




# ENERGY AFFORDABILITY AMONG YOUNG PEOPLE IN POLAND

KAROLINA WALAT

SUPERVISOR: SARAH MAWHORTER

FACULTY OF SPATIAL SCIENCES, UNIVERSITY OF GRONINGEN

Bachelor thesis, word count:6025



## **Summary**

Although energy affordability is a widely recognised problem, not a lot of attention has been paid to this issue in relation to young people. Therefore, this thesis explores the relationship between energy affordability and the housing situation among young people in Poland. There are several factors included in the analysis. For instance, the influence of the type of heating system or moving patterns on the affordability of energy bills. The purpose of the thesis is to more in-depth understand the influence of increasing energy prices on young people. A survey was conducted to better understand that phenomenon. Subsequently, binary logistic was performed. The results showed that there is a relationship between people who have difficulties with paying energy bills, moving away from their parents' homes and the size of the city they moved from. Moreover, several other observations were elaborated on in the paper. For instance, the relationship between energy bills and a type of heating or income.

## Table of Content:

<b>1. Introduction .....</b>	<b>4</b>
1.1 Background information .....	4
1.2. Research Problem .....	5
1.3. Structure of the Thesis .....	5
<b>2. Theoretical framework .....</b>	<b>6</b>
2.1. Energy affordability .....	6
2.2. Measures of energy poverty and energy affordability .....	7
2.3. Why are young people classified as vulnerable? .....	7
2.4. Type of housing.....	7
2.5. Structure of a household and energy consumption .....	8
2.6. Rural-urban .....	8
2.7. Type of heating system and energy prices .....	9
2.8. Conceptual model .....	9
<b>3. Methodology .....</b>	<b>10</b>
3.1. Classification of young people .....	10
3.2. Methods .....	11
3.3. Sampling techniques.....	11
3.4. Ethical consideration .....	11
3.5. Data analysis schemes .....	12
<b>4. Results .....</b>	<b>12</b>
4.1. Sample description .....	12
4.1.1 Demographic control measures - gender and age .....	12
4.1.2. Migration status .....	13
4.1.3. Housing situation .....	13
4.1.4. Income .....	13
4.1.5. Energy bills .....	14
4.1.6. Difficulties with paying energy bills .....	16
4.2. Findings .....	17
4.3. Statistical Analysis .....	19
4.3.1. Type of tenure.....	19
4.3.2. Type of system heating:.....	19
4.3.3. Size of city of origin: .....	19
<b>5. Conclusions.....</b>	<b>20</b>

5.1.	Discussion .....	20
5.2.	Conclusions.....	20
5.3.	Limitations.....	21
5.4.	Suggestions for further research.....	21
5.5.	Contribution and relevance to spatial planning .....	21
5.6.	Data-collection reflection .....	22
5.7.	Acknowledgments.....	22

## 1. Introduction

### 1.1 Background information

As a result of the constantly flourishing economies of most of the European Union's Member states, the average quality of life has been significantly increasing. It is measured by nine indicators, including material living conditions. Not only taking into consideration the purely monetary situation and consumption patterns, but also housing conditions. Which were identified as an important element influencing the well-being of individuals (Eurostat, 2022). Reasonably cheap access to energy is one of the factors contributing to increasing quality of life. The reason behind this is that people living in inadequate (temperature) comfort are at higher risk of health problems and higher mortality (European Commission, 2022). Moreover, mental health impacts can also be identified as one of the consequences (European Commission, 2022). Often results in stress, which occurs when people are not able to cover basic housing costs, including those related to energy. On top of that, unequal access to energy may even lead to stigmatization and social exclusion of certain, vulnerable groups exposed to this phenomenon. Groups especially exposed to this are elderly people and very young children. Not only because on average they spend more time at home than other age groups. But also due to the fact that they are more vulnerable to health problems when exposed to cold or heat. Among these age groups, the exposition to not adequate temperatures, especially coldness during winter months, may even lead to death (Rudge et Gilchrist, 2005; National Institute for Health and Care Excellence, 2015; Thomson et al., 2017). This is the reason why the impacts on different age groups, such as young people, for instance, are still not enough investigated. Hence, exploring this phenomenon in relation to different age groups is of significant societal relevance. Especially for planning, which aims at minimizing spatial and societal inequalities. Furthermore, the concept of energy affordability among young people and size of their city of origin is not well researched, yet. Therefore, this research aims at minimizing the gap in knowledge regarding this issue.

Moreover, the topic of energy affordability is particularly relevant in the current state of rapidly increasing energy prices. Although, the trend can be visible across the whole of Europe, as noted by Eurostat there is an uprating in energy prices in 16 out of 27 markets (Bankier, 2022). The Polish energy market has been facing difficulties due to several particular reasons. Namely, dependency on Russian coal, and gas as imports and a low share of renewable energy sources (Forum Energii, 2022). Therefore, Russian aggression against Ukraine has been identified as a primary reason behind the current increase in energy prices (Sawicki, 2022).

Several sources indicated that in March 2022 the average energy prices on POLPX (Day-ahead market) have increased by around 25 per cent in comparison to the average price from two previous months (Sawicki, 2022). Moreover, the average prices of long-term individual supply

energy contracts have also significantly increased in comparison to previous months. According to the last analysis from European Bank for Reconstruction and Development (EBRD), the escalation of prices will have significant repercussions on individual households and purchasing power in Poland (EBOR, 2022). Furthermore, it has also been stated that this situation will possibly slow down the energy transition from coal dependency to more sustainable sources of energy in Poland's total energy share (EBOR, 2022). Hence, the relationship between types of heating systems and energy affordability is worth investigating.

As a result of all of that, not only people who fall into the category of 'vulnerable groups' or that live below the poverty line might be negatively affected. Moreover, young people after moving out of their family homes were identified as having restricted economic resources due to precarious employment and income insecurities (Hoolochat et al., 2016; Rosvall, Rönnlund, and Johansson 2018). Therefore, their inclusion in the scope of the research is particularly relevant now in the given context of globally increasing energy prices.

## 1.2. Research Problem

Therefore this paper will aim to answer the following main research question:

What is the relationship between energy affordability among young people living in Poland and their housing situation?

And the following sub-questions:

- What is the relationship among young people between energy affordability and moving out of a family house?
- To what extent does the type of heating system influence energy spending?
- To what extent find young people living in Poland energy affordable?

## 1.3. Structure of the Thesis

The thesis firstly will provide a theoretical framework and conceptual model, to better understand the phenomenon of energy affordability and the specific characteristics of the studied population. Afterwards, methods of analysing, sampling techniques, ethical consideration and data analysis scheme will be introduced in the methodology chapter. This is followed by a sample description, findings based on descriptive statistics and results of statistical analysis. Subsequently, a discussion on how the results correspond with existing literature and broader context is provided. Finally, the conclusion is followed by a reflection on the data-collection instrument, suggestions for further research, contribution and relevance for spatial planning.

## 2. Theoretical framework

Although the general energy consumption has been growing significantly, the phenomenon of energy poverty is still a societal problem in Europe. Mostly remaining a major challenge for vulnerable citizens. According to statistics, this applies especially to elderly people and very young children. Due to the fact that, on average, they spend more hours per day at home than other age groups (Gonzalez-Eguino, 2015 & Jessel et al., 2019). In most of the EU countries, the ‘energy poverty’ concept is defined as the “inability to keep homes adequately warm” (European Commission, 2022). According to an EU-wide survey from 2021, the most significant reasons contributing to the problem are namely: low income, high expenditure of disposable income on energy and poor energy efficiency of buildings (European Commission, 2022). The last one, directly causes increased usage of energy, especially for heating purposes during the cold months. As indicated by several studies, poor housing conditions that make it difficult to keep a house adequately warm, are associated with increased health risks, especially for people with chronic and/or severe illnesses (Pete, 2008; Marmot Review Team, 2011; Thomson et al., 2017). Since older people are more likely to have underlying health conditions, weaker immune systems and generally lower abilities to recover, energy poverty has the most significant impact on them (Marmot Review Team, 2011; Thomson et al., 2017). To this extent that there is evidence that thermal discomfort (low indoor temperatures) caused by inefficient housing conditions increases winter mortality (Rudge et Gilchrist, 2005; National Institute for Health and Care Excellence, 2015; Thomson et al., 2017).

### 2.1. Energy affordability

As mentioned earlier, there is evident demography of energy poverty, especially affecting older people and very young children. However, taking into consideration the main reasons identified by the EU, young people who move out of their family houses are also vulnerable in this case. Due to the increasing prices of housing costs, including rents and energy spending, and at the same time relatively low income.

Although the European statistics did not identify a significant share of young people being affected by energy poverty, the phenomenon of energy affordability is worth referencing to. Affordability itself, according to the Cambridge dictionary (2022) means “the state of being cheap enough for people to be able to buy”. Therefore, when discussing energy affordability it is meant that the energy prices are at a certain level, which enables people to buy and consume it. However, the definition of ‘a certain level’ might vary from country to country due to differences in average income or even the currency.

## 2.2. Measures of energy poverty and energy affordability

To study to what extent the energy is affordable several measures have been identified from the studies on energy poverty. The factors chosen are: After Housing Costs, Energy burden and Low Income High Costs (LIHC) (Bouzarovski & Tirado Herrero, 2016). They all refer to spending on energy in relation to income. However, the energy burden indicator was identified as most suitable for this research. It is understood as 'the share of energy costs in a household's total budget'. The reason behind choosing this particular indicator is that, first of all, it directly applies to energy, not other costs related to housing such as rent for instance. Second of all, it does not include the relative poverty line in its calculations, in comparison to the LIHC approach.

## 2.3. Why are young people classified as vulnerable?

The poverty line is not desired in this research, because as mentioned earlier, young people are not necessarily affected by the energy poverty itself. However, it does not mean that they are not vulnerable to increasing costs of energy. Due to the fact that young people are indeed distressed by factors such as low income and poor efficiency of buildings. The former can be explained by students having part-time jobs, along with their studies. The latter, because they are mostly renters, meaning that the housing conditions, including energy efficiency of the building, are not up to them to decide (DeVaney et al., 2004). Moreover, a combination of both being affected by low income and renting, which oftentimes comes with low housing conditions, a significant part of their income covers only basic housing costs (Clapham et al., 2014). Therefore the energy affordability and energy behaviour patterns among young people in relation to the type of house are worth considering.

## 2.4. Type of housing

The type of dwelling is important to study since it might have a negative impact on energy performance. Therefore, results in higher energy consumption (Stępniaak & Tomaszewska, 2013). More explicitly, poorly insulated housing needs more energy to heat and subsequently sustain a comfortable temperature. According to research conducted by Holloway (2006), households living in detached and semi-detached houses on average use 74 per cent more energy than those living in multi-unit houses. This is strongly related to the insulation characteristics (European Commission, 2021) and the large size of the former type of dwellings (Holloway, 2006). For this analysis, only the distinction between single-family and multi-family dwellings will be applied. The reason for this is to avoid confusion regarding a specific type of housing when conducting the survey.



## 2.5. Structure of a household and energy consumption

Several research (Burke et al., 2002; IPART, 2004; Holloway, 2006) shows that there is a relationship between household composition and energy consumption. More precisely, households that tend to consume more energy are larger households, particularly, couples with children. As mentioned in the previous section, especially those who live in detached dwellings (Holloway, 2006). A single-person or two-person household were found to use half of the energy that multi-person households (Holloway, 2006). However, single households have the highest energy consumption per capita. Furthermore, people who own their houses were found to use more energy than households who rent properties where they live (IPART, 2004; Holloway, 2006). This is particularly relevant in regards to young people who move out of their family houses. They tend to fall into the category of low income, which leads to housing and energy affordability problems (Burke et al., 2002). Research by Burke et al. (2002) on Rent assistance and young people's decision-making found that a great share of young renters allocates 45-50 per cent of their income to pay rent.

## 2.6. Rural-urban

Currently, not a lot of attention has been explicitly paid to energy affordability regarding migration from rural to urban environments. However, there is extensive literature on housing affordability in this context. Considerably, it is still relevant for the theoretical framework, since some research includes energy prices as a component of housing affordability. Moreover, rural to urban migration has been identified as a significant aspect of housing affordability. The reason behind it is that firstly, housing prices influence a decision about migration (Dong & Zhou, 2016). Secondly, differences in housing prices reflect housing conditions, including insulation characteristics (Dong & Zhou, 2016). As mentioned in the previous section, these characteristics have a direct impact on energy efficiency. Several researchers (Gray et al., 2006; Hoolochat et al., 2016; Dong & Zhou, 2016; Rosvall, Rönnlund, and Johansson, 2018; Rosevall, 2020) argue that people migrating from rural to urban have more barriers and restrictions in the process of moving than people already living in urban areas. These barriers are especially restraining for young people, who often move from rural to an urban environment to continue education or to only now look for job opportunities. Therefore, their economic resources are significantly restricted due to precarious employment and income insecurities (Hoolochat et al., 2016; Rosvall, Rönnlund, and Johansson 2018). Moreover, Gray, Shaw, and Farrington (2006) in their study called this phenomenon the 'poverty of access'. This concept refers to differences between the geographical positioning of students in rural and urban areas. More precisely, students in urban areas who lack resources are still considered as being in a more advantageous position and having more prospects than students in rural areas (Rosevall, 2020). This is because urban students already live in geographical proximity to educational

facilities or workplaces. Moreover, according to Rosvall (2020), this geographical (im)mobility also implies social (im)mobility. As a result of financial and social barriers, rural migrants are more vulnerable to the high cost of renting sector in cities (Hoolachan et al., 2016). Therefore, they are more likely to rent low-price houses and hence, are exposed to lower housing conditions (Dong & Zhou, 2016).

## 2.7. Type of heating system and energy prices

Energy expenditures are linked to types of heating systems (Holloway, 2006). The main reason behind it is the usage of different energy sources and their prices, as well as the efficiency of heating systems. In Poland, three dominating types can be differentiated. Namely, gas, electricity and systems fuelled by coal. The former is used by 54 per cent of all households in Poland. 22 per cent of Polish households use electric systems and the remaining 24 per cent uses coal as a fuel for heating (GUS, 2020). Although the last one has a significant share in the context of the whole country, it has been excluded from the analysis. Because it is primarily used in rural areas and the sample mostly lives in the urban environment.

Although prices of both, gas and electricity increase rapidly (Forum Energi, 2022), several sources (Nawalny, 2021; GUS, 2022; 2022; Komputer Świat, 2022; Sawicki, 2022) identified that currently in Poland electric heating systems are cheaper. This is also a consequence of significantly lowering the tax on electricity by the Polish government. From the first of January 2022, the tax on electricity has decreased from 23 per cent to 5 per cent. Even though the gas tax also has been lowered, the difference is not so significant. It has been cut down also from 23 per cent to 10 per cent. Moreover, heating systems run by electricity have different tariff prices during the day and night. The latter is less expensive, positioning electric systems in a more competitive position in relation to gas systems.

## 2.8. Conceptual model

Based on the studied literature, I have created conceptual model to visualise variables influencing energy affordability. As mentioned in the theoretical framework energy affordability can be measured by the share of energy costs in a household's total budget (Bouzarovski & Tirado Herrero, 2016). Energy costs are subordinated to energy prices and the amount of energy consumed. Therefore, in the model, there are three main variables directly influencing energy affordability - income, energy prices and amount of energy consumed. The last one is, however; affected by several other variables interconnected with each other. More precisely, the type of building is connected to particular housing conditions, which influence energy efficiency and performance. People with higher energy efficiency were found to use less energy than those with isolation problems. Therefore, when setting the thermostat to a certain

temperature, people with better energy performance use less energy to be in physical comfort. Moreover, this might have also psychological aspects, particularly for those who have low income and poor energy efficiency conditions. Because this leads to consuming a higher amount of energy and therefore, higher energy bills. Potentially creating stress related to not being able to pay energy bills, resulting in overall decreased wellbeing of individuals.

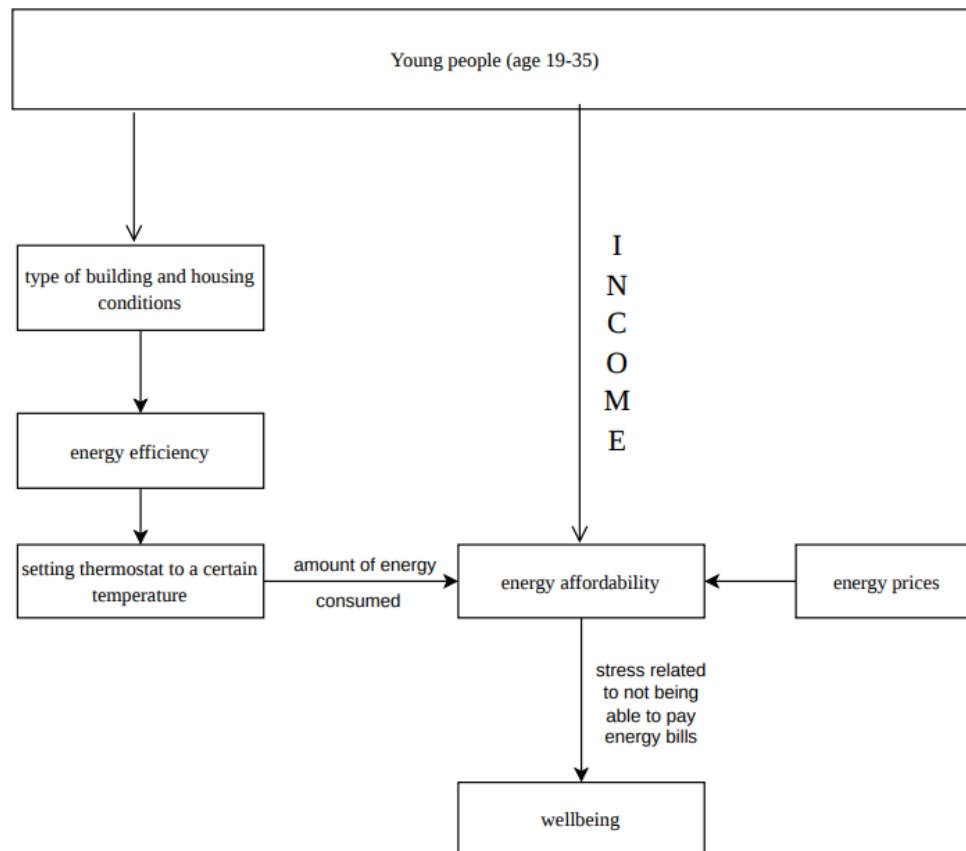


Figure 1. Conceptual model of energy affordability

### 3. Methodology

#### 3.1. Classification of young people

As for the classification of whom falls into the category of young people, the age cohort of 19 years old to 35 years were taken into consideration. The reason for the lower line is that in Poland this is the age of graduating from high school. As for the upper line, this is due to the fact that in Poland the average age of moving out is 27 years (GUS, 2020). Therefore, including people up to 35 years old gives an opportunity for finding a large sample.

### 3.2. Methods

The main research question with sub-questions will be answered through a mix-methods, online survey using Qualtrics. The reason behind choosing this research method is that the survey will enable the investigation of a greater number of respondents regarding energy affordability than in-depth interviews. This is believed to help to better understand the studied population of young people in Poland aged 19-35.

The survey consists of 22 questions. Furthermore, the levels of measurement of the questions are ordinal, ratio, binary and interval. The questions are formulated in such a way that they capture the relationship between the energy affordability and living with or without family, type of housing, migration status, tenure and heating system.

### 3.3. Sampling techniques

For this research non-probability, sampling techniques were applied. In particular, these include convenience/accessibility-based sampling strategies. Given the study population at hand, these techniques seem to be the most appropriate to conduct in an online manner. Therefore, the survey was distributed through social media platforms such as Facebook, Instagram and Whatsapp. To avoid a low level of representativeness by spreading the survey only within certain groups, administrators of renting groups in different Polish cities were approached, with permission for publishing the survey. Through such actions, the sample is believed to be more diverse.

Alternative sampling strategies such as random sampling, stratified sampling or purposive sampling could have been used, but these are harder to carry out among a widely dispersed population of young people in Poland. On top of that, an online survey also helps to avoid the risk of violating the privacy, especially in terms of anonymity.

### 3.4. Ethical consideration

As mentioned at the beginning energy affordability might have several negative consequences on the mental health of individuals and also their possible stigmatization or social exclusion. Therefore, making the topic of this research sensitive. Meaning that special research ethics needs to be taken into consideration to make sure that they are not subjects of any detrimental consequences caused by this research.

Only the data that is needed to answer the research objective was collected anonymously. So that the identity of the research participant is impossible to discern. Collected data is stored with respect to The General Data Protection Regulation (GDPR).

Moreover, regarding compliance with GDPR, a consent form was created and displayed at the beginning of the survey. Its completion was required in order for a research participant to

proceed to the questionnaire or the interview. Special care was taken so no personal data such as names and locations of the research participants is published or shared in other forms by the authors of this research and their supervisors from the University of Groningen.

### 3.5. Data analysis schemes

For analysis of the data which was gathered using the questionnaire, key-dependent and independent variables, as well as control variables, were identified. The dependent variable is defined by difficulties with paying energy bills. The scale was from 1 to 5, where 1 means not having difficulties at all, and 5 has a lot of difficulties. For the sake of statistical analysis, values 1,2 and 3 were classified as not having difficulties and values 4 and 5 as having them.

There are several independent variables. Namely, migration status (with categories living in a large-size city or moving from a small-size city to a large-size city); type of heating system (with categories gas and electric); and type of tenure (with categories rent or own) .

Based on the developed theoretical framework, I expect to find that people who moved from small-size cities; those who have gas heating systems and those who rent are more likely to experience difficulties with paying energy bills.

Logistic regression will be run to analyse the relationship between the key independent variables and difficulties with paying energy bills. The alternative hypothesis is as follows, in the population, migration status, type of heating system and tenure type are equal to zero in the model.

## 4. Results

### 4.1. Sample description

In total there are 88 responses to the survey, which was distributed through different channels, mentioned in the section above. Because of this, the gathered sample is sufficiently diverse. In the following sub-sections, characteristics of the sample, which are relevant for the research, will be elaborated on to better understand the context of the results.

#### 4.1.1 Demographic control measures - gender and age

The sample consists of 51 females (58 per cent), 35 males (40 per cent) and two respondents who either preferred not to reveal their gender or identify differently (2 per cent). As for the age, there is the highest representation of people who are 21 or 22 years old. Since in total they account for 50 per cent (44 respondents) of the whole sample. The remaining distribution of age is presented in Table 1.

#### 4.1.2. Migration status

Furthermore, it is important to mention the movement situation of respondents, as it has been highlighted in the theoretical framework as one of the crucial factors influencing affordability. For 42 people family home is located within the same big size city they are currently living. More precisely, for 40 people it is Warsaw, for the remaining two it is Wrocław. Moreover, 30 respondents (per cent) moved from small- or medium-size cities to big-size cities. The most significant flows to big cities are to Warsaw (20 respondents), Poznań (3), Wrocław (3), Kraków (3) and Bydgoszcz (1).

#### 4.1.3. Housing situation

In the sample, the highest share of the respondent, 27 of them (31%), still live with their parents. Followingly, there is also a substantial number of 24 people who live with room-mates (27 %) and 19 who share their house only with their partner (22 %). There are also 13 people who live alone (14%) and 4 who live with their partner and a child/children. Interestingly, there is also one respondent who lives with a partner, children and partner's parents.

Moreover, in the sample, the mean number of people per household is 1,8.

As for the renting versus owning, the distribution is as follows: 41 respondents (47 per cent) live in a house which is either owned by their parents or other family relatives; 33 respondents (38 per cent) rent a place where they live; 10 respondents (11 per cent) live in a house owned by them or their partner; 3 respondents (4 per cent) live in a place rented by their parents or other family relatives; and lastly, there is 1 person who lives in a house owned by parents of his or her partner.

The type of building that respondents live in is one of the least diverse characteristics in the sample. This is because 62 respondents (70 per cent) live in residential buildings with 5 or more than 5 units; 12 respondents (14 per cent) in single-family, detached houses; 9 respondents in semi-detached houses and 5 respondents (6 per cent) in residential units with 2 to 4 units. However, the small diversity of the sample might be related to housing structures in Poland. According to the last population census made by GUS in 2011 (Główny Urząd Statystyczny, in English - Main Statistical Office), 79 per cent of people in Poland live in residential buildings with more than 5 units.

#### 4.1.4. Income

In this study household income was chosen instead of an individual's income. The reason behind it is that energy bills are not calculated based on a person, but on the whole household. However, people who live with room-mates are considered to fall into the category of individual income. Therefore, the question about household income was displayed for people who indicated that they live with their parents or partners (51 respondents). On the other hand

for people who live alone or with room-mates (respondents), the question about individual income was presented.

The numbers are following. For the household income, 26 respondents indicated that their household income is higher than 13000 zł (euro); for 7 respondents it is 8000 – 13000 zł (euro); for 9 respondents it is 5000 – 8000 zł (euro); for 1 respondent it is less than 2000 zł.

For the individual income, 4 respondents said that their income is lower than 1000 zł (euro); for 13 respondents it is 1000 – 2500 zł; for 13 it is 2500 zł – 4000 zł; for 3 respondents it is 4000 – 6000 zł; for 2 it is more than 6500 zł; 2 other indicated that they do not work at all.

#### 4.1.5. Energy bills

Prior to asking about how much energy bills are, the question about the frequency of paying them was asked. The reason behind it was to simplify the process of answering the survey for respondents. Therefore, the results were divided by how often (number of months) respondents paid energy bills. The number presented right now are already standardized for the amount per month.

In the sample, none of the respondents indicated that they pay less than 50 zł per month (11 euros); 8 respondents indicated that they pay 50-99 zł (11-21 euro); the greatest group of respondents, because 28, stated that they pay 100-149 zł (21-32 euros). Followingly, 12 respondents answered that for them energy bills are 150-199zł (32-43euros); for 7 of them they are 250-299zł (43-65euros); for 6 of them, they are 300-350 zł (65-76 euro). Lastly, 13 respondents indicated that they fall into the category of the highest energy bills. Meaning, that they pay over 350 zł (76 euros).

<b>Energy affordability among young people</b>		<b>2022</b>	
respondent in sample (n =88)			
<b>Demographic control measures</b>			
<b>Gender</b>	<b>Number</b>	<b>Proportion</b>	
Female	51	58%	
Male	35	40%	
Other	2	2%	
<b>Age</b>			
19-22	51	58%	
23-26	20	23%	
27-30	10	11%	
31-35	7	8%	
<b>Migration status</b>			
Live in a large-size city	42	49%	
Moved to a large-size city from small-size city	29	34%	
Live in a small-size city	15	17%	
<b>Housing measures</b>			
<b>Household composition</b>			
Live with parents	27	31%	
Live with roommates	24	27%	
Live with partner	19	22%	
Live alone	13	14%	
Live with partner and children	4	5%	
other	1	1%	
<b>Owning vs renting</b>			
owned by parents or other family relatives	41	47%	
rent	33	38%	
owned by them or their partner	10	11%	
rented by their parents or other family relatives	3	4%	
other	1	1%	
<b>Type of building</b>			
residential buildings with more than 2 units	67	80%	
single-family detaches or semi-detached houses	21	20%	
<b>Type of heating system</b>			
Gas	54	61%	
Electric	32	37%	
Other	2	2%	



<b>Income</b>		
<b>Household income (n=51)</b>		
less than 2000 zł	1	1%
2000 - 5000 zł	8	16%
5000-8000 zł	9	18%
8000 - 13000 zł	7	14%
more than 13000 zł	26	51%
<b>Individual income (n=37)</b>		
less than 1000 zł	4	5%
1000 - 2500 zł	13	15%
2500 - 4000 zł	13	15%
4000 - 6000 zł	3	3%
more than 6500 zł	2	2%
do not have income	2	2%
<b>Energy spendings and difficulties</b>		
Monthly 50 - 99 zł	8	10%
100 - 149 zł	28	34%
150 - 199 zł	12	15%
250 - 299 zł	7	9%
300 - 350 zł	6	7%
more than 350 zł	13	16%
<b>Difficulties with paying energy bills (scale from 1 to 5)</b>		
No difficulties (1-3)	51	58%
Have difficulties (4-5)	37	42%

Table 1. Sample characteristics

#### 4.1.6. Difficulties with paying energy bills

A scale from 1 to 5 was used to understand to what extent respondents have difficulties with paying their energy bills. Where 1 means not having difficulties at all, and 5 has a lot of difficulties. For the sake of statistical analysis, values 1,2 and 3 were classified as not having difficulties and values 4 and 5 as having them.

In the sample, 51 people stated that they do not have difficulties with meeting the payments. Where 23 respondents do not have problems at all (1/5); 20 respondents have very little difficulties (2/5) and 8 respondents have little difficulties (3/5).

As for the people who indicated that have difficulties (37 respondents), the distribution is as follows: 36 people indicated that they have difficulties (4/5) and only 1 person stated that has big difficulties with paying energy bills (5/5).

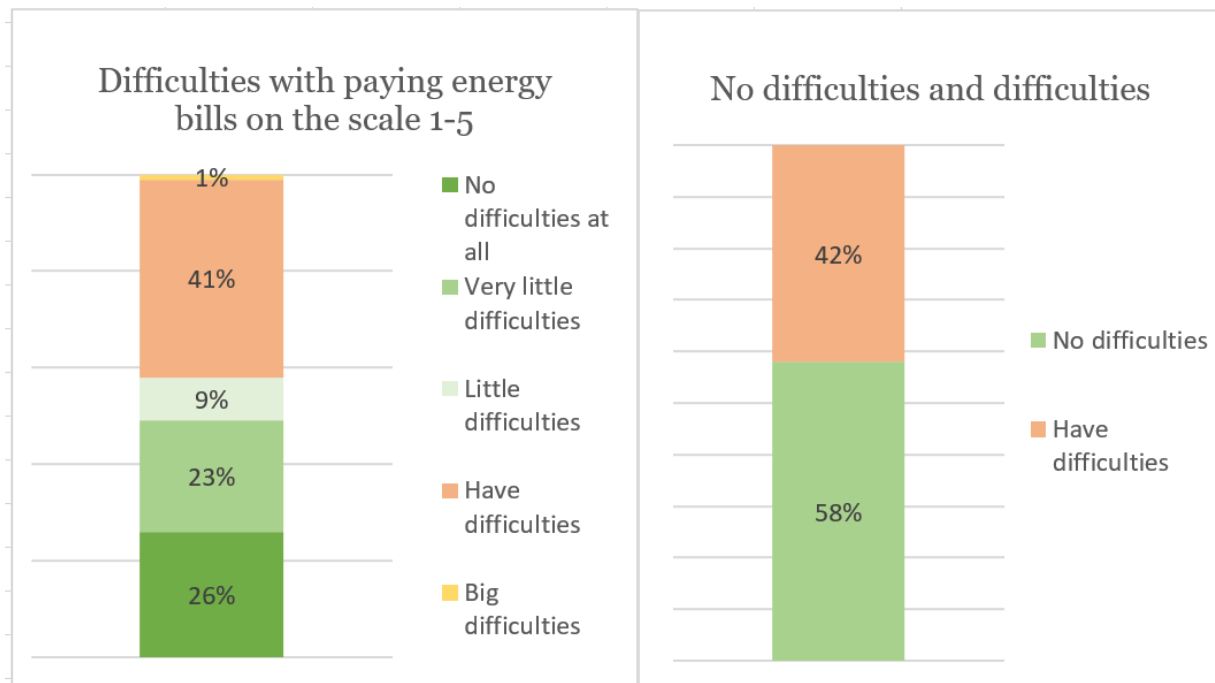


Figure 2. Distribution of difficulties with paying energy bills on the scale 1-5 and dichotomy categories of no difficulties and difficulties.

#### 4.2. Findings

Although respondents who indicated that did not have any problems with paying energy bills (51 people) are quite a diverse group, they have several characteristics in common. Namely, 23 of them stated that they live with their parents, 11 with partners and the remaining 17 live either alone or with room-mates. However, more striking are the results when comparing renting and owning to the extent of difficulties with paying energy bills. More precisely, 40 people who answered that they do not have difficulties also answered that they live in a place owned by their parents, another family relative or partner. In comparison to only 11 that indicated that they rent a place.

Interestingly enough, 16 out of 21 people who stated that they live in detached or semi-detached houses fall into the category of the highest energy bills. Namely, 4 respondents pay 250 - 300 zł, another 4 pay 300 zł - 350 zł and another 8 pay more than 350 zł per month. Worth mentioning is that this group of respondents live with their parents, and also had the highest income (over 13000 zł) and they also indicated not having any difficulties with paying energy bills).

Respondents who indicated that they have difficulties (37) with paying energy bills each month also have a few factors in common. Namely, all of these people move out from their parents. Moreover, the majority of them stated that they mostly live with room-mates or alone. Furthermore, their single income does not exceed 4000 zł (870 euros) or for dual-income, the amount is not higher than 5000 zł (1100 euro). More precisely, 20 people answered that they

make 1000-2500zł; for 5 people it is 2500 – 4000 zł (euros) and for one person it is less than 1000 zł (euros). For those household incomes, there are 11 people with incomes of 2000 – 5000 zł (euros). Moreover, 37 respondents with difficulties live in residential buildings with multiple units.

Interestingly, 25 respondents out of 37 who have difficulties also answered that they have a gas heating system.

Furthermore, 28 (out of 37) who have difficulties with paying energy bills moved to large-size cities from small-size cities.

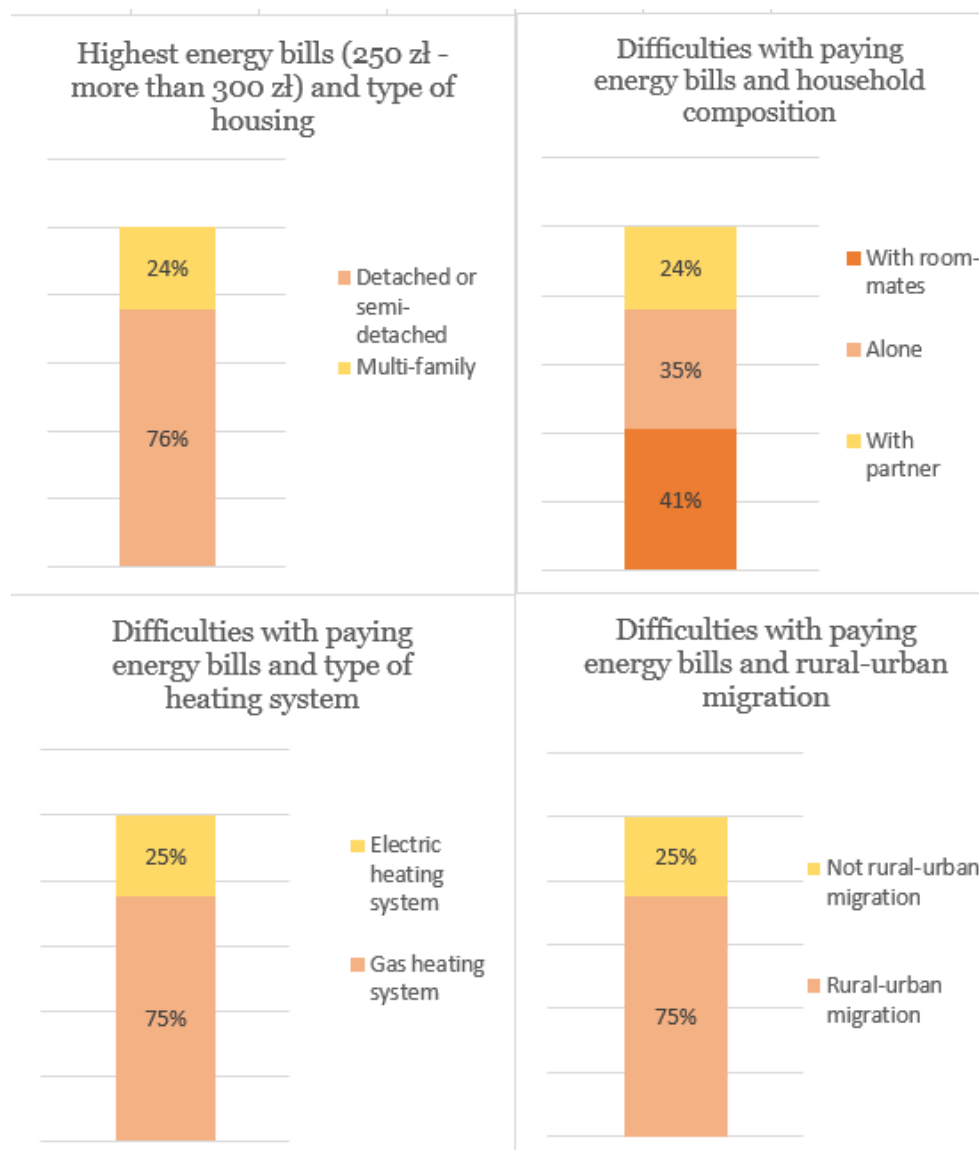


Figure 3. Highest energy bills and type of housing; household composition, type of heating system, rural-urban migration and difficulties with paying energy bills

### 4.3. Statistical Analysis

As mentioned in the methodology part, binary logistic regression was performed to analyse the results. Where 0 is equal to not having difficulties and 1 is equal to having difficulties.

Firstly, the test was run for the dependent variable – difficulties with paying energy bills and two independent ones – a type of heating system (0= gas, 1=electric) and type of tenure (0=owned, 1=rented). Secondly, additional independent variable was added to the equation – size of a city of origin (0=large-size city, 1=small-size city).

After performing the test the results are as follows. The model is significant (  $p < 0.05$ ). Meaning that the model is fitting the data more significantly than no model, with no predictors.

#### 4.3.1. Type of tenure

In both equations results for tenure type were very similar to each other. Namely, people who own properties where they live, are less likely to fall into category of difficulties with paying energy bills (1<sup>st</sup> test OR=0.181,  $p < 0.05$ ; 2<sup>nd</sup> test OR=0.216,  $p < 0.05$ ).

#### 4.3.2. Type of system heating:

As for the type of heating, in the first equation, people who have a gas system were found to be more likely to fall into category of having problems with paying energy bills (OR=8.299,  $p < 0.05$ ). However, after adding the size of a city of origin variable, the relationship between having a gas system and difficulties has fallen and became insignificant (OR= 2.561,  $p > 0.05$ ).

Moreover, the R squared has doubled (1<sup>st</sup> test  $R^2 = 0.251$ , 2<sup>nd</sup> test  $R^2 = 0.418$ ). Meaning that, the proportion of the variance for difficulties with paying energy bills that is explained by variances increased in the regression model. Which can be interpreted that the added variable (size of city of origin) has stronger influence on falling into the group with difficulties.

#### 4.3.3. Size of city of origin:

As mentioned above, size of a city of origin variable has been identified as the most influential one in terms of belonging to group with difficulties. More precisely, people who originate from large cities are less likely to have difficulties with paying energy bills (OR=0.048,  $p < 0.05$ )

Logistic regression				
n=86				
Dependent variable - difficulties with paying energy bills	Model 1 (R <sup>2</sup> =0.229)		Model 2 (R <sup>2</sup> =0.428)	
	Odds ratio	Significance	Odds ratio	Significance
<b>Type of heating system</b>				
Gas	8.299	0.002	2.565	0.268
<b>Housing tenure</b>				
Owned	0.181	0.002	0.216	0.019
<b>Size of city of origin</b>				
Large city	not included in the first model		0.048	0.000

Table 2. Logistic regression results

## 5. Conclusions

### 5.1. Discussion

This research has analysed the energy affordability among young people in Poland by investigating factors influencing difficulties with paying energy bills. The analysis has shown that there is the strongest relationship between having problems with paying energy bills and size of a city of origin. More precisely, young people who moved to large-size cities from a small-size city are more likely to experience issues with energy affordability. This finding corresponds with previous studies which discovered that young people from rural areas have often fewer resources than their peers in urban areas (Hoolachan et al., 2016; Rosevall, 2020). However, former research on rural-urban migrations among young people was mostly conducted in relation to housing affordability, not explicitly on energy affordability. Moreover, it has been found that gas systems are currently causing more difficulties with paying energy bills than electric ones. The current competitive position of electric heating systems has been also proven by the previous research. In Poland, this has been identified as rather a new thing due to the ongoing war in Ukraine and increasing gas prices as one of its results (Sawicki, 2022). On top of that, people who rent properties where they live were found to be more vulnerable to energy affordability. Furthermore, there were also a few other factors influencing energy affordability noted during the analysis. However, they have not been proved through statistical analysis but rather noticed through descriptive statistics. These are namely, household composition and type of dwelling. The former is related to the fact that people who live alone, hence, moved out of their family houses are more likely to experience difficulties with energy affordability. The main reason behind it was identified in the theoretical framework as having restrained economic resources due to precarious employment and income insecurities (Hoolachat et al., 2016; Rosvall, Rönnlund, and Johansson 2018). Furthermore, findings of type of dwelling are not particularly associated with having difficulties with paying energy bills, but energy consumption patterns. Precisely, people living in detached or semi-detached houses were found to use the most electricity and pay the highest energy bills out of the whole sample. This corresponds with previous findings where households living in detached houses were found to use half as much energy as those living in multi-family buildings (Holloway, 2006).

### 5.2. Conclusions

Through analysis in this paper I was trying to find answers to the following research questions: what is the relationship among young people between energy affordability and moving out of a family house; to what extent does the type of heating system influence energy spending; and to what extent find young people living in Poland energy affordable. This was done through a survey that was aiming to better understand the housing situation of young Polish people.

Subsequently, I analysed the findings by performing binary logistic regression and exploring descriptive statistics. As a result, some relevant findings and patterns were found. For instance, people who have a gas system were identified to be more likely to have difficulties with paying energy bills. This is interesting, especially in the context of globally increasing energy prices. Moreover, people who moved from a small-size city to a large-size city were found to be more likely to have difficulties than people who were already living in a large-size city. On top of that, people who owned their properties are less likely to have difficulties with energy affordability. This led to the discovery of spatial inequalities and patterns in the energy affordability phenomenon. Especially in regards to rural-urban migration of young people.

### 5.3. Limitations

Due to the sensitivity of the topic, no information about the location of the participants was gathered. Which restrained me from continuing to discover the spatial inequalities of energy affordability that emerged in the findings. Moreover, because the participants were not traceable, I could not contact them personally to perhaps ask more in-depth questions about more qualitative aspects of energy affordability and how it for instance influences their well-being.

### 5.4. Suggestions for further research

As mentioned in the limitations, this research does not cover all aspects of energy affordability among young people. Therefore, further research could focus more on deepening the understanding of spatial inequalities that emerge between young people in rural and urban areas. Moreover, special attention can be paid to discovering energy affordability among young people across European countries or cities. Investigating more precisely the relationship between types of housing, their isolation and energy spending; or the relationship between the type of source used for heating and energy affordability. Furthermore, more explicit attention can be paid to how stress is related to difficulties with energy bills and how it influences the energy behaviour of young people, their well-being and health. Moreover, focusing on discovering whether housing isolation or energy efficiency of housing are aspects that are taken into consideration while making a decision regarding buying or renting a place. It can be especially relevant for a better understanding of the housing market in the aspect of housing conditions. Moreover, based on the results several recommendations for sustainable housing could be drawn. This is growing in relevance since several cities are intensifying works on sustainable programmes for urban areas to face climate changes.

### 5.5. Contribution and relevance to spatial planning

This research is focused on energy affordability among young people in Poland, which has a significant contribution to further spatial research and planning. Moreover, the topic of the research highlights the arising inequalities between certain groups, which can be tackled by adequate spatial planning. More precisely, affordability of basic needs, such as energy, is

certainly a spatial phenomenon. Meaning, that the distribution of the phenomenon has specific patterns, connected to factors such as for instance, low investments in certain parts of a country/city with special regards to poor housing conditions. Resulting in a concentration of low-income inhabitants. Or as it has been investigated in the research, their significant inequalities in terms of difficulties with paying energy bills between people moving from small-size cities to large-size cities. Therefore, also discovers differences and mobility patterns between not only rural and urban environments but also international migration. This is particularly relevant currently, in the light of forced migration from Ukraine to Poland, which to great extent influence young people.

#### 5.6. Data-collection reflection

Although in the research 88 participants were analysed, the survey gathered more responses. Due to several difficulties, they could not be used. For instance, in the beginning, the display of questions was not complete. Moreover, several answers could have been standardised. By doing this, the obtained data could have been used for the analysis and could have added more insight into understanding the relationship between energy affordability and these factors.

Moreover, the survey could have been distributed through more channels, to gain more diversity regarding the location of respondents. This could allow exploring how (or if) energy affordability differs between big cities in Poland. Moreover, having a higher share of participants who do not live with their parents anymore would have contributed to more significantly verifying the given hypothesis.

#### 5.7. Acknowledgments

This research would not be possible without very valuable help of my supervisor Sarah Mawhorter.

### References:

Anon, 2022. *Cambridge University Press dictionary*

Bouzarovski, S., & Tirado Herrero, S. (2016). *Geographies of injustice: the socio-spatial determinants of energy poverty in Poland, the Czech Republic and Hungary. Post-Communist Economies*, 29(1), 27–50.

Burke, T., Pinkey, S. & Ewing, S., (2002). *Rent assistance and young people's decision-making. Australian Housing and Urban Research Institute.*

Clapham, D. et al., (2014). *The housing pathways of young people in the UK. Environment and Planning A: Economy and Space*, 46(8), pp.2016–2031.

DeVaney, S.A., Chiremba, S., Vincent, A.-M., (2004). *Life Cycle Stage and Housing Cost Burden. Journal of Financial Counseling and Planning*

DONG, X. & ZHOU, W., (2016). *Housing affordability and permanent migration intention of rural-urban migrants. Chinese Journal of Urban and Environmental Studies*, 04(02), p.1650019.

ESG, (2022). *WPLYW Wojny w Ukrainie na ceny energii. Portal ekonomiczny - Najbliżej Finansów.*

European Commission, (2022). *Energy poverty, Energy EC Europa.*

European Commission. (2022). *Energy poverty, Energy – European Commission.*

Eurostat (2022). *Quality of life indicators - material living conditions - Statistics Explained.*

European Commission. (2021). *EU buildings factsheets - energy European Commission. Energy - European Commission. [https://ec.europa.eu/energy/eu-buildings-factsheets\\_en](https://ec.europa.eu/energy/eu-buildings-factsheets_en)*

Forum Energii, (2022). *Koniec Importu Surowców energetycznych Z Rosji? - forum energii. Koniec importu surowców energetycznych z Rosji? - Forum Energii.*

González-Eguino, M., (2015). *Energy poverty: An overview. Renewable and Sustainable Energy Reviews*, 47, pp.377–385.

Główny Urząd Statystyczny (GUS), (2022), *Bank Danych Lokalnych.*

Główny Urząd Statystyczny (GUS), (2011), *Spis Ludności*



Główny Urząd Statystyczny (GUS), (2022), *Gospodarka Mieszkaniowa i Infrastruktura Komunalna. Nieruchomości*

Hoolachan, J. et al., (2016). 'generation rent' and the ability to 'settle down': Economic and geographical variation in Young People's Housing Transitions. *Journal of Youth Studies*, 20(1), pp.63–78.

Holloway, D. & Bunker, R., (2006). *Planning, housing and energy use: A Review. Urban Policy and Research*, 24(1), pp.115–126.

Jessel, S., Sawyer, S. & Hernández, D., (2019). *Energy, poverty, and Health in Climate Change: A Comprehensive Review of emerging literature. Frontiers in Public Health*, 7

Marmot Review Team.(2011), *The Health Impacts of Cold Homes and Fuel Poverty; Friends of the Earth and the Marmot Review Team: London, UK*

National Institute for Health and Care Excellence, (2015). *Excess Winter Deaths and Illness and the Health Risks Associated with Cold Homes; National Institute for Health and Care Excellence: London, UK.*

Nawalany, O., (2021). *Prąd, Gaz Czy Węgiel? Czym Najtaniej ogrzać dom I Mieszkanie. Businessinsider.*

Peate, I.(2008), *Keeping Warm: Health Risks and Vulnerable People. Nurs. Resid. Care*, 10, 606–610.

Rosvall, P.-Å., (2020). *Counselling to stay or to leave? - comparing career counselling of young people in rural and urban areas. Compare: A Journal of Comparative and International Education*, 50(7), pp.1014–1032.

Rudge, J.; Gilchrist, R, (2005). *Excess winter morbidity among older people at risk of cold homes: A population-based study in a London borough. J. Public Health*, 27, 353–358.

Sawicki, B., (2022). *Rekordowe Ceny energii W Cieniu Wojny. Rzeczpospolita.*

Stępnia, A. & Tomaszewska, A., (2013). *UBÓSTWO ENERGETYCZNE A EFEKTYWNOŚĆ ENERGETYCZNA- analiza problemu i rekomendacje, Fundacja Instytut na rzecz Ekorozwoju (InE).*

Thomson H, Snell C, Bouzarovski S., (2017). *Health, Well-Being and Energy Poverty in Europe: A Comparative Study of 32 European Countries. International Journal of Environmental Research and Public Health*. 14(6):584.

## **Appendix:**

### **Appendix 1. Consent form:**

By continuing, you declare the following:

- I am 16 years or older.
- I have been informed about this research satisfactorily.
- I have read the information and understood what is expected from me and understood the information properly. - I have had the opportunity to ask questions about the research.
- I know that my participation is voluntary and I have been informed about my rights.
- I also know that I can end my participation at any moment, without explaining why.
  
- I understand how my data will be processed and protected.
- I understand the text above and I agree with the participation in this research.

### **Appendix 2. Further ethical considerations:**

The description of the survey included all of the relevant information about the research, the process of how the data will be analysed and stored and the contact information of the researcher. Moreover, before displaying questions from the survey, a consent (can be found in the appendix) form was available to sign.

Importantly, the respondents were informed via the consent form that their participation can be withdrawn at any moment of the research, without explaining it. This can be done by contacting the researcher based on the information that was given in the previous step. As for processing and storing the data, the full anonymity of participants will be kept. Moreover, the personal information which would help identify the respondents, such as exact address was not asked. The main reason for this was to avoid the negative consequences mentioned in the previous paragraph.

**Appendix 3. Survey questions:**

1. How old are you?
2. How do you identify?
  - male
  - female
  - differently
3. In which city/village are you currently living?
4. In which city/village is your family home?
5. How many hours on average do you spend at home?
  - during week (Monday-Friday):
  - during weekend (Saturday – Sunday):
6. Which statement describes your housing situation the best:
  - I live alone
  - I live with roommates
  - I live with parents
  - I live with my partner
  - other:
7. Place where you live is:
  - rented by me and/or my partner and/or my roommates
  - rented by my parents or another family member
  - owned by my parents or other family member
  - owned by me or/and my partner
  - other:
8. How many (besides you) people do you share place where you live?
9. In what type of building do you live?
  - residential building with 2 or more units
  - in detached or semi-detached building
  - other:
10. Do you think that the place you live in is well isolated? 1=very poorly isolated, 5=very well isolated
11. What is the electric system at your place?
  - gas
  - electric
  - other:

12. Do you own AC at the place where you live?
- yes
  - no
13. How do you regulate heat in your house?
- thermostat
  - radiators
  - AC
  - other:
14. At what temperature do you usually set your thermostat/AC/radiators during cold months (November- April)?
- during the day when you are in your house:
  - during the day when you leave your house:
  - during the night:
15. What is your income? (displayed for those who live alone or with roommates)
- less than 1000 zł
  - 1000 – 2500 zł
  - 2500 – 4000 zł
  - 4000 – 6500 zł
  - more than 6500 zł
  - I do not work
16. What is your household income? ( displayed for those who live with their parents or partner)
- less than 2000 zł
  - 2000 – 5000 zł
  - 5000 – 8000 zł
  - 8000 – 13000 zł
  - more than 13000 zł
17. Do you pay your own energy bills?
- yes, me or my partner or roommates do that (separately from paying for rent)
  - yes, but energy bills are included in the rent price
  - no, someone else from my family does that
18. How often do you pay energy bills?
- every month
  - every two months
  - every three months
  - every six months
  - other:
19. On average, how much do you pay for your energy bills?
- less than 50 zł
  - 50 – 99 zł
  - 100 – 149 zł
  - 150 – 199 zł

- 200 – 249 zł
- 250 – 299 zł
- 300 – 350 zł
- more than 350 zł

20. Do you (or your family) have difficulties with paying energy bills? (taking into consideration your income and other expenses that you have)

- scale from 1 to 5, where 1= no difficulties at all and 5=a lot of difficulties

21. Do you do activities aiming at minimising energy consumption?

- I set thermostat on lower temperature during the night
- I turn down/off the heating when I leave my house
- I turn down/off the heating when I am in my house
- I turn off the lights and other electronic devices when I don't use them
- No I don't take any actions
- other:

22. If you do actions aiming at minimising energy consumptions, do they influence your wellbeing (physical and mental)? If they do, how?

(For example, you try to minimise energy consumption by turning off the heating during the night – is this temperature adequate for you? If it is too low for instance, it can influence your wellbeing (i.e. you are cold, so you don't feel comfortable, you need to put another layer of clothing, your sleep is shallow etc)

- yes. How?
- no it does not have influence on my wellbeing

## Appendix 4. Statistical tables:

*Model Summary*

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	70,177 <sup>a</sup>	,161	,214

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than ,001.

Figure 1. Model summary for the first equation with tenure type and type of system heating.

*Variables in the Equation*

Step 1 <sup>a</sup>		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
	Tenure(1)	-,811	,586	1,911	1	,167	,445	,141	1,403
	Type of system heating(1)	1,889	,726	6,768	1	,009	6,612	1,593	27,441
	Constant	-1,162	,673	2,976	1	,084	,313		

a. Variable(s) entered on step 1: Tenure, Type of system heating.

Figure 2. Equation with two variables – tenure type and type of system heating. Reference category for tenure type is owing, for type of heating is gas.

*Model Summary*

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	61,981 <sup>a</sup>	,418	,583

a. Estimation terminated at iteration number 6 because parameter estimates changed by less than ,001.

Figure 3. Model summary for the second equation with three variables – tenure type, type of system heating and size of city of origin.

<i>Variables in the Equation</i>									
		<i>B</i>	<i>S.E.</i>	<i>Wald</i>	<i>df</i>	<i>Sig.</i>	<i>Exp(B)</i>	<i>95% C.I. for EXP(B)</i>	
								<i>Lower</i>	<i>Upper</i>
Step 1 <sup>a</sup>	Tenure(1)	-1,531	,650	5,546	1	,019	,216	,061	,774
	Type of system heating(1)	,942	,850	1,229	1	,268	2,565	,485	13,564
	Size of city of origin(1)	-3,027	,757	15,997	1	,000	,048	,011	,214
	Constant	,664	,895	,551	1	,458	1,942		

a. Variable(s) entered on step 1: Tenure, Type of system heating, Size of city of origin.

Figure 4. Equation with three variables – tenure type, type of system heating and size of a city of origin. Reference category for tenure type is owing, for type of heating is gas and for size of city of origin it is large city.