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Energy Security of Polish Consumers in 2004–2021

Keywords: economic security; Poland; EU; household expenses; salaries; taxation

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Abstract

Theoretical background: Energy security is one of the most important components of economic security. It is influenced not only by access to energy sources and the economic situation of the state and the individual consumer. The authors adopted the definition of energy security of an individual consumer as included in the UN report. It states that energy security of an individual consumer is guaranteed when the average consumer has access to energy at all times, in various forms, in sufficient quantity and at a reasonable price, with the simultaneous development of support mechanisms for socially and economically sensitive consumers, and after implementation of independent mechanisms for resolving disputes with the energy company, which eliminate or at least alleviate the economic advantage of the enterprises.
Purpose of the article: The main aim of the paper is to present the impact of macroeconomic indicators of the Polish economy on energy security of Polish consumers with a minimum and average monthly income.

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Detailed objectives include determining the possibility of purchasing by consumers with such income, diesel oil, Pb95 gasoline, LPG, electricity, heat and present changes in the energy security of individual consumers in the analyzed period (i.e. 2004–2021).
Methods: The study covered Poland, country which joined the European Union in 2004. The period of the analysis described the years from 2004 to 2021. The source of the collected information was a review of the literature on the subject and statistical data. Descriptive, tabular and graphical methods, constant dynamic indicators were used for the analysis and presentation of the results.
Main findings: The last two decades of the 21st century have brought Poland a number of positive socio-economic changes. The Polish economy noted that inflation remained at the level of National Bank of Poland's expectations, increased trade, a marked decline in unemployment and rising wages, and, thus, a general increase in the quality of life as well as energy security of the individual consumer. The authors assumed that in the years 2004–2021, the consumer had good access to energy, heat and other fuels. The supplies of energy resources were ensured by long-term contracts, including the Yamal contract, and the demand for heating coal was satisfied with the raw material largely mined in Poland. Heat, mainly in large clusters of people, was generated by coal-fired power plants. This raw material was also used by power plants. For heating their houses, individual consumers – mainly in the countryside – used gas or oil.

Introduction

The Energy Law Act regulates the rights of the so-called vulnerable customers and defines an out-of-court method of resolving disputes between a consumer and an energy company (Obwieszczenie Marszałka Sejmu..., 2012). In practice, the Polish authorities in this period were characterized by a rather low attention to consumer rights, which was determined by the interests of large companies (Sozański, 2013).

The analyzed period was characterized by socio-economic changes in Poland. It begins with joining the group of EU countries (2004), then overcoming the difficulties resulting from the global financial crisis (2008), changing the government several times (in 2005, 2008 and 2015), as well as dealing with the economic and social consequences of the COVID-19 pandemic. One of the most important factors influencing the consumer's energy security is Poland's accession to the EU, which is associated with the adoption of EU legal solutions. Other economic events had also had a direct impact on the level of prices of individual energy sources, as well as the dynamics of changes in inflation and the average and minimum wages in Poland. In the literature on the subject, there is no study showing the impact of the condition of the Polish economy on energy security of an individual consumer with the minimum and average income. The following paper fills this research gap.

For Poland's energy security, energy efficiency is of great importance, as it, together with energy saving, may improve economic and environmental indicators (Masztalerska, 2011). The level of the state's energy security is measured, among others, by using the World Bank's net import model, revealing a change in GDP in the conditions of an increase in the price of energy, dependent on the volume of energy imported and the demand for it. In practice, the energy dependency ratio is used, showing the share of net energy imports in relation to gross domestic energy

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consumption plus stored energy. Energy security is a public good, it is characterized by uncompetitiveness and the inability to exclude these goods from consumption (Braun, 2018).

Literature review

In Polish literature, the least attention is paid to energy security of an individual consumer. The adoption of the definition of individual consumer safety in the energy sector proposed by the United Nations and the support of vulnerable groups with a special supplement are suggested by Mroczyński-Szmaj and Mroczyńska-Szmaj (2018). According to another author, a threat to the safety of an individual consumer in Poland could arise if Poland failed to modernize some of the existing power plants and build a few more by 2020, then the state would have to buy electricity abroad (Kłaczyński, 2013). Wasiuta (2015) made the safety of an individual consumer dependent on increasing the use of renewable energy sources.

The studies conducted so far focus mainly on energy security in the European (Misiągiewicz, 2019; Trubalska, 2017; Kałążna & Rosicki, 2010; Pach-Gurgul, 2016) and national dimension (Bałamut, 2017; Niedziółka, 2019). They often show the determinants of energy security of Poland and the European Union, taking into account the conflicting interests of both partners (Gryz et al., 2018). External factors for energy security include state alliances, the political situation of countries through which raw materials are transported, and permanent and long-term contracts for the supply of energy resources. Internal factors include: legal solutions, development of new technologies and increased awareness of societies accepting changes in the energy market (Ruszel & Podmiotko, 2019). The work edited by Kwiatkiewicz and collaborators focuses on the internal conditions of energy security, supplying industrial plants, environmental and military aspects of energy security, counteracting cybercrime and cyber-terrorism, and the safety of nuclear power plants. The technical aspect of energy security is presented in the second part of the monograph (Kwiatkiewicz et al., 2019; 2016; Kwiatkiewicz & Szczerbowski, 2017). The authors of the next monograph analyzed the problem of the profitability of energy generation in the oxy-combustion technology, the possibility of creating a gas hub and planning network infrastructure in Poland, and the financing of the energy policy in 2004–2013 by regional and national operational programs was also presented (Kwiatkiewicz & Szczerbowski, 2018).

An individual consumer of energy, fuels and heat, living in EU countries is exposed to insufficient protection of their rights due to the lack of effective sanctions that can be imposed on member states in the event of failure to comply with directives and recommendations.

Underlining the role of the prosumer in managing energy security in Poland, some authors postulate that the economic aspect should be the main goal of the Polish and EU authorities. This can be contributed by: exchange of experiences in the

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field of energy, fuel and heat markets introducing legal solutions to better meet the needs and increase the role of the prosumer in the creation of new energy sources and in the distribution of the transmission fee (Bałamut, 2016). The economic crisis in EU countries has sparked a discussion about the rising costs of energy production from renewable sources. The fight against unemployment, public debt and declining competitiveness of the EU economy led to a slowdown in the development of these energy sources (Pach-Gurgul, 2014). The report *The Role of the Consumer in the Energy Transformation* showed that the set of energy consumer rights developed on the basis of the European Commission's guidelines did not improve its position on the energy market. On the other hand, this situation was greatly exacerbated by the energy illiteracy of energy consumers. The lack of knowledge about large energy waste and the associated financial losses is one of the most important reasons why energy users do not invest in efficiency. Local governments should play an important role in increasing knowledge among energy users (Bator & Kukuła, 2016).

The regulations that are currently in force (both at the level of the EU and of particular countries) do not deal with energy poverty but with the protection of the so-called sensitive recipient, e.g. the elderly or the disabled people (Chojnacka, 2020; Wysokiński et al., 2018). The problem of energy poverty affects from 16 to 18% of Poles (Miazga & Owczarek, 2015; Gonera et al., 2019; Boguszewski & Herudziński, 2018). In this group, the level of energy security of an individual consumer drops significantly. Increasing energy efficiency and the use of energy-saving solutions in households would largely contribute to solving the problem, increase the value of real estate and increase the quality of life of consumers.

Moreover, it should be noted that an important element shaping the energy policy in Poland are also pan-European strategies of the EU, which have a direct impact on the policies of the member states. The most important goals of the EU, which are to be achieved by the end of 2030, include (Miciuła, 2015):

– ensuring the security of energy supply,
– increasing the competitiveness of internal energy market of the EU,
– diversification of energy sources,
– increasing energy efficiency,
– sustainable development of the energy market,
– increasing expenditure on research and development of innovative technologies of energy production and transmission,
– development of the energy infrastructure.

The analysis and evaluation of the EU strategy was not, however, the aim of the following study, as the authors focused their attention on examining the level of energy security of individual consumers, i.e. on a micro scale. It should be borne in mind that the policies of the EU and the member states affect the final sense of security and purchasing capacity of households, however, the EU strategy goes far beyond the analysis period (EU goals are to be achieved by 2030), while this article constitutes an analysis of energy security of Polish consumers in the years 2004–2021.

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Research methods

The study presented in the following paper covered the period from 2004 to 2021. The source of information was a review of the literature and macroeconomic data of the Central Statistical Office. Descriptive, tabular and graphical methods of constant dynamics and coefficients of variation were used to analyze the data presentation.

The conducted analysis included indicators concerning, *inter alia*, inflation, the level of wages (average and minimum), prices of selected energy sources: heating coal, gasoline, diesel oil and popular fuel in Poland, LPG, electricity and heat.

The study was supplemented with an analysis of the average and minimum wages, as well as the level of inflation. The above indicators made it possible to compare the prices of individual sources during the research period, as well as to assess the real possibilities of purchasing the analyzed sources of energy by individual consumers.

The authors used the amounts of gross wages to prepare the calculations. The rationale justification behind this assumption is that individual net salaries depend on numerous factors, including individual civil status, tax settlements with children, calculating reliefs and tax deductible costs. In addition, in the years 2004–2021, there were numerous changes that affected all taxpayers, i.e. a change in the rates of disability pension contributions, PIT, and the inclusion of a large group of taxpayers in the Employee Capital Plans. The above would have a significant impact on the differentiation of net amounts, as well as the possibility of comparing individual years; therefore, the authors decided to present the values in gross amounts. The selection of elements of energy carriers was made due to the share of individual sources in the final acquisition of heat by individual consumers. In Poland, the highest share of heat energy sources from fossil fuels was recorded (almost 32%). The next places belong to industrial heat sources (multi-family heating plants, combined heat and power plants and other collective heat sources, 19.4%), individual natural gas sources (18.4%), renewable (13.9%) and heating oil (3.3%) (European Comission Report, 2020). The final price of energy is influenced by taxes and mandatory fees imposed by the EU. The basic structure of the excise duty on mineral oils in the EU was established in 1992 as a minimum rate (Kopits, 1992). Despite the announced harmonization of fees, taxation in individual EU countries is different (Hoeller et al., 1996).

From January 1, 2022, the excise duty rates on certain energy products have been reduced and amount to:

– engine gasoline: PLN 1,413.00 / 1,000 l,
– diesel oil: PLN 1,104.00 / 1,000 l,
– liquefied gases to drive internal combustion engines (e.g. LPG): PLN 387.00 / 1,000 kg,
– natural gas to drive internal combustion engines (e.g. CNG): PLN 0,
– biocomponents constituting self-contained fuels: PLN 1,104.00 / 1,000 l,
– electricity: 4.60 PLN / 1 MWh.

The price of the above products should be increased by VAT.

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Among the research methods, the authors included a literature review, primary and secondary statistical data analysis, as well as a qualitative assessment of economic phenomena.

Results

Wages and inflation

The starting point for the analysis is the presentation of changes, including its dynamics, in the scope of the minimum and average wages in Poland and the level of inflation. The table below presents the values of the minimum legally regulated wage in Poland in 2004–2021, the average wage and inflation. The values are presented on the basis of Statistal Office data, taking into account the national calculation methodology. All data are presented in PLN.

Table 1. Summary of the minimum and average wages, the level of inflation together with the increase in the presented indicators

Year	Monthly minimum wage in PLN	Chain increase y/y [previous year = 100]	Average monthly salary in PLN	Chain increase y/y [previous year = 100]	Average annual inflation rate
2004	824	100	2,289.57	100	3.5%
2005	849	103.03	2,380.29	103.96	2.1%
2006	899.10	105.90	2,477.23	104.07	1.0%
2007	936	104.10	2,691.03	108.63	2.5%
2008	1,126	120.30	2,943.88	109.40	4.2%
2009	1,276	113.32	3,102.96	105.40	3.5%
2010	1,317	103.21	3,224.98	103.93	2.6%
2011	1,386	105.24	3,399.52	105.41	4.3%
2012	1,500	108.23	3,521.67	103.59	3.7%
2013	1,600	106.67	3,650.06	103.65	0.9%
2014	1,680	105.00	3,783.46	103.65	0.0%
2015	1,750	104.17	3,899.78	103.07	-0.9%
2016	1,850	105.71	4,047.21	103.78	-0.6%
2017	2,000	108.11	4,271.51	105.54	2.0%
2018	2,100	105.00	4,585.03	107.34	1.6%
2019	2,250	107.14	4,918.17	107.27	2.3%
2020	2,600	115.56	5,167.47	105.07	3.4%
2021	2,800	107.69	5,662.53	109.58	5.1%
Cumulative growth 2004–2021	1,976	339.81%	3,372.96	247.32%	49.25%

Source: Authors' own study based on ZUS data (www2).

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The data in Table 1 show that both minimum and average wages increased faster than inflation. The cumulative increase in the minimum (regulated) wage in the analyzed period amounted to nearly 340%, and the average wage slightly less, i.e. 247%. On the other hand, inflation, in cumulative values, in the years 2004–2021, amounted to nearly 50%. In addition, it should be noted that during 2015–2016, the deflation phenomenon occurred in Poland, which, with the simultaneous nominal increase in wages, meant a real increase in wages, and, thus, consumption opportunities.

Fuel coal

Heating coal, despite growing concerns about its negative impact on the natural environment, still remains an important source of heat for Polish individual consumers (Rogus et al., 2019). Its importance is also vital from the macroeconomic point of view, due to the great dependence of Polish power plants on this raw material.

Table 2. Comparison of heating coal prices with price increases in 2004–2021

Year	Average annual retail price of 1,000 kg of hard coal in PLN	Chain increase y/y [previous year = 100]
2004	459.67	100
2005	470.33	102.32
2006	491.54	104.51
2007	523.40	106.48
2008	604.62	115.52
2009	704.80	116.57
2010	719.76	102.12
2011	777.61	108.04
2012	818.16	105.21
2013	809.51	98.94
2014	802.37	99.12
2015	789.33	98.37
2016	780.38	98.87
2017	823.59	105.54
2018	887.30	107.74
2019	885.40	99.79
2020	887.95	100.29
2021	996.60	112.24
Cumulative growth 2004–2021	536.93	217%

Source: Authors' own study based on GUS (www1 and www3) and INFOR annual data.

The data presented in Table 2 reveal the average price of a ton of heating coal for an individual consumer in the years 2004–2021. The presented values show that the prices in absolute values in the analyzed period increased from PLN 459.67 to 996.6, i.e. by 536.93. In relative terms, the increase in prices was 117%.

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Table 3. List of possibilities to purchase fuel coal for minimum and average wages, along with the increase in the presented ratios

Year	Tons of coal that can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	Tons of coal that can be purchased for the minimum monthly wage	Chain increase y/y [previous year = 100]
2004	4.98	100.00	1.79	100.00
2005	5.06	101.61	1.81	100.70
2006	5.04	99.58	1.83	101.33
2007	5.14	102.02	1.79	97.77
2008	4.87	94.70	1.86	104.14
2009	4.40	90.42	1.81	97.21
2010	4.48	101.77	1.83	101.07
2011	4.37	97.57	1.78	97.41
2012	4.30	98.46	1.83	102.86
2013	4.51	104.75	1.98	107.81
2014	4.72	104.58	2.09	105.93
2015	4.94	104.78	2.22	105.89
2016	5.19	104.97	2.37	106.93
2017	5.19	100.00	2.43	102.44
2018	5.17	99.63	2.37	97.46
2019	5.55	107.50	2.54	107.37
2020	5.82	104.77	2.93	115.22
2021	5.68	97.63	2.81	95.95
Cumulative growth 2004–2021	0.70	114%	1.02	157%

Source: Authors' own study based on GUS data (www1 and www3).

When analyzing the possibilities of purchasing heating coal by households, it should be noted that despite a significant increase in prices, the possibilities of purchasing coal increased. On average, in 2004, the minimum wage allowed for the purchase of 1.79 tons of coal per month, while in 2021, it was 2.81 tons (an increase of 57%). For the average salary, in 2004, consumer could buy 4.98 tons of heating coal per month, in 2021, it was 5.68 tons. In both analyzed cases, however, the increase in purchase options was smaller than the price increase, which means that the increase in prices had a negative impact on the overall purchase options for this energy source (Table 3).

Prices of liquid fuels (gasoline, diesel oil, LPG)

The following study also took into account the prices of liquid fuels such as gasoline, diesel oil and LPG, along with a list of changes in the prices of individual fuels. In the years 2004–2021, significantly fewer drivers decided to buy a car equipped with a gas installation. The negligible interest of Poles in cars with alternative power sources (mainly electric vehicles) (Gajewski et al., 2019) made gasoline

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the primary source of power supply for passenger cars, used on a daily basis by individual consumers.

Table 4. Comparison of prices of liquid fuels (gasoline, diesel oil and LPG) along with price increases in 2004–2021

Year	Average retail price of Pb95/l gasoline in PLN	Chain increase y/y [previous year = 100]	Average retail price of ON/l	Chain increase y/y [previous year = 100]	Average retail price of LPG/l in PLN	Chain increase y/y [previous year = 100]
2004	3.76	100.00	3.41	100	1.95	100
2005	3.76	100.00	3.72	109.09	2.19	112.31
2006	3.58	95.21	3.61	97.04	2.01	91.78
2007	4.34	121.23	4.13	114.40	2.28	113.43
2008	3.52	81.11	3.56	86.20	1.99	87.28
2009	4.14	117.61	3.67	103,09	1.84	92.46
2010	4.56	110.14	4.28	116.62	2.22	120.65
2011	5.13	112.50	5.06	118.22	2.61	117.57
2012	5.71	111.31	5.69	112.45	2.79	106.90
2013	5.49	96.15	5.50	96.66	2.51	89.96
2014	5.26	95.81	5.22	94.91	2.57	102.39
2015	4.61	87.64	4.48	85.82	1.96	76.26
2016	4.34	94.14	4.12	91.96	1.80	91.84
2017	4.59	105.76	4.43	107.52	2.08	115.56
2018	4.93	107.41	4.91	110.84	2.23	107.21
2019	5.01	101.42	5.06	103.05	2.14	95.96
2020	4.41	88.20	4.43	87.55	2.03	94.86
2021	5.44	123.36	5.35	120.77	2.67	131.53
Cumulative growth 2004–2021	1.68	145%	1.94	157%	0.72	137%

Source: Authors' own study based on POPiHN reports (www5).

Table 4 shows the average prices of Pb95 gasoline, diesel oil and LPG. The presented data show that the average price of gasoline in the analyzed period increased from PLN 3.76 in 2004 to PLN 5.44 in 2021 per liter. This means an increase by 45% (PLN 1.68). Diesel oil prices grew faster, i.e. by 57% (PLN 1.94), from PLN 3.41 per liter to PLN 5.35 per liter. The price increase was also recorded in the case of LPG, however, the increase was the smallest and amounted to 37% (an increase of 72 groszes), from PLN 1.95 per liter in 2004 to PLN 2.67 in 2021. Analysis of the possibility of purchasing individual fuels for minimum and the average salary is presented in Tables 5, 6 and 7.

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Table 5. Pb95 gasoline purchase opportunities for the minimum and average wages along with the change in the presented indicators

Year	The number of liters of Pb95 gasoline that can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	The number of liters of Pb95 gasoline that can be purchased for the minimum monthly wage	Chain increase y/y [previous year = 100]
2004	608.93	100.00	219.15	100.00
2005	633.06	103.96	225.80	103.03
2006	691.96	109.31	251.15	111.23
2007	620.05	89.61	215.67	85.87
2008	836.33	134.88	319.89	148.32
2009	749.51	89.62	308.21	96.35
2010	707.23	94.36	288.82	93.71
2011	662.67	93.70	270.18	93.55
2012	616.75	93.07	262.70	97.23
2013	664.86	107.80	291.44	110.94
2014	719.29	108.19	319.39	109.59
2015	845.94	117.61	379.61	118.85
2016	932.54	110.24	426.27	112.29
2017	930.61	99.79	435.73	102.22
2018	930.03	99.94	425.96	97.76
2019	983.63	105.76	450.00	105.64
2020	1,171.76	119.13	589.57	131.02
2021	1,040.91	88.83	514.71	87.30
Cumulative growth 2004–2021	431.98	171%	295.56	235%

Source: Authors' own study based on POPiHN reports (www5).

When analyzing the possibilities of purchasing Pb95 gasoline for the minimum and average wages, it should be noted that the purchase opportunities in the analyzed period clearly increased. The minimum wage in 2004 allowed the purchase of 219.15 liters of gasoline, while in 2021, it was 514.71. This means an increase in absolute values by 295.56 liters, while in relative values the increase was 135%. For the equivalent of the average salary in 2004, one could buy 608.93 liters of gasoline, while in 2021 – 1,040.91 liters. This means an increase of nearly 432 liters and 71%.

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Table 6. Diesel oil purchase opportunities for minimum and average wages along with the increase in the presented ratios

Year	The number of liters of diesel oil that can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	The number of liters of diesel oil that can be purchased for the minimum monthly wage	Chain increase y/y [previous year = 100]
2004	671.43	100.00	241.64	100.00
2005	639.86	95.30	228.23	94.45
2006	686.21	107.24	249.06	109.13
2007	651.58	94.95	226.63	91.00
2008	826.93	126.91	316.29	139.56
2009	845.49	102.24	347.68	109.92
2010	753.50	89.12	307.71	88.50
2011	671.84	89.16	273.91	89.02
2012	618.92	92.12	263.62	96.24
2013	663.65	107.23	290.91	110.35
2014	724.80	109.21	321.84	110.63
2015	870.49	120.10	390.63	121.37
2016	982.33	112.85	449.03	114.95
2017	964.22	98.16	451.47	100.54
2018	933.81	96.85	427.70	94.74
2019	971.97	104.09	444.66	103.97
2020	1,166.47	120.01	586.91	131.99
2021	1,058.42	90.74	523.36	89.17
Cumulative growth 2004–2021	386.99	158%	281.72	217%

Source: Authors' own study based on POPiHN reports (www5).

In the case of diesel fuel, the possibility of purchasing this source of energy for minimum and average wages has also increased. In 2004, the minimum wage allowed the purchase of 241.64 liters of diesel fuel, while in 2021, it was 523.36 liters. This means an increase in absolute values by 281.72 liters, while in relative values the increase amounted to 117%. In 2004, 671.43 liters of diesel fuel could be purchased for the equivalent of the average salary, while in 2021 – 1,058.42 liters. This means an increase of almost 387 liters and 58%. The increase in the possibility of purchasing compared to gasoline was smaller (Table 6).

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Table 7. LPG purchase opportunities for the minimum and average wages along with the increase in the presented ratios

Year	The number of liters of LPG that can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	The number of liters of LPG that can be purchased for the minimum monthly wage	Chain increase y/y [previous year = 100]
2004	1,174.14	100.00	422.56	100.00
2005	1,086.89	92.57	387.67	91.74
2006	1,232.45	113.39	447.31	115.38
2007	1,180.28	95.77	410.53	91.78
2008	1,479.34	125.34	565.83	137.83
2009	1,686.39	114.00	693.48	122.56
2010	1,452.69	86.14	593.24	85.55
2011	1,302.50	89.66	531.03	89.51
2012	1,262.25	96.91	537.63	101.24
2013	1,454.21	115.21	637.45	118.57
2014	1,472.16	101.23	653.70	102.55
2015	1,989.68	135.15	892.86	136.59
2016	2,248.45	113.01	1,027.78	115.11
2017	2,053.61	91.33	961.54	93.56
2018	2,056.07	100.12	941.70	97.94
2019	2,298.21	111.78	1,051.40	111.65
2020	2,545.55	110.76	1,280.79	121.82
2021	2,120.80	83.31	1,048.69	81.88
Cumulative growth 2004–2021	946.66	181%	626.13	248%

Source: Authors' own study based on POPiHN reports (www5).

The possibility of purchasing LPG for the minimum and average remuneration increased in relation to the other analyzed liquid fuels to the greatest extent. The minimum wage in 2004 allowed the purchase of 422.56 liters of LPG, while in 2021, it was 1,048.69 liters. This means an increase in absolute values by 626.13 liters, while in relative values the increase was 148%. For the equivalent of the average salary in 2004, one could buy 1,174.14 liters of LPG, while in 2021 – 2,120.80. This means an increase of almost 945 liters and 81% (Table 7).

Electricity

Electricity is one of the important sources of energy in Poland. It is used not only to illuminate rooms, but also to heat and cool, cook, and to power electronics and household appliances (Bieńkowska-Gołasa, 2018; Sowa, 2018).

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Table 8. List of electricity prices with changes in prices in 2004–2021

Year	Electricity price for a household consumer including the fee for the provision of electricity distribution services [PLN/kWh] with VAT	Chain increase y/y [previous year = 100]	Average annual electricity sales price on the competitive market [PLN/kWh]	Chain increase y/y [previous year = 100]
2004	0.41	100	0.17	100.00
2005	0.42	102.44	0.17	100.63
2006	0.44	104.76	0.18	103.68
2007	0.45	102.27	0.18	100,89
2008	0.50	111.11	0.19	105.17
2009	0.53	106.00	0.24	126.87
2010	0.55	103.77	0.24	99.04
2011	0.56	101.82	0.24	101.83
2012	0.57	101.79	0.25	101.24
2013	0.58	101.75	0.22	90.16
2014	0.56	96.55	0.20	90.10
2015	0.57	101.79	0.21	103.92
2016	0.56	98.25	0.21	99.83
2017	0.55	98.21	0.20	96.46
2018	0.62	113.05	0.24	118.69
2019	0.60	96.18	0.30	126.32
2020	0.66	110.53	0.31	102.95
2021	0.73	110.66	0.34	110.05
Cumulative growth 2004–2021	0.32	178%	0.17	200%

Source: Authors' own study based on URE (www4) and GOV annual reports (www1 and www3).

The data presented in Table 8 reveal the average price of electricity (1 kWh) for an individual consumer in the years 2004–2021. The presented values show that the prices in absolute values in the analyzed period increased from 0.41 to 0.73 PLN per 1 kWh, i.e. by 0.32 PLN (78%) in the case of electricity prices for individual consumers. On the other hand, consumers not using tariff protection paid PLN 0.17 per 1 kWh in 2004 (excluding charges including the provision of electricity distribution services), while in 2021 – PLN 0.34 per 1 kWh (increase by 100%).

Due to the fact that individual consumers benefit from the tariff protection of the President of the Energy Regulatory Office, the authors took into account only prices from the regulated market.

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Possibilities of purchasing electricity for minimum and average wages increased in the analyzed period. The minimum wage in 2004 allowed for the purchase of 2,009.76 kWh of electricity per month, while in 2021, it was 3,827.85 kWh. This means an increase in absolute values by 1,818.09 kWh, while in relative values the increase was 90%. For the equivalent of the average salary in 2004, it was possible to buy 5,584.32 kWh of electricity per month, while in 2021, it was 7,741.19 kWh. This means an increase by almost 2,157 kWh and 39% in relative terms.

Table 9. Electricity purchase opportunities for minimum and average wages, including changes in the presented ratios

Year	kWh of electricity can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	kWh of electricity can be purchased for a minimum monthly wage	Chain increase y/y [previous year = 100]
2004	5,584.32	100.00	2,009.76	100.00
2005	5,667.36	101.49	2,021.43	100.58
2006	5,630.07	99.34	2,043.41	101.09
2007	5,980.07	106.22	2,080.00	101.79
2008	5,887.76	98.46	2,252.00	108.27
2009	5,854.64	99.44	2,407.55	106.91
2010	5,863.60	100.15	2,394.55	99.46
2011	6,070.57	103.53	2,475.00	103.36
2012	6,178.37	101.78	2,631.58	106.33
2013	6,293.21	101.86	2758.62	104.83
2014	6,756.18	107.36	3,000.00	108.75
2015	6,841.72	101.27	3,070.18	102.34
2016	7,227.16	105.63	3,303.57	107.60
2017	7,766.38	107.46	3,636.36	110.07
2018	7,374.22	94.95	3,377.48	92.88
2019	8,224.01	111.52	3,762.38	111.40
2020	7,817.63	95.06	3,933.42	104.55
2021	7,741.19	99.02	3,827.85	97.32
Cumulative growth 2004–2021	2,156.87	139%	1,818.09	190%

Source: Authors' own study.

Heat price

The last of the analyzed components is the price of heat produced by collective production plants (household, housing estate and municipal boiler houses). However, not every individual consumer has the opportunity to use this type of energy source due to the lack of access to the network and the distance from large clusters of houses or apartment blocks.

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Table 10. List of heat prices with the change in prices in the years 2004–2020

Year	Average single-component price of heat [PLN/GJ]	Chain increase y/y [previous year = 100]
2004	29.06	100.00
2005	29.22	100.55
2006	29.88	102.26
2007	30.74	102.88
2008	32.61	106.08
2009	35.45	108.71
2010	36.50	102.96
2011	39.19	107.37
2012	41.30	105.38
2013	44.27	107.19
2014	47.23	106.69
2015	48.97	103.68
2016	48.87	99.80
2017	48.33	98.90
2018	49.46	102.34
2019	51.93	104.99
2020	55.95	107.74
2021	no data	-
Cumulative growth 2004–2020	26.89	193%

Source: Authors' own study based on URE (www4) and GOV annual reports (www1 and www3).

The data presented in Table 10 reveal the average purchase price of heat by households from collective production plants in the years 2004–2020. The values show that the prices in absolute values in the analyzed period increased from PLN 29.06 to PLN 55.95 per 1 GJ, i.e. by PLN 26.89 (93%).

Possibilities of purchasing heat for minimum and average wages increased in the analyzed period. The minimum wage in 2004 allowed for the purchase of 28.36 GJ of heat per month, while in 2021, it was 46.47 GJ. This means an increase in absolute values by 18.11 GJ, while in relative values the increase was 64%. For the equivalent of the average salary in 2004, 78.79 GJ of heat energy could be purchased per month, while in 2020, it was 92.36 GJ. This means an increase by almost 13.6 GJ and 17% in relative terms.

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Table 11. List of heat prices with the change in prices in the years 2004–2020

Year	The amount of GJ of heat that can be purchased for an average monthly salary	Chain increase y/y [previous year = 100]	The amount of GJ of heat that can be purchased for a minimum monthly wage	Chain increase y/y [previous year = 100]
2004	78.79	100.00	28.36	100.00
2005	81.46	103.39	29.06	102.47
2006	82.91	101.77	30.09	103.56
2007	87.54	105.59	30.45	101.19
2008	90.28	103.12	34.53	113.40
2009	87.53	96.96	35.99	104.24
2010	88.36	100.94	36.08	100.24
2011	86.74	98.18	35.37	98.02
2012	85.27	98.30	36.32	102.70
2013	82.45	96.69	36.14	99.51
2014	80.11	97.16	35.57	98.42
2015	79.64	99.41	35.74	100.47
2016	82.82	103.99	37.86	105.93
2017	88.38	106.72	41.38	109.32
2018	92.70	104.89	42.46	102.60
2019	94.71	102.16	43.33	102.05
2020	92.36	97.52	46.47	107.25
Cumulative growth 2004–2020	13.57	117%	18.11	164%

Source: Authors' own study.

Conclusions and discussion

In the years 2004–2021, energy security of the individual consumer in the economic dimension significantly improved. This was due to several factors:

1. Both minimum and average wages grew faster than inflation. The cumulative increase in the minimum wage in the analyzed period was 340%, and in the average – 247%.

2. In the period under review, the prices of heating coal increased by 117%, and the possibility of purchasing coal by an individual consumer with a minimum remuneration of up to 2.8 tons and an average remuneration of up to 5.6 tons of coal also increased. The increase in the purchase price was lower than the increase in the raw material price.

3. In the analyzed period, regular supplies of energy resources, i.e. crude oil and gas, took place. The highest increase in the analyzed period was the increase in the prices of diesel oil by 57%, gasoline by 45%, and gas by 37%. In 2021, for the minimum wage one could buy by 295.5 liters of Pb95 petrol, by 281.7 liters of diesel and by 626.1 liters of gas more than in 2004. In the case of the average wage,

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the increase in the purchase of raw materials was even greater. In 2021, 432 liters of Pb95 gasoline, 387 liters of diesel and 945 liters of gas can be purchased.

4. Electricity prices for individual consumers in Poland increased by 78% per 1 kWh in the analyzed period, with the minimum wage it was possible to buy 90% more KWh, for the average salary – more by 39%.

5. The prices of heat generated by municipal, housing estate increased by 93% in the analyzed period. For the minimum wage in 2021, it was possible to buy 64% more heat than in 2004, and for the average wage only by more than 17%.

6. The minimum wage growth rate in 2004–2021 was higher than the average wage. In 2021, the minimum wage allowed to buy more heat and electricity than the average wage. For lower-income individual consumers, it has increased the availability of two basic elements of energy security: heat and electricity. Such a relationship did not occur in the case of the purchase of heating coal, Pb95 gasoline, diesel oil and gas. In this case, there was a greater percentage increase in purchased raw materials for average wages.

7. In the analyzed period, individual consumers with both minimum and average wages had greater opportunities to purchase heat, electricity and Pb95 gasoline, diesel oil and gas, which improved their quality of life and increased their energy security.

References

Bałamut, A. (2016). Wpływ prosumenta na zarządzanie bezpieczeństwem energetycznym w Polsce. *Bezpieczeństwo. Teoria i praktyka*, *4*, 57–70.

Bałamut, A. (2017). *Polityka bezpieczeństwa energetycznego Polski w latach 2000–2015*. Kraków: Oficyna Wydawnicza AFM.

Bator, A., & Kukuła, W. (2016). Rola konsumenta w transformacji energetycznej. *ClientEarth Prawnicy dla Ziemi*. Warszawa. Retrieved from https://pl.boell.org/sites/default/files/raport-rola-konsumenta-w-transformacji-energetycznej.pdf

Bieńkowska-Gołasa, W. (2018). Produkcja i wykorzystanie energii elektrycznej w Polsce z uwzględnieniem odnawialnych źródeł energii. *Stowarzyszenie Ekonomistów Rolnictwa i Agrobiznesu*, *18*(3), 17–22.

Boguszewski, R., & Herudziński, T. (2018). *Ubóstwo energetyczne w Polsce*. Warszawa: Pracownia Badań Społecznych SGGW.

Braun, J. (2018). Bezpieczeństwo energetyczne jako dobro publiczne – miary i czynniki wpływające na jego poziom. *Studia Ekonomiczne. Zeszyty Naukowe Uniwersytetu Ekonomicznego w Katowicach*, *358*, 23–32.

Chojnacka, K. (2020). Teoretyczny i praktyczny wymiar ubóstwa na przykładzie ubóstwa energetycznego. *Prace Naukowe. Uniwersytet Ekonomiczny w Katowicach*, 102–110.

European Commission. (2020). *Energy Prices and Costs in Europe*. Retrieved from https://ec.europa.eu/energy/sites/default/files/documents/swd2020_951_-_1_en_autre_document_travail_service_part3_v1.pdf

Gajewski, J., Paprocki, W., & Pieriegud, J. (Eds.). (2019). *Elektromobilność w Polsce na tle tendencji europejskich i globalnych*. Warszawa. Retrieved from https://www.efcongress.com/wp-content/uploads/2020/02/publikacje09__Elektromobilno%C5%9B%C4%87-w-Polsce-na-tle-tendencji-europejskich-i-globalnych.pdf

Pobrane z czasopisma Annales H - Oeconomia **http://oeconomia.annales.umcs.pl**
Data: 31/12/2025 07:14:36

Gonera, Ł., Smolarek, K., & Borychowski, M. (2019). Zmiany wydatków na energie elektryczną w Polsce. In A. Grzelak & J. Stanisławski (Eds.), *Rozwój biogospodarki w Unii Europejskiej. Uwarunkowania, dylematy, perspektywy* (pp. 83–95). Bruksela – Bydgoszcz – Poznań: Wydawnictwo Kujawsko-Pomorskiej Szkoły Wyższej w Bydgoszczy.

Gryz, J., Podraza, A., & Ruszel, M. (Eds.). (2018). *Bezpieczeństwo energetyczne. Koncepcje, wyzwania i interesy*. Warszawa: PWN.

Hoeller, P., Louppe, M., & Vergriete, P. (1996). Fiscal relations within the European Union. *OECD Economics Department Working Papers*, *163*. **doi:10.1787/618282870448**

Kałążna, K., & Rosicki, R. (2010). Analiza interesów w polityce bezpieczeństwa energetycznego w UE. In K. Kałążna & R. Rosicki, *Wymiary bezpieczeństwa energetycznego Unii Europejskiej* (pp. 165–214). Poznań: WSB.

Kłaczyński, R. (2013). Założenia i możliwości perspektywy polskiej polityki energetycznej. In A. Żebrowski, A. Jaeschke, & R. Kłaczyński (Eds.), *Bezpieczeństwo RP. Historia – ekonomia – polityka. Studia z zakresu bezpieczeństwa państwa* (pp. 13–20). Kraków: Wydawnictwo Naukowe Uniwersytetu Pedagogicznego.

Kopits, G. (1992). *Tax Harmonization in the European Community. Policy Issues and Analysis*. International Monetary Fund.

Kwiatkiewicz, P., Szczerbowski, R., & Ćwik, R. (Eds.). (2016). *Energetyka. Szanse wyzwania i zagrożenia*. Poznań: Fundacja na rzecz Czystej Energii.

Kwiatkiewicz, P., Szczerbowski, R. (Eds.). (2017). *Energetyka. Bezpieczeństwo w wyzwaniach*. Poznań: Fundacja na rzecz Czystej Energii.

Kwiatkiewicz, P., & Szczerbowski, R. (Eds.). (2018). *Energetyka. Aspekty badań interdyscyplinarnych*. Poznań: Fundacja na rzecz Czystej Energii.

Kwiatkiewicz, P., Szczerbowski, R., Stańczyk, K., & Sobków, R. (Eds.). (2019). *Energetyka w kręgu bezpieczeństwa i techniki*. Poznań: Fundacja na rzecz Czystej Energii.

Masztalerska, M. (2011). Znaczenie efektywności energetycznej dla bezpieczeństwa energetycznego kraju. *Polityka Energetyczna*, *14*(1), 1–16.

Miazga, A., & Owczarek, D. (2015). Dom zimny, dom ciemny – czyli ubóstwo energetyczne w Polsce. *IBS Working Paper*, *16/2015*. Retrieved from https://mpec.przemysl.pl/plugins/filemanager/userfiles/images/2015/pub/ubenerg.pdf

Miciuła, I. (2015). Sytuacja na globalnym rynku surowców energetycznych i perspektywy rozwoju do 2030 roku. *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania*, *41*, t. 2: *Gospodarka regionalna i międzynarodowa* (pp. 309–321).

Misiągiewicz, J. (2019). *Bezpieczeństwo energetyczne Unii Europejskiej*. Lublin: Wydawnictwo UMCS.

Mroczyński-Szmaj, Ł., & Mroczyńska-Szmaj, E. (2018). Współczesny polski model bezpieczeństwa indywidualnego konsumentów na rynku energii – wybrane definicje oraz aspekty systemowe. *Polityka Energetyczna*, *21*(1), 51–68.

Niedziółka, M. (2019). Rola państwa w kształtowaniu lokalnego bezpieczeństwa energetycznego. *Wrocławskie Studia Politologiczne*, *27*, 213–222.

Obwieszczenie Marszałka Sejmu Rzeczypospolitej Polskiej z dnia 15 czerwca 2012 r. w sprawie ogłoszenia jednolitego tekstu ustawy – Prawo energetyczne (Dz.U. 2012 poz. 1059).

Pach-Gurgul, A. (2014). Energetyka odnawialna w warunkach handlowych. *Studia Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego*, *1*(3), 130–147.

Pach-Gurgul, A. (2016). Unia Energetyczna – nowy etap polityki energetycznej Unii Europejskiej? *Finanse, Rynki Finansowe, Ubezpieczenia*, *3*(81), 213–224. **doi:10.18276/frfu.2016.81-19**

Rogus, R., Mazanek, Ł., Maczuga, R., & Cebo, W. (2019). Analiza zapotrzebowania na węgiel opałowy w gospodarstwach domowych w kontekście tendencji zmian w rynku komunalno-bytowym. *Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi i Energią Polskiej Akademii Nauk*, *108*, 63–70.

Ruszel, M., & Podmiotko, S. (2019). *Bezpieczeństwo energetyczne Polski i Europy. Uwarunkowania, wyzwania i innowacje*. Rzeszów: Instytut Polityki Energetycznej im. I. Łukasiewicza.

Pobrane z czasopisma Annales H - Oeconomia **http://oeconomia.annales.umcs.pl**
Data: 31/12/2025 07:14:36

Sowa, S. (2018). Odnawialne źródła energii jako czynnik wpływający na poprawę efektywności ekonomicznej. *Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi i Energią Polskiej Akademii Nauk*, *105*, 187–196.

Sozański, J. (2013). Niedostatki unijnej ochrony praw konsumenta w Polsce. *Jus Novum*, *3*, 226–254.

Trubalska, J. (2017). W kierunku unii energetycznej: Nowa koncepcja bezpieczeństwa energetycznego w Unii Europejskiej. *Zeszyty Naukowe Instytutu Gospodarki Surowcami Mineralnymi*, *97*, 21–31.

Wasiuta, A. (2015). Źródła energii odnawialnej i ekoinnowacje szansą dla zapewnienia bezpieczeństwa energetycznego. *Kultura Bezpieczeństwa. Nauka – Praktyka – Refleksje*, *20*, 358–377.

Wysokiński, M., Trębska, P., & Gromada, A. (2018). Problem ubóstwa energetycznego w Polsce. *Roczniki Naukowe Stowarzyszenia Ekonomistów i Agrobiznesu SERiA*, *20*(3), 171–176.

Online references

www1: https://stat.gov.pl/sygnalne/komunikaty-i-obwieszczenia/lista-komunikatow-i-obwieszczen/
www2: https://zus.pox.pl/zus/minimalne-wynagrodzenie-za-prace-obecnie-i-w-przeszlosci.htm
www3: https://www.infor.pl/wskazniki/glowny-urzad-statystyczny/
www4: https://www.ure.gov.pl/pl/cieplo/energetyka-cieplna-w-l
www5: https://popihn.pl/raporty-i-konferencje/