The impact of changes in the energy industry on the urban poor

COUNTRY REPORT - KYRGYZSTAN

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Contents

1 Introduction

The electricity supply industries in former soviet economies have been identified as a priority for economic development. Governments, supported by incentives of loans and investments from international institutions, have implemented policies of liberalisation and privatisation. Such policies are primarily based on macro economic considerations, but the authorities recognise the gravity of the potential consequences of increased electricity costs, especially on the poor.

In a DFID[1] funded project bringing together NGOs and energy institutions in Albania, Kyrgyzstan, and Moldova, Gamos have conducted field research aimed at helping policy makers and CSOs understand the likely impact of changes in energy supplies on the urban poor.

The research uses statistical analysis to identify how people's behaviour with respect to energy use has already changed, and how they are likely to cope with forthcoming changes. A stakeholder meeting was held in May 2004, at which delegates requested the project publish a detailed country report including a comprehensive analysis of the household data – this document has been written in response to that request.

2 Research Methodology

The project process comprised preliminary surveys in Tirane (Albania), Biskek and Osh (Kyrgyzstan), and Chisnau (Moldova), which provided opportunities to interview policy makers and stakeholders. Focus group discussions with residents were held in subsequent visits, and helped identify salient issues in each country context, which were used in the design of household questionnaires. Detailed household surveys have been conducted in each city, and analysis of the data has been completed.

The questionnaire comprised the following sections:

- Household descriptors, including employment and housing status
- Household energy use and changes in fuels
- Impact of tariff reforms, including likely coping strategies and outcomes
- Problems experienced with electrical supplies
- Household financial.

The analysis aims to assess how people will react to changes in energy markets – increases in prices, and enforcement of payment (electricity). The options are illustrated in Figure 1:

- Pay more
- Change to cheaper fuels
- Reduce energy consumption

It goes on to consider the possible implications of each of these.

[1] UK Department for International Development (DFID)

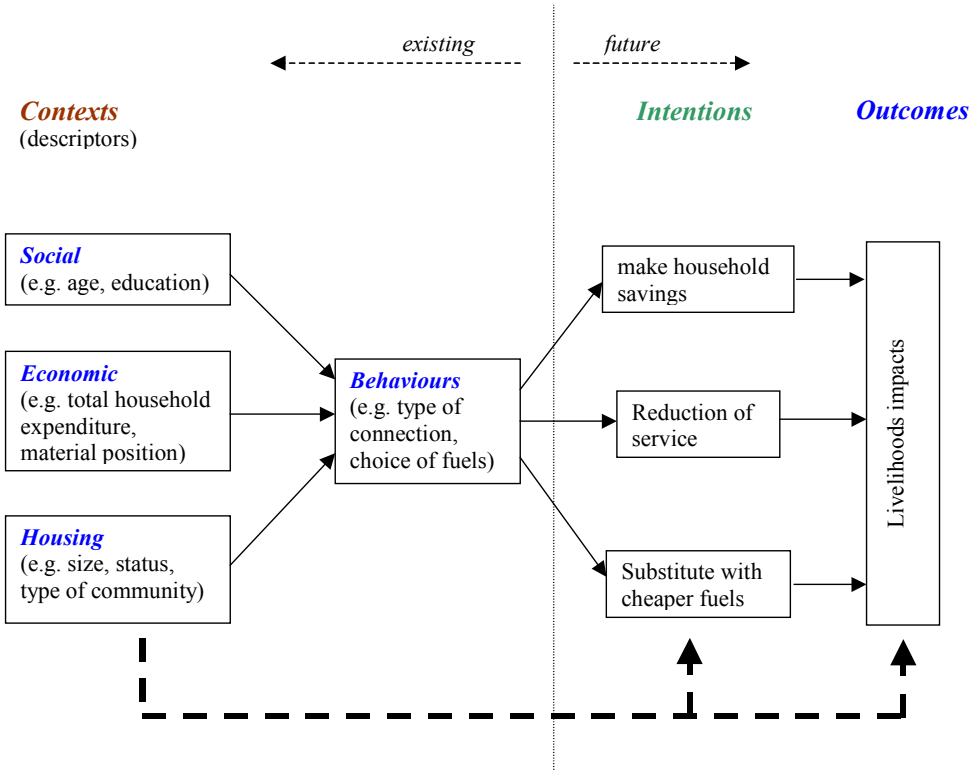

Figure 1 Links between indicators and behaviour

In Kyrgyzstan, a sample of 216 households was surveyed within urban (67%) and suburban (33%) neighbourhoods of Bishkek (capital city in the north of the country) and Osh (district capital in the south). The analysis uses non parametric statistical tests to look for the influence of various social groupings on behaviour and coping strategy[2].

3 Description of Sample

3.1 General

An understanding of the types of communities sampled can be gained by the following key figures:

- The gender of respondents was balanced: 47%:53% male:female;
- The average age of all respondents was 35; most (64%) are in the 20 to 40 age group.
- The majority of respondents (58%) have a tertiary or higher level of education (up to 18 years old)
- 45% of respondents are workers or government officials, 7% are professionals, 14% claim to be housewives;
- 27% of respondents are in full time employment, although 15% claim to be unemployed, only 3% claim to be unable to work; 44% work on an occasional basis;

[2] The Mann-Whitney U test has been used to test for differences between two groups, and tests present the probability (p value) that differences between two groupings have occurred by chance - differences with a probability of less than 0.05 have been taken to indicate a relationship. Similarly, when considering correlations between two variables, only where the p value associated with a Spearman Rank Order Correlation Coefficient is less than 0.05, and the correlation coefficient itself is greater than 0.2, has it been assumed that a valid relationship exists.

- The average size of household was relatively small (mean = 4.03). The average number of children per household was 1.11 children
- There was a roughly equal balance of respondents living in flats (almost entirely in urban areas) and those living in houses (equally split between urban and suburban areas); 10% live in temporary shelter (e.g. mud block house which has yet to be plastered and decorated);
- The mean number of rooms was 3.14; 31.5% live in 3 rooms, and 29.6% live in two rooms;
- 84% of houses are registered with the municipal authorities;
- The majority of people moved to their current house from within the city (43% from elsewhere in the city and 13% from the same neighbourhood). 15% have moved from other cities, and only 17% have moved from rural villages; the movement of people from rural villages into cities has only become more common within the last five years.

3.2 Employment

The average household size was quite small at 4.03. There was an even gender balance of 2.00 males to 2.04 females. The average number of children per household was 1.11, giving a mean of 3.28 adult units[3] per household.

Table 1: employment status of each household

n =216 households	Number	H/H mean
adults occasional / unemployed	163	0.75
adults part-time employed	53	0.25
adults full time employed	225	1.04
Pensioners	61	0.28
disabled / invalids	5	0.02
Students	70	0.32
Other	11	0.05
Totals	588	2.71

The employment status of adults is presented in Table 1; note that the average number of adults given in this table is marginally lower than the figure of 2.72 from the above figures (average of 3.28 adult units, less 1.11 children given 2.72 adults per household) because some respondents have been reluctant to disclose their employment status. The table indicates that each household has an average of 1.29 adults in employment, and most of these are full time; note that the additional 0.75 adults are likely to bring income additional income through occasional work. If the working potential of adults is weighted according to the employment status[4], then the average 'work potential' is 1.35 work units.

An alternative view of employment conditions can be seen by looking at the status of respondents – see Table 2 (bear in mind the gender balance of the sample at 47:53 male:female). Note that 60% of respondents are either unemployed or occasional workers, and 27% are full time, whilst Table 1 indicates that 28% of household members are

[3] The adult unit is calculated by treating children as 50% of an adult; all others including pensioners and invalids are regarded as one adult unit.
[4] Weighted full time = 1; part time = 2; occasional = 0.25

occasional workers or unemployed, and 38% are in full time employment. This reflects the fact that interviews were conducted with home carers.

Table 2: employment status of respondents

n =216 households	Frequency	Percent
unable to work	7	3.2
unemployed	33	15.3
ocassional	96	44.4
part time	16	7.4
full time	58	26.9
Totals	210	97.2

3.3 Housing

The sample includes an equal balance of respondents living in flats (almost entirely in urban areas) and those living in individual houses (equally split between urban and suburban areas).

Table 3: Type of housing - by type of community

	Suburban	Urban	Total*	Valid Percent
Shelter	19	4	23	10.6
Hostel	1	6	8	3.7
Flat	1	90	93	43.1
House	48	42	92	42.6
Total	69	142	216	100.0

* suburban / urban indicator missing from 5 records

Table 4 shows the similarity between the samples in Bishkek and Osh, with the notable exception that temporary shelters (the poorest category of accommodation) was more common in Bishkek.

Table 4: Type of housing - by city

	Bishkek	Osh	Total	Valid Percent
Shelter	20	3	23	10.6
Hostel	7	1	8	3.7
Flat	55	38	93	43.1
House	54	38	92	42.6
Total	136	80	216	100.0

The mean number of rooms of the sampled houses was 3.14; most have only 2 or 3 rooms – see Table 5.

Table 5: Number of rooms

Number of rooms	Frequency	Percent
1	17	7.9
2	64	29.6
3	68	31.5
4	34	15.7
>4	33	15.3
Total	216	100.0

A separate estimate of house size was also made based on the floor area from small medium and large (Table 6). As would be expected there was a significant correlation between the number of rooms and the estimated size of house. However, the number of rooms is the more sensitive variable.

Table 6: Size of house

	Frequency	Percent
very small (<20m2)	22	10.2
small (20 - 50 m2)	70	32.4
medium (51 - 100 m2)	101	46.8
large (>100 m2)	18	8.3
Total	211	97.7

Several characteristics of the sample show that it reflects the trend of unplanned urban resettlement that is typical of population movement:

- The majority (87.4%) of respondents claim to own their houses. A significant proportion were renting (8.9%), and only 1.4% have a mortgage (i.e. make regular payment on a loan secured on their house). Whilst the proportion of households renting is similar in urban and suburban neighbourhoods, it is clear that a greater proportion of rented households are not recognised by the authorities (50% are illegal, compared with 12% of owned houses).
- The mean length of stay in houses was 10.5 years. Table 7 shows that people in houses that are not recognised by the authorities tend to have lived in them for a relatively short period of time.
- Most temporary shelters (70%) are not recognised and are found in suburban areas (83%).
- Table 8 shows that 48% of people in temporary shelters moved from outside of the city, compared with only 32% of those living in flats and houses.

When looking at movement of people, data indicates a trend of increasing mobility:

- Table 10 shows that a greater proportion of the sample who moved a long time ago (>10 years) moved from within the neighbourhood (29%), compared with only 12% of those moving more recently.
- The proportion of people moving from outside the city has increased from 29% amongst those who mover over 10 years ago, to 38% of those moving within the last 5 years i.e. the movement of people from rural villages into cities has become more common in recent years;
- Note that most people move from within the city.

Table 7: Legal status * (banded) length of stay in house cross-tabulation

Frequency		(banded) length of stay in house			
		<5 years	5 - 10 years	>10 years	Total
legal status	legal	65	39	74	178
	illegal	28	4	2	34
Total		93	43	76	212

Table 8: Where people lived before moving * type of dwelling cross-tabulation

Frequency		type of house				
		temporary shelter	hostel	Flat	house	Total
location before moving to this house	House on same site	1	0	2	3	6
	Same neighbourhood	2	0	11	16	29
	Elsewhere in this city	9	4	43	37	93
	Other city	3	0	18	11	32
	other village	8	4	10	14	36
Total		23	8	84	81	196

Table 9: location before moving * (banded) length of stay in house cross-tabulation (whole sample)

Frequency		(banded) length of stay in house			Total
		<5 years	5 - 10 years	>10 years	
location before moving to this house	House on same site	2	0	4	6
	Same neighbourhood	9	5	15	29
	Elsewhere in this city	45	21	27	93
	Other city	11	6	15	32
	other village	24	8	4	36
Total		91	40	65	196

Table 10: location before moving * (banded) length of stay in house cross-tabulation (only those in residences NOT recognized by authorities)

Frequency		(banded) length of stay in house			Total
		<5 years	5 - 10 years	>10 years	
live before moving to this house	House on same site	1	0	0	1
	Same neighbourhood	3	0	1	4
	Elsewhere in this city	13	2	0	15
	Other city	2	0	1	3
	other village	9	2	0	11
Total		28	4	2	34

84% of houses are registered with the municipal authorities, but this does not correspond with ownership of houses – 12% of owned houses are not registered.

The majority of people moved to their current house from within the city (43% from elsewhere in the city and 13% from the same neighbourhood). 15% have moved from other cities, and only 17% have moved from rural villages. This means that, broadly speaking, the sample will have urban living habits and are not likely to have strong links with rural communities. During soviet times, urban people kept strong links with relatives in rural areas as they were a source of food, but this is changing as conditions in villages is getting poorer.

Of those who had always lived in their previous house (33% of sample), 45% moved within the last 5 years. Of other respondents (62% of sample), the average length of stay in their previous house was 10 years. This indicates that there is not a culture of moving house frequently.

Table 11: Correlation of household indicators

	number of rooms (text)	size of house	rented or owned	legal status	length of stay in house
number of rooms (text)		.700(**)	.276(**)	-.049	.200(**)
size of house	.700(**)		.181(**)	-.031	.155(*)
rented or owned	.276(**)	.181(**)		-.290(**)	.224(**)
legal status	-.049	-.031	-.290(**)		-.379(**)
length of stay in house	.200(**)	.155(*)	.224(**)	-.379(**)	

** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

The interrelationship of these variables is illustrated in Table 11:

- Smaller houses tend to be rented;
- People who have moved more recently tend to have smaller houses;
- Rented houses tend not be recognised by the authorities;
- People in rented houses tend to have moved in more recently;
- People who have moved more recently tend to live in houses that are not recognised by the authorities.

This builds a picture of vulnerability that can be based around the rental status of a household. There is no significant difference in the proportion of households renting or owning houses between Bishkek and Osh (MW p = 0.181).

3.4 Economic Status

3.4.1 Income and Expenditure

Respondents were asked for expenditure details of a number of priority items, of which food and energy were considered to be the only essential items i.e. any response with no value against food or energy expenditure was regarded as invalid. Average expenditure (for valid responses) is given in Table 12.

Table 12: Annual household expenditure (priority items)

Item N = 126	Annual Expenditure (som/a)	Percentage of total expenditure
food	21531	39%
clothing	8965	16%
travel	5803	11%
energy (10 fuels)	4848	9%
education	4254	8%
housing	3615	7%
medication	1985	4%
communal services	1708	3%
telephone	981	2%
other	754	1%
debt payment	618	1%
total household expenditure	55063	100%

There is some debate over whether expenditure of income figures are more reliable – people tend to inflate expenditure figures (tendency to assert the status of the household), but the deflate income figures (reluctance to expose themselves to tax). However, the mean annual declared income for the part of the sample represented in Table 12 is 54,800 som/a. In this case the ratio of declared income to expenditure is 99.5% which indicates the data is reliable[5].

Does this sample include the poor? Dividing the sample into ten bands according to per capita income shows that the per capita income amongst the poorest group is 3,240 som/year (see Table 13); this is still well above the figure of 140 som/month (1,680 som/year) used by the MLSA as a threshold for receiving state support.

Table 13: annual per capita income (10 groups)

Per capita income range	N	Mean
<5,800	11	3240
5,801 - 8,500	13	6887
8,501 - 11,000	14	9852
11,001 - 13,400	10	12117
13,401 - 15,000	10	14130
15,001 - 19,000	20	17180
19,001 - 22,000	8	20296
22,001 - 25,200	16	23760
25,201 - 33,000	13	28326
>33,000	11	47159
Total	126	18244

[5] This household incme figure is 15% higher than similar figures derived from the IPA Household Energy survey 2003)

3.4.2 Perceived household condition

Respondents were asked to rate the material position of their household on a subjective scale. The majority (57%) indicated that they can provide food but find it difficult to pay utility bills. Only 8% claim to be in severe poverty where they find it difficult to pay for food – see (Table 14).

Table 14: Material position of the household

	Frequency	Percent
Difficult to provide the family with food	17	7.9
Manage to provide food but find it difficult to pay the util	123	56.9
afford required foods, clothes and manage to pay the bills	54	25.0
Have all we need and made some savings	9	4.2
Don't know what to answer	11	5.1
Total	214	99.1

Respondents in Osh tend to regard themselves as better off (MW p = 0.000), although there is no difference in reported household expenditure (MW p = 0.719).

The relationship between this subjective poverty assessment and household income is presented in Table 15 (based only on complete records), and shows a good correlation of the subjective measure with declared per capita income.

Table 15: Per capita income for categories of Material position

	N	Mean annual per capita income
Difficult to provide the family with food	8	13695
Manage to provide food but find it difficult to pay the util	69	16993
afford required foods, clothes and manage to pay the bills	35	20757
Have all we need and made some savings	8	25286
Don't know what to answer	5	16480
Total	125	18346

3.4.3 Poverty indicators

Correlations between a range of indicators which represent aspects of economic conditions to a certain extent are presented in Table 16; a number of observations can be made:

- There is a good degree of correlation between the perceived economic condition of the household (material position), and ability to pay for items (electricity and others).
- It is interesting to note that whilst ability to pay for food and other items does correlate with per capita expenditure and income, ability to pay for electricity does not correlate.
- There is a good correlation between household income and expenditure (similarly between per capita income and expenditure);

It is proposed that per capita income and material position of the household are the most reliable indicators of poverty. Frequency of inability to pay other bills correlates strongly, but has only been responded to by 29% of the sample.

A snapshot of ability to pay for items is given by the number of households in debt at the time of the survey (presented in Table 17). However, these figures appear to contradict the findings from in Table 16, referred to above. Table 18 indicates that current food debts (snapshot) are associated with poverty, whilst both electricity and other debts are commonly found amongst households that regard themselves as comparatively well off. The most common 'other' debts are heating, education and credit repayments. Of the two sets of figures, the snapshot figures are likely to be less reliable.

Table 16: Correlation of economic indicators

	material position of h/h	rented or owned	frequency of inability to pay for electricity	frequency of inability to pay for food	frequency of inability to pay other bills	total annual h/hold expenditure	total household income	Per capita expenditure	Per capita income	Proportion of expenditure spent on energy	number of rooms	Number of fully employed adults
material position of h/h		0.203**	-0.252***		-0.454***			0.219*	0.206**			0.219***
rented or owned	0.203**		-0.312***								0.276***	
frequency of inability to pay for electricity	-0.252***	-0.312***		0.576***								
frequency of inability to pay for food			0.576***		0.354**			-0.253*				
frequency of inability to pay other bills	-0.454***			0.354**				-0.629***	-0.396***		-0.287*	-0.27*
total annual h/hold expenditure							0.322***	0.646***		-0.617***		0.202*
total household income						0.322***			0.733***			0.417***
Per capita expenditure	0.219*			-0.253*	-0.629***	0.646***			0.364***	-0.389***		
Per capita income	0.206**				-0.396***		0.733***	0.364***				0.223***
Proportion of expenditure spent on energy						-0.617***		-0.389***				-0.23**
number of rooms		0.276***			-0.287*							
Number of fully employed adults	0.219***				-0.27*	0.202*	0.417***		0.223***	-0.23**		

*** Correlation is significant at the 0.001 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)
* Correlation is significant at the 0.05 level (2-tailed).

Table 17: Households currently in debt

	Frequency	Percent
Electricity	37	17.1
Food	7	3.2
other	31	14.4

Table 18: Material position of the household currently with debts (frequency)

	Electricity	Food	Other
Difficult to provide the family with food	2	4	0
Manage to provide food but find it difficult to pay the util	24	1	23
afford required foods, clothes and manage to pay the bills	9	2	6
Have all we need and made some savings	0	0	0
Don't know what to answer	1	0	2
Total	36	7	31

4 State Safety Nets

Data was gathered on the following state benefits:

- 21% of the sample claimed to have one or more pensioner in the household, but nearly a quarter of these claim not be receiving any **pension benefit** (see Table 19**)**.
- **Invalidity benefit** is received by only a small proportion of respondents (3%) and appears to be well targeted (all 5 households registering an invalid receive benefit).
- None of the respondents claim to receive **unemployment benefit**.
- Few households (3%) receive **other MLSA benefits**.

Table 19: Households with pensioners (frequency)

Pensioners in household	Receiving benefit	Not receiving benefit	Total
yes	35	10	45
no	5		
Total	40		

Table 20: Households receiving benefits by poverty grouping (frequency)

	Per capita income quartiles				
	lowest (<10,400)	low (10,400 - 15,000)	medium (15,001 - 24,000)	high (>24,000)	Total
Senior citizens pension	10	12	9	9	40
Invalid benefit			4	2	6
Unemployment benefit					0
Other	3			3	6

Table 21: Households receiving benefits by perception of poverty groupings (frequency)

	Material position of household					
	Difficult to provide the family with food	Manage to provide food but find it difficult to pay the util	afford required foods, clothes and manage to pay the bills	Have all we need and made some savings	Don't know what to answer	Total
Senior citizens pension	3	26	9	1	1	40
Invalid benefit		5		1		6
Unemployment benefit						0
Other	1	1	2		2	6

These tables indicate that the existing system of benefits does not target the poor. This is primarily because it is pension and invalidity benefits that are received in the sampled communities, neither of which is intended to be poverty focused.

5 Energy use

5.1 Choices of fuels

The following table presents the numbers of household using each fuel as either a primary or backup fuel for a range of activities (cooking, space heating, water heating, lighting and washing):

Table 22: Households using fuels

Fuel	Frequency	Percent
Electricity	200	92.6
Gas	107	49.5
LPG	34	15.7
District Heating	70	32.4
Wood	51	23.6
Dung	26	12.0
Coal	87	40.3

N.B. based on 200 respondents indicating fuel uses

Table 23: Types of electrical connections

Fuel	Frequency	Percent
not connected	7	3.2
Illegal	11	5.1
legal disconnected	2	.9
Legal	192	88.9
Total	212	98.1

Note that of the 7 claiming not to be connected, 6 claim to use electricity as either a main or backup fuel for one of the activities, as does one of the two claiming to have disconnected legal supplies (so we can assume they were reluctant to admit to having an illegal connection). This indicates that 99% of households are connected (based on 212 responses in Table 23), and 8.5% have some form of illegal connection.

Table 24 indicates that illegal connections are not a feature of poverty.

Table 24: Type of electrical connection by poverty grouping (frequency)

	Per capita household expenditure quartiles				
	lowest (<13471)	low (13471 - 19037)	moderate (19037 - 28925)	high (>28925)	Total
not connected	0	1	2	1	4
illegal	0	2	1	2	5
legal	26	24	25	24	99
Total	26	27	28	27	108

Current fuel uses are presented in Table 25 and show the following characteristics:

- Where district heating is available, this is the preferred form of **space heating**; elsewhere, there is an equal split between electricity and coal use.
- Gas (piped) is the preferred **cooking** fuel, closely followed by electricity. Note that when people use coal for heating in winter, this is also used for cooking, but mostly by low grade energy users who use wood for cooking in the summer.
- Although most households connected to district heating services use central hot water for **water heating** and clothes washing, about one third of these households prefer to use electricity and gas for water heating. Electricity is clearly the preferred fuel. Again, there is a shift from wood to coal in the winter.

Table 25 Main choice of fuel (whole sample)

Percentages	**Cooking**		Space heating	**Water heating**		lighting	**Clothes washing**	
	summer	winter		summer	winter	summer	summer	winter
Elec	35.2	36.6	20.4	37.5	37.5	85.6	44.4	42.6
Piped gas6	42.1	39.8	2.8	12.0	13.0		6.5	6.0
LPG	4.2	4.6		1.4	1.4		.9	.9
central (district) heating			30.6	1.9	1.9			
central hot water			.5	19.0	19.9		19.9	19.9
Wood	10.2	5.1	3.7	12.0	5.1		7.4	1.9
cow dung			2.8	1.4	1.9		1.9	1.9
Coal	.5	5.1	20.8	.5	7.9		.5	5.6
Candles						0.9	.5	
Total	92.6	91.7	81.9	87.0	89.8	89.4	82.9	79.6

Table 26 presents the same information, but for those respondents falling into the poorest quartile based on per capita household expenditure:

- less people using electricity for **cooking** in favour of wood and coal, and piped gas.
- A greater reliance on wood for **space heating**, and less on electricity
- In contrast, more of the poor tend to use electricity for **water heating** and less use central heating services.

[6] used exclusively in urban communities

Table 26 Main choice of fuel (lowest quartile per capita household expenditure N=27)

Percentages	Cooking		Space heating	Water heating		lighting	Clothes washing	
	summer	winter		summer	winter	summer	summer	winter
Elec	22.2	25.9	11.1	48.1	40.7	85.2	48.1	51.9
Piped gas	48.1	48.1		14.8	18.5		7.4	7.4
LPG	3.7	3.7						
central (district) heating			37.0					
central hot water				11.1	14.8		14.8	11.1
Wood	18.5		11.1	11.1	7.4		7.4	3.7
cow dung								
Coal Candles		14.8	22.2		3.7			3.7
Total	92.6	92.6	81.5	85.2	85.2	85.2	77.8	77.8

When looking at choice of backup fuels for cooking:

- Gas users tend to use electricity as a backup
- Electricity users tend to use coal and LPG as a backup
- Wood users use coal as a backup; coal users use wood as a backup;

Table 27 Secondary fuels for cooking, by main fuel (winter)

Frequency	main cooking fuel - winter			
	elec	piped gas	wood	coal
Elec	0	65	1	3
Piped gas	9	0	1	0
LPG	20	2	0	0
Wood	6	1	0	5
cow dung	3	0	1	0
Coal	30	1	7	0

When looking at choice of backup fuels for space heating:

- District heating users use electricity as backup
- Electricity users use coal and gas for backup
- Coal users use electricity as a backup.

Table 28 Secondary fuels for space heating, by main fuel

Frequency	main cooking fuel - winter					
	elec	piped gas	District heating	wood	dung	coal
Elec	0	2	47	2	3	19
Piped gas	7	0	1	0	0	2
Wood	3	0	0	0	2	10
Coal	16	1	0	6	0	0

This indicates that piped services are preferred – both gas for cooking and district heating for space heating. Users then rely on electric appliances for backup. However, these are specifically urban services; elsewhere people use electricity for cooking using coal as a backup; electricity and coal are used as both main and backup for space heating.

Table 29 indicates those social groupings amongst which there are significant differences in the choices of main fuels; these differences are then expanded in the following tables which present frequencies of respondents using the principal fuels. Not surprisingly, characteristics of clothes washing closely follows that of water heating.

Table 29 Significant differences in main fuel choices amongst groupings

	Groups	main cooking fuel - winter	main space heating fuel	main water heating fuel - WINTER	main clothes washing fuel - WINTER
education	<tertiary: tertiary (MW sig.)	**0.004**		**.0452**	
Rental status	Rented: owned (MW sig.)	**.044**			
Material position	Prob paying bills: able to pay (MW sig.)			**.004**	**.005**
Per capita income	Lowest:low:medium:high (KW sig.)		**0.000**		
Adult units per h/hold	Low:medium:high (KW sig.)	**.009**	**.001**	**.006**	**.024**
Total h/hold exp	Lowest:low:medium:high (KW sig.)		.005		
% exp on energy	Low:medium:high (KW sig.)		**.002**		

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

Table 30 Significant differences in main cooking fuels (winter) by groupings (principal fuels only)

Frequency	Education		Rental status		Adult units per household		
	below tertiary	tertiary and above	rented	owned / mortgaged	Low (<=2.5)	medium (3.0 - 3.5)	high (>3.5)
Elec	46	33	13	63	27	36	16
Piped gas	26	60	3	81	29	30	27
District heating							
District hot water							
Wood	3	8	1	10	2	3	6
Coal	5	6	1	10	1	5	5
Total (for all fuels)	85	113	19	174	61	77	60

Households renting, and with lower levels of education tend to use electricity for cooking, whilst the more advantaged groups tend to use gas. Use of solid fuels increases with the number of people in a household, and is only really evident amongst owned properties; this may reflect the fact that traditional stove designs are not suited to small houses, and electricity requires less investment in appliances for temporary rented accommodation.

Table 31 Significant differences in main space heating fuels (winter) by groupings (principal fuels only)

Frequency	Per capita income				Adult units per household			% h/hold expenditure on energy		
	lowest (<10,400)	low (10,400 - 15,000)	medium (15,001 - 24,000)	high (>24,000)	Low (<=2.5)	medium (3.0 - 3.5)	high (>3.5)	Low (<7.16)	Medium (7.17 - 11.55)	High (>11.55)
Elec	10	4	14	15	21	20	3	11	10	6
Piped gas	0	0	3	2	4	0	2	2	0	1
District heating	7	15	25	19	21	22	23	17	14	12
District hot water										
Wood	5	2	0	1	2	2	4	1	0	6
Coal	22	13	8	2	8	21	16	2	8	13
Total (for all fuels)	48	36	52	39	57	69	51	33	32	39

There is greater use of solid fuels (predominantly coal) amongst the poor and a preference for electricity amongst the better off. The same trend can be seen in the household size, with greater use of solid fuels amongst larger households, and a preference for electricity amongst smaller households (as suggested above, stoves may be unsuited to small house design). Again, there is a greater reliance on solid fuels amongst households allocating a high proportion of their expenditure on energy, and a preference for electricity amongst those

spending a low proportion on energy (note that proportion of expenditure on energy is a relatively weak indicator of wealth as it correlates with per capita expenditure but not with per capita income – see Table 16).

Table 32 Significant differences in main water heating fuels (winter) by groupings (principal fuels only)

Frequency	Education		Material position		Adult units per household		
	below tertiary	tertiary and above	Problems paying bills	Able to pay bills	low (<=2.5)	medium (3.0 - 3.5)	high (>3.5)
Elec	41	40	47	33	30	35	16
Piped gas	10	18	16	12	13	9	6
District heating							
District hot water	14	29	34	9	9	16	18
Wood	3	8	6	5	3	5	3
Coal	10	7	15	2	2	6	9
Total (for all fuels)	85	109	130	63	60	76	58

Table 32 indicates that a greater proportion of those households with higher levels of education use district hot water, with others tending to use electricity and solid fuels in its place; however, this is more likely to reflect availability than choice. This may also be true of those expressing problems with paying utility bills; nevertheless, it is clear that those households in a better position tend to use high cost fuels (electricity and gas) whilst poor households use coal. Small houses tend to use electricity and gas, whilst district hot water is more common in larger houses.

5.2 Energy costs

Then mean annual household expenditure on energy is 4680 som ($110 approx.) amongst those households giving energy cost data (N = 184). Table 33 presents the annual expenditure on each type of fuel (irrespective of whether fuels are used as main or backup fuels), and shows that costs of district heating and LPG are highest.

Table 33 Annual expenditure on each fuel

Fuel	N	Mean annual expenditure (som)	Median annual expenditure (som)
Electricity	178	1413.15	1132.50
Piped gas	83	1619.10	1030.00
District heating	51	2706.92	2000.00
District hot water	32	1705.34	1440.00
Oil	0		
Kerosene	3	220.00	200.00
Wood	50	1202.90	900.00
Dung	11	1186.64	1400.00
Coal	74	2050.70	1650.00
LPG	21	2693.59	1625.00
Total energy	184	4677.85	4000.00

Exchange rate: 42 som/$US

These figures are based on the basis of five heating months in winter, which was obtained from the IPA survey data – see Table 34

Table 34 Heating season (months)

Fuel	N	Mean	Median
Bishkek	238	5.03	5
Issyk-Kul	276	5.63	6
Jalalabad	387	4.23	4
Naryn	295	6.73	7
Batken	300	4.87	5
Osh	490	4.81	5
Talas	292	5.74	6
Chui	356	4.79	5
Total	2634	5.15	5

From IPA household Energy Survey 2002 data set – DFID Tariff policy and utility reform project.

Based on half of the sample which gave adequate information (N = 126),
The mean percentage of household expenditure on energy is 11.4% (median = 9.6%), but Figure 2 shows that there are many households paying more than this. (12.5% of households spend more than 21%).

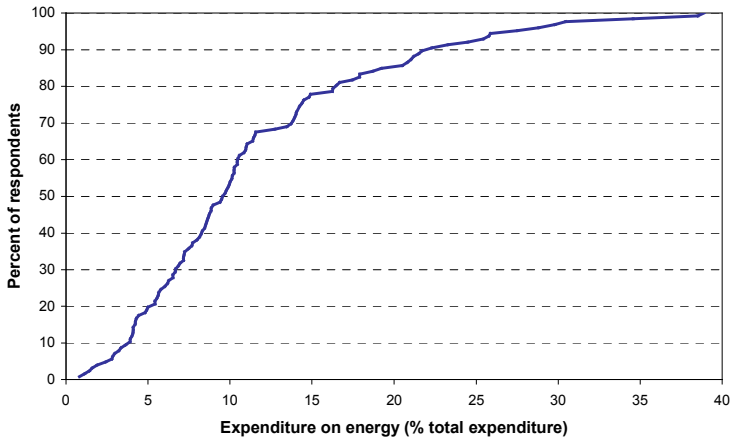

Figure 2 Cumulative distribution of percentage household expenditure on energy (N = 126)

There is remarkably little difference in absolute expenditure on fuels amongst various groupings, as shown in Table 35. Notable exceptions are:

- Higher expenditure on wood an dung amongst larger households;
- Expenditure on wood is lower in rented households;
- Poor households tend not to use district heating;
- Expenditure on coal tends to increase as a greater proportion of household expenditure is spent on energy (i.e. amongst poorer households)

Of more interest is the fact that total household expenditure on energy appears to be only weakly linked to poverty - absolute expenditure increases with total household expenditure, but not with per capita income – a strong indicator of poverty; it is also linked to household size (larger households spend more). Households spending a larger proportion of their total expenditure on energy are actually spending more on energy. Proportion of expenditure spent on energy is also weakly linked to poverty – the percentage tends to be larger amongst poor households, but the indicator does not correlate with the main poverty indicators (Table 16).

Table 35 Significant differences in expenditure on fuels amongst groupings

	Groups											
		Elec	gas	DH	DHW	Kerosene	Wood	Dung	Coal	LPG	Total	% exp on energy
education	<tertiary: tertiary (MW sig.)											
Rental status	Rented: owned (MW sig.)						**.009**					
Material position	Prob paying bills: able to pay (MW sig.)											
Per capita h/hold income	Lowest:low:medium:high (KW sig.)				**.010**							
Adult units per h/hold	Low:medium:high (KW sig.)				**.010**						**.004**	
Total h/hold exp	Lowest:low:medium:high (KW sig.)			**.023**							**.010**	**.000**
% exp on energy	Low:medium:high (KW sig.)			**.018**	**.010**				**.022**		**.000**	

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

5.3 Categories of housing by types of energy

It was proposed that dwellings can be categorised according to the types of fuel used for primary activities. The following typology has been proposed, and covers 65% of the sample.

Table 36 Housing categories by types of fuel

	Type of dwelling	***Cooking fuel***	***Heating fuel***	***Frequency***	***Percent (of total sample)***
1	flats	gas	district heating	55	25.5
2	flats	electric	district heating	9	4.2
3	houses	gas	gas	4	1.9
4	houses	electric	electric	14	6.5
5	houses	electric	solid fuel	20	9.3
6	houses	solid fuel	solid fuel	15	6.9
7	temporary dwellings	electric	electric / solid fuel	23	10.6
	Total			140	64.8

There are significant differences between the poverty conditions of these groups, as shown in Table 37 (KW p = 0.000).

Table 37 Annual per capita income for categories of housing

	Mean (som/year)	N	Adult units
houses - wood cooking, solid fuel heating	7732	15	4.1
houses - electric cooking, solid fuel heating	11493	20	3.4
temporary dwellings	13556	22	2.9
houses - electric cooking, electric heating	17394	14	3.0
flats - gas cooking, district heating	21127	55	3.3
flats - electric cooking, district heating	22781	9	3.0
houses - gas cooking, gas heating	26200	3	1.8
Total	16907	138	

Table 38 Mean annual expenditure on fuels by categories of housing

	Expenditure on energy (som/year)						TOTAL (10 fuels) (som/year)	% of expenditure on energy
	electricity	piped gas	district heating	wood	coal	LPG		
houses – wood cooking, solid fuel heating	1067	850		1338	2069		4412	14
houses - electric cooking, solid fuel heating	1822			1050	2344	4063	4687	14
temporary dwellings	1094			832	1547	1306	2797	15
houses - electric cooking, electric heating	2280	2850		550	1289	1523	4264	11
flats - gas cooking, district heating	1187	1093	2290				5090	10
flats - electric cooking, district heating	1593	665	5464				5348	10
houses - gas cooking, gas heating	1023	8825			800		7173	21

Table 38 presents the mean amounts spent on each fuel *by those households using each fuel* (e.g. houses – wood cooking, solid fuel heating; 1067 som/year is the mean expenditure of the 14 households paying for electricity, but there is only one household using piped gas and they pay 850 som/year).

Households in temporary dwellings tend not to have accumulated commonly held 'luxury' electrical appliances e.g. ownership of music equipment, fridges, washing machines is low, but on the other hand ownership of 'essential' electricity equipment such as electric hobs, home made heaters, electric irons, and electric kettles is high. The low expenditure on other fuels confirms that electricity is the primary energy source. The low expenditure on electricity reflects the illegal nature of connections and low payment rates. This group will, therefore, be affected by enforcement of payment.

The more wealthy groups are less dependent on electricity (preferring to use gas), and the poorest are not so dependent on electricity (forced to use solid fuels), but it is the middle to low income groups which tend to use electricity and which will be most severely affected by electricity price increases.

Under the tariff structure prevailing at the time of the survey (up to 150 kWh/month at 0.43 som/kWh, additional units at 0.80 som/kWh) the poorest category of houses is using an average of around 180 kWh/month; note that the average consumption is likely to be less than this in practice, as households are likely to use more premium cost units in winter, and may not even use the entire tier 1 allowance in summer.

5.4 Cost of electricity with / without meters

Of the total sample, 92% (198) claimed to receive metered bills, but only 164 gave a response to the amount they pay. Amongst those who pay, the mean annual cost is 1400 som. Amongst the 11 receiving nominal bills, 9 are paying, and the mean cost is 1412 som/year, indicating that the nominal bills closely match actual consumptions so there is no cost benefit or penalty associated with receiving nominal bills.

6 Changes to date

6.1 Changes in choice of fuels

18.5% of the sample claim to have changed their main cooking fuel in the last 5 years; Table 39 and Table 40 indicate that the shift is towards electricity, and away from wood and gas.

Table 39 Changes in Main cooking fuel – summer (frequency)

Main fuel	Changed from					
	elec	piped gas	LPG	wood	coal	Total
Elec		5	2	7	1	15
Piped gas	2		0	0	0	2
LPG	0	1		1	0	2
Wood	0	0	0		1	1
Coal	0	0	0	0		0
Total	2	6	2	8	2	20

Table 40 Changes in Main cooking fuel – winter (frequency)

Main fuel	Changed from					
	elec	piped gas	LPG	wood	coal	Total
Elec		5	2	8	2	17
Piped gas	0		0	0	0	0
LPG	0	0		1	0	1
Wood	0	0	0		0	0
Coal	2	0	0	0		2
Total	2	5	2	9	2	20

16% of the sample claim to have changed their heating fuel in the last 5 years. Although Table 41 appears to shows a shift to coal and electricity, note that an equal number of people have changed from coal to electricity as have changed from electricity to coal. Other changes are from district heating to electricity, and from piped gas to coal, but the numbers of responses are too small to be conclusive.

Table 41 Changes in Main space heating fuel (frequency)

Main fuel	Changed from					
	elec	piped gas	central (district) heating	wood	coal	Total
Elec		0	3	0	5	8
Piped gas	0		0	0	0	0
central (district) heating	1	0		0	0	1
Cow dung	1	1	0		1	3
Coal	5	3	1	1		10
Total	7	4	4	1	6	22

Any tendencies for members of vulnerable groups to change fuels are not significant, with the exception of those in rented properties who are more likely to have changed heating fuels (MW p = 0.047).

6.2 Reasons for changing fuels

Table 42 shows that economic considerations are clearly most influential in driving fuel switching. However, access is of similar importance for heating fuels – bear in mind that there are shifts from electricity to coal (where cost is likely to be influential), and shifts from coal to electricity (where access and convenience are likely to be influential). The main reason given under 'Other reasons' was moving house.

Table 42: Reasons given for change of fuel for cooking and space heating

	Cooking		Space heating	
	Frequency	Percent	Frequency	Percent
Less cost	20	60.6	13	40.6
less polluting			2	6.3
convenient	2	6.1	3	9.4
access	5	15.2	10	31.3
safety				
other	6	18.2	4	12.5
Total	33	100.0	32	100.0

However, when looking at the value placed on each of the characteristics of fuels Respondents were asked to indicate how important they felt each of these characteristics was (in a general context), and whilst the results confirm that cost and access are most important, there is not much difference between them. Note that pollution is clearly least influential.

Table 43: Mean and median importance attributed issues influencing fuel choice

Range 1 to 5	Accessibility	Cost	Pollution	Convenience	Safety
N	205	208	200	206	201
Mean	4.14	4.38	3.16	3.64	3.83
Median	5.00	5.00	3.00	3.50	4.00
IQR	(4 to 5)	(4 to 5)	(2 to 5)	(3 to 5)	(3 to 5)

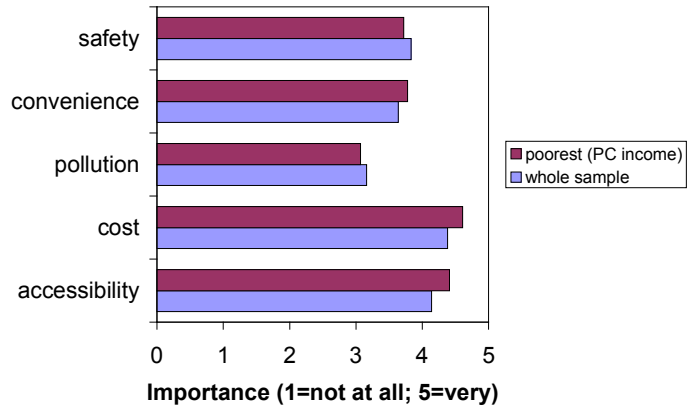

Figure 3 importance of fuel characteristics

Table 44 Significant differences in attitudes towards fuel characteristics amongst groupings

	Groups	access	cost	pollution	convenience	safety
Education	<tertiary: tertiary (MW sig.)			**.014**	**.007**	**.002**
Rental status	Rented: owned (MW sig.)					
Material position	Prob paying bills: able to pay (MW sig.)			**.045**	**.000**	
Per capita income	Lowest:low:medium:high (KW sig.)				**.043**	
Adult units per h/hold	Low:medium:high (KW sig.)					
Total h/hold exp	Lowest:low:medium:high (KW sig.)				**.028**	
% exp on energy	Low:medium:high (KW sig.)		**.003**			

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

Interestingly, education appears to have most influence on attitudes towards fuels, with better educated people attaching greater importance to pollution, convenience and safety. As might be expected, households having difficulty paying utility bills (material position) are less concerned with pollution issues, and those with greater spending power attach greater importance to convenience. The value of convenience is also evident amongst households with high per capita incomes; however, it is odd that convenience is also highly rated amongst the poorest group (see Figure 3). Cost is of more importance to households which spend a greater proportion of their total household expenditure on energy.

6.3 Changes in consumption

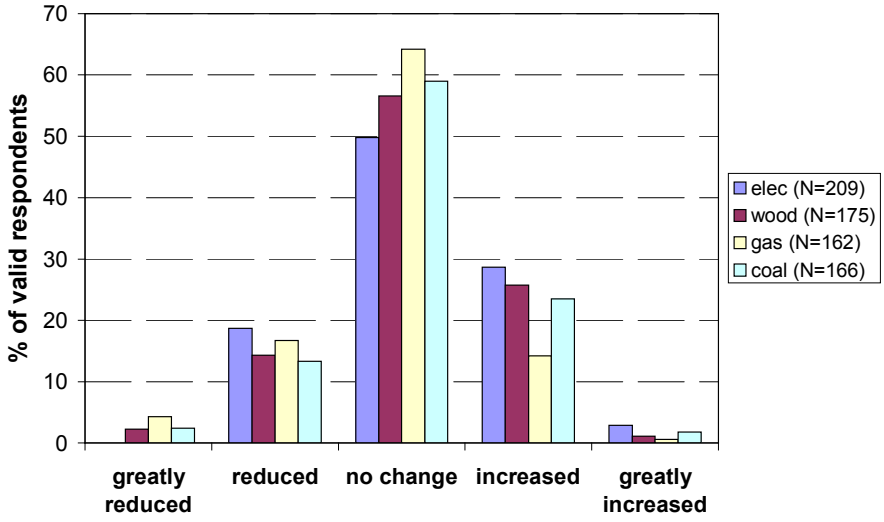

Figure 4 Perceived changes in consumptions of principal fuels (last 5 years)

Respondents were asked to make a subjective assessment of how their consumption of the principal fuels had changed over the last 5 years. The results presented in Figure 4 show that electricity consumption has been most subject to changes, with some households increasing their consumption and others reducing it. Consumption of gas (not distinguishing between piped and bottled) is most stable. Overall, consumptions of electricity, wood and coal appear to be increasing, whilst consumption of gas is decreasing slightly.

The main reasons given for these changes are summarised in Table 45

Table 45 Reasons for changes in consumption of fuels (ranked in order of frequency)

Fuel	Reasons for increase	Reasons for decrease
electricity	• installation of water heaters • increase in appliances • growing families	• Increasing tariffs • Economising • Substituting with other fuels (coal)
Wood	• Fuel substitution (savings on electricity, and power cuts) • Cheaper fuel	• Wood is expensive • Wood is not available • economising
Gas	• convenient	• Prices have increased • Expensive fuel • Economise
Coal	• Cheaper fuel (gas and electricity costs have increased) • Extending heating period • Convenient to purchase	• Expensive (for good quality coal) • Heat fewer rooms

Table 46 indicates that the poor are substituting clean fuels (electricity and gas) for solid fuels, especially coal. There appears to be an overall trend of substitution between electricity and coal – the better off are using more electricity and less coal, whilst the poorest group claim to be using less electricity and more coal.

Table 46 Changes in consumption of fuels over last 5 years by wealth groupings (means)

material position of your household (Range –2 to +2)	Electricity		wood		gas		coal	
	N	Mean	N	Mean	N	Mean	N	Mean
Difficult to provide the family with food	17	-.06	14	-.29	14	-.14	14	.21
Manage to provide food but find it difficult to pay the util	121	.02	109	.17	102	-.06	102	.15
afford required foods, clothes and manage to pay the bills	51	.41	37	.16	34	-.18	35	.06
Have all we need and made some savings	8	.63	6	-.33	5	-.40	6	-.83
Don't know what to answer	11	.36	7	-.14	6	.00	7	.14
Total	208	.15	173	.10	161	-.10	164	.10

To a certain extent this trend is also evident in changes claimed by categories of housing (see Table 47, ranked in order of increasing annual per capita income) – increase in coal use is closely linked to poverty and has increased amongst all but the wealthiest groups. It is interesting to note that the poorest category claim that their consumption of electricity has increased, presumably due to an increase in domestic appliances.

Table 47 Changes in consumption of fuels over last 5 years by housing categories (means)

Categpry of house (Range –2 to +2)	Electricity		wood		gas		coal	
	N	Mean	N	Mean	N	Mean	N	Mean
houses - wood cooking, solid fuel heating	15	0.2	15	0.6	9	0.11	13	0.69
houses - electric cooking, solid fuel heating	20	-0.05	20	0.4	20	-0.3	20	0.35
temporary dwellings	22	-0.23	23	-0.13	22	0.14	23	0.26
houses - electric cooking, electric heating	14	0.14	14	-0.07	12	0	13	0.31
flats - gas cooking, district heating	54	0.09	38	-0.13	38	-0.13	36	-0.14
flats - electric cooking, district heating	0	0	6	-0.5	6	-0.83	6	-0.83
houses - gas cooking, gas heating	4	-0.25						
Total	137	0.07	117	0.05	108	-0.11	112	0.14

6.4 Influence of changes in quality of service

There is strong correlation between the three types of problems encountered with electrical supplies i.e. households with poor quality supplies tend to suffer power cuts, voltage drop, and surges. Moreover, responses indicate (Table 48) that people feel that the quality of supplies has generally deteriorated over the last five years, most especially the temperature of the district heating water.

The correlations presented in Table 49 show the following relationships:

- Choice of main cooking fuel is influenced by the occurrence of power cuts and surges;
- Choice of space heating fuel is influenced by frequency of power cuts;
- Changes in quality of power supplies (all three indicators) correlate with changes in gas consumption, indicating that where quality of electricity supplies has increased, people have increased consumption of gas; this may reflects improvements made in areas where residents can afford to increase their use of gas.
- There is a correlation between the occurrence of problems (in the last 6 months) and changes in fuels for both cooking and heating (although interestingly only for power cuts and surges, but not for voltage drop). However, there is a correlation between frequency of voltage drop and change in cooking fuel, emphasising the importance of voltage stability when cooking.
- The negative correlation between changes in consumption of electricity and coal indicates that one is being substituted with the other, whilst the positive correlation between changes in the consumption of wood and coal indicates that they are used together (i.e. solid fuel as an alternative to gas / electricity).

When looking at perceived changes in quality of supply issues, there is no difference between poverty related groupings (rental status, material position, or per capita income).

Table 48: Changes in quality of supply issues (over the last five years)

Change (Range –2 to +2)	N	Mean	Median	IQR
Power cuts	174	-.39	0	(-1 to 0)
Weak supply	191	-.60	-1	(-1 to 0)
Appliances fused	96	-.55	-1	(-1 to 0)
Inadequate district heating	97	-1.10	-1	(-2 to 0)

An analysis of problems reported with district heating shows that those who feel they experience problems most frequently also feel that the quality of supply has deteriorated.

Table 49 Correlations between electricity quality of supply and changes in fuel use

	power cuts occurred	frequency - power cuts	change - power cuts	supply weak occurred	frequency - supply weak	change - supply weak	appliances fused occurred	frequency - appliances fused	change - appliances fused	main cooking fuel - winter	main space heating fuel	main water heating fuel - winter	changed cooking fuel	changed heating fuel	consumption of electricity changed	consumption of wood changed	consumption of gas changed	consumption of coal changed
power cuts occurred		-0.311***		0.279***			0.553***			0.215**			0.227***	0.269***				
frequency - power cuts	-0.311***			-0.26***	0.443***		-0.282**	0.25*			0.206*							
change - power cuts						0.828***	0.399***		0.84***								0.203*	
supply weak occurred	0.279***	-0.26***			-0.328***		0.371***											
frequency - supply weak		0.443***		-0.328***									0.204**					
change - supply weak			0.828***						0.823***								0.253**	
appliances fused occurred	0.553***	-0.282**	0.399***	0.371***					0.403***	0.228**			0.297***	0.24**	-0.224**		0.222*	
frequency - appliances fused		0.25*												0.261*				
change - appliances fused			0.84***			0.823***	0.403***										0.352**	
main cooking fuel - winter	0.215**						0.228**				0.309***	0.531***						
main space heating fuel		0.206*								0.309***		0.433***			-0.2**	0.317***		0.202*
main water heating fuel - winter										0.531***	0.433***					0.276***		
changed cooking fuel	0.227***				0.204**		0.297***							0.571***				
changed heating fuel	0.269***						0.24**	0.261*					0.571***					
consumption of elec changed							-0.224**				-0.2**							-0.26***
consumption of wood changed											0.317***	0.276***						0.506***
consumption of gas changed			0.203*			0.253**	0.222*		0.352**									
consumption of coal changed											0.202*				-0.26***	0.506***		

*** Correlation is significant at the 0.001 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).
* Correlation is significant at the 0.05 level (2-tailed).

6.5 Utility Payment patterns

6.5.1 Electricity

Electrification rates are high at around 99% (Table 23), and almost all households have meters (92% of sample). Only 5% claim to receive nominal bills – these are mostly 'illegal' connections. In Kyrgyzstan it is not uncommon for people to make their own illegal connection by tapping into overhead distribution cables, and then to enter into an agreement with the utility company to use the electricity – a meter can even be installed. This appears to be the case with those receiving nominal bills, as they claim to make payments to local inspectors.

Table 50 shows that most people pay electricity bills at the post office and through local inspectors, both of which are assumed to offer convenience in that they are local points of payment; it is alleged bills can be reduced (in a number of ways) by negotiating with local inspectors, who take a share of the benefit. Choice does not appear to change between poverty groupings. It was pointed out that inspectors are more interested in fixing bills in wealthy neighbourhoods, because the bills (and potential benefits) are higher i.e. negotiating with inspectors is not a feature of low income communities.

Table 50: Points of payment of electricity bills

Point of payment	Frequency	Percent
company	26	12.0
local inspector	48	22.2
occasional seller	1	.5
post office	76	35.2
government department	8	3.7
Total	159	73.6

Only 59% of the sample claim to be able to pay their bills in full, and a large number of households (one third) take advantage of flexible payment systems whereby they can make only part payment of bills. Rented households have significantly lower ability to pay, as do households with a lower perceived material position.

Table 51: Ability to pay electricity bills

Point of payment	Frequency	Percent
unable to pay	10	4.6
Make part payment - arranged with local inspector	47	21.8
Pay in instalments	25	11.6
Pay in full	127	58.8
Total	209	96.8

It is interesting to note that 64% of the sample claim to be unable to pay their bill in full at some time or other, indicating the value of flexible payment systems (see Table 52).

Table 52: Frequency of payment problems, and ability to pay electricity bills

Frequently unable to pay bills	payment of electricity bills				Total
	unable to pay	part payment - local inspector	Pay in instalments	Pay in full	
never	4	11	3	53	71
rarely	1	11	7	46	65
occasionally	0	18	6	16	40
often	2	5	3	0	10
continually	0	1	3	4	8
Total	7	46	22	119	194

Similarly, almost half of respondents indicated that they had experienced disconnection, with 5% claiming they were disconnected most months. The frequency of disconnection is linked to ability to pay electricity bills (KW p = 0.000) indicating that disconnection does not appear to be used simply as a means of persuading people to pay their bills, in which case frequency of disconnection would have been similar across all ability to pay groups.

Non payment of bills is given as the reason for disconnection amongst only half of those who gave a reason. A substantial proportion of respondents (15%) claim that disconnection was due to non-payment by neighbours, which has important implications for social networks.

Table 53: Reason for disconnection (electricity)

Reason	Frequency	Percent valid
We have not paid bills	51	43.6
Neighbours don't pay	17	14.5
Technical problems	43	36.8
Illegal connection was cut	4	3.4
other	2	1.7
Total	117	100.0

Respondents were asked how the frequency of disconnections had changed over the last five years, and although it appear that improvements in disconnection situation are closely related to poverty, such that things have improved amongst households with a high material position, and those with high per capita expenditure, this is not statistically significant. Nevertheless, it interesting to note that the most vulnerable group is the only one to register no change i.e. reforms have not yet resulted in an increase in disconnections due to non payment, or a decrease in disconnections due to improved network.

6.5.2 Gas and District Heating

Based on responses to use of fuels for principal activities, 50% of households use piped gas, 32% use district heating, and 16% use LPG (actual figures are likely to be higher as a small number of respondents did not indicate fuel choices).

Table 54 and Table 55 show that post offices are clearly the preferred point of payment for other utility bills.

Table 54: Points of payment of piped gas bills

Point of payment	Frequency	Percent
Company	17	7.9
local inspector	7	3.2
post office	38	17.6
government department	3	1.4
Total	65	30.1

Table 55: Points of payment of district heating bills

Point of payment	Frequency	Percent
Company	6	2.8
local inspector	1	.5
post office	38	17.6
government department	1	.5
Total	46	21.4

Although respondents were not asked for detail of payment of other utility bills, only 4 respondents claimed to have outstanding gas debts, indicating that non-payment is not a major problem (4% of gas users). However, 15 people (21% of district heating users) claimed to have outstanding heating debts. These figures compare with a figure of around 17% of the sample claiming to be in debt on electricity bills at the time of the survey. Note that both gas and district heating tend to be used by better off households (see Table 37).

6.6 Quality of life indicators

A number of questions were asked regarding observed changes in the living conditions of their respective neighbourhoods. These involved housing, health (child), employment, water and sanitation, education (schooling), communications, security, food and entertainment. An index of perceived neighbourhood improvement, was developed by taking the mean of the responses to the nine above indicators, each measured on a 5 point bi polar scale presented in Table 56. (This scale of nine indicators was found to have an Alpha coefficient [7]of 0.86). The neighbourhood index is compared with a more general measure of perceived improvement in living conditions over the same period. These two measures correlate closely ($p = 0.000$) although the general measure is consistently higher than the calculated index, which is not weighted.

Responses to a question on living conditions in general indicates that the general feeling is that things have improved slightly (mean = 0.16), although 47% of the sample feel there has been no change.

Those groupings where differences are evident in people's perception of changes in society are presented in Table 56. The most striking feature is that the poor feel that conditions have got worse, whilst the better off feel that things have improved, particularly in the areas of employment and housing conditions (Material position, and Per capita income). However, it is interesting to note that the view of the poorest group is consistently more optimistic than

[7] Cronbach's Alpha coefficient is a measure of a scale's reliability. A coefficient of >0.6 normally indicates reliability.

the 'low' per capita income group, indicating that the affect on the very poorest appears to have been mitigated to a certain extent.

Table 56: Neighbourhood quality of life indicators comparing tenure status and size of dwelling

	All	Education			Material position			Per capita income					Proportion of expenditure on Energy				
		below tertiary	tertiary and above		Probs paying bills	Able to pay		lowest (<10,400)	low (10,400 - 15,000)	medium (15,001 - 24,000)	high (>24,000)		Lowest (<= 5.01)	Low (5.02 - 9.80)	Medium (9.81 - 16.13)	High (>16.14)	
n		90	124		140	73		56	42	61	42		41	44	44	45	
Range (-2 to +2)	Mean	Mean	Mean	**MW Sig**	Mean	Mean	**MW Sig**	Mean	Mean	Mean	Mean	**KW Sig**	Mean	Mean	Mean	Mean	**KW Sig**
housing	0.1	-0.07	0.23	**0.014**	-0.04	0.37	**0.001**	0.1	-0.24	0.23	0.25	**0.028**	0.37	0.11	0.04	0	
child health	0.09	0.01	0.16		-0.02	0.31	**0.002**	0.09	-0.14	0.27	0.12		0.36	0.07	0.02	0.02	
Employment	-0.27	-0.47	-0.13	**0.016**	-0.56	0.26	**0**	-0.29	-0.67	-0.23	0.05	**0.018**	0.27	-0.29	-0.54	-0.53	**0.002**
water / sanitation	-0.01	-0.03	0		-0.04	0.04		-0.03	-0.11	0.02	0		0.18	-0.07	0	-0.16	
Education	-0.15	-0.23	-0.1		-0.29	0.1	**0.004**	-0.07	-0.3	-0.2	-0.14		-0.02	-0.09	-0.17	-0.27	
Communications	0.06	-0.09	0.17	**0.014**	0.01	0.15		0.02	0	0.06	0.13		0.15	0	0.09	-0.11	
security	-0.55	-0.62	-0.5		-0.66	-0.34	**0.031**	-0.39	-0.6	-0.64	-0.64		-0.36	-0.64	-0.41	-0.62	
food	0.14	0.09	0.17		0	0.4	**0.002**	0.02	-0.02	0.16	0.38		0.61	0.18	-0.13	0.11	**0**
Entertainment	-0.27	-0.44	-0.14	**0.02**	-0.53	0.2	**0**	-0.1	-0.73	-0.25	-0.13	**0.003**	0.15	-0.45	-0.48	-0.24	**0.012**
Mean index	-0.13	-0.2313	-0.0512	**0.032**	-0.2612	0.138	**0**	-0.09	-0.34	-0.09	-0.02		0.1599	-0.1439	-0.1944	-0.2	**0.019**
General living conditions	0.16	0.05	0.24		0.07	0.33	**0.014**	0.1	-0.16	0.2	0.48	**0.001**	0.51	0.16	-0.11	0.07	**0.008**

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

There does appear to be a link between a change in main heating fuel and quality of life indicators (see Table 57). However, the link may be considered counterintuitive – those who have changed fuel feel that conditions are getting worse (mean index = -0.44), whilst those who have not changed have a more positive view (mean index = -0.06).

Correlations with changes in electricity consumption reflect the increase in demand created by appliances (likely to be TV and video), which will in turn be linked to employment prospects.

Table 57: Correlation coefficients: changes in fuels and Neighbourhood quality of life indicators

Changes in conditions	Changed main fuel		Changes in fuel consumption (over 5 years)			
	cooking	heating	electricity	wood	gas	coal
housing		0.217**				
child health						
Employment			0.266***			
water / sanitation		0.255***				
Education						
Communications		0.214**				
security				0.22**		
food		0.224***				
Entertainment			0.21**			
6 Mean index		0.229***				
General living conditions		0.265***				

7 Perceived Impact of Tariff Reforms

7.1 Awareness of Tariff reform process

Only 59% of respondents claim to have any knowledge of the electricity reform processes, but all have given their opinions on likely changes in fuel prices and enforcement of bill payment (see Table 58). This indicates that people are aware of imminent changes in the electricity industry (price increases and enforcement of payment). 13% of the sample do not agree that households should pay for their consumption (this does not seem to be a poverty specific characteristic), so there is likely to be some resistance to paying bills. This distribution of opinion is more or less consistent across poverty groupings.

Table 58: Likely changes in energy markets during the next 5 years

Percent sample	Electricity Price increase	Coal price increase	District heating price increase	Gas price increase	Enforcement %
Very unlikely	.9	.5		.5	
unlikely	.9	.9	.5	.9	1.4
no opinion	25.9	26.9	33.3	24.5	15.7
likely	40.3	49.5	37.5	45.8	47.7
very likely	31.9	21.8	25.5	25.0	33.3
Mean (range –2 to +2)	1.01	.92	.91	.97	1.15

Television is clearly the most effective means of informing people of reform processes.

Table 59: Sources of information on electricity reforms

	Frequency	Percent
press	44	20.4
TV	89	41.2
radio	11	5.1
friends and family	16	7.4
not interested	23	10.6
Total	183	84.7

Respondents were asked which of the possible changes in energy markets would have most impact on their household, and rank the three highest priority issues. As can be observed in Table 60, the prospect of electricity price increases will have the greatest impact followed by enforcement of payment, and it is assumed that in this context people are concerned that the utility will require complete payment, and people will loose current flexible payment options. It is somewhat surprising to note that there are no significant differences in expected impact of changes between groupings.

Table 60: Impact of price increases and enforcement

% sample Ranking	Electricity	Coal	District Heating	Piped gas	Enforcement (electricity)
First	70.8	6.5	16.2	2.8	8.8
second	22.7	37.0	21.8	4.6	10.6
third	3.7	11.6	3.7	23.1	46.8
% response	97.2	55.1	41.7	30.5	66.2

Opinions on likelihood of changes and the perceived impact of changes can be combined to create a measure of attitude towards changes. This measure shows that overall, people believe prices will only go up, and that electricity price increases are perceived as the most important threat. The potential impact of electricity price increases is most keenly felt amongst those in the 'low' per capita income group (mean = 3.04), but less so amongst the poorest (see Table 61) – this reflects the reduced reliance on electricity amongst the poorest. Conversely, they are more concerned about increases in solid fuel prices (coal). This group is also more concerned about enforcement of payment, reflecting lower rates of payment (especially in informal settlements).

Table 61: Mean attitudes towards changes in energy industry

Range –6 to +6	Electricity	Coal	District Heating	Piped gas	Enforcement (electricity)
Whole sample	2.69	1.01	1.21	.56	.95
Material position – difficult to provide food	2.71	1.18	.76	.18	1.00
Per capita h/hold expenditure = lowest	2.22	1.39	.58	.25	1.09

8 Future Coping Strategies

8.1 Overall

When asked how people would respond to an increase in the cost of energy, reduction in use is clearly the favoured response. When rankings are weighted, the figures indicate that changing fuels is a marginally more popular strategy than paying more (see Table 62).

shows the proportion of the total sample that ranked each strategy as their first, second and third choice, and it presents the mean of weighted scores as an overall index.

Table 62: Ranking of proposed coping strategies

Range (0 to 3)	N	Pay more	Change fuel	Reduce use
Weighted mean		1.59	1.64	2.40
Material position – difficult to provide food	17	2.59	1.65	1.47
Per capita h/hold income = lowest	28	2.25	1.96	1.29

Weighted scores – 1st ranking = 3, 2nd = 2; 3rd = 1; not ranked = 0.

There are some differences between social groupings (see Table 63):

- Those who have problems paying utility bills are less likely to elect to pay more and are more likely to reduce their consumption;
- It is only those in the highest per capita household expenditure group who are willing to pay more, and least likely to change fuels or reduce consumption;

Table 63 Significant differences in coping strategies amongst groupings (weighted responses)

	Groups	Pay more	Change fuel	Reduce use
Education	<tertiary: tertiary (MW sig.)			
Rental status	Rented: owned (MW sig.)			
Material position	Prob paying bills: able to pay (MW sig.)	**.000**		**.000**
Per capita h/hold expenditure	Lowest:low:medium:high (KW sig.)	**.021**	**.012**	**.006**
Adult units per h/hold	Low:medium:high (KW sig.)			
Total h/hold exp	Lowest:low:medium:high (KW sig.)	**.015**	**.033**	
% exp on energy	Low:medium:high (KW sig.)			

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

However, when looking at the poorest groups in these sensitive categories, quite a different set of priorities are evident – see Table 62. This indicates that the poorest feel they have little scope for energy saving, and they will have to pay more. Bear in mind that people's experience of payment includes considerable flexibility - though non-payment, negotiating with inspectors, or stealing.

8.2 Pay more – savings in household expenditure

Travel and housing are the items of household expenditure where cost savings are most likely to be made (see Table 64 which presents the percentage of the sample who have ranked each option as their first, second or third choice, and the mean of weighted scores as an overall index); within this context, travel most likely includes holiday travel, mostly to villages.

Table 64: Areas where savings would be made in the household budget

% sample	Housing	Food	Travel	Debt payment	Education	Clothing	Telephone	Medical
First	40.7	3.7	39.8	3.7	2.8	15.3	4.2	1.9
second	22.2	4.2	31.5	6.5	6.5	17.6	7.4	3.2
third	17.6	5.1	13.4	14.8	6.0	29.2	6.9	5.1
% response	80.6	13.0	84.7	25.0	15.3	62.0	18.5	10.2
Weighted means (range 0 to 3)								
Whole sample (N=216)	1.84	.25	1.96	.39	.27	1.10	.34	.17
Material position – difficult to provide food (N=17)	1.59	.18	2.00	.24	.00	1.18	.35	.35
Per capita h/hold expenditure = lowest (N=28)	2.04	.21	1.86	.14	.07	1.07	.29	.07

Weighted scores – 1st ranking = 3, 2nd = 2; 3rd = 1; not ranked = 0.

It is somewhat surprising that there are few significant differences between those who indicated that paying more (and making costs savings elsewhere) would be their primary response, and all others in the sample (see Table 65). Those intending to make savings are more inclined to make savings in debt payments and in telephone costs.

Amongst those not able to pay utility bills, they would be less inclined to make savings in food costs, and more inclined to make savings in travel and telephone costs. Areas where the poor (per capita income) would make savings are roughly the same as for the sample as a whole.

Table 65 Significant differences in items for making savings amongst groupings

	Groups	Housing	Food	Travel	Debt payment	Education	Clothing	Telephone	Medical
Education	<tertiary: tertiary (MW sig.)				**0.048**				
Rental status	Rented: owned (MW sig.)								
Material position	Prob paying bills: able to pay (MW sig.)		**0.009**	**0.02**				**0.049**	
Per capita income	Lowest:low:medium:high (KW sig.)								
Adult units per h/hold	Low:medium:high (KW sig.)						**0.019**		
Total h/hold exp	Lowest:low:medium:high (KW sig.)								
% exp on energy	Low:medium:high (KW sig.)	**0.024**	**0.02**						
coping	Pay more as 1st: others				**0.008**			**0.002**	

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

8.3 Reduce energy consumption

Domestic appliances and lighting are the electrical services where energy savings are most likely to be made (see Table 66). There appear to be few significant differences in response across various groupings.

Table 66: Areas where energy savings would be made

(range 0 to 3)	N	lighting	cooking	Space heating	Hot water	entertainment	appliances	business
Weighted mean	216	1.49	0.45	0.86	0.66	0.96	1.46	0.14
Material position – difficult to provide food	17	2	0.59	0.88	0.59	0.82	1.18	0.12
Per capita h/hold expenditure = lowest	59	1.59	0.46	1	0.42	0.64	1.39	0.17

8.4 Fuel substitution

Respondents were asked to rank their top three choices of fuels they would prefer to use for cooking and heating if the cost of their current fuel were to increase. Potential changes in cooking fuels are given in Table 67, which presents the means of weighted scores from this ranking:

- A large number of electricity users responded that they would use electricity, implying that they would still be prepared to use electricity even if the prices go up; others would switch to wood;
- Pipe gas and LPG users would switch to electricity;
- Wood users would continue to use wood others would switch to dung;
- Coal users would switch to wood.

Table 67 Preferred alternative cooking fuels (mean weighted scores)

Main fuel (winter)	N	Preferred change to (range 0 to 3)					
		elec	piped gas	LPG	Wood	dung	coal
Electricity	79	1.58	.44	1.15	1.27	.19	.94
Piped gas	86	2.45	.84	1.36	.23	.01	.10
LPG	10	2.20	.30	1.50	.90	.30	.70
Wood	11	.64	.00	.18	2.36	1.55	1.18
Coal	11	.64	.55	.36	2.36	.45	.82
Total	198	1.89	.60	1.16	.91	.21	.57

Weighted scores – 1st ranking = 3, 2nd = 2; 3rd = 1; not ranked = 0.

When it is considered that poor households tend to use piped gas, electricity and solid fuels (Table 26), it emphasises the impact that electricity price rises will have on the poor, as they will tend to continue using electricity. Investigation of poverty groups shows trends similar to those in Table 67

Potential changes in heating fuels are presented in Table 68:

- Electricity users will continue to use electricity, and will change to coal and wood;
- District heating users will switch to electricity;
- Coal users will switch to electricity and wood (and continue to use coal).

Table 68 Preferred alternative heating fuels (mean weighted scores)

Main fuel	N	Preferred change to (range 0 to 3)						
		elec	piped gas	LPG	District heating	Wood	dung	coal
Electricity	44	1.48	.73	.18	.34	1.23	.25	1.45
Piped gas	6	2.00	.50	.50	.00	.67	.00	1.50
District heating	66	2.73	.80	.21	.32	.02	.05	.02
Wood	8	.38	.00	.00	.00	2.13	.88	1.38
Dung	6	1.33	.00	.00	.00	1.83	.67	.33
Coal	45	1.73	.20	.09	.00	1.67	.47	1.58
Total	177	1.99	.55	.16	.20	.92	.26	.90

8.5 Intentions

During the preliminary surveys, a number of statements were given regarding possible responses to increasing energy costs. These were used in the questionnaire as intention statements, and can be categorised according to the proposed coping strategies i.e. pay more (P), change fuels (C), and reduce consumption (R). Some of the statements given refer to making informal arrangements (I) to secure power, which was not included as a proposed coping strategy on the basis that this is exactly what the utilities will be taking measures to prohibit; nevertheless, this is evidently regarded as a coping strategy and must be included in the analysis.

Table 69: Outcome beliefs regarding impact of electricity price increase ranked by strength

Category	Statement	Mean	Median (range –2 to +2)	IQR
I	some people will use beetles[8]	0.65	1	(0 to 2)
I	make an arrangement with the inspector to cover our debt	0.07	0	(-1 to 1)
R	will heat fewer rooms	0.04	0	(-1 to 1)
P	will borrow money	0	0	(-1 to 1)
R	reduce the number of hours that we heat the house	-0.03	0	(-1 to 1)
R	will STOP (continue) using hot water	-0.12	0	(-1 to 1)
P	find extra work to pay the extra money	-0.13	0	(-1 to 1)
C	will cook outside (using wood)	-0.23	0	(-1 to 1)
R	we will STOP (continue) using the fridge	-0.26	-1	(-1 to 1)
P	will buy food on credit	-0.38	0	(-1 to 0)
C	use kerosene lamps for lighting	-0.49	-1	(-2 to 1)
C	will cut woods by ourselves	-0.52	-1	(-2 to 1)
P	close family will help with paying bills	-0.62	-1	(-1 to 0)
R	move to a new house to escape from debts	-0.62	-1	(-2 to 0)
R	eat more food that does not need to be cooked	-0.73	-1	(-2 to 0)
I	will arrange to take electricity from a neighbour's supply	-0.74	-1	(-2 to 0)
C	use candles for lighting	-0.75	-1	(-2 to 0)
R	will stop watching TV	-0.93	-1	(-2 to 0)
R	send our children to live with relatives	-1.13	-1	(-2 to –1)
R	whole family will move into a relative's house	-1.18	-1	(-2 to –1)

[8] Device used to steal electricity by bypassing meter

These outcome beliefs are ranked in Table 69 and show that people are generally reluctant to take most of the actions represented in the statements (negative response indicates disagreement with statement).

Note that means for all options for the sample as a whole are negative (see Table 71), indicating that there is resistance to any change. The least negative option is to make informal arrangements, indicating that people's preference will be to try to avoid paying extra before actually paying more, which appears to be the next least negative option; this contradicts responses presented in Table 62, in which people claim their preferred option will be to reduce consumption.

Significant differences in responses are noted between those able to pay utility bills and those not (see Table 70), such that the better off exhibit a stronger resistance to change fuels and to reduce consumption. Resistance to change fuels is highest amongst the highest per capita income group, but is also high amongst the poorest, indicating they feel they are currently using lowest cost fuels.

Table 70 Significant differences in calculated coping strategies - amongst groupings

	Groups	Pay more	Change fuel	Reduce consumption	Informal
Education	<tertiary: tertiary (MW sig.)				
Rental status	Rented: owned (MW sig.)			**.030**	**.009**
Material position	Prob paying bills: able to pay (MW sig.)		**.000**	**.000**	**.000**
Per capita income	Lowest:low:medium:high (KW sig.)		**0.009**		
Adult units per h/hold	Low:medium:high (KW sig.)				
Total h/hold exp	Lowest:low:medium:high (KW sig.)		**.029**		
% inc on energy	Low:medium:high (KW sig.)	**.03**			

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

Table 71 presents a breakdown of results for groupings of material position of household (the most sensitive indicator in Table 70). This indicates that the poorest are least resistant to paying more, and to reducing consumption; it also shows that only the better off (top two groups) will not be inclined to make informal arrangements i.e. the preferred strategy for most of the sample will be to make informal arrangements if at all possible.

Table 71: Mean calculated coping strategies (by material position of household)

Range -2 to +2	N	Pay more	Change fuel	Reduce consumption	Informal arrangements
Difficult to provide the family with food	17	-.1029	-.3824	-.3913	.2157
Manage to provide food but find it difficult to pay the util	123	-.2520	-.2893	-.4673	.2263
afford required foods, clothes and manage to pay the bills	54	-.2546	-.8657	-.7359	-.3519
Have all we need and made some savings	9	-.3333	-.7222	-.5895	-.7037
Whole sample	215	-.2849	-.4988	-.5548	-.0039

8.6 Outcomes and Impact

Some of the statements gathered during the preliminary surveys relate to how people believe they will be affected by increasing energy costs. These were used in the questionnaire to assess the strength of belief and the importance given to these. Each statement was presented with a bi polar 5 point scale exploring the degree of agreement or disagreement with each.

Outcome statements can be categorised into key issues: family unity (F), security (S), health (H), education (E), financial independence (debt avoidance) (D).

Table 72 presents the mean, median and IQR for each of these statements for the whole sample. The statements that were most strongly agreed with related the negative impact of price increases on, education and health. Respondents generally do not agree with beliefs that they will run into difficulties with paying e.g. that the utility company will late personal property to cover bad debt nor that they will be disconnected.

Table 72: Outcome beliefs regarding impact of electricity price increase ranked by strength

Category	Statement	Means	Median (range –2 to +2)	IQR
S	lighting in public places will reduce, so thefts and crimes will increase	-0.79	-1	(-2 to 0)
E	children's education will be affected by not enough heating	-0.78	-1	(-1 to –1)
E	children's education will be affected by poor lighting	-0.76	-1	(-1 to –1)
H	will get sick because of lack of heating	-0.73	-1	(-1 to –1)
H	our inability to pay bills will cause psychological illness	-0.69	-1	(-1 to 0)
F	inability to pay bills will cause arguments in the family	-0.67	-1	(-1 to 0)
H	will get sick because of not cooking properly	-0.58	-1	(-1 to 0)
S	our house will be disconnected	-0.56	-1	(-2 to 0)
D	will get into debt with Energosbyt	-0.56	-1	(-1 to 0)
H	our health will be affected by not having hot water	-0.47	-1	(-1 to 0)
S	will be disconnected because of our neighbour's debts	-0.27	-1	(-1 to 1)
D	electricity company will get a court order against us	0.1	0	(-1 to 1)
S	company will take things from our house to pay for debts	0.22	0	(-1 to 1)
D	close family will help with paying bills	0.62	1	(0 to 1)

Most significant differences in responses to these outcome statements were evident between groups of material position of the household (Table 73). Responses amongst those who regard themselves as in poorer material position are more strongly negative, indicating that they feel more vulnerable to the impacts of cost increases. However, whereas the general trend is for the poor to have a more negative view of outcomes than the better off, the poorest (per capital income) tend to have a more positive view – details are presented in Table 74.

Table 73: Differences in Outcome beliefs by vulnerable groups

	Material position	Per capita income
	Prob paying bills: able to pay (MW sig.)	Lowest : low : medium : high (KW sig.)
inability to pay bills will cause arguments in the family (CS)	**0**	**0.002**
thefts and crime will increase (CHANGED SENSE)	**0.029**	**0.028**
company will take things from our house to pay for debts (CS)	**0.001**	**0**
will be disconnected because of our neighbours debts (CS)	**0.017**	**0.001**
our house will be disconnected (CS)	**0.002**	**0**
will get sick because of lack of heating (CS)	**0.001**	**0.001**
our inability to pay bills will cause psychological illness (CS)	**0**	**0.008**
will get sick because of not cooking properly (CS)	**0**	**0.007**
our health will be affected by not having hot water (CS)	**0.02**	**0.08**
childrens education will be affected by poor lighting (CS)	**0**	**0.007**
childrens education will be affected by not enough heating (CS)	**0.001**	**0.01**
electricity company will get a court order against us (CS)	**0.044**	**0**
close family will help with paying bills (CS)		
will get into debt with Energosbyt (CS)	**0**	**0.04**

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

Table 74: Differences in Outcome beliefs by per capita income groups

	lowest (<10,400)	low (10,400 - 15,000)	medium (15,001 - 24,000)	high (>24,000)
inability to pay bills will cause arguments in the family (CS)	-0.24	-0.93	-0.98	-0.53
thefts and crime will increase (CHANGED SENSE)	-0.34	-1.07	-0.97	-0.84
company will take things from our house to pay for debts (CS)	1.05	-0.02	-0.03	-0.22
will be disconnected because of our neighbours debts (CS)	0.26	-0.51	-0.59	-0.18
our house will be disconnected (CS)	0.14	-0.87	-0.87	-0.64
will get sick because of lack of heating (CS)	-0.19	-0.84	-0.92	-0.98
our inability to pay bills will cause psychological illness (CS)	-0.25	-0.84	-0.87	-0.8
will get sick because of not cooking properly (CS)	-0.1	-0.76	-0.86	-0.6
our health will be affected by not having hot water (CS)	-0.14	-0.53	-0.73	-0.42
childrens education will be affected by poor lighting (CS)	-0.31	-1.07	-1	-0.69
childrens education will be affected by not enough heating (CS)	-0.31	-0.98	-1.05	-0.8
electricity company will get a court order against us (CS)	0.79	0.09	-0.22	-0.24
close family will help with paying bills (CS)	0.82	0.51	0.47	0.64
will get into debt with Energosbyt (CS)	-0.18	-0.8	-0.73	-0.53

Respondents were also asked to rank each of the five key issues, and the results are presented in Table 75, and show that good health and maintaining family unity are regarded as most important.

Table 75: Importance of issues

Issues N = 216 Range (0 to 3)	Mean	Median	IQR
Health	2.06	2	(1 to 3)
Family	1.89	2	(1 to 3)
financial	.97	1	(0 to 2)
Security	.82	9	(0 to 2)
Education	.42	0	(0 to 1)

A set of impact measures was calculated as the product of the response to the outcome statement and the importance attributed to the key issue. When ranked (see Table 77), the four most strongly negative impacts relate to health.

Table 76: Attitudes regarding impact of electricity price increase ranked by strength

Statement	Means	Median (range –6 to +6)	IQR
impact - sick because of lack of heating	-1.59	-2	(-3 to 0)
impact - inability to pay will cause psychological stress	-1.51	-2	(-3 to 0)
impact - get sick not cooking properly	-1.28	-2	(-3 to 0)
impact - health, not enough hot water	-1.11	-1	(-3 to 0)
impact - inability to pay will cause family arguments	-1.06	-1	(-3 to 0)
impact - get into debt with Energosybt	-0.44	0	(-2 to 0)
impact - thefts and crime increase	-0.41	0	(-1 to 0)
impact - poor education not enough heating	-0.23	0	(0 to 0)
impact - poor education because of poor lighting	-0.2	0	(0 to 0)
impact - house will be disconnected	0.02	0	(0 to 0)
impact - company will get court order	0.03	0	(0 to 0)
impact - disconnected because of neighbour's debts	0.05	0	(0 to 0)
impact - company will take things from house	0.53	0	(0 to 0)
impact - family will help with paying bills	0.8	0	(0 to 2)

A mean impact scoring can be calculated for each category of outcome statement by taking the mean of all attitudes in each category - the results are ranked in Table 77 and confirm that the greatest impact is likely to be on health. The potential impact on family unity is also flagged as important (bear in mind that this score is based only on a single indicator).

Table 77: Potential impacts resulting from cost increases

Impact N = 216 Range (-6 to +6)	Mean	Median	IQR
Impacts - health	-1.3709	-1.5	(-3 to 0)
Impacts - family unity	-1.0556	-1	(-3 to 0)
Impacts - education	-.2140	0	(0 to 0)
Impacts - security in home	.0475	0	(-0.25 to 0)
Impacts - financial independence (debt)	.1349	0	(0 to 0)
Overall impact (sum) (range -84 to +84)	-6.38	-10	(-16 to –1)

Table 78 shows that attitudes are most sensitive to material position of the household groupings, so these have been explored and the detail is presented in Table 79 and Table 80:

- the general trend is for poorer groups to have more negative attitudes (overall); this is true except for the poorest group (by per capita income), which has a positive attitude;
- concerns regarding education are linked to wealth, such that the better off believe they will be more negatively affected than the poor;

- even amongst the poorest there is a weak attitude regarding getting into debt i.e. people are not especially concerned that they will encounter serious difficulties when paying increased costs;

Table 78 Significant differences in attitudes re: impact of cost increases - amongst groupings

	Groups	Attitudes regarding:					Overall
		family	security	health	education	financial	
Education	<tertiary: tertiary (MW sig.)	**.028**					
Rental status	Rented: owned (MW sig.)						
Material position	Prob paying bills: able to pay (MW sig.)	**.000**	**.038**	**.000**	**.026**	**.002**	**.000**
Per capita income	Lowest:low:medium:high (KW sig.)	**.001**	**.021**			**.002**	**.008**
Adult units per h/hold	Low:medium:high (KW sig.)		**.019**				
Total h/hold exp	Lowest:low:medium:high (KW sig.)					**.028**	
% inc on energy	Low:medium:high (KW sig.)	**.013**					

- MW Sig = p values resulting from the Mann Whitney U Test
- KW Sig = p values resulting from the Kruskal Wallis H Test
- differences significant where p>0.05.

Table 79: calculated attitudes (by material position of household)

range	N	Attitudes regarding: family (-6 to +6)	security (-6 to +6)	health (-6 to +6)	education (-6 to +6)	financial (-6 to +6)	Overall (-84 to +84)
Difficult to provide the family with food	17	-1.7647	-.2353	-1.7353	-.0588	.0392	-9.6471
Manage to provide food but find it difficult to pay the util	123	-1.5447	-.0894	-1.7967	-.2114	-.0352	-9.6179
afford required foods, clothes and manage to pay the bills	54	.0000	.3472	-.7361	-.2685	.3889	-.9259
Have all we need and made some savings	9	-1.2222	-.1389	-1.4167	-.3889	.3333	-7.2222

Table 80: calculated attitudes (by per capita income groups)

range	N	Attitudes regarding: family (-6 to +6)	security (-6 to +6)	health (-6 to +6)	education (-6 to +6)	financial (-6 to +6)	Overall (-84 to +84)
lowest (<10,400)	58	-0.1186	0.6949	-0.556	-0.0431	0.5862	2.1552
low (10,400 - 15,000)	45	-2.2444	-0.0889	-1.7833	-0.2111	-0.1407	-10.5778
medium (15,001 - 24,000)	64	-1.4844	-0.2852	-1.7656	-0.2031	-0.0521	-10.25
high (>24,000)	45	-0.5333	-0.1556	-1.4944	-0.4667	0.0815	-7.8222

9 Summary

Housing indicators build a picture of vulnerability that can be based around rental status of a household – they tend to be smaller, are not recognised by the authorities and are occupied by people who have moved more recently. Poverty is reflected in energy choices - people tend to use district heating and piped gas (for heating and cooking respectively) where they are available, but elsewhere the poor use solid fuels for both heating and cooking, the better off tend to use electricity, and those who can will pay a premium for gas (bottled). Nevertheless, the poor use electricity for lighting and household appliances.

Price increases were given as the main factor affecting ability to pay for household items (38%), followed by household members loosing their jobs (30%). Many households have changed fuels in favour of electricity for cooking; electricity and coal appear to be interchangeable for space heating. *Cost* was clearly the main reason for changing fuels, especially for changing cooking fuel, although *accessibility* of fuels was also important in changing space heating fuels. Overall, consumptions of electricity, wood and coal appear to be increasing, whilst consumption of gas is decreasing slightly. Households in a stronger material position are more likely to have increased consumption of electricity, whilst the poorest group indicated that they have reduced consumption. Fuel choices appear to be most sensitive to cost, and recent changes to in choice of fuels indicate that electricity is regarded as cheap compared to other fuels. As people gain more disposable income, they will increasingly be prepared to pay for premium fuels which offer good accessibility (reliable, easy to use), notably LPG where piped gas is not available.

Indicators covering changes in living conditions show that the poor feel that conditions have got worse, whilst the better off feel that things have improved. The strongest sense of deterioration concerns security, followed by employment and entertainment; whilst improvements are felt in food, housing and health.

The employment context of many households is unreliable and erratic e.g. many people can only find casual employment, and others may return to their villages for seasonal labouring. This means that many households may have problems paying bills on a regular basis, and this is evident in the number of households (even those who pay their bills in full), reporting having difficulty in paying bills regularly. Some form of flexible payment mechanism would help such households pay for their consumption over the longer term.

Overall, payment rates appear to be good – only 5% claim to be unable to pay electricity bills. This indicates that there is a good culture of payment in the domestic sector, and so there is little need for more expensive metering options to improve recovery rates, such as prepaid meters.

There is a clear indication that the poor are likely simply to pay more in the event of increasing electricity costs. This is likely to be because they feel they have already pared energy consumption, and are using lowest cost fuels, so they have little scope to make further cost savings. Households will make savings in housing and travel budgets to make up additional costs. However, results show that the most likely response will be to resort to informal means of reducing costs e.g. theft, and negotiating with inspectors; utilities need to be prepared for this. Findings also indicate that households, including the poor, do not believe they will run into financial problems in the event of increased prices i.e. they are confident in their ability to pay higher costs.

However, those households likely to be most severely affected by electricity reforms are those currently using electricity i.e. lower and middle income groups. Higher income households tend to use gas and district heating, and the lowest income households use solid fuels. These are the households which have scope to move down the energy ladder to cheaper fuels (but not those in flats). However, sourcing additional fuelwood will increase environmental pressures, when it appears that informal wood cutting already appears to be significant; the burning of coal will also have consequences in terms of health and environmental pollution.

The greatest impact of price increases is likely to be on health. Health is regarded as the highest household priority, and people are concerned that the responses they will need to make will adversely affect family health. This has implications not only for government health services, but also for wider development planning e.g. impact on school attendance, labour resources etc.

Just over half of the respondents claimed to have any knowledge of the reform processes, indicating that there remains a need for further awareness raising campaigns. Campaigns should also encourage people to pay (13% do not agree that people should pay for energy consumed), and to publish the real cost of fuels, to enable people to make informed fuel choices. TV appears to be the most influential medium.