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Research Article

The Consumption of Firewood as an Energy Consumption among Households in Kosovo and its Environment Implications

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Abstract

Energy consumption research in household is very complicated since households in Kosovo use various energy sources for many purposes. Furthermore, the energy consumption has become even This high preference of usage of firewood in households, which is continuously increasing, will have more unpredicted by the fact that Kosovo is has a very high unemployment rate (highest in Europe), very high electricity prices, which for most of the Kosovar households unmanageable financially as a result of low average salary, which complicates issues further. This paper will try to show the quantity and quality, respectively the efficiency of energy consumption in Kosovo separated in different types of energy sources. Although all energy consumption sources will be analysed, more attention will be paid to the firewood consumption for various reasons but mainly financial since for some households wood from their own forests or even public forests is free, even though wood logging is illegal without permission in Kosovo. Furthermore, the paper will analyse living conditions, quality of construction with regards the absorptive material or energy insulated, house equipments or energy consumption sources, varieties of heating appliances that are used in household, and finally some basic information that are linked with the efficiency of energy consumption, the level of efficiency measures used in Kosovo households as well their future plans regarding energy efficiency.

Keywords: *Energy, Kosovo, households, consumption, firewood*

1. Introduction

Over the last ten years Kosovo has had a rocky ride with regards to available energy, in particular electrical energy. Kosovo of its 11,000km^2, 43% of it is forest. From about half million hectares of Kosovo's forests 60% is public and 40% is private owned forest (FAO, 2003).

Human Development Report on Energy for Development (UNDP Kosovo 2007) has identified firewood as the main source of heating by 80 percent of households surveyed for this report, with electric heating being the main source for 12 per cent. According to UNDP, there is only a small difference in the relative use of electricity and firewood between urban and rural households.

Also, in some rural parts of Kosovo, as a result of restriction of electrical energy and numerous breakdowns on both power plants and distribution network, there were times when households and businesses were more without electricity then they were with. On addition to this and with high fuel prices people turned to the consumption of firewood for both heating and households cooking as well. huge consequences to the environment in Kosovo. The wood used from the Kosovo forests is much more than what is allowed, thus, if it continues at the current consumption rate, Kosovo could have no forests in the future (Pira *et al*., 2011).

2. Methodology

In 2009 Riinvest Institute has conducted a comprehensive survey with all sectors of economy in Kosovo about overall energy consumption. The study was conducted with all five sectors of Kosovar economy: household, industry, agriculture, transport and services. All sectors were interviewed separately and apart from the industry sector, which the whole sector was interviewed, all other sectors we interviewed using samples.

All alternatives to the data collection were analysed and interpersonal, "face-to-face", interviews have been selected as the best methods in collection of quantitative energy consumption data.

For the purpose of the households sector, initial analyses were done to determine that there have been similar surveys done on the energy consumption and firewood in particular. In addition, regional and experiences from developing countries were conducted to

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determine the so called "rule of thumb" data for developing countries were sought.

The next step was to determine the population of the households in Kosovo. Since, the last census in Kosovo was conducted in 1981 the data from statistical office on the size and location of the total household population would have been incomplete. Therefore, the best alternative to the census information was the information from costumer case database of the KEK (Kosovo Energy Corporation), the only distribution of electricity in Kosovo.

The next step is to determine the number of active users of electricity in the last year since Kosovo has large number of Kosovars who live abroad and yet have a house in Kosovo that might rarely or never visit. Based on the data of KEK' costumer care database, which had 300501 household active clients during 2008 from all the regions and communities of Kosovo. From this number of active users of electricity in 2008, were extracted 1205 households (KEK costumers).

Now, since KEK lacks data regarding the clients in the northern part of Kosovo, 150 households were surveyed for that region based on a standard methodology for cases where there is no electronic registry. This sample is representative and gives a confidence result for 99%.

A very comprehensive questionnaire was drafted which included questions about the size of the households, their income and expenditure, type of energy used as well as the scale (quantity) used and for what purpose. The questionnaire also included some indicative questions for energy efficiency.

The household survey was conducted during the period of 15th of May – 2nd of June 2009, from 46 surveyors which have the necessary experience for implementing fieldwork research. The interview was conducted with the head of family who is more informed regarding the household energy consumption.

3. Main survey findings

Following data collection in all sectors (since the household sectors was the last of the sectors to be researched) if was apparent that households is the sector that consumes the most energy available in Kosovo. The survey analysis also showed is that there is a:

- Much higher consumption of biomass (firewood) compared with estimates in the past (MEM Energy Balance, 2007). It is estimated by Ministry of Energy and Mining (then, now it is called Ministry of Economic Development) than the biomass consumption is about 2.41m3 compare to all other energy sources available in Kosovo (MEM, 2008).
- Little (just under 1%) use of other energy sources: Generated heat, Solar Energy and Biofuels.
- Tendency for the increase of coal consumption has nearly all sectors of the economy but more on the household sector.

The household sector is the sector that consumes the most firewood (87%) followed by the industry sector. It is important to mention that the wood used in the industry sector is used for energy purposes (bakeries, heating, etc) and not for the wood production industry. In household sector 76% of firewood is used for heating while 24% of it is used for cooking and other domestic (non-heating) purposes (Pira *et al*, 2011).

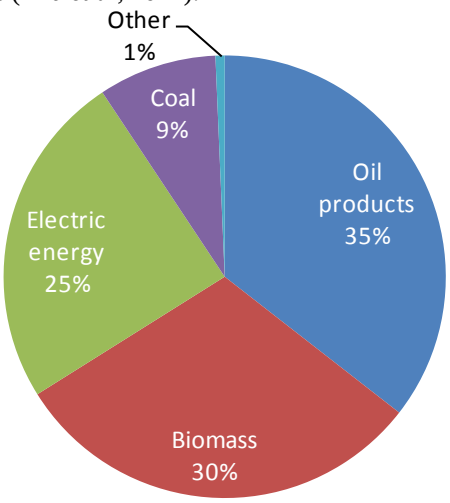

Figure 1 Composition of energy sources in energy consumption in Kosovo

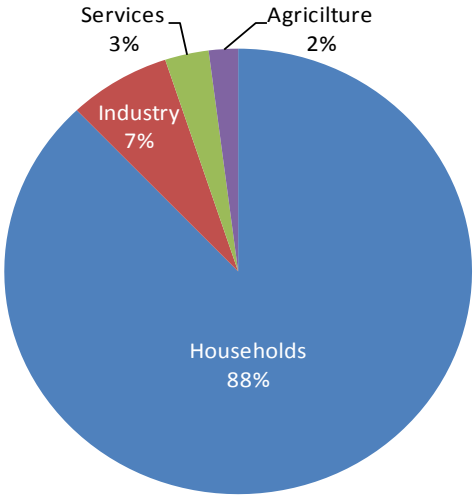

Figure 2 Composition of energy sources in energy consumption in Kosovo

The survey with the households has also shown that 88% of the households use firewood in one way or another (potentially in conjunction with other energy sources) for heating purposes. This high prices and unreliable electric energy has reduced the dependence on it to about 10% while only a limited number of households used diesel and LPG as a fuel source. On the other hand, fewer households use firewood for cooking (about 66%) while just over half of them prefer to use electric energy for cooking.

Vast majority of Kosovars who use local heating appliances (not local or city central heatin) use woden stoves. About 70% of households in Kosovo use firewood for heating. This claim is emphasised by the fact that over 87% of the respondents use different kind of stoves for

heating while under 13% use central heating with electrical energy, LPG, Oil products and in some cases even coal and firewood central heating. Central heating makes only 2% of overall heating in the households sector. This is slitely smaller than the early estimates that 5% of the energy estimates (UNDP, 2007). There is a rational however for higher percentage of usage of generated heat (district central heating in two towns: Prishtina and Gjakova) as energy source for heating since this paper only talks about the usage of energy by the households while the generated heat can be used by the services sector as well. Also, this survey did not include the generated heat by the Mitrovica District Heating, therefore, all those in mind, the generated heat could account to 5% of total energy used in heating.

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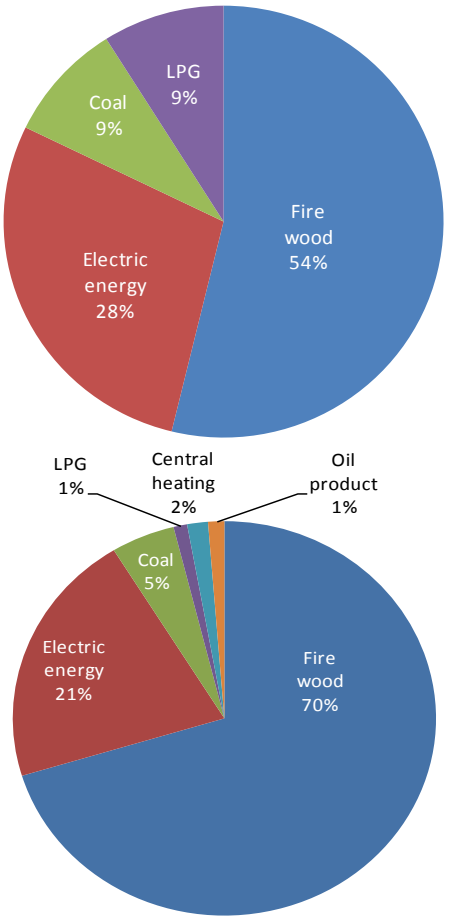

Figure 3 The source of energy used in heating (a) and cooking (b)

Regarding firewood, one of the main findings of the Riinvest survey is the consumption of firewood in households sector. Until 2007 is thought that for household needs, 2.41m^3 fire woods per year per household are consumed (MEM, 2008).

According to surveys conducted by the household sector, the average household consumption of wood for household needs is 7.28m^3 per year per household. These findings are in line with the study conducted by Openshaw, where on average 1.12 m^3 per capita of firewood are consumed in the developing countries (Openshaw, 2009).

As per the 2011 census, in Kosovo, the total number of households is 297,090 and number of household's members is 5.9. Based on these information, one can conclude that the annual firewood consumption in Kosovo is around 2,162,000 m^3 (at the rate of 7.28 m^3 per household).

According to the Ministry of Environment and Spatial Planning approximately 222,000 m3 of wood being cut each year (MESP, 2006). This is only 10% of the firewood annually used in Kosovo. A questions then arrases, where does the other 90% of the wood consumed in Kosovo come from? Of course, it doesn't come from import, but rather from potentially illegal logging.

There are several publications on the firewood consumtion in Kosovo by different individuals and organisation. One such publicatioin if an annalusis of the renewable energy and its impact in the rural development. The authors have estimated that only 50% of Kosovars use firewood as a source of energy and the total annual consumption of firewood in Kosovo is 837,500m3 (Ibra and Buchenrieder, 2009)

A study conducted in 2012 by WB-PROFOR attempts to show dhe difference in the annual allowance logging of 900,000 m3 of forewood, compare top the 1.44milion m3 of annual consumption, at the rate of 7m3 of firewood consumed annulay and 66% of the Kosovo houselds using wood (WB-PROFOR, 2012). Though this is lower that the paper shows, is actually ephasisis the difference in the official allowance and the actual use of firewood.

Another recent study conducted by the AUK Institute showed that the average annual consumption pwer households is approximation of 9.6 m3 (Bowet at, 2013). This is not far from the results of the study presented in this paper.

In 2003, there were 464,800 ha of forest in Kosovo (or 42% of its territory). Wood volume in Kosovo's forests in 2003 was 53 million m3 with an average of 114m3 for an hectare. The annual level of the volume of wood increase (new wood plant and wood growing) is 2.69% (FAO, 2003). Considering this fact and the fact that in Kosovo 2.5 million m3 of wood were consumed in 2008 (87% from the household sector), if this trend is to be continued then it can theoretically be concluded **that in 2028 Kosovo will have no forest left.**

4. Conclusion and recommendations

A high consumption by the household sector of firewood may be justified by the fact that:

- The areas that are not covered by central heating usually rely on electrical energy for heating. However, the electrical energy is implemented with

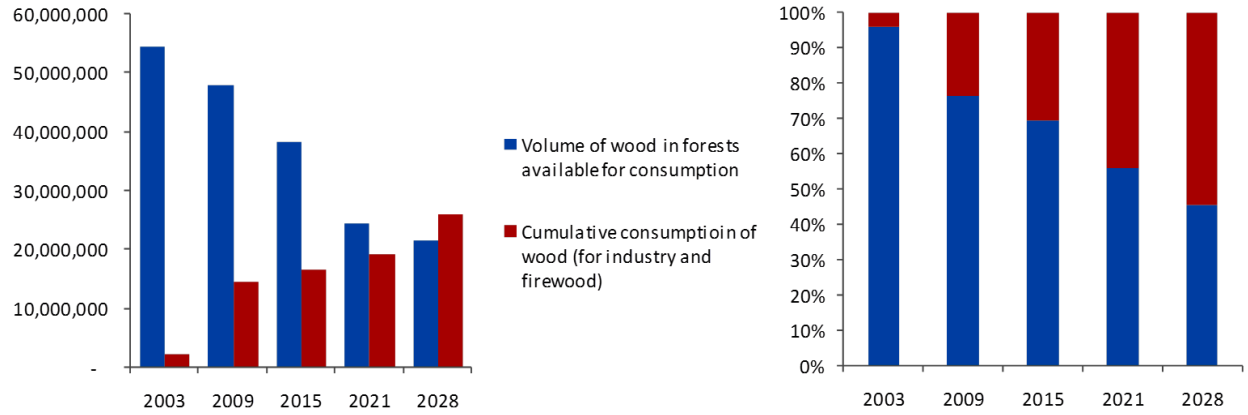

Figure 4 Prediction of firewood consumption in Kosovo through 2028

- the plan ABC (A being the category with the least power reductions) which makes it difficult to rely on it for hearing. Moreover, the price of electrical energy makes it unfavorable to use it for heating.
- In Kosovo there is no **oil for heating** which could be used by households, which could replace the high price of heating by oil (diesel) which is currently applied by a number of households.
- LPG is a good alternative; however it is in the very beginning stages in Kosovo. There is a small number of households which use mobile ovens for heating with LPG, but this number is very small.

Considering the fact that households have to warm during winter, and having no other reliable alternative, they rely in the most reliable and economical source of energy. In a large number of households wood is even a free energy source, especially in cases where wood is collected from:

- Their forests, 37% of forests in Kosovo is private property, and
- Public forests without even paying.

There are several way which would reduce the consumption of wood to the mass:

1. Use of coal as a substitute of wood (wherever it is possible).
2. Encouragement of wood drying before consumption.

Even though there is a tendency of increased coal consumption among households, this tendency has to be accelerated in order to substitute coal with wood. Better access for buying coal and more favorable price would lead to a greater consumption by interested households. Encouragement for wood drying would be an important element in order to reduce the volume of cut wood in Kosovo's forests.

Also, the plan to build new Cogeneration Heating capacities in Prishtina linking KEK Power Plant Kosova B with Termokos, Prishtina's District heating Company (MED, 2013). This can contribute greatly towards reduction of the reliance on the firewood in the city of Prishtina and possibly, in the years to come, even beyond Prishtina.

References

Pira B., Cunaku I., Hoxha N., Bajraktari A., (2011): Energy Consumption in Households Sector in Kosovo – Future Developments, *TMT*

Kosovo Forest Inventory, (2003): United Nations Organization for Food and Agriculture (FAO)

Estimates of energy demant ion Kosovo for the period 2009-2018, (2008): *Ministry of Energy and Mining, Republic of Kosovo*

Openshaw K., (2009): Woodfuel - A time for reasesment, *UN Sustainable Development Journal*

UNDP, (2007): Energy for Development, *Human Development Report*

WB – PROFOR, (2012): Study and Analysis of Innovative Financing for Sustainable Forest Management in the Southwest Balkan - Inception Phase Report Part III Kosovo Wood Biomass Case Albania & Kosovo

Menderes I., (2009): Analysis of Renewable Energy And Its Impact on Rural Development in Kosovo

Bowen B.H., Myers J. A., Myderrizi A., Hasaj B., Halili B., (2013): Kosovo Household Energy Consumption Facts & Figures

Heating Strategy 2011-2018 (2011): Ministry of Economic Development (MED), Republic of Kosovo