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Attitude toward and Awareness of Renewable Energy Sources: Hungarian Experience and Special Features

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Abstract: The current paper analyzes the awareness of renewable energy sources (RES), the relationship between self-reported and actual knowledge, and the correlation among the knowledge of renewable energy sources, the characteristic stereotypes, and the typical attitude of different social groups to energy, comparing them with international experience. A nationwide representative questionnaire-based survey was carried out involving 1002 people in Hungary in 2019. Better education, a higher income, an active white-collar profession, and a health- and environment-conscious approach to life (LOHAS (lifestyle of health and sustainability) segment) are definitely an advantage when it comes to knowledge of renewable energy sources. No significant relationship was detected in terms of age; however, in cluster formation, young people were typically found to be better informed. Overall, the actual knowledge of the Hungarian respondents is more favorable than the self-reported one, and the basic level of knowledge of energy sources in the case of wind and hydropower exceeds international experience. The social factors of better knowledge essentially correspond to the international trends; however, regarding firewood, solar, and wind energy, the average Hungarian has certain false stereotypes that can be considered typical. The assessment of convenience and that of environmental aspects are almost the same.

Keywords: knowledge; LOHAS; stereotype; convenience; environmental aspects

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1. Introduction

Although the adoption and use of renewable energy sources (RES) in Central and Eastern Europe is still at a relatively early stage, renewable energy production and consumption are becoming increasingly attractive alternatives due to the considerable financial resources from tenders, decreasing production costs, improved efficiency, and changing market conditions [1,2]. According to the latest report from the International Energy Agency (IEA), despite the Covid-19 crisis, annual growth in renewable investments can be projected at around 5% in 2020, barely behind the trend of recent years [3]. According to the IEA forecast, the largest capacity growth in the coming years is clearly expected in the field of solar energy, followed by wind, hydropower, and bioenergy. With regard to countries/regions, the largest growth is expected in China, followed by the European Union (EU) and India [4]. Contrary to current energy production and consumption patterns, investment in renewable energy has also started to increase in the Arabic countries and Russia.

Significant differences can be observed among the Member States of the European Union depending on their economic situation, the energy mix, the availability of resources, and the means and efficiency of energy use. The flagship states for these processes are primarily Germany and Denmark. In addition to meeting the EU's climate protection and emission reduction targets by energy savings and the increased use of renewable energy sources, considerable reductions can also be achieved in energy imports, alongside the economic and political benefits [5,6].

The total energy consumption of our planet in 2019 was 13.975 GtOE (585 EJ) [7], which was 60% higher than in 1990. Within this, the household sector plays a significant role, accounting for 27% of total energy consumption at the EU level, of which 36% is natural gas, 24% is electricity, 18% is renewable, and 11% is oil [8,9]. Heating accounted for 64% of household consumption, almost one-quarter of which involved renewable energy sources. In Hungary, the share of the household sector in total energy consumption is 35% higher than the EU average, the major part of which is the consumption of natural gas [10].

Hungarians spent, on average, 20% of their income, i.e., 50–55 EUR per capita per month on housing and household energy bills, of which the share of household energy is 64% (approximately 32–35 EUR/capita/month), and three-quarters of this is expenditure on gas and electricity [11]. The percentage figures for retired and single people and for lower-income social groups are obviously even higher.

With regard to the facts above, it can be concluded that the dissemination and increased use of renewable energy sources have significant potential in terms of cost reduction in the household sector, sustainable energy consumption, and income retention. In addition, the involvement of the household sector as effectively as possible and the promotion of renewable energy sources would make a major contribution to reducing greenhouse gas (GHG) emissions. In the current paper, our goal was to present and analyze the awareness of RES, the relationship between self-reported and actual knowledge, and the correlation among the knowledge of renewable energy sources, the characteristic stereotypes, and the typical attitude of different social groups to energy, comparing them with international experience. In order to achieve our research goals, we conducted a nationally representative survey of 1002 people in April 2019 in Hungary.

In the current paper, first, the most relevant tendencies of household energy consumption, previous experience about awareness and influencing factors related to RES among the population, and the lifestyle of health and sustainability (LOHAS) segment are introduced. Then, our analysis is divided into two main parts: (a) descriptive statistics on the self-reported knowledge of the Hungarian population about RES and the reliability of this self-assessment and (b) analysis of energy attitudes (effect of age, income and education, and seeking relationships can be considered significant). The final chapter concludes our findings.

2. Literature Review

2.1. Renewable Energy Consumption in the Household Sector

The share of households in total energy consumption in the EU-27 was 26.1%. Their share in Hungary was 32.6% in 2018, more than 6% higher than the EU average, which can primarily be explained by differences in energy efficiency. The share of energy sources in final energy consumption at the EU-27 level was 18.9% (of which electricity accounted for 32.2%, heating/cooling for 21.1%, and transport for 8.3%), whereas in Hungary it was 12.5% (of which electricity was 8.3%, heating/cooling 18.1%, and transport 7.7%). The share of electricity and heat generated from renewable energy sources and the most important renewable energy sources in terms of production volume are shown in Table 1 below.

Table 1. Share and main sources of renewable electricity and heat generation in 2018 (European Union (EU) and Hungary).

	Renewable Electricity Generation	
	European Union	**Hungary**
Share of Renewables:	**32.9%**	**11.8%**
Main renewable energy sources, in order:	1. Hydro (38%)	1. Solid biofuels and renewable wastes * (52%)
	2. Wind (33%)	2. Solar (17%)
	3. Solar (12%)	3. Wind (16%)
	4. Solid biofuels and renewable wastes * (10%)	4. Biogases (9%)
	5. Biogases (6%)	5. Hydro (6%)
	6. Other (7%)	6. Other (<1%)
	Renewable Heating and Cooling	
	European Union	**Hungary**
Share of Renewables:	**28.1%**	**15.4%**
Main renewable energy sources, in order:	1. Solid biofuels and renewable wastes * (89%)	1. Solid biofuels and renewable wastes * (63%)
	2. Biogases (6%)	2. Geothermal (34%)
	3. Geothermal (2%)	3. Biogases (1%)
	4. Other (3%)	4. Other (2%)

Note: * A category containing charcoal, fuelwood, wood residues and byproducts, black liquor, bagasse, animal waste, other vegetal materials and residuals, and renewable fraction of industrial and municipal solid wastes [12]. Source: European Commission (2020) [13].

While, in the EU, the greatest role in renewable electricity generation is played by hydro, wind, and solar energy, and in renewable heat production by solid biofuels and renewable wastes, in Hungary, in both cases, solid biofuels and renewable waste have a more than 50% share. The degree of energy import dependence was 58.1%, both in the EU and in Hungary [13].

Finding a compromise and balance between private and public interests can be considered one of the cornerstones of sustainable development [14]. Increasing general public awareness of the adverse environmental impacts of fossil fuel use and of the potential provided by renewable energy sources will contribute to the realization and expansion of renewable energy investments [14,15].

2.2. *Awareness and Influencing Factors Related to Renewable Energy Sources among the Population*

The level of awareness and knowledge of different renewable energy sources may differ from country to country and even from region to region within the same country [16]. The population's knowledge of and their opportunities related to renewable energy sources, and their willingness to adopt them depend on several factors.

According to the analysis by Bird and Sumner (2011), 80% of the United States (US) population was to some extent concerned with the issue of renewable energy use [17]. According to an analysis by the National Marketing Institute, US consumers see the widescale use of renewable energy as an effective solution in the fight against climate change, with 55% wanting companies to increase their use of renewable energy [18].

Rowlands et al. (2003) assessed the profile and characteristics of the average consumer buying green energy and concluded that liberal and altruistic personality-type consumers with a focus on ecological considerations are more likely to choose green energy [19], while, on the basis of a questionnaire survey, Zoellner et al. (2008) found the cost effectiveness of the given renewable system the most important motivating factor, i.e., social acceptance can be achieved by the returns following a positive cost–benefit calculation [20]. In contrast, US consumers mostly considered the impact on the environment as a primary benefit related to renewable energy (46% of respondents in 2010), while they were less likely to associate it with economic (8%) and health (10%) benefits [17].

In their case study, Assefa and Frostell (2007) assessed the social acceptance of different energy-generating technologies in terms of the knowledge and concerns associated with them. The findings of the study suggest that social acceptance is a key factor in the future spread of these technologies, while the lack of reliable knowledge can have a highly detrimental effect on acceptance [21].

According to surveys conducted in different countries, the most widely known types of renewable energy sources are solar and wind [22–24]. The findings above were confirmed by the research of Sardianou and Genoudi (2013) [25], according to which, with regard to the potential use of renewable energy sources in households, the vast majority of consumers had information about the possible use of solar energy (98.7%) and wind energy (83%), whereas 60% of them had heard about the use of hydropower, while less was known about the possible use of geothermal energy (38%) and biomass (36%).

Karytsas and Theodoropoulou (2014) [26] examined the demographic and socioeconomic factors that determine knowledge about different forms of renewable energy on the basis of data from a survey conducted in Greece in the summer of 2012. The best-known renewable energy sources were solar and wind, followed by geothermal, hydropower, and biomass. According to the research, the factors statistically significantly related to the awareness of different forms of renewable energy are as follows: gender, age education, the educational level of the head of household, environmentally friendly behavior, occupation, interest in the environment, and technology or technical knowledge [26].

According to the analysis performed by Karytsas and Theodoropoulou (2014), there are six factors significantly related to knowledge of renewable energy sources, which are as follows:

(1) Gender is a factor, in which research results differ. Several sources suggest that men are more likely to be aware of these forms of RES than women [27–29]; however, other studies on the same issue do not confirm this [30–32]. A number of other sociodemographic factors, such as age, education, religion, occupation, and political ideology can also contribute to the development of gender differences [33,34].

(2) Regarding age, studies show that younger people are more likely to know about these energy options, which is also consistent with the findings of Zyadin et al. (2014) [29]. The fact that younger people are more likely to be aware of several energy sources may also be due to the developments and changes in the curriculum of schools and universities in terms of environmental awareness and behavior. The younger generation has more opportunities to receive better environmental education through various communication channels such as websites and digital social networks, which are more accessible to younger than older people [35–37].

(3,4) The education of the head of the household and education in general also influence knowledge about renewable energy sources, and the knowledge of those with a higher education degree can be broader and deeper, which is in line with several previous findings [30,38]. This means that, in order to gain a broader knowledge of renewable energy sources, it is necessary to teach these topics from primary school to university [22]. The fact that related knowledge can be influenced by the education of the head of the household suggests that a more informed current generation can positively influence future generations, while this finding also proves the positive impact and importance of lifelong learning and adult education [39,40].

(5) Occupation and interest in the environment, in technology, or in engineering are positively related to knowledge about renewable energy sources, which is in line with the results of Karatepe et al. (2012) [30]. The impact of this factor on the knowledge of renewable energy sources is proof of the lack of information on these sources, since, if they were widely known, they would not be affected by this factor.

(6) People with more conscious environmental behavior are more likely to have broader knowledge about renewable energy sources. This could mean that environmental behavior and education on a broader scale can encourage awareness of renewables, since people with such attitudes are more likely to be interested in details and information about renewable energy sources. More environmentally friendly and more educated individual development can certainly have a positive effect on the knowledge of renewable energy sources [26].

In their study, Sardianou and Genoudi (2013) [25] examined the most important consumer factors related to the adoption of renewable energy in a 200-person consumer questionnaire. The results of the empirical research based on estimations with binary probit regression models indicate that middle-aged, highly educated people are more willing and, consequently, more likely to use renewable energy systems in their homes. A higher income also has a positive impact on the adoption and use of renewable energy systems. In contrast, in their study, the effect of marital status and gender was not found to be statistically significant in the case of willingness to accept renewables. The authors see tax cuts as the most effective solution for the adoption and use of renewable energy sources. In their view, this may have a greater impact than (energy) subsidies.

Although the use of green energy may bring significant benefits to society as well (e.g., a cleaner environment and better air quality), electricity generated from renewable energy sources—depending on the type—is in most cases proportionally more expensive than that derived from fossil fuels, such as coal- or lignite-based fuels. Furthermore, the additional costs of renewable energy sources and price support are generally borne by the end users of electricity, i.e., households and businesses; thus, it is the private sector that bears a significant share of the development costs of the renewable energy sector. As the monetary value of the associated costs and benefits cannot be expressed directly in many cases, correctly estimating the value of these externalities can represent a serious difficulty.

2.3. Reasons for the Lack of Knowledge about Renewables, Limiting Factors

International research has also addressed the limitations and barriers of the household sector in relation to renewable energy sources for certain countries or regions [41,42]. In their research study in India, Luthra et al. (2015) classified the possible barriers into seven dimensions: "economic and financial, market, awareness and information, technical, ecological and geographical, cultural and behavioral, and political and government issues". According to their results the "ecological and geographical" dimension is the most prominent, while the "market" dimension has the least significance. Among each dimension/category the following barriers were found to have the greatest impact in Indian conditions: "high initial capital", "lack of consumer awareness of technology", "unavailability of solar radiation data", "technology complexity", "ecological issues", "rehabilitation controversies", and "lack of political commitment" [42].

As seen above, one of the main limiting factors is often the lack of technological knowledge about renewable energy sources; hence, the need for an adequate level and quality of education and training is unquestionable. In addition, a number of technological, economic, sociocultural, and institutional barriers can be mentioned that hinder the spread of RES [43]. In order to increase the acceptance of renewable energy technologies, it is necessary to change the attitudes and preferences of the population and of the decision-makers [44,45]. Therefore, the development of education and training in the field of energy, particularly in the field of renewable energy sources, is of the utmost importance [46].

The findings of an American research study indicate that the majority of Americans support renewable energy initiatives and express a willingness to pay more for renewable-based electricity; however, biomass has the lowest support of all. Respondents did not find woody biomass better than fossil fuel and often rated it even less favorably than natural gas. However, the low level of social support is not entirely surprising; although woody biomass has been used for electricity generation for decades, there is little public awareness of this process [47].

2.4. The Priority Target Group of the Renewable Energy Market—The LOHAS Segment

Segmentation based on lifestyle can be considered a modern approach to consumer segmentation, which is also a well-applicable criterion in the renewable energy market. Trend researchers have identified a trend group of increasing proportion and significance, i.e., a group of consumers leading an environmentally conscious and health-conscious lifestyle called LOHAS (lifestyle of health and sustainability). It is characteristic of their consumption and purchases that, instead of mass accumulation of new and even newer objects, priority is placed on the search for quality of life, authenticity, and naturalness [48]. These are the consumers most aware of the values they have chosen themselves. LOHAS is a postmodern lifestyle where affiliated consumers are geared toward the conscientious consumption of products with health benefits that go in alignment with social justice, ecology, and sustainability. These consumers recognize the importance of their contribution and responsibility as an individual toward the society and environment [49]. The literature suggests that the LOHAS lifestyle has five well-defined value categories that guide the behavior of individuals. These are as follows: authentic values, health awareness, ethical values, individualism, and environmental awareness [5]. It is a significant market, as shown by the fact that the LOHAS segment is globally estimated at nearly $550 billion, of which the United States accounts for $355 billion. The LOHAS consumer group consists of approximately 100 million consumers worldwide. In Europe, it represents about 18% of the population. In developing countries, their share can be estimated to be 25%, while, in the US 13–19% of the American population belong to this group [50–52]. Hungarian researchers estimate the proportion of the LOHAS segment within the Hungarian population as ranging from 4% to 30%, depending on the value categories used in the segmentation. Most have estimated the proportion to be around 8%, while the size of the group featuring some elements of the LOHAS lifestyle (potential market) is estimated at 20–30% [5,53,54]. The characteristics and (potential) size of the LOHAS group support the view in the literature that this segment is particularly ideal for the "green" market, including the market for renewable energy sources, biomass, and clean technologies [55]. Holopainen et al. (2014) examined the bioeconomic potential of the forest sector and also found that a limited smaller group of LOHAS consumers is likely to bear the main risks and costs of following sustainable consumption patterns [56]. Since LOHAS represents a lifestyle of health and sustainability, consumers who identify with the given group also buy green and sustainable products/services in order to indicate their affiliation. Members of the LOHAS segment can generally be seen as early followers and trend followers who lead modern and urban lifestyles. In his dissertation, Hanimann (2013) examined consumer behavior related to renewable electricity and concluded that green electricity should be linked to modern and progressive lifestyles rather than to extreme environmental protection and anti-consumerism [57]. In Malaysia, Rajiani and Buyong (2020) examined (among others) the market opportunities for switching to renewable energy sources. Since the extent of the environmental efforts of consumers is highly dependent on their value orientation, Schwartz's value dimensions have been used as a guiding principle in making purchasing decisions for green high-tech products. Their results indicate that people with values (among other things) such as acceptance of people and nature and the general wellbeing of the above would make good target groups for green products [58]. However, Emerich (2011) draws attention to the fact that LOHAS should not only be seen as a target of a business strategy, but also a segment that opens the window to social change [59].

2.5. Trends in Hungary

Unfavorable knowledge of RES, also described in international sources, is also relevant in Hungary. According to Csorba et al. (2020), the embeddedness of renewable energy sources in the public consciousness is currently weak and uncertain. Continuous information on the subject is a suitable tool to stabilize this, as the more people hear, read, and see about renewables, the more conscious they become. An important factor in this respect is that the current "automated", campaign-like, and centrally instructed use should be replaced by a socially bottom-up public need in the near future. In this way, the intentions of the managing authorities and that of the population would converge, which could make the leaders and residents of municipalities take responsibility for the protection of the environment, in addition to enjoying the savings benefits provided by the renewables. According to the survey, the adult population and school-age children surveyed identified out-of-school media as a source of their renewable energy knowledge. At the same time, however, the majority emphasized the important role of the school. As long as little is known about renewable energy socially, it will not be used extensively. By disseminating knowledge, there is a chance to increase the rate of use in settlements and among individual residents. The adaptation of so-called good practices would increase the responsibility for the common good [60].

In their research in 2013, Bujdosó et al. carried out a survey on the social acceptance and awareness of renewable energy sources. According to the questionnaire-based survey, similarly to the conclusions drawn in other countries, solar energy, wind energy, and hydropower were found to be the most well-known renewable energy sources, with more than 90% of respondents admitting awareness of them [61]. The survey also covered the most important benefits of RES, of which environmental aspects were mentioned in the largest proportion (87.72%). Respondents seem to be aware of the nonpolluting nature of RES and of the fact that cheaper energy production (compared to fossils) can also be achieved this way.

One-third of the energy needs of Hungary come from domestic production and two-thirds from imports. Before the turn of the millennium, in addition to biomass for combustion, electricity supply was based almost exclusively on fossil fuels and nuclear energy; today, however, renewable energy sources, although at a slowly growing rate, are playing an increasingly important role in supply. In Hungary, the largest amount of electricity (approximately 50%) is generated by the Paks Nuclear Power Plant. The increase in the share of renewable energy in the past decade is mainly related to the significant use of biomass on a national level and the targeted implementation of EU and domestic tenders. Electricity generation is largely driven by an increase in the total capacity of solar systems, while thermal energy is generated by geothermal energy and heat pumps, as well as biomass-based systems which generate either electricity or heat, or both at the same time.

In recent years, several international and domestic studies were conducted to examine issues such as expected energy trends in Hungary [62,63], potential estimation [64–66], energy policy [64,67,68], and the attitude of the population toward this field [16,69,70]. These resources highlight the challenges the area faces and the fact that the capacities and activities at local levels (local authorities, microregions, and communities), as well as the availability of credible information, play an important role in the further dissemination of renewable energy sources and in adaptation to climate change.

Improving the local economic environment is of great significance for the success of localization efforts and for boosting the renewable energy sector. Closely related to this can be the local utilization of alternative energy sources and the construction of systems that can also enable the implementation of an independent community energy supply [71–73], whether for residential, institutional, or business/industrial energy supply. Several examples of all these can be found in the country. With regard to the motivation for the construction and implementation of renewable energy systems and the related goals, respondents mentioned the following aspects (which, of course are not separated in all cases; thus, overlaps may occur) [74]:

- Economic considerations, energy saving, rationality;
- Partial power supply;
- Ideal alternatives for new construction, renovation, modernization;
- Tender opportunities, favorable financing schemes;
- Compliance with certain tender criteria;
- Convenient, up-to-date, modern solutions.

The sources below also show the change in trends in Hungary over time. According to a questionnaire-based survey on energy recovery from byproducts conducted by Bai (1998) in 1996, with the economic polarization of society, the price of energy is becoming a vital factor for an increasing number of people, which may, thus, outweigh considerations of convenience. Among the participants in the survey, it was the biobriquette that aroused the greatest interest [75]. Bai et al. (2016) [76] conducted representative research in one of the least developed regions (the Valley of the Hernád river), concluding that people are primarily motivated to choose energy sources by the possibility of reducing costs, but their lack of information hinders the identification of the most appropriate energy source. The communication channels available provided the population with little and often professionally incorrect information. The results of the survey showed that the knowledge of different age groups differed significantly, and, due to the use of the Internet, the energy awareness of younger residents proved to be more favorable. The textbooks used in primary and secondary education contained very little or disproportionately distributed and outdated information on renewable energy sources [77]. Only 10–15% of respondents in the region would have been willing to accept the implementation of a larger-scale renewable investment in their own settlement. Jobbágy (2013) carried out research on biofuels among Hungarian motorists. His findings suggested a typically positive attitude toward biofuels, especially with regard to environmental protection, and the knowledge of the respondents did not lag behind the European and North American average. The main source of their knowledge was the Internet, which is to be welcomed since it is the fastest possible way to obtain the latest and most up-to-date information; however, it also carries risks, as false, professionally incorrect information is just as easily accessible and the reliability of the source is often difficult to verify [78]. Qazi et al. (2019) carried out a comprehensive review on the specialties of the national attitudes regarding support of RES [79].

As can be seen above, the effect of age, wealth, and education, as well as LOHAS attitude to life, on the use of and interest toward RES has been internationally studied before. However, the comparison of self-reported and of actual knowledge of the same respondents about RES may be considered as a novel approach. Another less-researched question is also addressed in our study, i.e., which is more important in energy consumption: convenience or eco-friendliness? Furthermore, we attempted to discover the Hungary-specific features in the attitudes toward RES.

Our hypothesis was that the knowledge and attitude of differential social groups would correspond to the previous research results, with some national specifics due to the Hungarian energy system. According to the energy structure and economic factors in Hungary, convenience was expected to be more important than environment.

3. Materials and Methods

In order to achieve the set objective, a nationwide representative questionnaire-based survey was carried out involving 1002 people in Hungary in 2019. Representativeness for regions and types of settlement was ensured by the applied quoted sampling method. The sample pattern met the quotas previously defined by the Hungarian Central Statistical Office for the entire Hungarian population (HCSO) [80,81]. In the assigned settlements, a random walking method was used to ensure total randomness in selection. In the second step, within one household/family, the respondent was selected by using the so-called birthday-key method. The main point of this method is to select a person of the proper age (18 or older) from among the family members by finding whose date of birth (birthday) falls closest to the day of the interview. With this method, randomness was also ensured in the second step. The refusal rate was 35%; the questions were answered in 65% of all households surveyed.

Since random walking does not ensure that the sample is a reflection of the entire population, the sample was corrected using multidimensional weighing factors (gender and age). As these methods were applied, the sample was representative of the structure of the Hungarian population in all the four aspects (region, type of settlement, gender, and age) (Table 2).

Table 2. Distribution of the sample according to the most important background variables (*N* = 1002) and population composition according to representative variables.

Label	Sample Distribution		Population Distribution *
	Count	%	%
Male	471	47.0	47.8
Female	531	53.0	52.2
18–29 years	174	17.4	17.2
30–39 years	164	16.4	16.0
40–49 years	194	19.3	19.6
50–59 years	150	15.0	15.1
60+ years	320	31.9	32.1
Budapest	190	19.0	17.9
Other town	539	53.8	52.6
Village	273	27.2	29.5
Western Transdanubia	102	10.2	10.1
Central Transdanubia	108	10.8	10.8
Southern Transdanubia	92	9.2	9.0
Northern Great Plain	148	14.7	14.8
Central Hungary	308	30.8	31.0
Northern Hungary	115	11.5	11.5
Southern Great Plain	129	12.8	12.7
Primary school	132	13.2	
Vocational school	385	38.5	
High school	357	35.6	
Higher education	128	12.7	
Income:			
Can live on it very well and can also save	32	3.2	
Can live on it but can save little	395	39.4	
Just enough to live on but cannot save	471	47.0	
Sometimes cannot make ends meet	68	6.8	
Have regular financial problems	13	1.3	
Not known/No answer	23	2.3	

Note: * Source of data: [80,81].

Respondents were asked not merely about their awareness but also about the extent to which they know about the particular item (on a five-point-scale ranging from having an excellent knowledge to only having heard about it).

Responses by regions were also assessed, as the level of knowledge about different renewable energy sources may differ not only from country to country, but even from region to region within the same country [16].

Data were obtained from the responses of 1002 individuals. In the course of the data analysis, a chi-square test, two independent sample *t*-tests, one-way ANOVA, factor analysis, two-step cluster analysis, and ordinal logistic regression techniques were used, in addition to descriptive statistical indicators. SPSS ver. 25.0 was used to perform the analysis.

For nominal (categorized) questions, the comparison was performed using a chi-square test of independence. In the responses obtained from the different socioeconomic groups, two independent sample *t*-tests were used when two categories were separated. In the case of more than two categories, a one-way ANOVA test with a Tukey post hoc test (for a pairwise comparison) was used. In order to categorize the questions into groups, we ran a factor analysis and examined which issues were grouped together [82]. We attempted to name these factors on the basis of the questions creating the given factor [83].

The next step in analyzing the questionnaire data was to classify respondents into homogeneous groups using a two-step clustering process. Commonly used methods in cluster analysis are hierarchical and K-centroid cluster analysis methods, but they do not allow the joint use of variables of different measurement levels (nominal, ordinal, and metric). As we intended to include several variables of different measurement levels as the basis for clustering, we decided to use two-step clustering. The advantage of this approach is that it allows the combination of nominal and metric attributes, and it suggests the ideal cluster number.

The following settings were used in the analysis: logarithmic similarity/log-likelihood/ distance determination, Schwarz–Bayesian criterion and automatic cluster number determination. To determine the cluster numbers, the Bayesian information criterion (BIC value) and the ratio of distance measures were used [84]. Two distance measures were employed, namely, log-likelihood (for categorical variables) and Euclidean (for continuous variables). Macintyre and Blashfield's split sample method was used [85]. The cluster analysis procedures were repeated in an internal random sample of 50% of the total study sample. The internal consistency of the clusters was examined for clustering variables.

After the cluster analysis, the ordinal logistic regression model was applied to determine which factors significantly influence convenience and environmental considerations. The dependent variable had three different levels (1–4; 5; 6–10) transformed from a 10-point scale, where 1 stood for "convenience is crucial" and 10 meant "eco-friendliness is crucial". Different items (heating cost, aspect of the heating convenience and environmental consideration, two latent factors created from the level of awareness of the energy sources, the energy types—wood and natural gas—for heating, gender types, four categories of age, education levels, income, and environmental consciousness of the respondents) were used as independent variables of the logit model.

4. Results and Discussion

Our research and results can basically be divided into three parts. First, as a function of the nationally representative sample, the responses to our questions and the most characteristic trends were analyzed by using descriptive statistics. Clusters were used to characterize the typical Hungarian groups. Then, correlation studies and factor analysis were performed to analyze the relationship between respondents' self-reported and actual knowledge. Lastly, with the help of cluster formation, we attempted to find out how age, income, and education influence the assessment of the economic, convenience, and environmental aspects of renewable energy sources, as well as which relationships can be considered significant.

4.1. Self-Reported and Actual Knowledge of the Population about Renewable Energy Sources

Results indicate that, according to self-report, the knowledge of the three renewable energy sources is outstanding (Table 3). They involve, in descending order, solar, wind, and hydropower (92–98%), which people are not merely aware of, but about which they have a deeper knowledge (12–14%). These three sources were followed by biogas, biodiesel, and geothermal energy. For example, 56–66% of respondents had already heard of biobriquettes, heat pumps, and bioethanol, but had much less expertise in them (5–9%), while wood pellets represented the least known energy source in all respects. This difference in knowledge is likely to reflect differences in education concerning various renewable energy sources, leaving too much scope for ill-founded (mostly negative) stereotypes that hinder the future spread of these energy sources. Considering the number of car owners and the fact that significant amounts of biodiesel and bioethanol are blended into standard quality residential fuel, which is also indicated at petrol stations, the proportion of those who have not even heard of the two renewable fuels (35% and 44%, respectively) can be considered surprisingly high.

Table 3. Public awareness of different renewable energy sources and energy processes (*N* = 1002).

Type of Energy Source	*N*	Distribution of Responses (%)		Distribution of Responses (%)		
		Have Heard about	Have Not Heard about	Have Excellent Knowledge of	Know Well	Have Only Heard about
Solar energy	977	97.5	2.5	4.9	8.9	29.5
Wind energy	963	96.2	3.8	4.2	8.0	32.4
Hydropower	922	92.0	8.0	4.2	8.0	32.9
Biogas	658	65.7	34.3	0.8	4.8	41.6
Biodiesel	653	65.2	34.8	1.6	4.5	38.1
Geothermal energy	652	65.0	35.0	1.9	6.8	33.1
Biobriquette	598	59.7	40.3	0.9	4.3	38.1
Heat pump	570	56.7	43.3	1.7	5.1	37.3
Bioethanol	562	56.1	43.9	1.4	4.3	35.7
Wood pellet	437	43.6	56.4	0.9	3.6	38.2

According to results in the international literature above, and in line with our findings, the most widely known types of renewable energy sources are solar and wind energy [22–24,27,30,31,86]. According to self-reports of Hungarian respondents, the awareness of solar energy (97.5%) is similar, but wind and hydropower are better known compared to international experience. In Hungary, solar, wind, and hydropower also used to be the best known renewable energy sources, known to more than 90% of the respondents [61]. Compared to the Hungarian survey above, awareness of geothermal energy has decreased over the past 6 years, while awareness of biogas has increased in Hungary, despite its importance in the energy mix, which is probably due to development trends.

Since the awareness of solar, wind, and hydropower is clearly outstanding, the significant differences among these were examined in relation to each group of background variables. The conclusions drawn are as follows:

- A significant difference was found in education (primary school, vocational school, high school, higher education) for all three energy sources (solar: means 2.25–2.74; F value: 5.92 df: 3, 964 $p < 0.001$; wind: means 2.17–2.65; F value: 5.51 df: 3, 949, $p < 0.001$; hydropower: means 2.18–2.69; F value: 5.962 df: 3, 907, $p < 0.001$). Knowledge by hearsay of those with tertiary education was 7–10% higher compared to those with maximum basic education.
- In this context, with regard to the activity groups examined (pensioner, other job, active manual worker, active intellectual worker), those with active intellectual jobs had knowledge in the highest proportion (solar: means 2.24–2.44 F value: 3.121 df: 3, 964, $p < 0.01$; wind: means 2.14–2.41 F value: 3.234 df: 3, 949, $p < 0.01$; hydropower: means 2.16–2.39 F value: 3.06 df: 3, 907, $p < 0.05$).
- The level of knowledge improved with the increase in health consciousness (not health-conscious at all, mostly not health-conscious, both health-conscious and not, mostly health-conscious, very health-conscious; solar: means 2.01–3.05 F value: 10.506 df: 4, 948, $p < 0.001$; wind: means 1.98–3.13 F value: 9.331 df: 4, 933, $p < 0.001$; hydropower: means 1.95–3.05 F value: 9.249 df: 4, 891, $p < 0.001$) and in environmental consciousness (not environmentally conscious, both environmentally conscious and not, mostly environmentally conscious, very environmentally conscious solar: means 1.96–2.61 F value: 8.973 df: 4, 946, $p < 0.001$; wind: means 1.96–2.53 F value: 6.019 df: 4, 931, $p < 0.001$; hydropower: means 1.85–2.65 F value: 8.938 df: 4, 889, $p < 0.001$).

Education and intellectual activity also influence knowledge about renewable energy sources according to the previous literature [29,30,38,87].

The knowledge of environmentally conscious individuals about renewable energy sources is more likely to be broader also according to international literature, as people with such attitudes are more likely to be interested in details and information about renewable energy sources [26], which also supports our results.

According to the above, it can be stated that, with regard to self-report, the knowledge about renewables and its social background in Hungary is in line with international trends.

Following self-reported knowledge, it was also considered necessary to examine the actual knowledge of the same respondents by means of control questions. Despite the less known bioenergy processes, the concept of biomass was interpreted correctly by the majority, while the opposite was found to be true in the case of solar collectors, since the vast majority of people automatically think of solar panels when considering solar energy. In the case of biogas, the low rate of correct answers was in line with the low level of awareness, which is also reflected in the fact that the combined rate of uncertain and nonresponders was by far the highest here.

The increase in the level of education, as well as health and environmental awareness, can also be linked to the correct understanding of biomass (in all cases, $p < 0.01$). With regard to the type of settlement, the higher proportion of correct responses was also significant among those living in the capital and in Central Hungary (in both cases, $p < 0.001$). This finding is basically consistent with the research results of Bai et al. (2016) [76], which showed a value typically less than 20% for the awareness of biomass in the settlements studied in one of the poorest rural areas of Hungary, despite the fact that 63% of the people living there used wood for heating (Table 4).

Table 4. Detailed knowledge of the term "biomass" ($N = 575$).

Type	Distribution of Responses	
	Count	%
Any organic material	296	51.5
Plant material	198	34.5
Herbaceous plant	25	4.3
Wood	14	2.5
Not known/no answer	42	7.3

With regard to solar energy, the same trends were true for heat and electricity generation as well, in the case of those with higher education ($p < 0.05$), of active intellectuals and environmentally conscious individuals (both $p < 0.01$), and of those with higher incomes ($p < 0.001$). It should be noted, however, that the distinction between a solar collector and a solar panel was blurred in both cases (Table 5).

Table 5. Knowledge of energy sources that can be generated by solar collectors ($N = 1002$).

Energy Source	Distribution of Responses	
	Count	%
Electricity	644	64.3
Thermal energy	293	29.3
Any can be generated	194	19.3
Fuel	15	1.5
Not known/no answer	4	4.9

In the case of biogas production (Table 6), there were no typical respondents providing the correct answer (it is possible to produce any type of energy). However, the highest proportion of answers believed to be correct was found among younger age groups, among those with a better education, active white-collar workers ($p < 0.05$), and those living in the capital ($p < 0.01$). The latest trend for the utilization of biogas is for fuel, and the responses of the generally better-informed individuals were probably due to this fact.

Table 6. Knowledge of energy sources that can be generated by biogas ($N = 1002$).

Energy Source	Distribution of Responses	
	Count	%
Fuel	330	33.0
Thermal energy	266	26.5
Any can be generated	238	23.7
Electricity	112	11.2
Not known/no answer	164	16.4

Table 7 clearly shows that the majority of respondents found the purchase of renewable energy equipment expensive and their operation, with the exception of biomass-based heating methods, convenient, environmentally friendly, and cheap.

Table 7. Assessment of energy sources based on the purchase and operation of the energy equipment ($N = 1002$).

Renewable Energy Equipment	Purchase of Equipment		Operation of Equipment					
	Cheap (%)	Expensive (%)	Cheap (%)	Expensive (%)	Convenient (%)	Inconvenient (%)	Environmentally Friendly (%)	Polluting the Environment (%)
Solar panel	9.4	85.3	61.6	25.9	93.9	1.2	64.2	1.9
Solar collector	6.0	87.2	59.7	25.8	92.2	1.4	92.4	2.1
Windmill	6.2	80.8	53.1	26.7	84.8	4.2	90.6	2.4
Heat pump	4.0	70.5	31.6	32.8	63.3	7.5	68.6	5.7
Wood	2.9	61.6	26.4	58.8	23.7	6.2	31.2	61.0
Biobriquette	15.4	56.7	21.3	44.6	31.3	42.0	46.5	27.5
Wood pellet	10.6	56.4	18.8	40.9	30.0	36.9	42.4	25.4

The answers to various questions connected to wood heating revealed a lot of uncertainty. According to Table 7, firewood received a negative rating in all respects (expensive investment and operation, inconvenient, and polluting), despite the fact that the vast majority of domestic renewable energy is produced by firewood. The assessment of compacts was a bit more favorable from the point of view of convenience and environmental protection; however, due to the low level of knowledge related to them, this does not necessarily mean an advantage in terms of actual use, either. However, the different values indicate that respondents were basically aware of the differences between the compact solids.

Two of these aspects were highlighted, namely, convenience and environmental friendliness, as they can provide relevant market information on which of these two aspects are more important to respondents. The question was to be assessed on a 10-point scale, where 1 stood for "convenience is crucial" and 10 meant "eco-friendliness is crucial". The mean was 4.92 with a standard deviation of 2.159 ($N = 1002$), suggesting that convenience and environmental protection are given similar importance when choosing the type of energy.

For each group of background variables, the following significant differences were observed:

- As the level of education, health, and environmental awareness increases, the mean shifts toward the environmental aspect. While the mean among those with primary education was 4.67 (Std = 2.251), the mean among those with tertiary education was 5.38 (Std = 2.189; F value: 2.658 df: 3, 997, $p < 0.05$). The values for health-conscious people were as follows: mean = 6.39, Std = 2.189; F value: 10.521 df: 4, 980, $p < 0.001$, while those for environmentally conscious people were as follows: mean = 5.97, Std = 2.462; F value: 8.705 df: 4, 978, $p < 0.001$.

- When examined by regions, in the northern regions (Northern Hungary, Northern Great Plain) of the country (mean = 5.45, Std = 2.299, and Mean = 5.49, Std = 2.085, F value: 6.501 df: 6, 994, $p < 0.001$), environmental friendliness was also more important, but to a lesser extent than above. This was probably due to the fact that the three richest and the poorest of Hungary's seven NUTS-2 regions are located in the northern part of the country.

In addition to the above, a lot of uncertainty was experienced about wood heating. Specifically, 0.8% of households considered firewood a renewable energy source and interest in it was low (4.2%). At the same time, wood consumption accounted for a significant proportion of total use, together with natural gas, which was confirmed by the responses to the question related to the energy used (wood: 30%, natural gas: 67%). Inadequate information was probably due to a poorer financial situation, as well as to the marginal settlement type, for the following reasons:

- Wood combustion is typically applied by the "poor". As the income level of a household decreased (can live on it very well and can also save, can live on it but can save little, just enough to live on but cannot save, sometimes cannot make ends meet, have regular financial problems), so did the share of wood burning (means 4.39–5.10 F value: 4.275 df: 4, 294, $p < 0.001$).
- As the size (population) of the settlement decreased (Budapest—capital city, other town, village), the proportion of those using wood heating increased significantly (χ^2 = 176.328 df: 3 $p < 0.001$), which was primarily related to the significant proportion of detached houses in smaller settlements. Detached houses in the green belts of larger settlements typically heat with natural gas or, in the case of renewables, with wood pellets, solar collectors, and possibly a heat pump, i.e., they prefer the convenient solutions.

All the above confirm the typical attitude, i.e., that because of the lesser awareness and use of modern technological solutions, typical users consider wood an unfavorable, nonrenewable energy source.

The existence of a connection between firewood and renewable energy sources was also confirmed by other Hungarian studies. Szabó et al. (2018) [69] used word association tests to prove that respondents connected the two concepts to a minimal extent, regardless of the region. However, the stereotype is not unique to Hungary; according to a survey by Plate et al. (2010) [47], in the US, respondents did not rate woody biomass better than fossil fuels, and often even rated it less favorably than natural gas. They claimed that its low social support is mainly due to the ignorance of modern technologies, which also confirms that the perception of wood is significantly worse than its actual value [47].

4.2. Examination of the Reliability of Self-Assessment

The correctness of the answers presented in Table 7 above were examined, and the results showed that responses can be divided into three categories. In the case of solar collectors and solar panels, the proportion of those who gave correct answers to all the questions (concerning economy, convenience, and environment) was 52–53%. However, this proportion indicates that a greater or lesser degree of ignorance is very significantly present. With regard to other energy sources, the proportion of correct answers was much lower (2–20%), but the assessment of two factors was slightly different from the previous ones:

- With regard to windmills, the rate of correct answers was much lower compared to the results based on self-assessment, which was probably due to people being less familiar with family-sized solutions and identifying wind energy with wind turbines.
- With regard to wood pellets, a considerably higher proportion of correct answers was identified (10.5%) compared to self-assessment (4.5%). Considering the population

of Hungary and the current minimal use of wood pellets, this can serve as a good basis for the spread of this environmentally friendly and convenient fuel, already widely used in Western Europe, if the financial situation of the Hungarian population allows it.

Respondents with correct answers were compared with their own self-assessment, as well as with the self-assessment of respondents with incorrect answers (Table 8); on this basis, we reached the following conclusions:

- Accurate self-assessment was higher in the case of respondents with correct answers than with respondents with incorrect answers, but the difference was significant only for solar panels, solar collectors, and biobriquettes. In no case did self-assessment reach a value of "3" even with respondents giving correct answers, which represents average awareness.
- In the case of the solar panel, there was a significant (p = 0.011), but slight difference between the self-reported and actual knowledge of the two group means (2.48, and 2.29, respectively). In the case of the solar collector, the difference was much more reliable (p = 0.002) and also larger (2.50, and 2.27, respectively). In the case of the biobriquette, the difference was very reliable (p = 0.002) and large (2.86, and 2.02, respectively). However, in the case of correct answers, there were very few (11) respondents; thus, this can be accepted only to a limited extent.
- In the case of wood pellets and wood heating, as well as the windmill, it can be concluded that the few respondents giving correct answers assessed themselves in an unreliable way, by giving extremely weak values for self-assessment (below 2). For other energy sources, there was no significant difference between the self-reported and the actual knowledge.

Table 8. The evaluation of responses presented in Table 7.

	Correct	**Incorrect**	**Respondents**
Solar collector	531	470	1001
Solar panel	520	480	1000
Heat pump	205	797	1002
Wood pellet	105	897	1002
Windmill	46	955	1001
Wood	23	979	1002
Bio-briquette	19	983	1002

We also examined the reliability of self-assessment in the ranking of energy consumption aspects, placing special emphasis on the ranking between convenience and environmental aspects. It can be clearly stated that respondents were extremely consistent in terms of both convenience and environmental aspects (p = 0.00 for both); the difference on a 10-point scale was much larger for respondents with environmental preferences (1.54) than for those who focus on comfort (0.8).

4.3. Energy Attitudes of Respondents

According to the self-report, respondents could basically be classified into two groups (Table 9): the first includes wind, solar, and hydropower, and the second includes other (mainly biomass-based) renewable energy sources. This examination also confirms that, according to the self-report, there was a very strong relationship between the awareness of the three energy sources that belong to the first factor, while the awareness of energy sources other than these was much weaker.

Table 9. Factors of the relationships among the awareness of the energy sources studied.

	Factor	Factor
	1	**2**
Wind energy	0.94	
Solar energy	0.89	
Hydropower	0.85	
Biogas		0.81
Biodiesel		0.81
Bioethanol		0.79
Biobriquette		0.69
Wood pellet		0.67
Heat pump		0.64
Geothermal energy		0.56

Note: Extraction method: maximum likelihood; rotation method: varimax with Kaiser normalization. KMO = 0.891; Bartlett test (χ^2 = 2960.608; p < 0.001); communalities: 0.475–0.956; cut-off point: 0.50; total explained variance: 69.144%, Cronbach's alpha (total): 0.84; N = 1002.

As a function of these factors, we formed clusters. Cluster 1 included 60.6% of the respondents and Cluster 2 included 39.4%, the statistical characteristics of which are demonstrated in Table 10.

Table 10. Aspects of cluster formation.

		Cluster 1	**Cluster 2**
REGR factor score 1	Mean	0.04	−0.02
	Std. Deviation	0.98	0.90
REGR factor score 2	Mean	0.11	−0.04
	Std. Deviation	0.99	0.95
Importance of convenience or eco-friendliness *	Mean	4.96	4.92
	Std. Deviation	2.18	2.15
Heating cost per month	Mean	3.90	3.66
	Std. Deviation	1.32	1.37
Cheap investment (e.g., boiler)	Mean	2.57	2.39
	Std. Deviation	1.07	1.08
Cheap operation	Mean	1.86	1.76
	Std. Deviation	0.85	0.83
Convenience	Mean	2.30	2.48
	Std. Deviation	1.14	1.07
Environmental aspects	Mean	3.28	3.37
	Std. Deviation	0.89	0.82
18–40 years of age	Frequency	171	195
	Percent	0.467	0.532
40–65 years of age	Frequency	215	266
	Percent	0.447	0.553
65 and older	Frequency	0	132

Table 10. *Cont.*

			Cluster 1	**Cluster 2**
Maximum 8 years of primary schooling		Frequency	15	111
		Percent	0.12	0.88
Vocational schooling		Frequency	132	247
		Percent	0.35	0.65
High school graduation		Frequency	161	188
		Percent	0.46	0.54
Degree in higher education		Frequency	78	47
		Percent	0.62	0.38
Income	can live on it but can save little	Frequency	386	46
		Percent	0.89	0.11
	just enough to live on, but cannot save	Frequency	0	465
		Percent	0	1
	has difficulties in making ends meet	Frequency	0	82
		Percent	0	1
Do you use renewable energy sources in your household?				
Yes		Frequency	8	16
		Percent	0.33	0.67
No		Frequency	378	577
		Percent	0.40	0.60

Note: * scale: 1–10, where 1 denotes "it is rather convenience that is crucial for me" and 10 denotes "it is rather eco-friendliness that is crucial for me". The clusters were based on the best combination of a low Bayesian information criterion (BIC) and a high ratio of BIC changes, as well as meaningful conceptual considerations. The quality of the cluster solution in the total dataset was analyzed by a silhouette coefficient indicating cohesion and separation (a relatively high value indicates that the person is well matched to their own cluster and poorly matched to neighboring clusters). The silhouette measure of cohesion and separation was above 0.5, indicating good cluster quality. Conducting a replication analysis using Blashfield and Macintyre's split sample method produced clusters that were fairly similar to the main results. Cohen's kappa coefficient was 0.48 ($p < 0.001$), suggesting moderate agreement.

In general, cluster members could be characterized as follows:

- Those in Cluster 1 were generally better acquainted with both factor 1 and factor 2 energy sources than those in Cluster 2.
- For members of Cluster 1, the convenience and environmental aspects were the determining factors in the consumption of energy, whereas, for members of Cluster 2, economic aspects dominated (for the purchase of machinery, operating costs).
- The assessment of environmental and convenience aspects when compared to each other was practically the same.
- Cluster 1 consisted of older people, those with lower income status, and less education, while, in Cluster 2, nobody was over 65, and both their educational level and financial situation were much higher.
- Renewable energy sources were in principle used to a greater extent by those in Cluster 2, which was, however, due to the fact that wood is not considered a renewable energy source by members of Cluster 1. This was mainly due to poorer awareness, which can be traced back not only to poorer opportunities for acquiring knowledge, stereotypes, and outdated knowledge, but also to misinformation in public education.
- Overall, Cluster 1 included older, less informed, poorer, and cost-oriented respondents, while Cluster 2 included young, well-educated, richer, and environment- and convenience-oriented ones.

The difference observed between the clusters is in line with the findings indicated in the literature [29,35–37], which is explained by the fact that younger people are more likely to be aware of renewable energy choices. This is partly due to more up-to-date curricula and partly to the acquisition of knowledge via the Internet, which is more easily accessible to younger than older people. Our conclusion is supported by a previous study in Hungary [69], according to which both the adult population and school-age children surveyed marked the extracurricular media as a source of their renewable knowledge, which highlights the fact that the role of school education needs to be strengthened.

The characteristics of Cluster 2 developed by us (young, wealthier, more educated) correspond to the results of Sardianou and Genoudi (2013) [25], according to which middle-aged, highly educated people are more likely to use renewable energy systems in their homes; thus, a higher income also has a positive effect on the adoption and use of renewable energy systems.

As there was no significant difference between the clusters in terms of the importance of convenience and environmental aspects when purchasing an energy source, by ordinal regression calculation, we also examined the differences between respondents who clearly took a position on one aspect or for whom convenience and environmental aspects were equally important (Table 11A,B).

Table 11. (**A**) Part 1: Ordinary Logit Model for the examination of both the convenient and the environment-friendly attitude compared to the convenient attitude. (**B**) Part 2: Ordinary Logit Model for the examination of preference for environment-friendly attitude compared to the convenient attitude.

(A)						
Denomination *	**B**	**Std. Error**	**Wald**	**df**	**Sig.**	**Exp(B)**
Intercept	2.192	0.772	8.059	1	0.005	
How much does the family spend on heating in winter on average?	−0.126	0.069	3.351	1	0.067	0.881
What aspects do you take into account in your energy consumption? Please rank them according to their importance. Aspect: Convenience	0.081	0.091	0.789	1	0.374	1.084
What aspects do you take into account in your energy consumption? Please rank them according to their importance. Aspect: Environmental considerations	−0.437	0.121	13.094	1	0	0.646
REGR factor score 1 for analysis 2	−0.164	0.102	2.606	1	0.106	0.849
REGR factor score 2 for analysis 2	−0.088	0.097	0.82	1	0.365	0.916
What do you use for heating? 1. Wood = 0	−0.323	0.248	1.696	1	0.193	0.724
What do you use for heating? 1. Wood = 1	0	n.a. **	n.a.	0	n.a.	n.a.
What do you use for heating? 2. Natural gas = 0	0.46	0.214	4.618	1	0.032	1.584
What do you use for heating? 2. Natural gas = 1	0	n.a.	n.a.	0	n.a.	n.a.
Gender of the respondent = 1	0.264	0.185	2.042	1	0.153	1.302
Gender of the respondent = 2	0	n.a.	n.a.	0	n.a.	n.a.
Age group_3 = 1	−0.167	0.266	0.396	1	0.529	0.846
Age group_3 = 2	−0.106	0.251	0.178	1	0.673	0.899
Age group_3 = 3	0	n.a.	n.a.	0	n.a.	n.a.
The highest level of education completed = 1	−0.47	0.372	1.597	1	0.206	0.625
The highest level of education completed = 2	−0.676	0.303	4.964	1	0.026	0.509
The highest level of education completed = 3	−0.447	0.297	2.27	1	0.132	0.639
The highest level of education completed = 4	0	n.a.	n.a.	0	n.a.	n.a.

Table 11. *Cont.*

(A)						
Denomination *	**B**	**Std. Error**	**Wald**	**df**	**Sig.**	**Exp(B)**
Income category 3 = 1	0.058	0.349	0.028	1	0.868	1.06
Income category 3 = 2	−0.04	0.335	0.014	1	0.905	0.961
Income category 3 = 3	0	n.a.	n.a.	0	n.a.	n.a.
Environmentally conscious category 3 = 1	−0.77	0.261	8.689	1	0.003	0.463
Environmentally conscious category 3 = 2	−0.153	0.202	0.574	1	0.449	0.858
Environmentally conscious category 3 = 3	0	n.a.	n.a.	0	n.a.	n.a.
Type of home = 1 ***	−0.187	0.227	0.68	1	0.41	0.829
Type of home = 2 ***	0	n.a.	n.a.	0	n.a.	n.a.

(B)						
Denomination *	**B**	**Std. Error**	**Wald**	**df**	**Sig.**	**Exp(B)**
Intercept	2.011	0.718	7.841	1	0.005	
How much does the family spend on heating in winter on average?	−0.075	0.066	1.313	1	0.252	0.927
What aspects do you take into account in your energy consumption? Please rank them according to their importance. Aspect: Convenience	0.459	0.082	31.353	1	0	1.583
What aspects do you take into account in your energy consumption? Please rank them according to their importance. Aspect: Environmental considerations	−0.643	0.108	35.401	1	0	0.525
REGR factor score 1 for analysis 2	0.019	0.091	0.042	1	0.838	1.019
REGR factor score 2 for analysis 2	0.107	0.087	1.513	1	0.219	1.113
What do you use for heating? 1. Wood = 0	0.074	0.225	0.11	1	0.74	1.077
What do you use for heating? 1. Wood = 1	0	n.a.	n.a.	0	n.a.	n.a.
What do you use for heating? 2. Natural gas = 0	0.064	0.203	0.1	1	0.752	1.066
What do you use for heating? 2. Natural gas = 1	0	n.a.	n.a.	0	n.a.	n.a.
Gender of the respondent = 1	0.102	0.17	0.363	1	0.547	1.108
Gender of the respondent = 2	0	n.a.	n.a.	0	n.a.	n.a.
Age group 3 = 1	−0.152	0.246	0.381	1	0.537	0.859
Age group 3 = 2	−0.136	0.233	0.342	1	0.559	0.873
Age group 3 = 3	0	n.a.	n.a.	0	n.a.	n.a.
The highest level of education completed = 1	−0.693	0.354	3.841	1	0.05	0.5
The highest level of education completed = 2	−0.443	0.281	2.49	1	0.115	0.642
The highest level of education completed = 3	−0.179	0.276	0.421	1	0.517	0.836
The highest level of education completed = 4	0	n.a.	n.a.	0	n.a.	n.a.
Income category 3 = 1	−0.06	0.333	0.033	1	0.856	0.942
Income category 3 = 2	0.123	0.319	0.15	1	0.699	1.131
Income category 3 = 3	0	n.a.	n.a.	0	n.a.	n.a.

Table 11. *Cont.*

(B)						
Denomination *	**B**	**Std. Error**	**Wald**	**df**	**Sig.**	**Exp(B)**
Environmentally conscious category 3 = 1	−0.913	0.228	16.007	1	0	0.401
Environmentally conscious category 3 = 2	−0.814	0.191	18.239	1	0	0.443
Environmentally conscious category 3 = 3	0	n.a.	n.a.	0	n.a.	n.a.
Type of home = 1	0.166	0.203	0.667	1	0.414	1.181
Type of home = 2	0	n.a.	n.a.	0	n.a.	n.a.

Note: * The reference category is: Preference for convenience (1–4). The dependent variable had three different levels (1–4; 5; 6–10) transformed from a 10-point scale, where 1 stood for "convenience is crucial" and 10 meant "eco-friendliness is crucial". ** Not available. *** Type of home: 1 = Detached house with a garden, 2 = Flat. AIC: 1964.905; BIC: 2150.164; - 2 Log Likelihood value: 1888.905; Likelihood Ratio Tests (Chi-square value: 194.082, df: 36, $p < 0.001$); Cox & Snell R Square: 0.182; Nagelkerke R Square: 0.206.

Differences that could be considered significant as compared to the group that preferred convenience were as follows:

- Those with higher heating costs were 12% more likely to belong to the neutral group ($p = 0.07$);
- Those for whom environmental considerations were more important when purchasing energy were 55% more likely to belong to the neutral group, and self-reportedly environmentally conscious people were 54% more likely to belong to the neutral group, while the reliability was also very strong ($p = 0.00$);
- Those who did not heat with natural gas were 58% more likely to belong to the neutral group ($p = 0.03$);
- Those with primary education were 49% more likely to belong to the neutral group than those with secondary education ($p = 0.03$);
- Those for whom aspects of convenience were more important had a 37% lower chance of being placed in the environmentally friendly group, with strong reliability ($p = 0.00$);
- Those with lower education were 50% less likely to be classified into the environmentally friendly group ($p = 0.05$);
- Nonenvironmentally conscious people were 60% less likely, while neutral respondents were 56% less likely to be included in the environmentally friendly group ($p = 0.00$).

Overall, it can be concluded that an extremely strong significance ($p < 0.001$) could be detected in the consistency of respondents when purchasing the energy type and ranking the convenience/environmental aspects. It can also be stated in a statistically reliable way ($p = 0.03$–0.07) that the "convenient" had a higher education, heated with natural gas, and paid less for heating. The latter was partly due to their more typical use of renewables and energy-efficient solutions, and partly to the fact that the price of natural gas in Hungary has been stagnant for years due to the state regulation of the "public utility price cut". The results also clearly indicated that wood is basically the fuel for the poorer and less educated, whereas natural gas is basically used by the more affluent and better-educated strata. The commitment between convenience and environmentally friendly fuels showed a much more reliable relationship than the relationship observed between the self-reported and actual knowledge of different energy sources.

5. Conclusions

Our nationally representative questionnaire survey examined not only the awareness of renewables, but also the relationships between self-reported and actual knowledge, as well as the correlation among each energy source, characteristic stereotypes, and the typical energy attitudes of each social group. Some of our results correspond to international experience, whereas the remainder of our research (mapping of typical misconceptions, relationships between self-reported and actual knowledge) has, to our knowledge, no international history and, thus, presents novel connections.

According to the respondents' self-assessment, their information was below average for all energy sources examined, but the actual knowledge of those who answered the control questions correctly was significantly better than that of those with incorrect answers in the case of solar panels, solar collectors, and biobriquettes.

In terms of awareness of renewable energy sources, better education and income, an active white-collar job, and a health- and environment-conscious outlook on life are definitely advantages. We did not show a significant relationship with age; however, in cluster formation, young people were typically more informed. These demographic lifestyle factors are basically the same as the characteristics of the LOHAS segment. Thus, the results of the cluster analysis on the Hungarian sample also confirmed the international opinion that the LOHAS group could be one of the key target markets of the renewable energy market.

The awareness of wind, solar, and hydropower was outstanding and the relationship between them was very strong.

An interesting contradiction was that, while the majority of the respondents had not heard about biodiesel and bioethanol mixed into public fuels, biogas could be considered relatively well known as a fuel despite the fact that it is used for fuel purposes in only one place in Hungary.

Firewood received another specific outlook, as it was considered by most to be expensive, inconvenient, and polluting from an investment and operational point of view, as well as a nonrenewable energy source; nevertheless, it was used in a significant proportion. This was mainly due to its use by the less well-informed (older, poorer, less educated).

It was also clearly confirmed by the current research that people definitely think of the solar panel in relation to solar energy and wind turbines in relation to wind energy, while not much is known about other solutions (solar collector, windmill) in relation to the two renewable energy sources.

The assessment of convenience and of the environmental aspects was almost the same, and no significant relationship could be detected between the clusters examined, either. However, the stereotype of convenient and cheap heating was clearly linked to natural gas heating, which was typical of the younger, better-educated, and wealthier social strata.

Overall, the actual knowledge of Hungarian respondents was more favorable than the self-reported one, and the basic knowledge of energy sources in the case of wind and hydropower exceeded international experience. The social factors of better knowledge were essentially in line with international trends; however, at the same time, typical false stereotypes could be observed in the field of firewood, solar, and wind energy.

The findings of the research highlighted that there is a significant difference between the perceived and actual knowledge of the Hungarian population concerning renewable energy, i.e., the objective knowledge—in the case of several energy sources—exceeds the related belief. Therefore, the level of awareness does not meet the required extent, and the marketing programs must primarily focus on shaping awareness and on education. Marketing instruments can efficiently operate if they are the results of widescale cooperation between stakeholders (such as policymakers, businesses, press and communication networks, local and academic institutions, the general public, experts and committed people, schools, and nongovernmental organizations).

Dissemination of information and knowledge can be carried out through multilevel marketing communication within the framework of programs increasing awareness. First, the government has to target stakeholders who play a crucial role in disseminating information and in shaping awareness: local authorities, nongovernmental organizations, research institutes, the media, etc. In the course of convincing, the role of reference groups is outstanding in making the public more aware of the principles and necessity of energy-saving and substitution. Consequently, segments including opinion leaders (such as the LOHAS segment and community and social media influencers) should be primarily reached, as they have dominant power in forming the opinion of the wide public.

It must be stressed, however, that providing a favorable environment is a crucial criterion in changing the objectives of the energy policy, as well as the attitude and behavior of energy consumers. This requires a systematic approach covering all factors, including technological and infrastructural aspects, supporting financial mechanisms, and market-based instruments.

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