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### THE IMPACT OF THE COVID-19 PANDEMIC ON HOUSEHOLDS' ENERGY CONSUMPTION: THE CASE OF POLAND

#### | Abstract

- ▶ *Goal* – the aim of the article is to investigate and assess the energy situation of Polish consumers aged 25–45 during the coronavirus pandemic. In particular we wish to find information concerning the response to the impact of a pandemic situation on consumer behavior in terms of energy consumption, possibilities and willingness to save energy and the ability to cover energy bills.
- ▶ *Research methodology* – the research was based on CAWI (Computer-Assisted Web Interview) methodology as a tool to assess the energy situation of respondents aged 25–45. Information on the surveyed population sample was obtained through the use of a research questionnaire filled with questions of mostly qualitative nature. Some of the questions were open-ended, which made it possible to delve into the actions and motivations taking place in households during the pandemic. The survey was conducted on a sample of 533 respondents, covering all of Poland. The study was conducted in the period October–November 2021.
- ▶ *Score/results* – the results of the study highlight the basic implications of respondents' energy consumption in the consequence of the lockdown caused by the COVID-19 pandemic. Household energy consumption implications can be understood as temporary changes and some as long-term changes. Research results show various impacts on energy consumption in households, which were assessed in two areas: standard lifestyle and work at home.
- ▶ *Originality/value* – the analysis carried out in the paper allows assessing the relationship between the impact of the COVID-19 pandemic on the scale of electricity

consumption in households. Research results can provide energy saving recommendations for consumers. In addition, the study shows aspects of social trends in household energy consumption in times of crisis such as a pandemic.

| **Keywords:** energy security, Poland, COVID-19, energy consumption, households

## 1. Introduction

One of the main problems facing the global economy has been the COVID-19 pandemic, which has negatively affected economies of many countries. Despite the global pandemic, national economies must continue to develop and social, economic and political challenges will not disappear without appropriate decisions and actions. The outbreak of the COVID-19 pandemic has also affected many industries and sectors [Quarnain et al., 2020], including the energy sector, causing changes in the electricity demand profiles of consumers. This situation has significantly influenced the energy sector, where correct forecasting of energy consumption is one of the key factors guaranteeing the stability and security of consumers' and producers' operations. The International Energy Agency (IEA) indicates that the change in energy demand in 2020 was the largest in 70 years [IEA, 2020].

The relationship between COVID-19 and the performance of energy sector in the literature is discussed in the context of the energy crisis [Brosemer et al., 2020], the increase in energy demand [Gillingham et al., 2020; Norouzi et al., 2020] and sustainable energy transformation [Kuzemko et al., 2020]. However, research into the relationship between COVID-19 and consumer energy use may offer new perspectives on changing energy needs [see: Caetano et al., 2017].

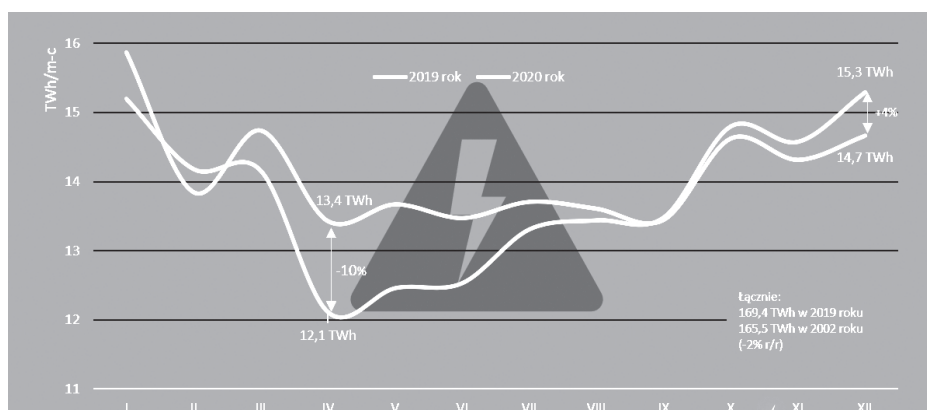
This paper analyzes the energy consumption of households in Poland during the COVID-19 pandemic. The introduction of the lockdown resulted in the confinement of energy consumers in their homes, which led to a significantly high electricity consumption in residential buildings [Bhagwati, 2020]. Therefore, there was an increase in electricity consumption in households during the lockdown, mainly due to the use of household appliances. This relationship is shown in Figure 1. Theoretically, higher electricity bills in households should stimulate energy saving [Bilal et al., 2022; Wang et al., 2018]. The increase in electricity consumption in apartments might also offset the corresponding decrease in energy consumption in trade and industry [*India's electricity...*, 2020]. There is no doubt that uninterrupted energy supplies are of paramount importance to the

inhabitants who have had to stay in their homes. Empirical research shows the correctness of the above assumptions, mostly in developing countries [Surahman et al., 2022; Azhgaliyeva et al., 2021].

The aim of the article was formulated in the above context and subject area of research. Therefore, the main goal of the article is to identify the energy situation of Polish consumers during the coronavirus pandemic. In particular, it was intended to obtain an answer to the questions concerning the impact of the pandemic situation on consumer behavior in terms of:

- energy consumption, the ability and willingness to save energy and the ability to pay energy bills,
- affecting the standard of living of people setting up their own households (age 25–45) and young families.

Figure 1. Monthly electricity consumption in Poland in 2019–2020.



Source: Polskie Sieci Energetyczne, January 2021.

This study contributes to the literature by presenting the case of Poland in identifying household energy consumption motives during the COVID-19 pandemic. It examines the impact of the pandemic on household energy consumption in relation to such areas as standard and lifestyle of energy consumers as well as motives for energy consumption/saving stemming from switching to home office. The research was done during the pandemic period, which means that the respondents were coping with the actual situation at the moment of conducting surveys. The results of the research might hopefully provide new guidance on the policies affecting the behavior of energy consumers in the area of electricity saving.

## 2. Research methodology

The implementation of goals and the verification of research hypotheses required the use of appropriate methods of analysis. The study was based on the method of direct research using a questionnaire with qualitative-type questions. Some of the questions were open-ended, which allowed us to get deeper insights into the motives of households during the pandemic.

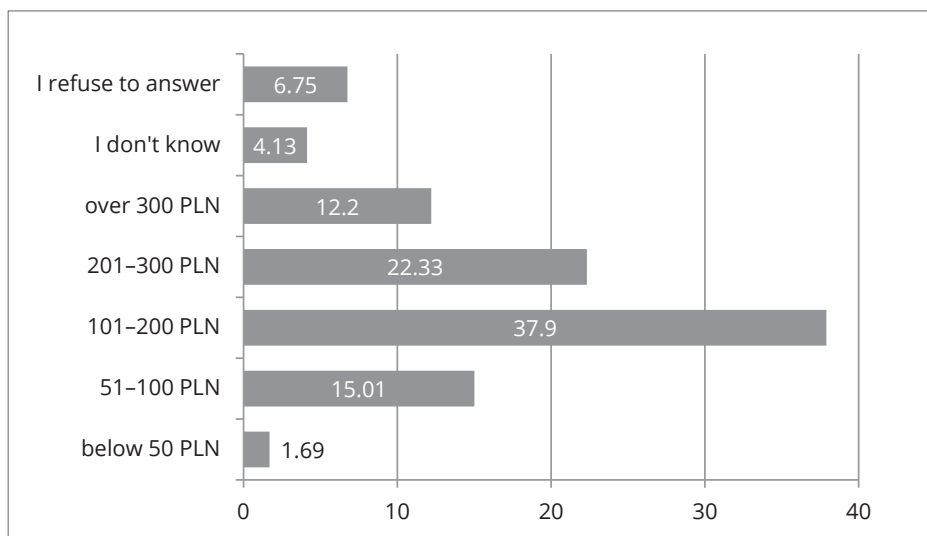
The research was carried out using the CAWI (Computer Assisted Web Interview) method, which in the then-current situation was one of the few opportunities to learn about the respondents' situation. This method enables the participation of a large group of respondents while maintaining anonymity. The survey was conducted on a sample of 533 respondents. Women constituted 60.2 percent and men 39.8 percent of the total. The respondent group consisted mostly of people with higher education (BA or MA), who constituted 55.7 percent of the total, and with secondary education – 38.8 percent. Persons with other levels of education were in minority, i.e. persons holding PhD were below 2 percent of respondents and people with primary or lower secondary education were 3.5 percent of the total.

Most of the respondents lived in the urban area – 81.6 percent, whereas only 18.1 percent came from rural areas. Taking into account the age of the respondents, the smallest share were respondents between 36 and 40 years old, i.e. 18.2 percent. The analysis of the age distribution shows that in the remaining age groups the percentage is at a similar level, i.e. about 27 percent for all groups. The number of persons in the household indicates that the largest share are households with 2, 3 or 4 persons (27.4 percent, 25.5 percent, and 24.8 percent correspondingly). Only 7.5 percent of the respondents were a single parent of a child or children. Most of the respondents (47.1 percent) indicated that the household was inhabited by children and adolescents up to 16 years of age, and students/young adults (15.2 percent). The average monthly income per capita of the respondents ranged from PLN 2,501 to PLN 5,000 (36.21 percent) and from PLN 1,501 to PLN 2,500 (23.64 percent). As many as 15 percent of the respondents indicated that the monthly income per person was up to PLN 1,500 (15.38 percent). With regard to energy usage costs, for most of respondents energy bills were between 100 and 300 PLN per month. For 12.2 percent of the surveyed they extended over 300 PLN (see Chart 1 for more details).

The study was conducted in October-November 2021. The study area covered the entire territory of Poland. The results of the research are presented in diagrams, but only a fraction of the results could be shown in a single paper. We have selected the

results linked to socio-economic factors of well-being in Poland with special attention paid to young families, which had received lots of attention from the Law and Justice government since 2015 in the form of public allowances and cultural recognition.

Chart 1. Monthly household electricity bills (% of households)



Source: author's survey.

### 3. The results

The research results are presented in two related areas, based on links between energy consumption, the ability and willingness to save energy, and the ability to cover energy bills. Firstly, the results in the area of standard of life and lifestyle<sup>1</sup> show a positive relation between the increase in energy saving and the ability to pay electricity bills. Secondly, the results obtained for energy saving and billing capacity are summarized together to indicate the changes taking place between the two needs in households significantly affected by the pandemic. Finally, the results

<sup>1</sup> Standard of life and lifestyle are two similar notions, but we decided to treat them separately. The standard of life should be understood as the degree of wealth and material comfort available to a given household. The lifestyle concerns the way in which persons in a given households live, including the interests, values and ideas supported by them. This recognition implies that households might have different motivations (materialistic or idealistic) for saving energy.

for household energy savings during the COVID-19 pandemic are summarized. This category is responsible for the comfort of living and an expected standard of life in households. The results in the area of switching to home office show a correlation between the increase in energy bills in households and working at home due to the lockdown, as well as the lack of compensation from employers for higher respondents' bills. The home office period shows increased energy saving during the pandemic, but also a return to pre-pandemic habits after lockdowns had been lifted.

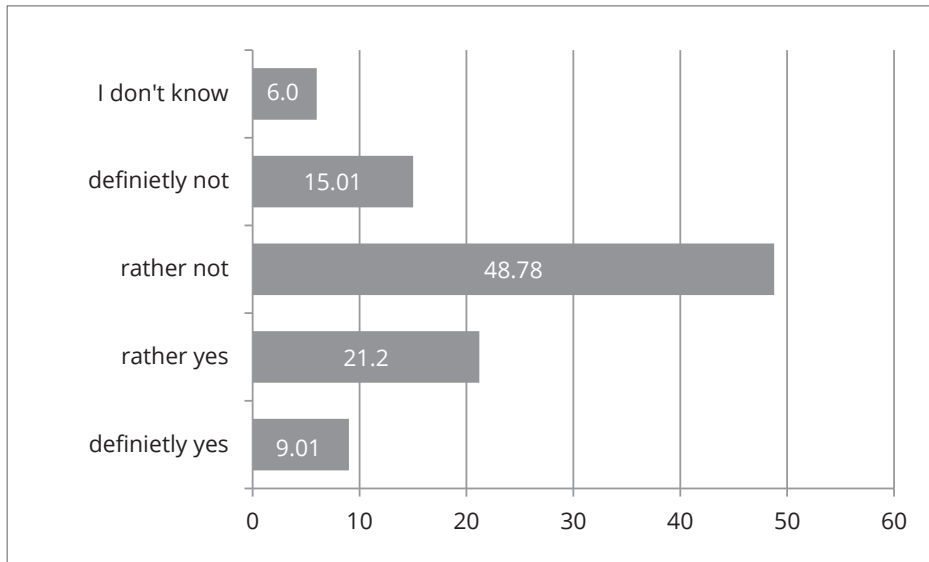
The research shows that the standard of life (or lifestyle) significantly influences household energy saving decisions. The increase in energy consumption and the increase in its prices meant that only 30 percent of respondents felt the need to save energy during the pandemic. At the same time, as many as 63 percent did not feel such a need at all (Chart 2). This fact can be interpreted in various ways, i.e. 1) most Poles are ready to pay more in energy bills to maintain their lifestyle, or 2) energy remains relatively cheap, so its price increases do not translate into budget difficulties for households. Resolving this issue will require further questionnaire research. However, what is worth noting, many respondents have already explained shortly the reasons why they were not willing to save energy:

- for 24.2 percent it would mean a reduction in the standard/comfort of their life,
- for 17 percent it would be too complicated in terms of changing their lifestyle,
- as much as 12.6 percent do not care about extensive energy consumption.

To conclude, it were socio-cultural and possibly educational reasons that overshadowed economic incentives (possibly weak incentives considering relatively low prices of energy) in making consumer decisions not to save energy.

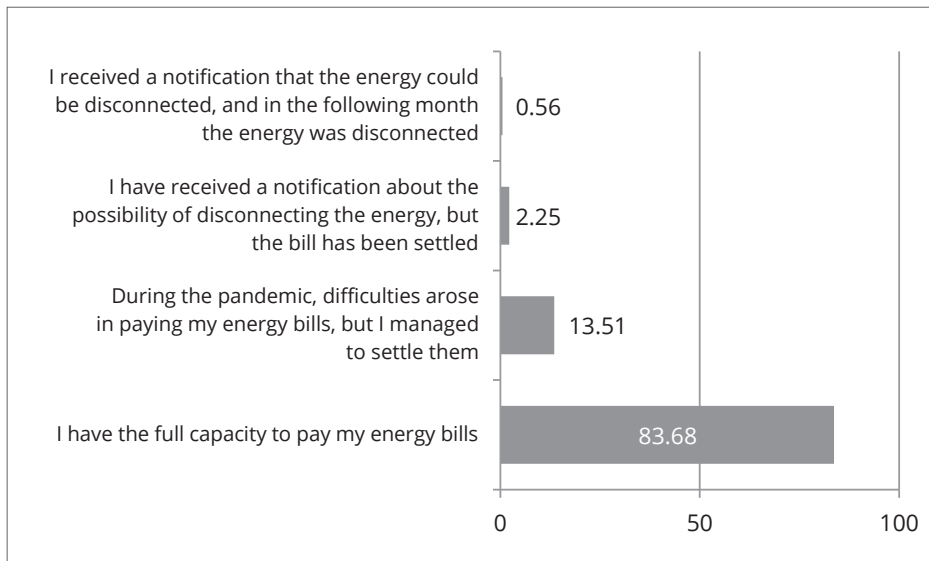
At the same time, it is worth emphasizing that as many as 83 percent of the respondents were of the opinion that they had full capacity to pay their energy bills (Chart 3). Thus, some people, convinced of their financial liquidity, still felt the rising energy costs and the need to save it. Much more important is that, especially from the point of view of public policies, as many as 16.5 percent of Poles had problems paying their energy bills during the COVID-19 pandemic. The vast majority of them finally managed to cover the electricity bill, but this proves tight household budgets and the negative impact of the pandemic on the possibility of consuming basic goods, such as electricity. Moreover, 14 percent of respondents indicated that they covered their energy bills at the expense of other necessary items, such as medicines or food. Also, as many as 61 percent of respondents receiving social benefits ("Family 500 + program", energy subsidies) considered them to be a significant facilitation in paying their energy bills.

**Chart 2.** Respondents on the need regarding saving electricity as a result of the COVID-19 pandemic (%)



Source: author's survey.

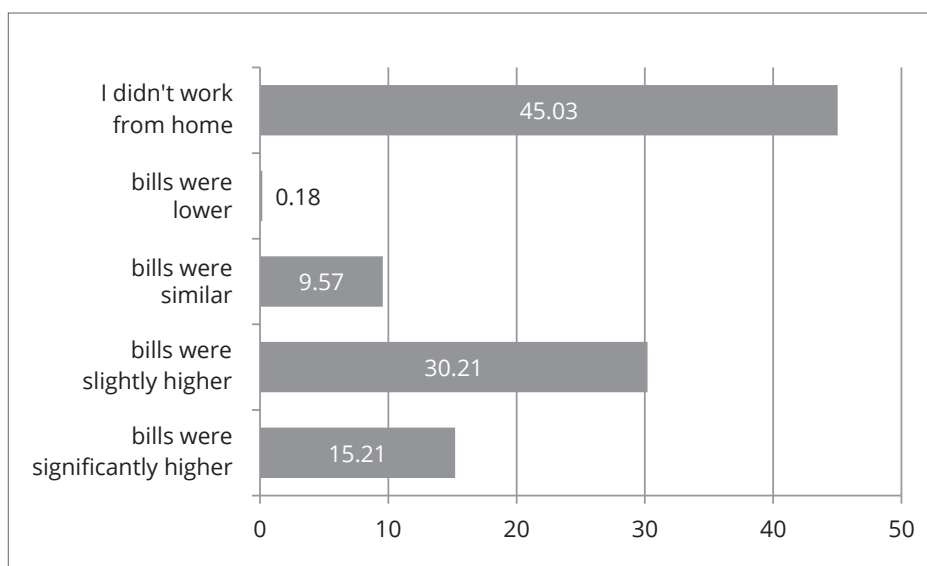
**Chart 3.** Respondents' ability to pay their energy bills from the outbreak of the pandemic to today ( percent)



Source: author's survey.

For nearly 55 percent of respondents, the pandemic meant switching to home office. Among them, as much as 82.6 percent claimed that working at home translated into higher energy bills, whereof for 27.5 percent the bills were significantly higher than before the pandemic (Chart 4). The reason for higher bills in this case was forced remote work, which required the use of computer equipment and usually constant internet access. In addition, higher electricity consumption during the lockdown period was caused by more frequent use of electrical equipment, i.e. desk lamps, coffee makers, electric kettles and stoves, etc.

Chart 4. The impact of home office during the COVID-19 pandemic on respondents' energy bills (%)



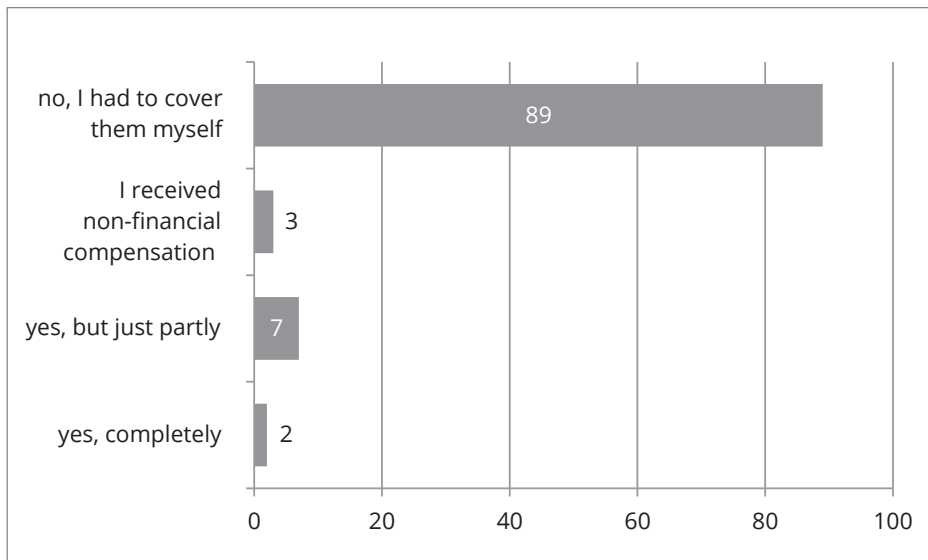
Source: author's survey.

Higher electricity bills, as indicated by 89 percent of the respondents, were not compensated by the employer. The respondents themselves had to bear the cost of higher bills. 7 percent of them received partial compensation, 3 percent indicated that they received non-financial compensation, and only 2 percent received full financial compensation from the employer (Chart 5). This suggests that employers were able to flip some operational costs on workers, who could not refuse, being afraid of losing their jobs in highly insecure times. However, this situation should require some public legislation to counterbalance stronger position of employers on labor market in times of crisis.



After the most deadly waves of the pandemic, when lockdowns had been lifted and life had returned to relative normality, the respondents faced the decision whether to continue with energy saving. However, 22 percent of them declared that their change in behavior was only temporary and returned to previous habits. Considering the fact that 12 percent of respondents claimed that they did not try to save energy, 34 percent of the surveyed households learned no lesson from the pandemic period and is not willing to save the energy. However, almost 35 percent of respondents claimed that they are trying to continue with energy saving and 33 percent adopted some (though not all) energy saving habits from lockdown period. It remains unclear for now how much of the behavior change was caused by closing home office and returning to workplaces provided by the employer and how much by permanent change of habits motivated by lower energy bills or changed lifestyle. This requires further research.

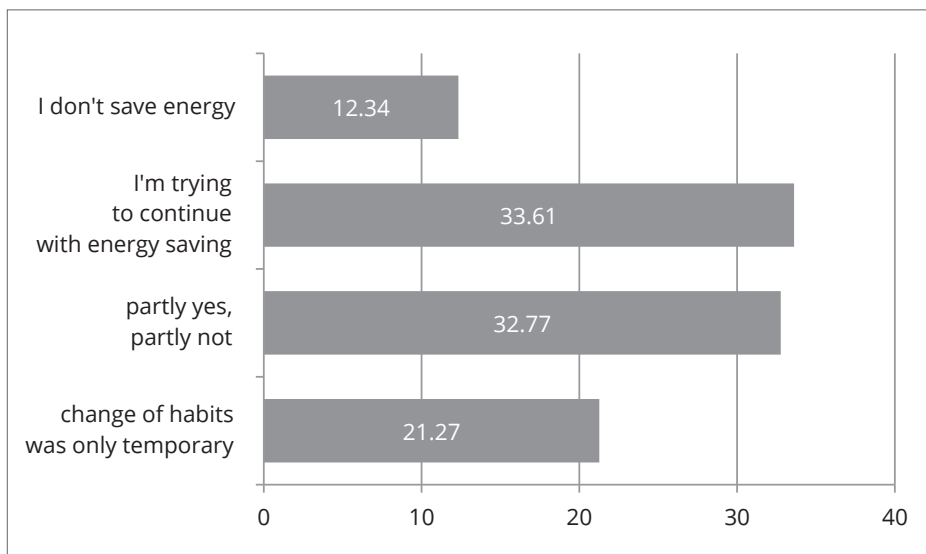
Chart 5. Employer compensation for higher energy bills of the respondents (%)



Source: author's survey.

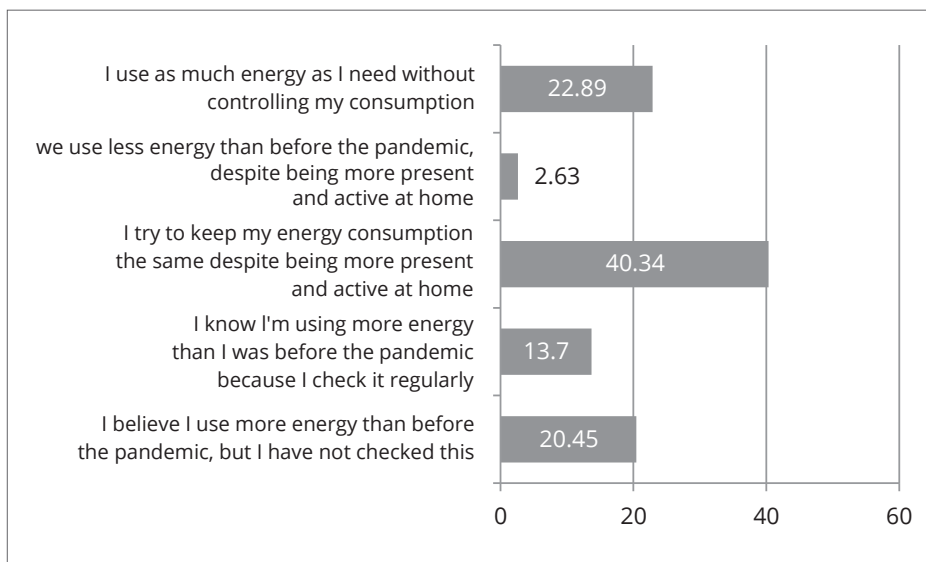
Respondents' assessment of energy saving in the context of COVID-19 is presented in Chart 7. As many as 33 percent of respondents indicated that they use more energy than before the pandemic, of which 13 percent even compared their bills to be sure of it. Among surveyed households, slightly over 40 percent try to keep their energy consumption constant despite staying more at home.

Chart 6. Return to pre-pandemic habits of energy use after the first waves of the COVID-19 pandemic (%)



Source: author's survey.

Chart 7. Final statements of respondents regarding energy saving in the context of the COVID-19 pandemic (%)



Source: author's survey.

It is worth noting that as many as 22 percent of respondents use as much energy as they need without controlling the consumption. This means that for these households, the increase in energy prices as well as the increased energy consumption in homes as a result of the lockdown does not provide incentives to save energy. This should be recognized by policy makers when designing tools and institutions that are supposed to assist in reducing energy consumption in the future.

#### 4. Conclusions

The study was conducted during the COVID-19 pandemic and focused on household energy consumption patterns. We assumed that the pandemic will have impact on energy savings patterns, billing capacity, and changing levels of energy consumption due to lockdowns and work from home.

Based on the research, the following conclusions can be drawn:

1. The COVID-19 pandemic had a limited impact on energy savings in households in Poland despite increased energy consumption and higher bills.
2. The COVID-19 pandemic confirmed the existing social divisions:
  - difficulties with paying energy bills contrasted with uncontrolled energy consumption among households,
  - employers were able to shift operational costs (i.e. energy costs) on employees, often without compensation.
3. The survey confirmed that Poles appreciate the importance of social programs (e.g. “Family 500+”) for balancing their household budget.
4. Getting used to comfort and lifestyle is a significant obstacle in motivating Poles to save energy.

The results of this study can hopefully provide guidance for energy suppliers, energy sector regulators or employers, who can influence consumer energy consumption behaviour by modifying incentives in the perspective of future possible crises, be it returning waves of pandemic and energy shortages stemming from other reasons. However, as for the Polish society, the results prompt us to assume that:

- consumption aspirations of a significant part of the society remain unmet,
- Poles are willing to bear higher energy costs to preserve their lifestyle, despite the awareness of increasing price,

- a further increase in energy prices will deepen social divisions and generate pressure to expand specific benefits with regard to subsidizing energy consumption.

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