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RESEARCHING THE INFLUENCE OF ENERGY CONSUMPTION ON ENERGY POVERTY IN EASTERN AND ADRIATIC CROATIA

ISTRAŽIVANJE UTJECAJA POTROŠNJE ENERGIJE NA ENERGETSKO SIROMAŠTVO U ISTOČNOJ I JADRANSKOJ HRVATSKOJ

ABSTRACT

The consumption and energy costs affect the competitiveness of industrial branches as well as business in general. The implementation of an effective energy policy encourages the economic growth and prevents significant energy poverty. Development of energy systems depends on many factors, among which the energy price and the rate of return on invested funds should be emphasized. Long-term use of real energy prices will result in a reliable supply of energy in the future. The price of energy for households depends significantly on production costs and energy consumption. Households consume energy for heating, cooling, cooking, domestic hot water, lighting and household appliances. In fact, the biggest item is the cost of heating which depends significantly on the climatological conditions and specific habits of consumers. Developed societies tend to use a variety of devices. As a consequence, energy consumption and price increase continuously. Hence, the cost of energy becomes a significant part of the total costs of an average household. The number of people who cannot pay the cost of energy will inevitably increase in the future in line with rising energy bills and energy poverty. The complex energy poverty issues must be studied in depth because there are many countries in which energy poverty is a major social problem. However, in Europe, only the United Kingdom and Ireland have determined the criterion for energy poverty.
This research is focused on the energy consumption in households. The energy needs are presented and the energy costs in relation to the available household income are considered. Furthermore, the influence of energy consumption on energy poverty in Eastern and Adriatic Croatia is researched.

Key words: *Adriatic Croatia, Eastern Croatia, Energy poverty, Households, Energy consumption*

SAŽETAK

Potrošnja i troškovi energije utječu na konkurentnost industrijskih grana i poduzetnika općenito. Provedba učinkovite energetske politike potiče gospodarski rast i onemogućuje znatnije energetsko siromaštvo. Razvoj energetskih sustava ovisi o mnogim čimbenicima, od kojih treba naglasiti cijenu energije i stopu povrata na investirana sredstva. Dugoročna primjena realne cijene energije rezultirat će pouzdanom opskrbom energijom u budućnosti. Cijena energije za kategoriju kućanstva ponajviše ovisi o troškovima proizvodnje i potrošnji energije. Kućanstva troše energiju za grijanje, hlađenje, kuhanje, zagrijavanje potrošne tople vode, rasvjetu i rad kućanskih aparata. Pri tome, najveću stavku predstavlja trošak grijanja koji značajno ovisi o klimatološkim uvjetima i navikama potrošača. Razvijeno društvo sve više upotrebljava različite uređaje. Stoga potrošnja i cijena energije kontinuirano rastu. Troškovi utrošene energije imaju značajan udio u ukupnim troškovima prosječnog kućanstva. Broj ljudi koji ne mogu podmiriti račune za energiju rast će se u budućnosti sukladno rastu iznosa na računima i energetskog siromaštva. Kompleksnu problematiku energetskog siromaštva treba studiozno razmatrati budući da upravo energetsko siromaštvo predstavlja krucijalan socijalni problem u velikom broju zemalja. U Europi, samo su Ujedinjeno Kraljevstvo i Irska utvrdili kriterij za energetsko siromaštvo.

Istraživanje u radu usmjereno je na potrošnju energije za kategoriju kućanstva. Predočene su potrebe za energijom i razmotreni troškovi energije u odnosu na raspoloživ prihod kućanstva. Nadalje, istražen je utjecaj potrošnje energije na energetsko siromaštvo za područja istočne i jadranske Hrvatske.

Ključne riječi: *energetsko siromaštvo, istočna Hrvatska, jadranska Hrvatska, kućanstva, potrošnja energije*

1. Introduction

The scientific and professional communities, political and public organizations, and media address poverty issues. In Croatia, the at-risk-of-poverty rate in 2011 was 21.1%. The at-risk-of-poverty threshold for a one-person household amounted to HRK 24,240 in 2011, while for a household consisting of two adults and two children it amounted to HRK 50,904 per year. Furthermore, for a household consisting of two adults without children, the poverty threshold amounted to HRK 36,360 per year[179]. The at-risk-of-poverty rate in Croatia in 2006 was 19%, which means that the level of poverty was high even in the period of a high economic growth.

The possibility of access to energy is a prerequisite for acting against poverty. Without energy there is no economic growth, there is no dynamism, and there is no opportunity, said the World Bank Vice President Rachel Kyte.[180] On the other hand, the rise in energy prices significantly increases the number of those households that have difficulties settling these costs, or they deny other basic needs, such as food and health. This presents a huge problem in modern society, so the issues of energy (fuel) poverty should be considered closely. In general, the problem of poverty occupies economists, politicians, sociologists, social workers,

[179] Croatian Bureau of Statistics, Poverty Indicators, 2011– Final Results, First Release No. 14.1.3., 1 February 2013, ISSN 1330-0350.

[180] http://news.nationalgeographic.com/news/energy/2013/05/130529-surprising-facts-about-energy-poverty/, 2 April 2014.

psychologists and historians. According to the significance of the regulation of energy activities (Banovac, 2009, 178-189), the regulatory experts should also be informed about these important issues. In fact, energy poverty is a growing problem.

Within the EU, the strict criterion of an energy-poor household at the national level was determined only in the UK and Ireland. In the UK, for instance, a household is deemed to be fuel poor if it requires to spend 10% or more of its income on essential energy services (which is adequate for health and comfort). According to 2009 findings of the European Fuel Poverty and Energy Efficiency Project (EPEE) between 50 and 125 million people suffer fuel poverty in Europe. This number could easily double due to the economic crisis and the expected rise in energy costs (Zametica, 2011, 41).
Consumption depends on structure (heating, cooling, cooking, domestic hot water – DHW, appliances and lighting). Heating causes the biggest cost which depends on the climatological conditions and specific habits of consumers. The possibility of paying prices of energy depends on the total household income and share of the cost of energy in the total household expenditure. In Croatia, the climatological conditions in Eastern Croatia differ from Adriatic Croatia in such a way that the winters are colder (when heating is required) in Eastern Croatia, while summers are hotter (when cooling is needed) in Adriatic Croatia. A real temperature compared to the project temperature (pleasant to live) is far higher in winter than in summer, so it is expected that the energy consumption for heating and air conditioning is higher in Eastern Croatia than consumption in Adriatic Croatia. On the other hand, the salaries in Adriatic Croatia are slightly higher than salaries in Eastern Croatia. Taking into account the total household income and energy costs, it is expected that there is a larger number of energy-poor households or those which have more difficulty paying their energy bills in Eastern Croatia compared to Adriatic Croatia.

2. Poverty and energy poverty

Although there is no unique and universally accepted definition of poverty, according to the Scottish Poverty Information Unit (BBC, 2005), people live in poverty if they do not have enough money for their material needs and if these circumstances exclude them from taking part in common activities in that society (Bejaković, 2005, 113). The United Nations consider people poor if they are deprived of comfort and dignity, which is considered common in the society in which they live. The fact that they cannot actively participate in common activities leads to a lack of social contacts, which, along with poverty and unemployment, are a major element of exclusion. According to the United Nations[181], about 21,000 people in the world die every day of hunger or hunger-related causes. Even though there is an abundance of food in the developed world, a significant portion of the world's population is underfed, thus suffering severe health issues, which consequently lead to work incapability, resulting in even higher levels of poverty. Although previous reports about poverty blamed the poor people for their own failure, and the lack of motivation is taken as a cause, the recent researches show that poverty directly impedes cognitive function, so the poor often behave in less capable ways, which can further perpetuate poverty (Mani, 2013, 976). Scientists argue that financial worries cause an IQ reduction of 13 points, which is equivalent to the decline in intellectual abilities as in the case of a whole sleepless night or chronic alcoholism. Therefore, poor people's ability to pay the rent and overhead costs is worsened, as they are less focused and more likely to make inadequate decisions. As a result, their working ability is reduced.

[181] http://www.poverty.com/, 2 April 2014.

It is estimated that 10% of the population (440,000 people) is socially excluded in Croatia, with an additional 5% (220,000 people) with the risk of social exclusion (Šućur, 2006, 7).
The comparison of the poverty indicators for EU Member States and for the Republic of Croatia was given in Table 1. These indicators were calculated on the basis of data collected through the SILC (Social Inclusion and Living Conditions) Survey.

Based on a comparison of data shown in Table 1 it can be concluded that Bulgaria, Greece, Romania and Spain have a higher rate of poverty than Croatia. Croatia has a significantly higher rate of poverty than the average EU-27. In the case of Croatia, the at-risk-of-poverty or social exclusion rate in 2011 amounted 32.7% and is higher by 55% than the at-risk-of-poverty rate, which is 21.1%.

In Europe, energy is not considered a public good. The traditional energy subsidies are eliminated which results in high energy prices as well as energy unavailability for poor consumers. Energy costs are a significant amount of income expenditure of households and they cause serious problems. Thus, households switch to unhealthier ways of heating or compromise spending on food and even health care. Due to this, many people are faced with the "eating or heating" dilemma (Zametica, 2011, 6).

Table 1 Poverty indicators, comparison of EU countries and Republic of Croatia, 2011

	Stopa rizika od siromaštva, % *At-risk-of-poverty rate, %*	Stopa rizika od siromaštva, prije socijalnih transfera, % *At-risk-of-poverty rate, before social transfers, %*	Stopa rizika od siromaštva, nisu uključene mirovine i socijalni transferi, % *At-risk-of-poverty rate, pensions and social transfers excluded, %*	Stopa rizika od siromaštva ili socijalne isključenosti, % *At-risk-of-poverty or social exclusion rate, %*	
EU-27	16,9 (s)	26,1 (s)	44,0 (s)	24,2 (s)	*EU 27*
Austrija	12,6	24,9	43,6	16,9	*Austria*
Belgija	15,3	27,8	42,0	21,0	*Belgium*
Bugarska	22,3	27,1	41,5	49,1	*Bulgaria*
Cipar	14,5	23,3	33,3	23,5	*Cyprus*
Češka	9,8	18,0	37,8	15,3	*Czech Republic*
Danska	13,0	28,4	40,4	18,9	*Denmark*
Estonija	17,5	24,9	41,1	23,1	*Estonia*
Finska	13,7	27,4	41,3	17,9	*Finland*
Francuska	14,0	24,7	44,2	19,3	*France*
Grčka	21,4	24,8	44,9	31,0	*Greece*
Irska	:	:	:	:	*Ireland*
Italija	19,6	24,4	44,9	28,2	*Italy*
Letonija	19,3	27,3	45,7	40,1	*Latvia*
Litva	20,0	31,8	49,4	33,4	*Lithuania*
Luksemburg	13,6	27,2	43,8	16,8	*Luxembourg*
Mađarska	13,8	28,9	51,8	31,0	*Hungary*
Malta	15,4	22,9	36,9	21,4	*Malta*
Nizozemska	11,0	20,9	36,9	15,7	*Netherlands*
Njemačka	15,8	25,1	44,6	19,9	*Germany*
Poljska	17,7	24,1	43,4	27,2	*Poland*
Portugal	18,0	25,4	42,5	24,4	*Portugal*
Rumunjska	22,2	29,1	49,8	40,3	*Romania*
Slovenija	13,6	24,2	40,2	19,3	*Slovenia*
Slovačka	13,0	19,5	38,3	20,6	*Slovakia*
Španjolska	21,8	29,8	44,8	27,0	*Spain*

	Stopa rizika od siromaštva, % *At-risk-of-poverty rate, %*	Stopa rizika od siromaštva, prije socijalnih transfera, % *At-risk-of-poverty rate, before social transfers, %*	Stopa rizika od siromaštva, nisu uključene mirovine i socijalni transferi, % *At-risk-of-poverty rate, pensions and social transfers excluded, %*	Stopa rizika od siromaštva ili socijalne isključenosti, % *At-risk-of-poverty or social exclusion rate, %*	
Švedska	14,0	27,9	42,4	16,1	*Sweden*
Ujedinjena Kraljevina	16,2	30,5	43,4	22,7	*United Kingdom*
HRVATSKA	21,1	30,7	46,7	32,7	*CROATIA*

Source: Eurostat – Income, Social Inclusion and Living Conditions
Croatian Bureau of Statistics, Poverty Indicators, 2011– Final Results, First Release No. 14.1.3., 1 February 2013, ISSN 1330-0350

The World Health Organization (WHO) estimates that more than 1.45 million people per year die too early due to inefficient combustion of biomass in the household, and the most important part are children who spent most hours in the houses next to such a cookstove. Today, the number of too early deaths as a consequence of air pollution exceeds the number of too early deaths as a consequence of malaria or tuberculosis (for more than 4,000 people per day)[182]. Cooking on a traditional cookstove has a far greater risk factor than bad water and sanitary conditions. According to the WHO, the annual deaths due to cookstove pollution is 2 million which has declined compared to 4.6 million in 1990, but remarkably higher than the annual deaths attributed either to malaria (1.2 million) or to HIV/AIDS (1.5 million).[183]

The EU doesn't set out a clear definition of fuel poverty. For example, fuel poverty can be generally defined as the inability to keep the home adequately warm at an affordable cost. Fuel poverty is treated differently by each Member State, although it disproportionately affects those on low household incomes, such as retired people, those out of work or with poorly paid jobs, and those dependent on social security benefits. For instance, fuel poverty has been treated as a problem of general poverty in France. The incidence of fuel poverty in France is estimated at between 2 and 5 million households. Hence, a range of measures have been developed to help vulnerable households but they are not well directed towards addressing the causes of fuel poverty. Furthermore, there is a considerable degree of social support in Belgium. Based on the aforementioned criterion for fuel poverty, there are currently about 5.1 million fuel-poor households in the UK (almost 20% of all households). A social tariff has been established for electricity consumers (5 million vulnerable households) in Italy and a similar mechanism for the gas market is considered. Finally, there is no perception of fuel poverty as a compelling social problem in Spain (EPEE European Fuel Poverty and Energy Efficiency, Intelligent Energy Europe, Tackling Fuel Poverty in Europe, Recommendations Guide for Policy Makers).[184]

[182] http://www.worldenergyoutlook.org/resources/energydevelopment/energypoverty healthwhocollaboration/, 20 August 2013.
[183] http://energyblog.nationalgeographic.com/2012/12/13/cookstove-smoke-is-largest-environmental-threat-global-health-study-finds/, 12 September 2013.
[184] http://www.fuel-poverty.org/files/WP5_D15_EN.pdf, 12 September 2013.

Table 2 Material deprivation indicators, 2011

Postotak osoba koje žive u kućanstvu koje:		*Percentage of persons living in household that suffers from:*
- nije u mogućnosti priuštiti si adekvatno grijanje u najhladnijim mjesecima, %	9,7	- *Inability to keep home adequately warm during the coldest months, %*
- nije u mogućnosti platiti tjedan dana godišnjeg odmora izvan kuće,%	69,3	- *Inability to afford paying for one week annual holiday away from home, %*
- nije u mogućnosti priuštiti si svaki drugi dan obrok koji sadrži meso, piletinu, ribu ili vegetarijanski ekvivalent, %	16,9	- *Inability to afford a meal with meat, chicken, fish or vegetarian equivalent every second day,%*
- nije u mogućnosti podmiriti neočekivani financijski izdatak, %	64,5	- *Inability to face unexpected financial expenses, %*
- kasni s plaćanjem računa za režije, %	26,4	- *Being in arrears with utility bills, %*
Mogućnost spajanja kraja s krajem,%		*Ability to make ends meet, %*
- vrlo teško	19,6	- *With great difficulty*
- teško	32,4	- *With difficulty*
- s malim poteškoćama	35,8	- *With some difficulty*
- uglavnom lako	9,2	- *Fairly easily*
- lako	2,6	- *Easily*
- vrlo lako	0,4	- *Very easily*
Financijsko opterećenje ukupnim troškovima stanovanja, %		*Financial burden of total housing cost, %*
- znatno financijsko opterećenje	58,0	- *With heavy financial burden*
- s financijskim opterećenjem	38,5	- *With financial burden*
- bez financijskog opterećenja	3,4	- *Without financial burden*
Stopa materijalne deprivacije (3 ili više stavki), %	34,0	*Material deprivation rate (three or more items), %*
Intenzitet materijalne deprivacije, prosječan broj stavki	3,7	*Intensity of material deprivation, mean number of items*
Stopa teške materijalne deprivacije, %	14,8	*Severe material deprivation rate, %*

Source: Croatian Bureau of Statistics, Poverty Indicators, 2011– Final Results, First Release No. 14.1.3., 1 February 2013, ISSN 1330-0350

In Croatia, the concept of energy poverty is not defined officially. Previously, the energy prices were treated as a part of a broader social policy, which is reflected in consumption, which is higher if the gas price is lower (Pudić, 2013, 147-157). However, Croatia will determine the energy prices in accordance with the rules of the European Union because it became a member of the European Union in 2013. An appropriate regulation of energy poverty could lead to paying the energy costs for those who really need it, instead of the broader scope of subsidies.

Material deprivation refers to indicators showing material conditions affecting the quality of life of the households. Table 2 presents the material deprivation indicators. Using the data shown in Table 2 it is evident that 9.7% of the population are not able to keep home adequately warm during the coldest months, and that 26.4% of the population late with paying utility bills.[185]

3. Comparison of energy consumption

3.1. Energy consumption for heating

Energy consumption for heating is higher in Eastern Croatia than in Adriatic Croatia. Taking into account the average monthly air temperatures in Split and Osijek (Table 3) it is apparent that the average temperatures in Osijek are significantly lower especially during the winter

[185] http://www.dzs.hr/Hrv_Eng/publication/2012/14-01-03_01_2012.htm, 19 March 2014.

months. Therefore, it is necessary to spend significantly more energy to heat households during the winter months in Eastern Croatia than in Adriatic Croatia. Even during March and November the temperatures in Osijek are lower than in Split during the coldest months (January and December). The difference in temperatures (outdoor and indoor) during the winter months is significantly greater than the difference in temperatures during the summer months. Consequently, the amount of energy consumed for heating during the winter months is larger than the amount of energy consumed for cooling during the summer months.

Table 3 Average monthly air temperatures in Split and Osijek

	January	February	March	April	May	June	July	August	September	October	November	December
Split	7,9	8,2	10,7	14,2	19,1	23,1	25,9	25,6	21,5	17,1	12,5	9,2
Osijek	-0,7	1,2	6,2	11,5	16,5	19,8	21,6	20,8	16,7	11,2	5,7	1,3

Source: State Weather Bureau[186] (the table is made by the authors).

Table 4 shows the heat consumption in Eastern Croatia in 2012, while Table 5 shows the heat consumption in Adriatic Croatia in 2012. Tables show all cities in Eastern and Adriatic Croatia where there are companies for district heating and for which there is evidence of consumption.

Table 4 Heat consumption in apartments heated through the local plant in Eastern Croatia

City	Energy* (MWh)	Surface (m^2)	Number of apartments	The average floor area (m^2)	The average consumption (kWh/m^2 year)
Slavonski Brod	28,579	201,820	3,770	53.53	141.61
Vinkovci	10,550	89,616	1,698	52.78	117.72
Požega	2,421	19,840	417	47.58	122.03
Vukovar	16,002	206,079	3,713	55.50	77.65
Virovitica	3,629	30,052	482	62.35	120.76
Total	**61,181**	**547,407**	**10,080**	**54.31**	**111.77**

** Thermal energy is delivered to heat the apartments.*

Data source: Croatia Energy Regulatory Agency (the table is made by the authors).

Table 5 Heat consumption in apartments heated through the local plant in Adriatic Croatia

City	Energy* (MWh)	Surface (m^2)	Number of apartments	The average floor area (m^2)	The average consumption (kWh/m^2 year)
Split**	10,700	222,539	3,264	68.18	48.08
Rijeka	58,913	580,685	10,010	58.01	101.45
Total	**69,613**	**803,224**	**13,274**	**60.51**	**86.67**

** Thermal energy is delivered to heat the apartments.*

*** Data for Split in 2011 (since 2012 a large number of apartments is not warming due to difficulties in business supplier of thermal energy).*

Data source: Croatia Energy Regulatory Agency (the table is made by the authors).

It can be seen in tables 4 and 5 that thermal energy consumption for apartments' heating (without DHW) is 29% higher in Eastern Croatia than in Adriatic Croatia. It pertains to apartments that are located in buildings and for such apartments the average price of thermal energy is 0.35 HRK/kWh (the natural gas prices after conversion into thermal energy without

[186] http://klima.hr/klima.php?id=mjes, 19 March 2014.

VAT). An average-sized apartment in Eastern Croatia has an annual cost of heating in the amount of HRK 2,655 (including VAT), while a comparative same-sized apartment in Adriatic Croatia has an annual cost of heating in the amount of HRK 2,059 (including VAT).

3.2. Electricity consumption

Table 6 shows the electricity consumption of the HEP-ODS distribution areas in Eastern Croatia and Adriatic Croatia (2012).

Table 6 Electricity consumption for distribution areas of HEP-ODS, 2012

Distribution area	**kWh**	**Number of m.p.**	**kWh/m.p.**
DA Osijek	426,777,017	140,694	3,033.37
DA Vinkovci	248,063,605	74,918	3,311.13
DA Slavonski Brod	176,268,467	58,332	3,021.81
DA Požega	72,929,623	24,654	2,958.13
DA Virovitica	75,285,658	26,700	2,819.69
Total	**999,324,370**	**325,298**	**3,072.03**
	kWh	**Number of m.p.**	**kWh/m.p.**
DA Split	968,042,178	254,605	3,802.13
DA Zadar	348,545,540	107,938	3,229.13
DA Šibenik	215,227,369	78,014	2,758.83
DA Dubrovnik	203,238,059	46,422	4,378.05
DA Rijeka	618,376,619	188,867	3,274.14
Total	**2,353,429,755**	**675,846**	**3,482.20**

Source: Annual Report of HEP-ODS for 2012 (the table is made by the authors).

The households in Adriatic Croatia spend 13% more electricity per measurement point (m.p.) than households in Eastern Croatia. It follows that the average household in Eastern Croatia, spends HRK 3,225 per year, while the average household in Adriatic Croatia spends HRK 3,656 per year (the calculation is based on the electricity price of 1.05 HRK/kWh). Generally, when considering the number of measurement points for electricity it should be noticed that the number of measurement points per capita in Adriatic Croatia is considerably higher than in Eastern Croatia. Obviously, there is a large number of apartments used only for tourism purposes or as occasional (summer) residence of the owners who have primary residence in the continental part of Croatia. Furthermore, a significant number of apartments in Adriatic Croatia use electricity for heating. It is possible for these apartments that there are no additional heating costs, but such costs are included in the costs of the consumed electricity.

Summing the costs for electricity and heating, the average household in Eastern Croatia spent HRK 5,880 per year, while the average household in Adriatic Croatia spent HRK 5,715 per year. It follows that the average household spent 2.9% more for electricity and heating in Eastern Croatia than in Adriatic Croatia. However, taking into account that many households in Adriatic Croatia use electricity for heating (they do not use any other energy source for heating) would lead to even greater differences in the costs for energy.

Table 7 shows the average monthly net income (the average net salary) per employee for Croatian counties for the period from 2002 to 2011. Based on a comparison of these data it

can be concluded that the average salary per employee in Adriatic Croatia is 11.1% higher than the average salary per employee in Eastern Croatia. Furthermore, the net income of the average employee in Eastern Croatia amounted to HRK 57,024 per year, while the costs for electricity and heating of the average household in Eastern Croatia amounted to HRK 5,880 per year.

Table 7 Average monthly net income per employee

County	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Osiječko-baranjska	3.299	3.540	3.674	3.881	4.034	4.309	4.600	4.707	4.774	4.892
Vukovarsko-srijemska	3.403	3.633	3.755	3.892	4.006	4.203	4.501	4.563	4.630	4.748
Brodsko-posavska	3.223	3.564	3.670	3.826	3.981	4.161	4.464	4.599	4.649	4.761
Požeško-slavonska	3.265	3.488	3.615	3.719	3.901	4.088	4.457	4.603	4.605	4.794
Virovitičko-podravska	3.136	3.459	3.531	3.639	3.843	3.986	4.267	4.349	4.415	4.563
The average monthly net salary in 2011 →										**4.752**
County	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
Splitsko-dalmatinska	3.549	3.830	3.997	4.197	4.394	4.656	4.947	5.002	5.089	5.170
Zadarska	3.628	3.960	4.133	4.327	4.423	4.659	4.996	5.105	5.137	5.280
Šibensko-kninska	3.554	3.761	3.907	4.047	4.234	4.474	4.889	4.963	5.031	5.172
Dubrovačko-neretvanska	3.519	3.789	4.047	4.246	4.481	4.690	5.055	5.155	5.240	5.348
Primorsko-goranska	3.725	3.993	4.182	4.414	4.591	4.823	5.193	5.285	5.312	5.418
The average monthly net salary in 2011 →										**5.278**

Source of data: State Bureau of Statistics (the table is made by the authors).

The annual net income of the average employee in Adriatic Croatia amounted to HRK 63,336, while annual costs for electricity and heating of the average household amounted to HRK 5,715. From these indicators, with the criterion that the energy-poor households are those which consume 10% of their disposable incomes to cover the costs of energy that they use in their households, it follows that the average household in Eastern Croatia suffers from energy poverty if the household has one employee who earns an average net salary, while the average household in Adriatic Croatia with one employee and an average annual income is not in the category of energy poor households. It should be noted from the data presented in Table 8 that, compare to the total population, there are more people in Eastern Croatia whose main source of income is a social assistance or even those who have no income in relation to Adriatic Croatia.

Using the data presented in Table 8 it is calculated that the social fee is the main source of income for 6.25% of the population in Eastern Croatia, while in Adriatic Croatia this

percentage is 3.66%. Furthermore, in Eastern Croatia, 37.3% of the population has no income, while in Adriatic Croatia this percentage is lower and it is 32.81%.

Table 8 Number of residents who have no income or their main source of income is social fee, 2011

County	Total population	Number of recipients of social fees	Population without income
Osiječko-baranjska	305.032	17.002	107.786
Vukovarsko-srijemska	179.521	10.850	70.124
Brodsko-posavska	158.575	11.467	63.556
Požeško-slavonska	78.034	4.259	29.338
Virovitičko-podravska	84.836	6.785	29.872
Total	**805.998**	**50.363**	**300.676**
Splitsko-dalmatinska	454.798	16.858	161.436
Zadarska	170.017	6.717	58.936
Šibensko-kninska	109.375	6.714	35.809
Dubrovačko-neretvanska	122.568	3.566	40.861
Primorsko-goranska	296.195	8.293	81.204
Total	**1.152.953**	**42.148**	**378.246**

Source data: State Bureau of Statistics (the table is made by the authors).

4. Conclusion

The results of this preliminary study for energy poverty for Eastern Croatia and for Adriatic Croatia show that, by applying the criterion that the energy-poor households are those which consume 10% of their disposable incomes to cover the costs of energy that they use in their households, the average household in Eastern Croatia would belong to the category of energy-poor households (provided that the household has one employee with an average annual income), while it would not be the case with a compatible average household in Adriatic Croatia.

Furthermore, the average salary is higher in Adriatic Croatia than in Eastern Croatia. Hence, due to the lower energy costs, employers from Adriatic Croatia have an advantage in the labor market in relation to employers from Eastern Croatia. Therefore, there is more potential for the population to migrate from Eastern Croatia to Adriatic Croatia than in the reverse direction, which presents an opportunity for future research.

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