonies from affected inhabitants and qualified informants.

Table N° 21 UPEA II Energy consumption patterns in slums, Buenos Aires

	Why it is used? (not used)	Issues related with use	Good & Bad practices
electricity	<ul style="list-style-type: none"> <li>▪ Slums have a collective connection – not always measured. Provided within a <b>general framework agreement</b><sup>46</sup>. Thus the <b>consumption is free of charge</b> for those slum dwellers.</li> <li>▪ <i>Hooking</i> is possible by paying informally to a “<i>technician</i>” not linked to the utility<sup>47</sup>,</li> <li>▪ Absence of alternative, single available source</li> <li>▪ Expensive cost of Alternatives</li> <li>▪ Used for <b>water pumping</b>, both: underground water provision (not always clean/pure), as well as draining rain water in those slums located in depressed areas. Pumps are provided by government.</li> </ul>	<ul style="list-style-type: none"> <li>▪ ACCESS &amp; AVAILABILITY</li> <li>▪ AFFORDABILITY</li> <li>▪ <b>Absence of long term plan</b>, lack of structural measures taken, initially it was an emergency solution, no alternative developed.</li> <li>▪ <b>Problems for land tenure regularization</b>, lack of success of past policies and actions<sup>48</sup>.</li> <li>▪ <b>Stress on electricity infrastructure</b> (wires, transformation capacity, poles and physical space) is happening, resulting in further electricity service <b>interruptions</b> and <b>worsened service provision</b> to slums and even to the surrounding area<sup>49</sup>. Sometimes this service interruption is followed by <b>water provision interruption</b>.</li> <li>▪ Variation/ frequent change in voltage (from theoretical 220vltts down to 150-130vltts),</li> </ul>	<ul style="list-style-type: none"> <li>▪ Sometimes a thermal key and stabilizations devices are installed, but what should be the norm is the exception</li> <li>▪ Appliances are usually old and inefficient; there is no encouragement of facilities to renew them for new ones, resulting in very inefficient electricity consumption.</li> <li>▪ Illegal repair shops or other sort of small productive shops (sewing machines) use high voltage electricity, causing interruptions to the whole line users.</li> <li>▪ Neighbours express their willingness to pay for the service, as the collective electricity provision is very bad and unstable. But the layout of the homes</li> </ul>

<sup>46</sup> About 700,000 homes were “legalized” resulting in reduction of non technical losses. The agreements – some of them designed in 1994 and renewed by 2003 - were signed between local or provincial; national governments; and the respective utilities, slums have a common meter for measuring the whole consumption. Government would pay the electricity, but sometimes Utility’s punishment fines or taxes are cancelled against this electricity consumption, there are claims from the Utilities for the lack of government payment. Nevertheless, utilities can negotiate better due to this irregular service provision situation. It is not a long term clear solution. See further detail on previous section’s text.

<sup>47</sup> If a specific slum is not covered by a framework agreement, hooking becomes the only way of getting electricity. Thus, there are permanent cutting and re-hooking to the grid, while many cases of electricity wires robbery appear. Those electricity wires are in many times under use, a nightmare for utilities.

<sup>48</sup> This issue is relevant for all the sources, but of course it is more important for an energy source requiring a meter.

<sup>49</sup> Electricity service interruption is one of big problems that slum dwellers claim – the government for an urgent solution. The other two are lack of clean water and the absence of trucks service for sewage cleaning.

	Why it is used? (not used)	Issues related with use	Good & Bad practices
		<p>producing frequent appliances damages, and unbearable noises.</p> <ul style="list-style-type: none"> <li>▪ Paradoxically, those stealing electricity – <i>hooked</i> - have a better “service provision” than those collectively connected,</li> <li>▪ <b>Serious health hazards</b>, electrocution, including death of children and <i>technicians</i>. Roof and walls are usually made of thin metal sheets.</li> <li>▪ <b>An excessive use of electricity is sometimes found, when it is <i>costless</i>, associated with the caloric use of home warming.</b></li> <li>▪ <b>Unsafe, operators and technicians from the Utilities do not get in the slum for lack of safety. Absence of public lighting or very bad functioning.</b></li> </ul>	<p>frequently makes impossible to provide meters (very thin streets and corridors, soft precarious walls) there is no real option to become a household customer.</p> <ul style="list-style-type: none"> <li>▪ Some households and small food shops, share the cost of an electricity technician (not related to the Utilities) services for fuses change, house-wires replacement and wire-pole conditioning.</li> </ul>
LPG	<ul style="list-style-type: none"> <li>▪ There is a culture of gas use - slum inhabitants coming from former middle working class.</li> <li>▪ It is perceived to be more safer, than other fuel sources</li> <li>▪ It is more efficient for caloric uses or purposes</li> </ul> <p>(Why not used?):</p> <ul style="list-style-type: none"> <li>▪ (lack of LPG cylinders availability)</li> <li>▪ (hard to afford, expensive)</li> <li>▪ (an empty cylinder is required for buying the new one)</li> </ul>	<ul style="list-style-type: none"> <li>▪ ACCESS &amp; AVAILABILITY</li> <li>▪ AFFORDABILITY</li> <li>▪ Generalized LPG<sup>50</sup> provision is not profitable for the <b>oil industry firms</b> - there is no governmental or regulatory action for the effective enforcement of the service supply obligation.</li> <li>▪ There is <b>no universal provision obligation</b> for LPG<sup>51</sup>.</li> <li>▪ The failure of the LPG social plan, resulted in a very bad concept linked to it, people recalls it the “false or <b>adulterado</b> cylinder”</li> </ul>	

<sup>50</sup> This issue is also extensible to **kerosene** provision.

<sup>51</sup> This issue is also extensible to **kerosene** provision.

	Why it is used? (not used)	Issues related with use	Good & Bad practices
biomass	<ul style="list-style-type: none"> <li>▪ Due to income reduction (slum dwellers might face a complete lack of monetary income) and having been cut off from the grid, <b>the poor usually burn collected urban residues: cardboard, container's wood</b>, within devices consisting of very basic wood burners.</li> <li>▪ Absence of alternative</li> <li>▪ Availability of burner (appliance), low costs and useful (although unhealthy) with almost any burning fuel or material.</li> <li>▪ Cultural Issues: Slum inhabitants coming from rural areas, are used to burn wood. Argentine meat "asado" is typically cooked with wood or charcoal.</li> </ul> <p>(Why not used?):</p> <ul style="list-style-type: none"> <li>▪ (Wood and charcoal might be available, but at a high cost).</li> </ul>	<ul style="list-style-type: none"> <li>▪ AFFORDABILITY</li> <li>▪ CULTURAL ISSUES</li> <li>▪ EXTREME POVERTY (plastic burning)</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wood residues burning cause health consequences, reducing quality of life within the homes.</li> <li>▪ Inadequate burning equipment (without pipe link to the outside for releasing combustion gases) causes pollution inside the house.</li> </ul>

## **6. CONCLUSIONS AND STUDY RECOMMENDATIONS**

### **6.1 Main Conclusions**

It is not possible to approach the main conclusions without a clear reference to the social framework of slums.

The actual urban society is constantly growing under a private property regime which warrants permanence of existing propriety rights and production and reproduction of urban lands rents. The raise of the population rate, the tendency to live in large cities, and the strengthening of market relations and market ruling— within a context of limited asset, in terms of both nature and built space - generates an extended and growing commercialization process that can only be refrained by government intervention. In order to access the urban ground, government or privately-held pieces of lands are occupied, with the insecurity such possession implies, until the government intervenes to lead to a land tenure regularization.

Thus general needs can be summarized as:

- Need to promote the role of local authorities,
- Need to provision of security of tenure and access to affordable land,
- Need of funds for slum upgrading and urban development programmes, and
- Need to empower the urban poor, within the promotion of an inclusive approach.

From the point of view of energy policies for the poor, the situation in Argentina has been regressive (even considering the price of the social gas cylinder). Also, whereas a clear cross-subsidy policy was implemented in an attempt at making the energy system feasible by avoiding negative macroeconomic effects, the complexity of the Argentine energy context after the privatizations, deregulation and subsequent change of regulations has privileged household users connected to the grid more than any other user category.

Regarding the field work developed by Fundación Bariloche, it implied more than just collaboration with partners assisting in communicating research results to a broader section of society. In the southern Buenos Aires slums case study - Villa Fiorito and Budge – the

issue of *communicating results* was reinforced by an alliance between the Fundación Bariloche and the Foundation for Communities, FOC. This allowed an unusual action within the area, with very good contacts, and broad satisfaction with the task performed. In simple words the product of research is available for the people of the neighbourhoods. Moreover this information can be gathered with other primary data operatives, in order to perform a broad scope action towards poverty, which is also one of the main objectives of our partner the FOC.

Now, going to energy main issues, there is a generalized situation of irregularity in the energy provision: LPG is not available in some places, it is expensive and the subsidized cylinder is found to be adulterated. Electricity situation is also unsustainable, lack of payment, hooked customers and a very bad service is observed. This involves problems also to those neighbours who pay their bill, as interruptions of supply, damages in the grid; variation of frequency and voltage causing appliances damages are very frequently denounced.

Additionally a noticeably high portion of basic energy needs remain unfulfilled in poor urban areas of Greater Buenos Aires, as found in case study analysis. This is a structural feature of the poor households and should be overcome by policy intervention, as the market-driven context of energy provision in Argentina, proved unable to solve the issue. A share of 24% of unfulfilled basic energy needs (UBEN) was found in the field study, employing conservative assumptions. Moreover a 41% of surveyed homes have UBEN above 25%.

A quite high share of overall energy costs within poor family budget is also revealed by the survey, the expenditure on energy would be even higher if all basic needs were fulfilled. Total energy disbursement represents respectively 10% of an indigence or deprivation minimum basket of food,<sup>52</sup> and 6% of a poverty basket of food plus basic goods. Meaning that the surveyed energy expenditure represents as much as 10% of the cost of the food needed by that family in order to get the minimum amount of calories, required to maintain their body weight - or 6% of the monetary threshold level indicating poverty. Furthermore, the energy expenditure takes as much as the 39% of the most important – in terms of total beneficiaries - social plan or subsidy for a home head, or the 26% of the unemployment subsidy.

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<sup>52</sup> See foot note number 11.

A more efficient use of energy is desirable, but this should not prevent from basic needs fulfilment. Some of the measures seem to put additional limitations in necessities poorly fulfilled. The demand side of the problem is not approached systematically, on one hand the lack of payment of service encourages further consumption, but on the other the provision is increasingly inaccurate, resulting in the worse of both worlds.

Although energy saving measures are not considered to have a significant impact on the improvement of supply and energy consumption of these households, some actions to improve the situation are proposed below. Nevertheless, solving unfulfilled basic energy needs would lead to a significant increase in energy consumption, both net and useful.

- A rational management of energy would encourage substitution of EE by LPG and NG in Water Heating (53% of useful consumption) and Home Heating (54% of useful consumption). With the desired outcome of social and individual costs reduction.<sup>53</sup>
- In Lighting some potential for savings exists, this use involves 12% of net consumption of EE, and only 8% of lamps are efficient energy saving.
- Substitution of charcoal in Home Heating is strongly advisable, as it accounts for the 29% of Useful Consumption of that energy use. A cleaner and safer fuel as LPG – NG in the long term – should be encouraged.
- Nevertheless, all saving measures in Space Heating and Ventilation must be closely related to improvements in construction characteristics of the houses, since these have a high incidence on the efficient use of energy in these uses. Remarkably the issue of land tenure appears again as a major barrier.
- There might be space for some appliances improvement, but this would need further research, as the low income levels of these households, prevents from major home

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<sup>53</sup> Figures indicate the share of electricity among the fuels employed in each energy use - please see Table N° 20 above - thus it is possible to improve, turning from electricity to gas, more than the half of total useful energy if heating is addressed. In Argentina employing electricity for caloric energy uses is not advisable. As most of the electricity is generated from gas, thus an initial loss of energy takes place on production stages, around 40/50%. On the other hand if gas use is encouraged, not only energy saving takes place, but also the electricity infrastructure (generally more expensive than the one required by gas) is released for other sectors and more specific uses. At a more complex level this consideration needs the reinvestment of gas industry profits in securing long term gas availability, basically by exploration developments, but these issues fall outside the scope of the article.

investments. A public program including funding of efficient appliances might be a good strategy.

In conclusion some energy uses record a high percentage of unfulfilled basic requirements. Natural Gas penetration could solve both problems. On the one hand, it could reduce Electricity consumption, contributing to solving the irregular situation of these households, apart from reducing the demand on distribution grids - which, in turn, would improve the quality of the service. On the other hand, it could cater for unfulfilled needs to a large extent. Of course this would require a long term policy strategy as discussed below.

## **6.2 Policy Directions**

### **6.2.1 Overview**

The ways in which energy is produced and consumed has important economic, social and environmental implications. The availability of energy services affects the lives of the poor, and among them, that of women, young people and children in particular. Fulfilling uses such as lighting, cooking, water heating, food conservation, space heating and cooling, access to means of communication, and others such as water pumping and those devoted to productive activities, depends on its proper supply. The quality of energy products and the devices using them can also affect people's health, education and use and availability of leisure time. Likewise, accessing energy services in a legal or illegal manner (particularly in the case of electricity supply) is related to subjective perceptions of social inclusion or exclusion, the possibility of getting credits for consumption and other objective and subjective aspects.

None of the eight Millennium Development Goals could be reached without relating them, whether directly or indirectly, to adequate energy availability. However, although this has been acknowledged in the literature (Suárez, C. et al, FB, 2001), explicit references to energy policies for the poor – especially the urban poor – are more than scarce in the context of literature dealing with poverty reduction strategies (UNDP, March, 2007). Though not meaning to be exhaustive, this UNDP research work reveals that only five papers have been

found with explicit references to the topic of energy poverty for Latin America in work on poverty reduction strategies, which contrasts with the situation in other regions. A review of such literature reveals a fact already confirmed by FB in other reports for the GNESD and the WEC: the predominance of the approach on energy poverty in rural and non-urban areas.

The **field work** carried out at this stage of the UPEA project has outstandingly contributed to the view of the energy poverty problem in urban areas, particularly in “shanty towns”. At the same time, further research focusing on topics specifically related to policies aiming at the urban poor (Fundación Pro Vivienda Social, 2002; Annecke, W. et al., 2004; ACIJ, 2007) contributes several useful aspects in order to evaluate and suggest energy policies for the urban poor.

The relevant aspects that have been detected were already evaluated. Below a range of policies are analysed as concluding section of this report, as it will be necessary to implement in order to contribute, from the energy point of view, to the reduction of extreme poverty, one of the Millennium Goals. Remarkably the proposed policies are briefly presented, in a way that constitutes a sort of national strategy, instead of isolated bullets proposals. Nevertheless actions aimed at the most poor households are also detailed firstly below the first specific guideline.

### **6.2.2 Towards the design of a comprehensive energy policy for the urban poor**

The formulation of a comprehensive energy policy aiming at mitigating poverty should include a set of instruments contributing to the achievement of short-, mid- and long-term goals. And it should also be within the context of a comprehensive energy strategy, and of global sustainable poverty mitigation strategies. Authors intend to emphasize the superlative importance of both, an employment program and land tenure / housing regularization programs, it is not possible to design a modern energy provision strategy without securing a minimum regular income and safety housing to the households.

#### **Main strategic guidelines**

In Argentina, particularly in GBA, where the largest number of urban poor live, the long-term goal to be achieved should be the connection of poor users to natural gas grids. This could significantly reduce their energy expenditure and improve the fulfilment of their UBEN, as is the case with room conditioning, for which some of them use electric devices in winter. Such a strategy would, then, not only help to reduce the users' electricity bill through the substitution of LPG and EE with NG, but it would also lead to a more efficient use of energy without affecting the fulfilment of basic needs. This could be so even assuming an adjustment in the cost of NG and EE tariffs, which will surely be effected. For the more specific situation of case study – very poor neighbourhoods of Greater Buenos Aires – charcoal should be substituted by LPG, as a first step, as well as electricity for caloric uses and then natural gas grids should be available to the whole household sector.

Subsequent savings for more efficient use of energy and increased gas utilities profits could then be invested in the joint financing of NG grids. LPG companies could also export their surplus, and both, the National Government and producers would get higher incomes. The only actors that would not benefit from such a scheme would be those in charge of LPG fractioning in the City of Buenos Aires and GBA. A strategy would then be necessary to help reconvert this sector, which could promote LPG use in rural areas.

On the one hand, the specific implementation of this strategic line requires several components, and on the other some concrete actions are urging in order to help the existing critical situation. A draft of both is proposed below.

### **Specific guidelines for more immediate actions**

1. Making the social gas cylinder available and affordable to all **LPG consumers** – in 10 kg cylinder which is the common household size – during the transition period, in exchange for a reduction in current LPG export duties, and with the commitment that exports should be subject to the fulfilment of domestic market needs. Transition period means that improving the use of LPG is considered a first step towards natural gas provision in the longer term.

1.1. Charcoal for most of the cooking and all the space heating, as well as electricity for caloric uses in very poor households, should be substituted by LPG.

1.2. The appliances could be provided at a low subsidized price; furthermore LPG devices could be designed in such a way to allow later adaptation for natural gas connection.

1.3 Inefficient electrical appliances for home and water heating should be replaced by mentioned LPG devices. A substantive public campaign should be enacted for both appliances replacement and social gas cylinder provision and distribution.

1.4. As energy sources and appliances are proposed to be replaced, special attention should be paid to introducing renewable energy devices, specially solar water heaters (installed on homes roofs, when possible, to increase the temperature of water entering into the house, and then combined with gas for further final heating) and solar ovens or cookers.

1.5 This should be launched within a strategy that includes pilot programs, public campaign for awareness and promotion and a broad study for real potentials quantification. The participation of local workers should be maximized, as well as the use of most simple materials available on the region; ideally devices should be constructed inside the neighbourhood.

2. Coordinating actions to be carried out by **natural gas** distribution companies, ENARGAS and neighbour associations in poor neighbourhoods in order to survey the following: a) conditions of the dwellings to be connected to the grid; b) conditions to become a legal user; c) estimating what the neighbours could potentially contribute in order to build the gas grid, both in money and labour (e.g. trench digging); d) training licensed gas workers in the neighbourhoods - See Fidanza, 2002, Project by *Fundación Pro Vivienda Social* - ; e) setting up household grids to cover basic caloric uses with different thresholds for summer and winter periods, which should be considered, for poor users' natural gas tariffs, in the context of a comprehensive adjusted tariff; f) determining the time span of the social tariff once the grid has been paid off; g) surveying the supply of minimum and efficient NG equipment for poor households, which would require a coordination with suppliers of cooking stoves, water heaters and space heaters<sup>54</sup>.

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<sup>54</sup> It should be noted that in Colombia, the spread of natural gas began at the lowest income strata with the supply of devices by distribution companies, which rendered the policy implemented as of 1996/1997 very successful, with results that went beyond original expectations.

This part of the scheme should require at least a **two-year-long survey** and would promote setting minimum and maximum annual connection goals.

3. Implementing a plan for the permanent regularization of poor **electricity** users as a contractual obligation of distribution companies. This would require the definition of a social tariff for basic electricity consumption. Some of the actions to be taken would also include the necessary cooperation of distribution companies for a survey of the devices used in the households they supply with the service, as well as the legal ownership condition of the dwellings in order to create a national data base supervised by the ENRE. This should contribute to the implementation of a strategy aiming at substituting inefficient equipment as part of a RUE plan affecting all users. The tariff adjustment should necessarily take these aspects into account. Distribution companies could finance new equipment under efficiency criteria duly certified by IRAM standards, the Industrial Sector and ENRE, which would require a careful articulation of actions and the participation of impartial and well-trained technicians.

4. Data collection, monitoring and follow-up strategies. In addition to the efforts made by distribution companies, the Argentine body in charge of statistics (INDEC) should include in the Permanent Home Survey, data collection about devices used in each type of household, the fuels consumed and the estimated energy expenditure, as well as a characterization of the household in order to identify poverty indicator trends so as to comply with the main Millennium Goals. This should not imply a very high cost, and it would be very useful for the follow-through of key energy consumption indicators. On the other hand, censuses should include an annex for the survey of energy-consuming devices whose processing could be financed by the Regulating Bodies or by other means.

It is believed that strategies of this kind would contribute to poverty mitigation not only because of their impact on future energy expenditure by the urban poor, but also because they can lead to strategies for RUE by the Industrial Sector, and hiring of unskilled workers. If all of these actions were to be accompanied by plans for the improvement of precarious houses, this could be an important step towards fulfilling the MDG.

Even when, at this stage of the research, the cost of the suggested Plan could not be accurately quantified, it is estimated that, with political goodwill, it is possible to articulate the necessary funds and carry out the corresponding actions, which would lead to a high social benefit for society at large. It is important to bear in mind that Energy Sector companies earn substantial incomes, but their national tax participation is also very significant. It is estimated that national and provincial taxes coming from energy sector activities have accounted for 3 – 3.7% of the GDP, though a slight drop has been recorded since 2006. Therefore, the main obstacle is not of an economic or financial nature, but of a cultural one, which includes political culture, that of the companies and of poor and non-poor users.

### **6.3 Outreach Plan**

Outreach action should be distilled from the way forward considerations, and the mentioned successful interaction with community based organizations, and pertinent government dependence or office (slum related) if it is viable.

Additionally the idea of involving each centre within a local net of organizations towards the slum improvement and upgrading might be a good step ahead. Energy is not always born in mind when thinking in urban planning measures, thus GNESD excellence centres might have – ideally - a role to play in a systematic long term strategy for improving slums conditions. Putting the feet on the ground, it might prove advisable to cooperate in a local action (pilot case) towards slum upgrading; of course it does not seem quite realistic to lead the way toward this sort of measures. But to be alert and moreover, to spread the need of a systematic approach to the issue of long term energy (as well as general infrastructure) and land planning, including productive activities identification, insertion of slum inhabitants with the rest of the Urban and Periurban neighbours.

## ***7. FURTHER AREAS FOR RESEARCH AND WAY FORWARD***

One possible future activity would be to estimate the cost of a comprehensive Plan, proposing how to articulate the necessary funds, describe and carry out the corresponding actions, which would lead to a high social benefit for society at large.

The strategies should contribute to poverty mitigation because of their impact on future energy expenditure by the urban poor, but also because they can lead to strategies for RUE

by the Industrial Sector, and hiring of unskilled slum local workers. All these actions can be accompanied by suggestions of plans for the improvement of precarious houses – emphasizing energy issues.

Another possible evolution for UPEA could be to design a project structure - with its full necessary articulation and components - aimed at implementing and launching what is found in each case study, to be the main positive action. This will require important efforts of coordination, and team gathering, in order to present a fully feasible project of a specific action within a specific slum or neighbourhood. Of course this involves one step ahead in terms of field work and compromise with action, the coherence and pertinence of this idea should be thoroughly discusses within the steering committee of the GNESD.

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**10. RELEVANT INFORMANTS AND INSTITUTIONS**

	<b>Contact</b>	<b>Institution</b>	<b>Program/ Work or Publication</b>
1	Di Virgilio, Mercedes	Gino Germani Research Institute, Social Sciences School, Buenos Aires University	Social habitat production in the Metropolitan Area: story with absence of encounter
2	Cravino, Maria Cristina Fernández Wagner, Raúl Clichevsky, Nora	General Sarmiento National University	Latin American Workshop "Theory and Politics on Informal Settlements"
3	Lebrero, Carlos	School of Architecture and Urbanism, University of Buenos Aires FADU UBA	
4	Borthagaray, Juan	High Level Urbanism Institute ISU School of Architecture and Urbanism, University of Buenos Aires FADU UBA	Towards the Social Management of Urban "Empty Spaces" in Buenos Aires City
5	Sarquis, Jorge	School of Architecture and Urbanism, University of Buenos Aires FADU UBA (POIESIS Centre)	Habitat for the Social and Environmental Emergency
6	Tarzia, María Verónica (Coordinator)	Civil Association for the Equality and Justice	"Public Inform: Identified Lack of Compliment and Deficit in Subsidy Social Programs Implementation for LPG Cylinders Acquisition
7	Amichetti, Juan Pablo, Head	NGO Organization of Communities Foundation	Citizens empowerment, leadership and self organization (Villa Fiorito and Budge, among other neighbourhoods featured with slums)
8	Dra. Romina Montiel	Communitarian medical Centre, Dock Sud Buenos Aires Provincial Government	
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11. ANNEX

Satellite Image N°2



Satellite Image N°3



Satellite Image N°4

