



COMPARISON OF HOUSEHOLD ELECTRICITY CONSUMPTION COSTS

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POROVNANIE NÁKLADOV NA SPOTREBU ELEKTRICKEJ ENERGIE V DOMÁCNOSTIACH



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ABSTRACT

In Eastern Europe, wages are generally lower than in Western Europe. This is due to historical developments. The monthly wage is, however, only a relative figure. It is necessary to compare it not only to each other but to relate to the monthly costs. A large part of the plan costs are the costs of housing, especially energy. In our article, we focus on what constitutes the cost of electricity, as it affects the total cost of living compared to wages in Western and Eastern Europe. Based on data measured in Slovakia, in a regional city in a three-room apartment with an average three-member family.

KEY WORDS:

Electricity, consumption, costs, living standards, delivery, distribution

ABSTRAKT

Vo východnej Európe sú mzdy všeobecne nižšie ako v západnej Európe. Je to dôsledok historického vývoja. Mesačná mzda je však iba relatívna. Je potrebné porovnávať to nielen medzi sebou, ale aj v súvislosti s mesačnými nákladmi. Veľkou časťou plánovaných nákladov sú náklady na bývanie, najmä energiu. V našom článku sa zameriavame na to, čo tvorí náklady na elektrickú energiu, pretože ovplyvňuje celkové životné náklady v porovnaní s mzdami v západnej a východnej Európe. Na základe údajov meraných na Slovensku v regionálnom meste v trojizbovom byte s priemernou trojčlennou rodinou.

KLÚČOVÉ SLOVÁ:

elektrická energia, spotreba, náklady, životná úroveň, dodávka, distribúcia

1 Introduction

Electricity consumption in the company, whether it's households, businesses, or the total consumption of the company is growing. This increase has a major impact on living standards. In general, the higher the relative price of energy increases (relative to income), the fewer resources remain for consumption and investment. This impact is essential because each household is both directly energy consumers and, on the other hand, everyone pays for the increased energy price projected into everyday consumer purchases. Electricity is an essential part of the total energy requirements. But its price is made up of its supply and its distribution. The difference in the trend of the prices of these two components is a source of rising costs and at a time when the price for electricity supply decreases.



2 Electricity price

Electricity prices are often a topic to be discussed. They have a direct and indirect impact on our standard of living. The direct impact is evident in every-year payments for the supply and distribution of electricity consumed at the collection points, indirectly electricity prices are projected into other commodities and daily consumption items we buy. It is therefore clear that the lower is the total cost of electricity compared to our income, the higher could be the standard of living we can maintain at relatively constant consumption.

A lower electricity price can therefore mean more savings to be used to buy other goods and services. Customers' shopping habits, however, sometimes contradict logic and are based on a purely emotional basis.¹

Energy costs are on a continuous upward trend in Europe. In 2015 the average residential consumer's electricity price was 20.8 cents per kilowatt hour (cents/kWh), a 24% increase from the average price of 16.7 cents/kWh in 2010. These average values vary significantly across the European Union, ranging from 9.4 cents/kWh in Bulgaria to 30.7 cents in Denmark in 2015. In the past decade residential electricity prices increased by the average of 56%. The highest rise in cost was found in Greece (157%), the United Kingdom (142%) and Spain (110%). A very slight increase (0,1%) was recorded in the Netherlands. Between 2014 and 2015 the highest increase in private household electricity prices was recorded in Latvia (+20%), followed by Bulgaria (+13%) and the United Kingdom (+11%). The highest decrease was observed in Malta and Cyprus (-15%). In Europe, residential consumer prices for electricity have long exceeded the industrial prices, and the gap has even become bigger in recent years. The highest residential electricity prices are paid in Denmark (30.7 cents) and Germany (29.5 cents) for many years in a row now. The price per kilowatt hour is more than three times higher than in Bulgaria (9.6 cents). Italy (24.5 cents) and Ireland (24.3 cents) are competing for the 3rd and 4th place, while the prices in Spain (23.1 cents) went somewhat down in 2014. The energy prices in the EU depend on a range of factors, including taxation, network charges or environmental protection costs. Taxes and levies make the biggest difference. Residential electricity rates are taxed at an average of 32%. These values vary greatly from one country to another, with rates as high as 57% in Denmark and 52% in Germany (including a renewable energy tax 22%).²

The European Commission hopes that its Energy Union strategy will make the EU's energy supply more secure, affordable and climate-friendly. But the energy market is highly fragmented, and focused on national interests. The price that the average European household pays per kWh of electricity has risen from 12 cents in 2005 to 18 cents in 2014. However, the prices in individual countries varies significantly. In Bulgaria and Hungary, households currently pay around 10 cents per kWh. In Germany and Denmark, energy is three times more expensive. Factors that influence cost include a country's geographical location, energy resources, and world market prices. But energy policies are increasingly a significant factor. Energy subsidies are growing across the majority of countries in the European Union. Only Austria and Sweden decreased their subsidies from 2008 to 2012. The rest of the EU increased by 57%. Leading the way? Denmark and Greece, which increased subsidies by over 1000%, and Germany, which accounts for roughly 25% of all energy subsidies in the EU. But despite more subsidies, electricity prices are still increasing. While household electricity prices have risen by 50% from 2005 to 2014, the average price for industrial consumers has increased by 66%. These prices also vary significantly across the EU. In Germany and the Netherlands, prices for medium-sized industries have remained fairly stable, increasing by approximately 25%. In the United Kingdom and Poland, however, prices have gone up by as much as 100%. To build a successful Energy Union, the

¹ TRNKA, A.: *Statistical analysis of online shopping behavior of students*, In: Marketing Identity : Digital Life - part II. : Conference Proceedings from International Scientific Conference 10th - 11th November 2015, Congress Hall of the Slovak Academy of Sciences, Smolenice, Slovak Republic, Trnava : Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava, 2015. - ISBN 978-80-8105-780-9. - ISSN 1339-5726, S. 283-292.

² Storm – report blog.: *Electricity prices in Europe – Who pays the most?*, [online]. [2017-09-26]. Available at: <<https://1-stromvergleich.com/electricity-prices-europe/>>



Commission has a tough job ahead of itself: harmonizing the different national policies, building a transnational infrastructure, and getting member states to work together, towards a common goal.³ Other countries have been successful in garnering electrical power via renewable options, allowing prices that are more budget-friendly than those seen in Italy and Germany. Electricity rates across 18 developed country can be seen illustrated within the table below. Note that electricity rates in our cheapest country, Sweden, are only 37% of those seen in Italy at the other far end of the spectrum.⁴

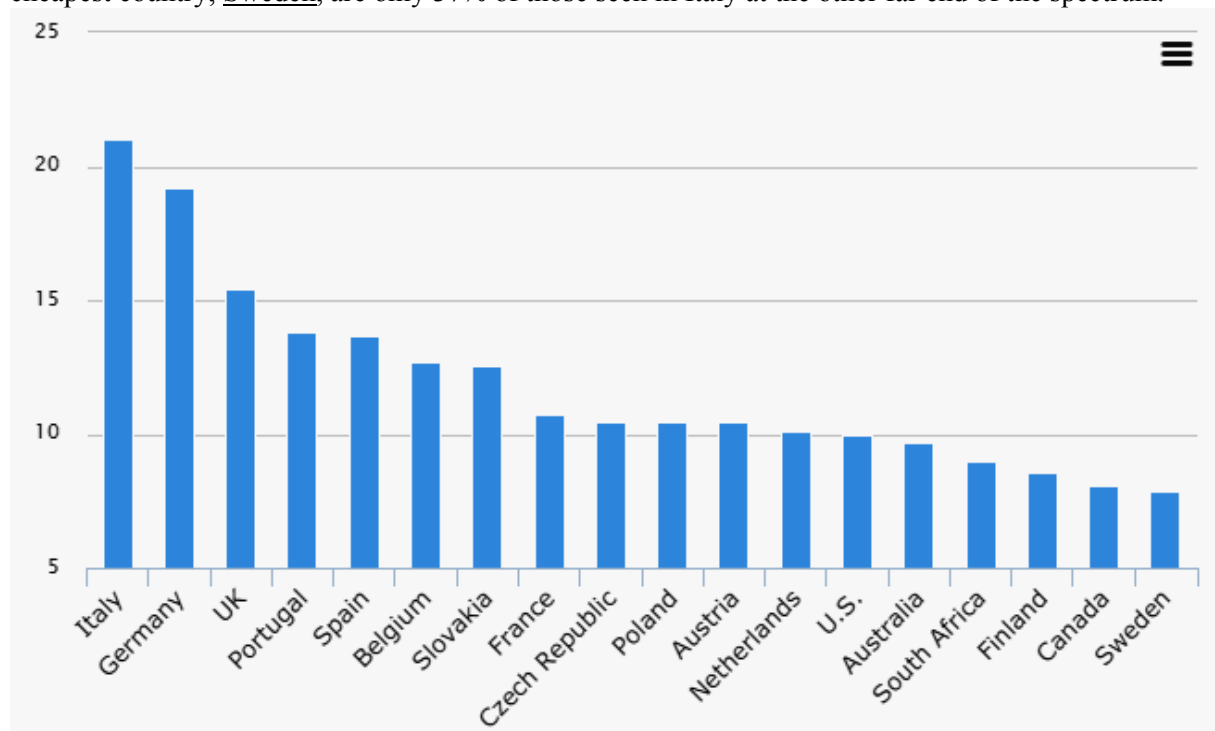


Chart 1 Cost of electricity by country cents/kWh

Source: Cost of electricity by country, [online]. [2018-02-06]. Available at: <http://www.worldatlas.com/articles/electricity-rates-around-the-world.html>

In different countries, however, there are also different habits that affect the overall consumption of electricity. Dependence may be individual at the level of technological, cultural or economic maturity, climate and climatic conditions. Due to this fact, the measurement is carried out under different conditions, which affects the total electricity consumption, the time it is consumed, the method of production and hence the price. For standard deviations, it would be more necessary to identify globalization or segregation impacts. Some aspects are dealt with by the literature.⁵

3 Components of electricity price

According to the Slovakia Energy portal, the price of electricity is made up of the following components:

- Distribution including transmission (fee for "transport" of electricity to the end customer)
- Price for power electricity (manufacturer's price + dealer's margin)

³ Lamos, E.: *Electricity prices in Europe*, [online]. [2018-02-06]. Available at: <https://www.euractiv.com/section/electricity/video/electricity-prices-in-europe/>

⁴ Dillinger, J.: *Cost of electricity by country*, [online]. [2018-02-06]. Available at: <http://www.worldatlas.com/articles/electricity-rates-around-the-world.html>

⁵ PRAVDŔOVA, H.: *Discrepancies of globalization processes and multiculturalism in media culture*, In: Médias et sociétés interculturelles : Société et médias dans le dialogue interculturel / Sous la direction de Martin Klus, Gilles Rouet ; la revision de textes: Anne-Coralie Bonnaire, Christophe Lips. - 1. vyd. - Paris : L'Harmattan, 2013. - ISBN 978-2-343-01216-2, S. 119-128.



- Distribution including transmission (fee for "transport" of electricity to the end customer)
- Tariff for system operation
- Tariff for losses
- System services
- Withdrawal into the National Nuclear Fund⁶

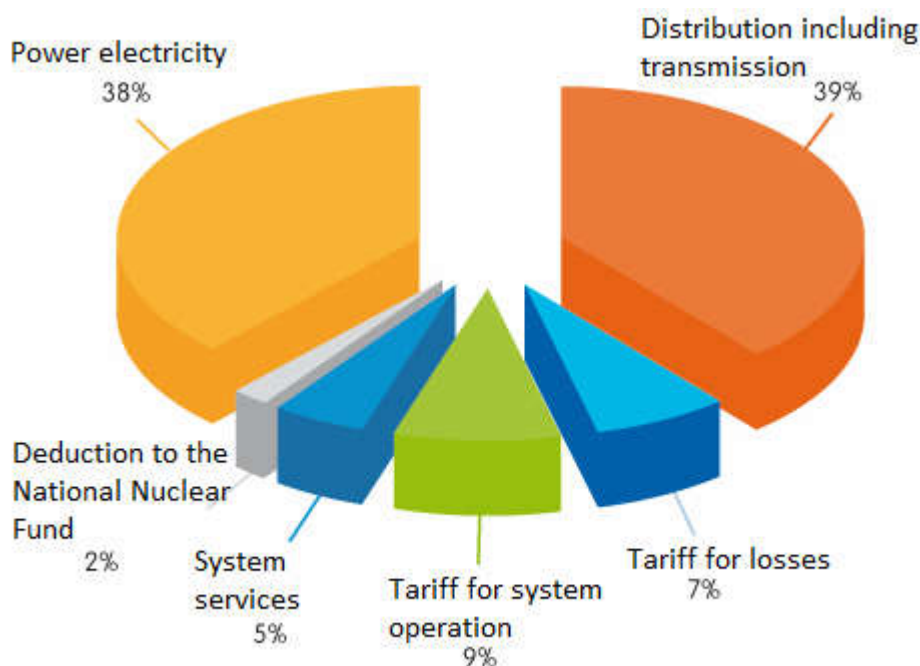


Fig. 1: Components constituting the cost of electricity

Source: Slovakia energy: Z čoho sa skladá cena elektriny, [online]. [2018-02-06]. Available at: <<https://www.slovakiaenergy.sk/co-robit-ked/technicke-informacie/z-coho-sa-skladaju-ceny/#z-coho-sa-sklada-cena-elektriny>>

4 Measurement of consumption and cost of electricity

The following tables show the consumption of electricity in the household of a specific three-member family of a regional city in Slovakia, which is a 3-room flat (65m²) in a panel house in which there is central heating, without natural gas supply and electricity is supplied in 3 phases. Consumption and cost of electricity are collected from invoices from the supplier during the years 2007 to 2016. During this period, the method of conversion of consumption was changed in 2011. By 2011, two components were counted (Tab 1):

- The fixed component - Payment for take-off point
- Variable component: Price of electricity consumed

Since 2011, the electricity supply is billed and calculated in a way that is obvious from the following section (Tab 2 and 3): It is divided into two basic parts, namely the supply and distribution of electricity.

⁶ Slovakia energy: Z čoho sa skladá cena elektriny, [online]. [2018-02-06]. Available at: <<https://www.slovakiaenergy.sk/co-robit-ked/technicke-informacie/z-coho-sa-skladaju-ceny/#z-coho-sa-sklada-cena-elektriny>>



Table 1 Electricity consumption in the ordinary household 2007-2010

	Billing period		Consumption kWh	Invoiced Amount EUR	Fixed monthly charge for one take – off point EUR	Price of electricity EUR
	From	To				
1	5.4.2007	10.4.2008	1178	224,26 €	73,39 €	150,86 €
2	11.4.2008	10.4.2009	1294	233,68 €	73,78 €	159,90 €
3	11.4.2009	9.4.2010	1756	283,43 €	41,19 €	202,92 €
4	10.4.2010	18.8.2010	574	95,53 €	48,86 €	46,67 €

Source: Own processing

Table 2 Electricity consumption in the ordinary household 2011-2016 – supply

	Billing period		Consumption kWh	Invoiced Amount EUR	Power supply	
					Fixed monthly charge for one take – off point EUR	Price of electricity EUR
	From	To				
5	19.8.10	28.3.11	1079	182,51 €	6,14 €	81,29 €
6	29.3.11	23.3.12	1690	303,24 €	9,96 €	129,94 €
7	24.3.12	21.3.13	1496	279,72 €	9,88 €	116,88 €
8	22.3.13	21.3.14	1461	264,54 €	9,37 €	102,56 €
9	22.3.14	27.3.15	1358	240,16 €	9,53 €	80,90 €
10	28.3.15	23.3.16	1301	226,18 €	9,28 €	71,15 €

Source: Own processing

Table 3 Electricity consumption in the ordinary household 2011-2016 – distribution

	Billing period		Distribution of electricity					
			Fixed monthly charge for one take – off point EUR	Transfer to the Nuclear Fund EUR	Payment for system services EUR	Variable component of the tariffs for distribution EUR	Payment for electricity losses during electricity distribution EUR	Payment for system operation EUR
	From	To						
5	19.8.10	28.3.11	37,06 €	1,52 €	12,05 €	16,46 €	14,64 €	12,39 €
6	29.3.11	23.3.12	60,41 €	6,08 €	17,40 €	25,69 €	23,24 €	30,52 €
7	24.3.12	21.3.13	60,84 €	5,48 €	11,52 €	23,34 €	20,65 €	30,14 €
8	22.3.13	21.3.14	61,15 €	5,50 €	13,93 €	24,32 €	17,62 €	30,11 €
9	22.3.14	27.3.15	62,14 €	5,20 €	12,82 €	22,25 €	13,58 €	34,28 €
10	28.3.15	23.3.16	60,49 €	5,00 €	11,76 €	21,25 €	12,76 €	34,49 €

Source: Own processing



The following are charts graphically expressing the reported data.

Chart 2 reflects that vary the average monthly consumption (calculated as the average of the amount billed for the period) over the said period 2007-2016. The price is an aliquot part of that month, calculated from the total invoiced price.

Charts was made in table calculator from tables reported higher and to achieve longer time may by archived as images, described in literature.⁷

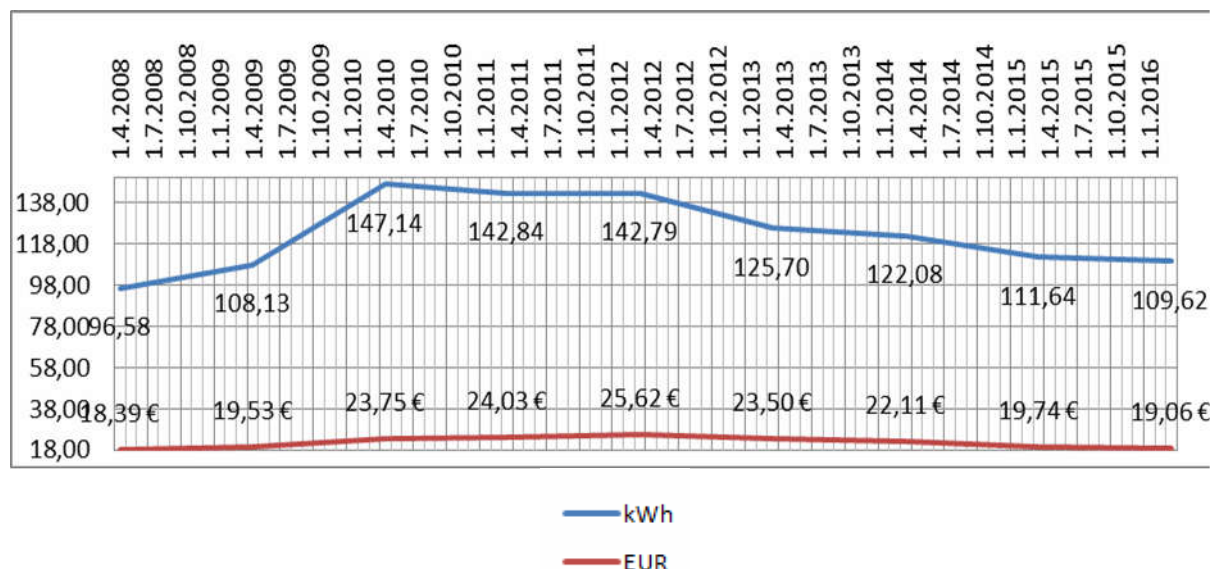


Chart 2 Average monthly electricity consumption in ordinary household 2007-2016
 Source: Own processing

It follows that the total average monthly price changes relatively little with respect to consumption in kWh. This is a consequence of the ratio of each variable and fixed component.

5 Comparison of household in Western Europe and in Slovak republic

In Western Europe, energy costs account for about 7 percent of the family budget, and in Slovakia it is more - 15 to 20 percent. Every energy saving is a plus for the family budget. To save energy, you should first be aware of your consumption and energy costs.⁸

⁷ HALENAR, R.: Archiving documents in form of image using Matlab and Photoshop, In: Marketing Identity : Digital Life - part II. : Conference Proceedings from International Scientific Conference 10th - 11th November 2015, Congress Hall of the Slovak Academy of Sciences, Smolenice, Slovak Republic, Trnava : Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava, 2015. - ISBN 978-80-8105-780-9. - ISSN 1339-5726, S. 348-354.

⁸ HALENAR, R.: Bezplatná aplikácia radí ako skrotiť náklady na energie v domácnosti, ?, [online]. [2018-02-06]. Available at: <<http://www.oplyne.info/bezplatna-aplikacia-radi-ako-skrotit-naklady-na-energie-v-domacnosti/>>

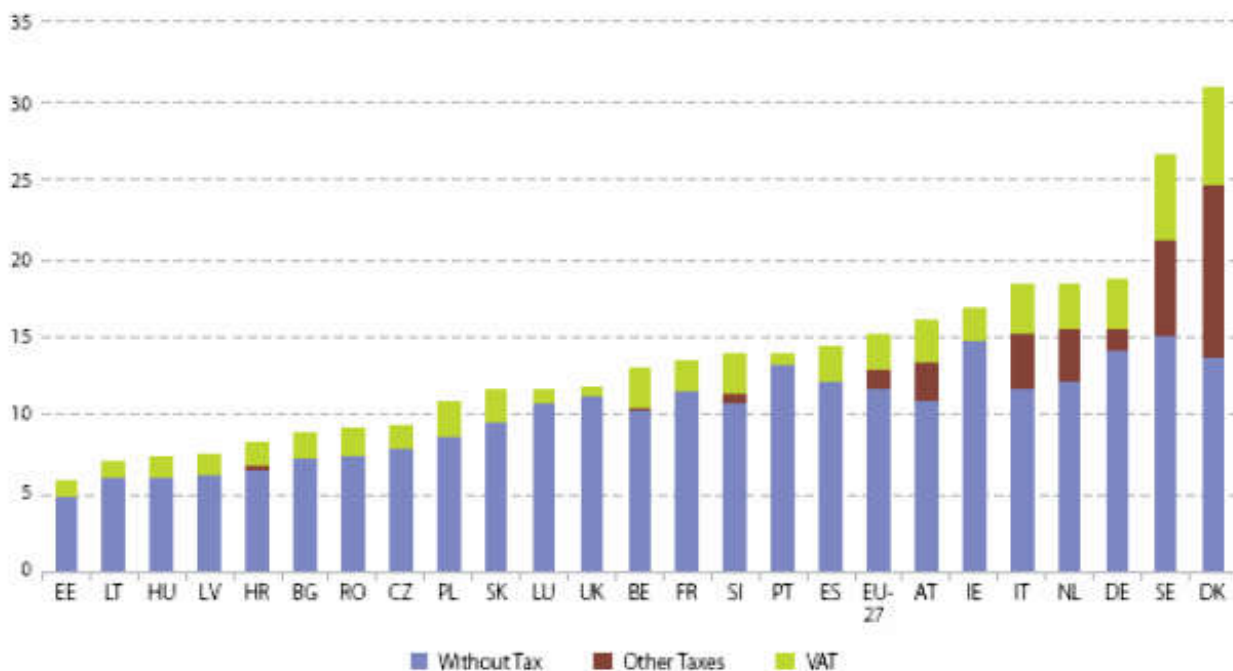


Chart 3 Composition of the gas prices for household consumers on 1 January 2007 (in EUR per GJ)
 Source: Eurostat, *European Price Statistics 2008*, [online]. [2018-02-06]. Available at:
 < <http://www.foreverfuels.biz/content/renewables-and-domestic-energy-lessons-europe-part-6> >

Chart 4 and Chart 5 are the answer to why Slovakia has a high housing price in terms of total household income. Since energy prices are globally given and only partially influenced by the level of taxes, it is clear that income inequality is most likely to be affected by this effect.



Panel A. Annual median equivalised disposable household income in USD at current prices and current PPPs in 2010 (rounded at nearest 100)

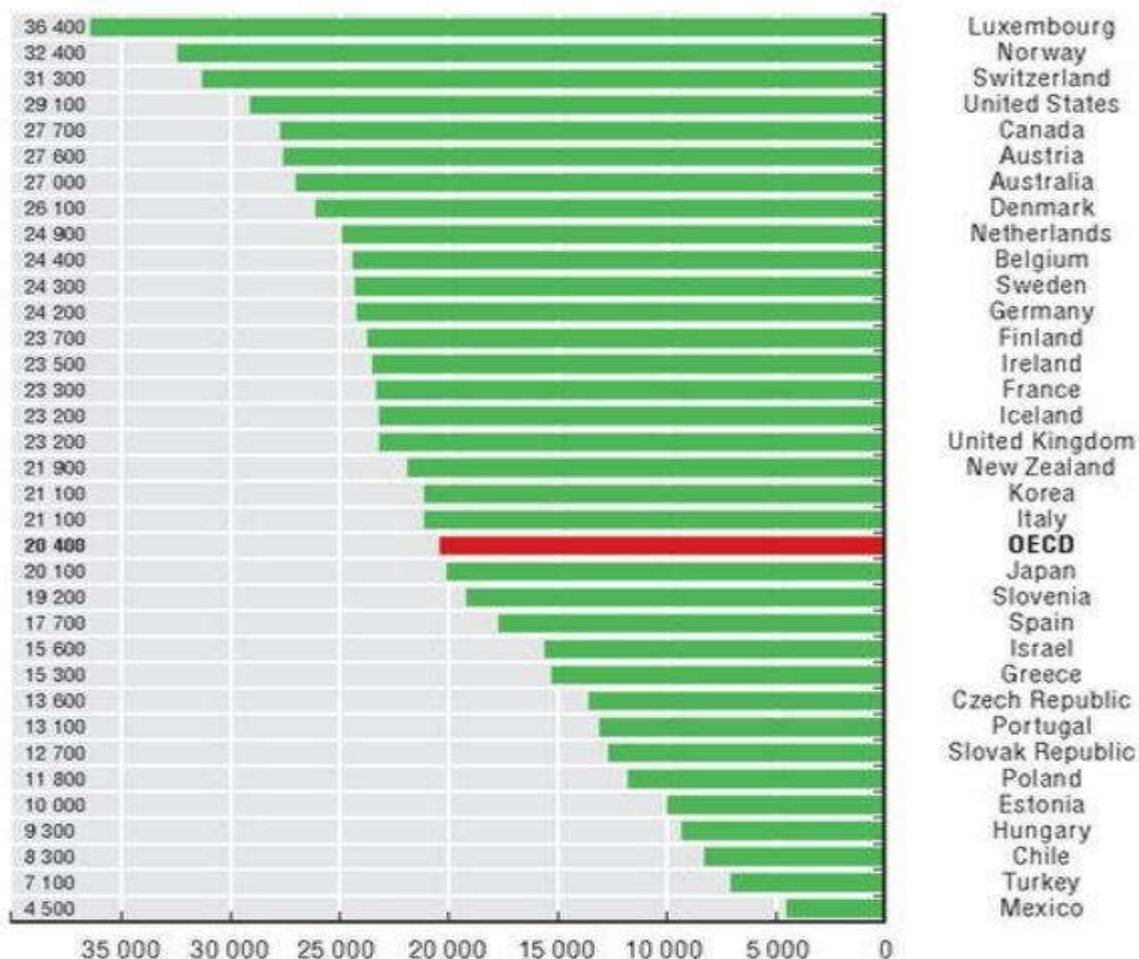


Chart 4 Annual median equivalised disposable income in USD at current prices and current PPPs in 2010 (rounded at nearest 100) , [online]. [2018-02-06]. Available at:
 < <https://www.zerohedge.com/news/2016-10-31/when-it-comes-household-income-sweden-germany-rank-kentucky> >

6 Conclusion

The total cost of households is many. However, total revenues are a widespread wage bill. As there is a large income inequality in Europe, it is obvious that it will be most pronounced where inputs and outputs are essentially the same. The consumption of household energy is the same, and household income ratios are also unchanged. The price of environments is global and it is not to be expected that manufacturers or resellers will want to adapt to local conditions. There is nothing else, just to try to change just the local circumstances.



LITERATURE AND SOURCES

- Dillinger, J.: *Cost of electricity by country*, [online]. [2017-09-26]. Available at: <<http://www.worldatlas.com/articles/electricity-rates-around-the-world.html>>
- HALENAR, R.: *Archiving documents in form of image using Matlab and Photoshop*, In: Marketing Identity : Digital Life - part II. : Conference Proceedings from International Scientific Conference 10th - 11th November 2015, Congress Hall of the Slovak Academy of Sciences, Smolenice, Slovak Republic, Trnava : Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava, 2015. - ISBN 978-80-8105-780-9. - ISSN 1339-5726, S. 348-354.
- Lamos, E.: *Electricity prices in Europe*, [online]. [2018-02-06]. Available at: <<https://www.euractiv.com/section/electricity/video/electricity-prices-in-europe/>>
- PRAVDOVA, H.: *Discrepancies of globalization processes and multiculturalism in media culture*, In: Médias et sociétés interculturelles : Société et médias dans le dialogue interculturel / Sous la direction de Martin Klus, Gilles Rouet ; la revision de textes: Anne-Coralie Bonnaire, Christophe Lips. - 1. vyd. - Paris : L'Harmattan, 2013. - ISBN 978-2-343-01216-2, S. 119-128.
- Slovakia energy: *Z čoho sa skladá cena elektriny*, [online]. [2017-09-26]. Available at: <<https://www.slovakiaenergy.sk/co-robot-ked/technicke-informacie/z-coho-sa-skladaju-ceny/#z-coho-sa-sklada-cena-elektriny>>
- Storm – report blog.: *Electricity prices in Europe – Who pays the most?*, [online]. [2018-02-06]. Available at: <<https://1-stromvergleich.com/electricity-prices-europe/>>
- TRNKA, A.: *Statistical analysis of online shopping behavior of students*, In: Marketing Identity : Digital Life - part II. : Conference Proceedings from International Scientific Conference 10th - 11th November 2015, Congress Hall of the Slovak Academy of Sciences, Smolenice, Slovak Republic, Trnava : Faculty of Mass Media Communication, University of Ss. Cyril and Methodius in Trnava, 2015. - ISBN 978-80-8105-780-9. - ISSN 1339-5726, S. 283-292.

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