

# BIO FUELS' SELLING AND UTILIZATION FROM AGRO FORESTRY PRODUCTS AND WOOD PROCESS RESIDUES IN WEST MACEDONIA IN GREECE

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## Introduction

The energy problem that most of the countries in the world are facing nowadays, it becomes even more intensive because of the continuously increasing prices of oil in an international level, but also because of the continuously declining quantities of non renewable energy resources that we insist to use for the satisfaction of our energy needs.

The use of biofuels and especially of wood pellets, constitutes an environmentally acceptable and financially profitable politic towards this direction, simultaneously with the development of agricultural economy of our country [1, 2, 3].

The study of the capabilities to use wood pellets or wood briquettes by the Greek consumers constitutes the basic aim of this research which is the result of the research program "*PROARES – Promotion of the capabilities of renewable agricultural energy resources*" and of the program "*Possibilities of production and disposal of biofuels from agricultural – forest products – pilot application*", of the Department of Wood and Furniture Technology and Design of the T.E.I. Larissas in cooperation with the Environmental Center of Kozani Prefecture.

## Methodology

The methodology that was applied for this research, it was the filling of specially constructed questionnaires which were selected as a mean for gathering primary data using the method of telephone interview. The determination of the sample was made using the methodology of random sampling by layers with the help of the Greek telephone catalog. The size of the sample was determined to 189 persons with the accuracy level up to 90%. Finally, one hundred and fifteen (115) questionnaires were filled by regular residents of all the municipalities of the Prefecture of Western Macedonia. That was a percentage of 61% from the first selected sample. The data collection was made during September – October of 2006. The data were analyzed using the scientific rules of statistics such as the relevant checking of frequencies, descriptives and crosstabs [4, 5, 6].

## Results and Discussion

The average fuel consumption (in tons) of each household or of each enterprise of the study area, comes up to 2,5 tn/year for each household approximately, while for each enterprise comes up approximately to 2,8 tn/year. Basically the greatest part of the consumers (69,2%) uses quantities less than five (5) tons per year.

A quite significant result of the present study that came up, was consider to the knowledge and the information of biomass meaning and its use by the residents of Western Macedonia in a percentage of 56,5% ( that is quite significant for the total population of the Prefecture).

The residents of the greatest towns (with population over 10.000) was familiar with the use of biofuel in a greater percentage (62,2%), as this was predictable because they have a greater information about the subject. Finally, the professionals are a bit more familiar with the subject (67,6%) than the household users.

A significant percentage of 39,1% of the residents of the area was for the first time informed for the use of the mentioned product by the present study (effective way of promotion), while a percentage of 26,1% by the media.

The knowledge of contribution or not of the use of biomass as an energy material which helps the environmental protection, constitutes a common sense for the 84,3% of the population, along as a mean of money saving in an individual level to a percentage of 74,2%. The above mentioned factors are statistically related to the Prefecture that the questioned live (V of Cramer = 0,214 and 0,233 respectively,  $X^2 = 15,7$  and  $12,4$  respectively for  $\alpha < 0,10$ , and kendal' s tau-c = -0,078 and -0,134 respectively).

A percentage of 26,1% of the residents of the whole Western Macedonia is interested in direct personal use of biomass, a percentage that is quite significant and encouraging for production, exploitation and disposal of biomass from each origin (agricultural or forestry). Also, the percentage of corresponding to biomass use is a quite significant percentage (50,4%) under specific conditions.

The basic factors of biomass direct use are the free supply and replacement of the old boiler (score 3,97 with excellent score 5) and the existent of a form of a financial contribution or tax exemption (such as income taxes, reduce of municipality taxes for energy performance buildings, lower V.A.T. etc) by biomass use (score 3,75).

According to the population data of the National Statistic Service (census of 2001), it is estimated that the total number of households in Western Macedonia is up to 19.500. Having as a fact the consumption of each household of approximately 2,5 tons of heating oil per year and as the heating performance of oil related to wood pellets is approximately 2:1 it is estimated that the needed quantities of biomass for the whole Western Macedonia comes up to 97.500 tons. Having also as a fact that the average price of oil in Greece is 600€ /ton (prices of 2006) and the currency €/US dollar at 1,3 approximately (prices of November of 2006), accrues an average price of 192,3€/ton of cost for the supply of wood pellets for each household, thus an amount of 962€ per year for the heating, while with the use of petrol are expended about 1.500€ per year.

From the present study arises that there is a great “opportunity” for the enterprises of biomass production and disposal by wood pellets or briquettes at the study area, great financial benefits for the consumers, simultaneously to the environmental protection. The possible future investments that will be done in the area seem to have a quite short depreciation but the editing of a business plan and of a marketing plan are essential for the maximization of the results and the minimization of potential “risk” .

*Keywords: biofuels, wood pellets, wood briquettes, compressed firewood*

## References

- [1] Reineke, L. H., 1964. Briquettes From Wood Residue U. S. Forest Service Research Note FPL-075, Forest Products Laboratory, Forest Service.U.S. Department of Agriculture
- [2] Olsson, M., 2004. Wood Pellets: Sustainable Heating for Residences. «VISION» The e-journal of the World Student Community for Sustainable Development.
- [3] Ntalos, G., Papadopoulos, J., Tsialtas, T., 2004. ‘New Products and/or Processes Development and/or methods of transformation in Timber sector (W.IN)’, Proceedings of "Innovative Actions in W. Macedonia", scientific Congress of the Region of W. Macedonia, Kastoria 13/12/2004.
- [4] Norusis, M., 1997. SPSS Professional Statistics 7.5. Chicago: SPSS Inc. 276 p.
- [5] Paschaloudis, D., Zafeiropoulos K., 2002. ‘A Marketing Research’, Gkiourdas Eds, Athens, pp. 88.
- [6] Howitt, D., Cramer, D. 2003. ‘Statistics with SPSS 11 for WINDOWS’, Klidarithmos Publication, Athens, pp 291.

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