



---

# Energy Crisis as Catalyst: the Transformation of Energy Awareness and Consumer Attitudes in Hungary

Ágnes Fűrész<sup>1</sup>, András Szeberényi<sup>2</sup>

<sup>1</sup>Hungarian University of Agriculture and Life Sciences, Gödöllő, Hungary, ORCID ID: 0009-0009-7202-0928, [fureszagi@gmail.com](mailto:fureszagi@gmail.com)

<sup>2</sup>Budapest Metropolitan University, Budapest, Hungary, ORCID ID: 0000-0002-1387-0350, [aszeberenyi@metropolitan.hu](mailto:aszeberenyi@metropolitan.hu)

**Abstract:** The 2021 energy crisis has had a profound impact on Hungarian consumers, compelling both households and policymakers to reconsider energy consumption habits and the broader concept of energy awareness. This study investigates how the crisis has influenced consumer attitudes, motivations, and behaviors toward renewable energy adoption, with particular emphasis on financial, environmental, and socio-economic determinants. Using an online survey of more than 400 respondents, the research explored knowledge, openness, motivational factors, and perceived barriers to adopting renewable energy. The results demonstrate that financial considerations, including rising utility costs and the aspiration to reduce expenditures, remain the strongest motivators, followed by environmental awareness, the desire for independence from providers, and the crisis itself. Respondents identified high upfront costs, insufficient support schemes, and long payback periods as key barriers to adoption. Consumer responses to rising energy prices were heterogeneous: some adopted immediate energy-saving measures, others relied more heavily on cheaper fossil fuels, while a minority maintained previous consumption patterns. Importantly, the findings highlight a growing openness to educational content and information provided by energy companies and policymakers, suggesting that effective communication and support mechanisms are critical to shaping long-term awareness. In summary, the energy crisis acted as both a disruptive shock and a developmental opportunity, accelerating the spread of energy-conscious attitudes and practices. By strengthening educational initiatives, improving financial support, and fostering reliable communication, Hungary has the potential to cultivate a more energy-conscious society that is resilient to future economic uncertainties and environmental challenges.

**Keywords:** energy awareness, energy crisis, consumer behavior, renewable energy

**JEL Classification:** D83, Q20, Q29

## 1. Introduction

Managing energy responsibly has become indispensable in contemporary society. Establishing and consolidating fundamental consumer habits related to energy awareness remains an exceptionally complex task, as entrenched attitudes and individual preferences are difficult to reshape. Nevertheless, the potential benefits are considerable, particularly in the global fight against climate change. Developing energy-conscious behavior requires clear, comprehensible, and accessible communication and education, which can effectively guide individuals through the complexities surrounding energy (Hassan et al., 2009). The accelerating depletion of fossil fuels, the continuous rise in greenhouse gas concentrations, unfavorable geopolitical developments, and escalating energy prices have all highlighted the vulnerabilities of modern societies – with the energy crisis proving particularly impactful in Hungary (Kolozsi, 2023). Unpredictable energy prices place heavy burdens on consumers, creating uncertainty in their daily lives and worsening living conditions (Baranyai & Banai, 2022). This occurs because their previous energy consumption patterns have become unsustainable, compelling financially less stable households to make difficult choices. Against this backdrop, the present study investigates how the energy crisis has reshaped consumer attitudes, behaviors, and energy awareness in Hungary.

### **1.1. The impact of the energy crisis on consumer behavior**

Hungarian society is currently facing challenges that, due to global developments, may prove decisive for both the present and the future. The increasingly visible consequences of climate change, the structural problems of energy production and consumption, and the instability of energy markets collectively call into question the sustainability of current economic systems and social behavior. In this context, energy awareness and conservation are gaining importance not only from an environmental standpoint but also from economic and social perspectives. The diffusion of energy-efficient and innovative technologies can generate significant savings for both households and companies, while simultaneously strengthening energy security, reducing dependence on imports, and contributing to price stability. Paradoxically, the adverse impacts of the recent energy crisis may serve as a catalyst for the wider adoption of renewable energy sources.

The 2021 energy crisis can be compared to the oil crisis of the 1970s, as both have stimulated research and practical efforts aimed at expanding the use of alternative energy, thereby underlining the critical need to diversify energy supplies (Gajdzik et al., 2024). In Hungary, the crisis appears to have transformed consumer attitudes, with an increasing share of the population regarding renewable energy as an essential pillar of the future. This study therefore seeks to provide a comprehensive analysis of how the energy crisis has fostered the evolution of energy awareness and consumer attitudes. Evidence suggests that a growing proportion of the population has moved beyond awareness to embrace energy efficiency, recognizing the necessity of modifying unsustainable consumption patterns. A fundamental prerequisite for this transformation is the acquisition of reliable knowledge about energy and renewable sources (Meyer et al., 2021). In the absence of credible and accessible information, knowledge gaps are often filled with misconceptions or misinformation, which may lead to apathy, distrust, or outright rejection (Kolozi et al., 2022).

The determinants of energy consciousness are complex and multidimensional, spanning psychological, sociological, economic, and environmental domains (Mansor et al., 2019). Numerous studies confirm that an energy-conscious mindset can most effectively be cultivated by transforming entrenched, inefficient habits. Such change results from the interaction of psychological factors and external influences, which together shape the persistence of old patterns and the willingness to adopt new ones (Sheau-Tingi et al., 2019).

### **1.2. The evolution of energy awareness in Hungary**

Psychological factors exert a direct influence on consumer decisions, motivation, and the inclination to adopt energy-conscious behavior, while other determinants operate indirectly by shaping intentions (Gárdan et al., 2023). Energy awareness, therefore, largely depends on willingness; without it, the transformation of consumer habits remains inconceivable. Within the Hungarian energy market, the concept of energy awareness can be interpreted at both the household and corporate levels. The present study focuses on individuals, examining their attitudes, habits, and behaviors. In this regard, generational differences also play a decisive role: younger consumers tend to be more open to experimenting with new technologies and adopting energy-saving habits, while older age groups display more conservative attitudes, often due to lower financial flexibility or limited access to information.

Consumer responses to the negative consequences of the energy crisis, such as rising energy prices, can be assessed from multiple perspectives. Household energy consumption is strongly influenced by socio-economic and demographic characteristics (e.g., household size, age, financial status), lifestyle, childhood experiences, and inherited behavioral patterns. Technical aspects, including the type, efficiency, and

condition of dwellings and appliances, further shape consumption patterns (Ślupik et al., 2021). Knowledge related to energy also plays a crucial role, affecting both intentions and concrete behaviors. Previous studies confirm a direct relationship between energy awareness and energy-saving practices (Zhao et al., 2019). As consumers acquire reliable information and recognize the tangible benefits of modifying their habits and living conditions, they can achieve significant reductions in consumption through more responsible energy management. In this way, energy awareness expands not only as a mindset but also as a practice, whereby individuals set an example that encourages others to follow (Gadenne et al., 2011). Beyond personal experience, the role of mass communication and digital media has become decisive, as reliable online content and targeted campaigns provide opportunities to translate abstract concepts of sustainability into everyday practices.

Despite the proliferation of offline and online information sources in recent years, energy awareness continues to represent a critical societal issue. According to survey participants, however, the proportion of genuinely energy-conscious Hungarians remains low: only 12.5% consider the population to be energy-conscious. Regional variations further complicate the picture, as levels of knowledge, access to information, and willingness to adopt energy-saving practices differ across the country. These disparities are closely linked to educational attainment, household living conditions, and other socio-economic variables (Szakály et al., 2020). While some consumers have already reformed their energy habits as a result of the crisis, the absence of willingness continues to prevent meaningful change. This factor thus emerges as a decisive condition for adopting an energy-conscious mindset and achieving sustainable energy use (Wall et al., 2021). Moreover, the influence of peers and social networks should not be underestimated: households that witness positive examples in their immediate environment are more likely to engage in similar practices, creating a diffusion effect that can gradually raise the overall level of energy awareness in Hungarian society.

### 1.3. New consumer attitudes due to the energy crisis

In recent decades, numerous sustainability-oriented concepts have emerged, primarily centered on renewable energy, climate change mitigation, and environmental responsibility. As a result, the Hungarian public has been increasingly exposed to global debates through diverse sources of information, and environmentally focused campaigns have reached consumers with growing intensity. Initially, however, these initiatives had only a limited effect on individual responsibility, as energy was long perceived as a mere necessity and the concept of utilities as a “necessary evil.” Definitions such as energy awareness, energy efficiency, or ecological footprint were absent from everyday discourse for years. Consequently, the population had to undergo a long transition before recognizing the value of energy and the necessity of handling resources responsibly rather than wastefully. Over time, individuals became more conscious, and new internal motivators began to emerge in consumer behavior. Yet it was the energy crisis as a global shock that truly accelerated this process, forcing society to reconsider unsustainable consumption habits and creating the conditions for the formation of distinct consumer groups.

The findings highlight that new attitudes and motivations related to energy are emerging within Hungarian society, which can be observed in the following consumer segments:

1. **Green consumers:** These individuals are primarily motivated by the desire to actively contribute to the reduction of greenhouse gases responsible for global warming and to minimize harmful impacts on the planet. They are leaders in replacing fossil fuels with alternative resources, viewing renewable energy sources as the future. Their consumption habits indicate a keen interest in innovation, technology, and renewable energy content, keeping them highly informed on the subject. Their respect and care for the environment further enhance their sensitivity towards it (Cheng et al., 2015). According to the survey results, **23.2% of respondents identified**

**environmental protection as their primary motivation** for adopting renewable energy, confirming that this group's mindset is strongly value-driven.

2. **Energy efficiency-oriented consumers:** Driven mainly by economic interests, this active consumer group focuses on reducing energy-related costs, with their primary goal being to minimize or entirely eliminate these expenses (thus becoming independent of energy providers). Some have already installed renewable energy sources to mitigate the uncertainties and financial issues caused by the energy crisis. Their consumer decisions are significantly influenced by the opinions and experiences of individuals or groups they consider authoritative. Their attitude towards renewable energy sources is significantly influenced by the availability and monetary value of EU or state subsidies. The database reveals that **26.8% of respondents adopted renewable energy mainly for financial savings**, and an additional **24.4% cited rising energy prices** as their key driver, illustrating the strong dominance of cost-related motivations in this group.
3. **Energy-conscious consumers:** These individuals are mindful of their energy use in their daily lives, avoid waste, monitor their energy consumption and related habits, and are willing to change established practices if it leads to an improved quality of life (financial return is secondary to them). They have adopted a fundamental energy-conscious mindset and typically use renewable energy sources to meet their energy needs. If they do not have access to alternative resources, they remain open and interested in the topic. Should their financial situation or current living conditions permit, they would transition to renewable energy. They set an example for their children, emphasizing the importance of educating the next generation on energy awareness. Supporting this profile, survey participants rated their own **energy awareness at an average of 6.65 on a self-assessment scale**, and only **1% indicated that they make no attempt to live energy-consciously**, highlighting a broad, albeit uneven, commitment to conscious energy use.
4. **Open and receptive consumers seeking energy awareness:** They are interested in the topic and follow developments and innovations in the energy sector in some way. Their openness is evident in their media consumption habits, as they consume relevant content across various platforms and follow different energy providers. Their main areas of interest include content focused on minimizing energy waste and energy consumption tips. When asked about their preferences for educational materials, **45% of respondents expressed clear interest in content from energy providers, 35% showed conditional openness ("maybe"), and 13% reported that they already consume such content**, with only **5% declaring no interest**. These findings emphasize that this group can be reached effectively through targeted communication strategies.
5. **Environmentally conscious consumers:** They are familiar with basic environmental definitions and aware of current issues related to the topic. Therefore, they are committed to both their lifestyle and actions, believing that their efforts contribute to change. Their lifestyle, habits, and behavior reflect this commitment. The research data supports this characterization: **12.6% of respondents stated that the energy crisis directly increased their interest in renewables, 18.4% reported that the crisis has driven more households toward renewable energy**, and a large majority, **64.1% perceived a general increase in openness to renewable energy in society**. These percentages show that environmental concerns and collective responsibility are increasingly relevant motivators.
6. **Passive, indifferent social group:** They are not particularly interested in renewable energy and remain indifferent towards it. They are either unable or unwilling to change their lifestyle, or both conditions may apply. They only alter their entrenched habits if these habits negatively impact their lives and financial situation. For this group, barriers represent the most significant explanation for inactivity: **33.6% reported that the high initial cost of renewable installations prevents them from investing, 18% cited the lack of adequate financial support schemes, and 16.6%**

**pointed to excessively long payback periods.** A smaller proportion, **10.1% believed that renewables are not worthwhile under current Hungarian conditions,** while only **1.8% described such investments as too risky due to uncertainties associated with the energy crisis.** These results illustrate the structural constraints and psychological reservations that characterize this disengaged segment.

This typology underscores the heterogeneous ways in which Hungarian consumers have responded to the energy crisis. While some groups – particularly green consumers and energy-conscious households – demonstrate proactive, value-driven behavior, others are primarily guided by economic considerations, and a notable portion of society remains resistant to change. The coexistence of these diverse attitudes reveals both opportunities and obstacles for policymakers, energy providers, and educators. On the one hand, proactive groups provide a solid foundation for the diffusion of sustainable practices; on the other, economically motivated and passive groups highlight the necessity of differentiated policy measures and targeted communication strategies.

The results therefore suggest that energy awareness in Hungary is far from homogeneous. Instead, it is shaped by a complex interplay of financial incentives, ecological values, lifestyle factors, and social influence. Recognizing this diversity is essential: policy interventions must address acute vulnerabilities in energy-poor households, provide incentives for financially secure but reluctant consumers, and strengthen educational and communication campaigns that can further mobilize the open and environmentally conscious groups. In this sense, the energy crisis has acted not only as a disruptive shock but also as a formative force, accelerating the crystallization of new consumer typologies that reflect the multifaceted nature of energy awareness in contemporary Hungary.

## **2. Materials and Methods**

The primary focus of this research was on understanding respondent's perspectives, specifically in relation to how the energy crisis has influenced the Hungarian population's views on renewable energy (1), the impact of recent events on the public's perception of renewable energy (2), the preliminary knowledge of individuals participating in the online survey (3), the level of awareness among the surveyed consumers (4), and the external and internal motivations (5) that have affected or could affect their purchasing decisions or would affect them if they had the opportunity to transition to alternative energy sources.

To achieve this, we employed a user-friendly online questionnaire administered through the Surveyplanet platform. The questionnaire was organized into four principal sections: an assessment of knowledge related to renewable energy (1), an exploration of consumer attitudes towards renewable energy, interest in renewable energy sources and preconceptions (2), an examination of experiences among individuals using renewable energy and the factors influencing their decisions (3), and demographic questions (4). The survey was completed by over 400 participants, primarily private individuals who either already utilize renewable energy sources or are open to them and possess some knowledge about alternative energy.

## **3. Results**

The energy crisis and its effects, such as rhapsodically fluctuating prices, have disrupted the daily operations of all energy stakeholders. Therefore, it was deemed essential to examine how participants perceive the impact of the energy crisis as an external event on their interest in and openness towards renewable energy. Moreover, this study aims to determine whether the energy crisis can be considered an influencing factor in the willingness to adopt renewable energy sources, changes in consumer behavior, and the dissemination of an energy-conscious mindset.

### 3.1. Consumer openness

A substantial proportion of respondents believe that consumers have become more receptive to renewable energy sources, with 18.7% asserting that the crisis has actually increased the number of individuals interested in renewable energy. In contrast, 4.8% of respondents stated that residents would have invested in renewable energy sources regardless of the crisis, suggesting that the latter did not exert a significant influence. Although the number of green movements and individuals actively engaged in environmental initiatives has grown in recent years, environmental protection has not yet mobilized the wider population.

70% of respondents indicated that their decisions had been directly affected by rising energy prices and expenditures, whereas 24.4% reported no impact. This demonstrates that a considerable portion of the population has been adversely influenced by the energy crisis, which necessitated adjustments in existing consumption habits while still attempting to preserve the quality and quantity of their preferred comfort levels. The survey further explored which communication channels respondents consider most effective for disseminating information on renewable energy. Television programs (70% rated 4 or 5) and social media advertising (69%) were identified as the most influential formats, followed by online advertising (64%) and advertising films (62%). By contrast, only 26% regarded print materials (brochures, flyers, press advertisements) as effective, while newsletters achieved similarly low levels of support (28%). Approximately half of the participants valued professional articles on the websites of energy providers (48%) and mobile applications (47%). These findings underline that receptiveness to renewable energy is closely connected to media preferences, with younger cohorts tending to favor digital platforms and older groups relying more strongly on television.

### 3.2. Internal and external consumer motivations

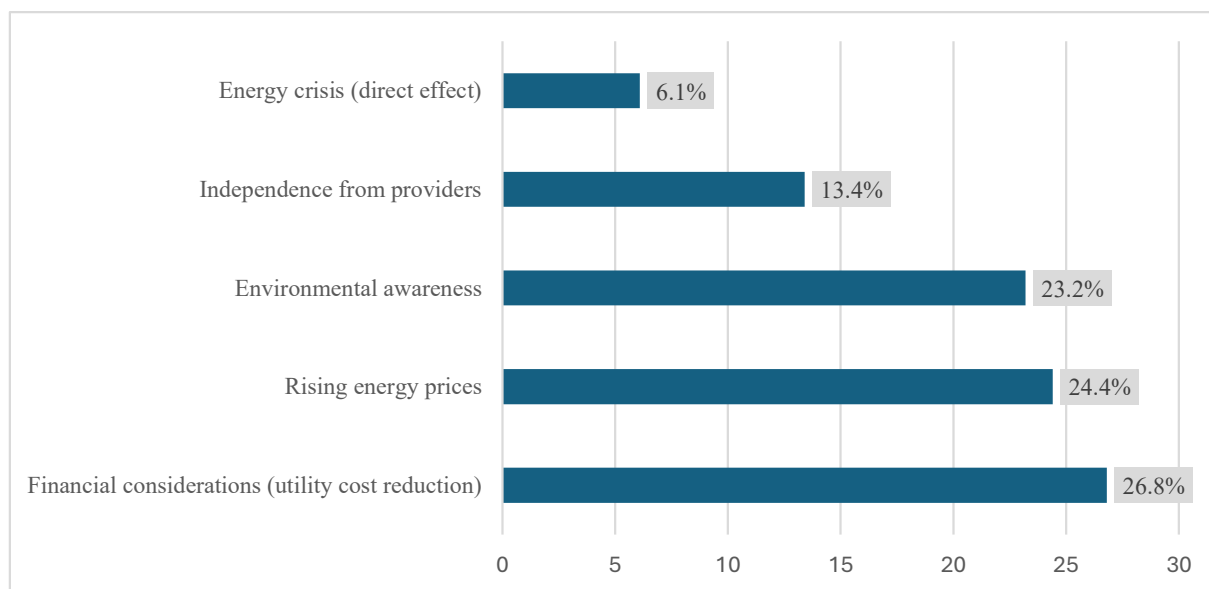
Beyond the overall level of energy consumption, it is equally important to emphasize the transformation of consumption habits. The ongoing technological revolution has altered consumer behavior, exemplified by the increasing prevalence of online shopping. These behavioral changes have introduced new attitudes, motivations, and concerns into decision-making processes. Consumers are now striving for more deliberate and conscious practices in multiple areas of life, shaped by global disruptions such as the Russian–Ukrainian conflict and the climate crisis (Graczyk et al., 2023). These events have underscored the vulnerability of energy systems, forcing governments to develop alternative strategies and encouraging individuals to reconsider their energy use at a personal level (Rausser et al., 2023). This heightened awareness enables more effective responses to unexpected circumstances rather than passive adaptation.

The identification of external and internal motivational factors is critical for understanding consumers' decision-making mechanisms, as well as their beliefs, habits, and concerns. On this basis, the current level of energy awareness can be evaluated, its determinants mapped, and the new habits and attitudes shaped by the crisis better interpreted. A more precise understanding of consumer segments supports targeted educational initiatives and fosters the development of content that is practical, accessible, and relevant. Contemporary consumers tend to reject superficial messages and instead demand reliable, information-rich, and applicable knowledge. The surge in consumer interest and the heightened demand for credible information observed during the energy crisis serve as clear evidence of this shift.

The survey identified five key internal and external motivational factors among the Hungarian population: (1) financial considerations, (2) rising energy prices, (3) environmental awareness, (4) the desire for independence from providers, and (5) the energy crisis. The distribution of these motivators is illustrated in Figure 1. The most decisive factor proved to be financial pressure, with 26.8% of respondents indicating that they selected renewable energy solutions primarily to reduce utility costs. Rising energy prices were cited as an external motivator by 24.4% of respondents, while 23.2% reported environmental considerations as

their main reason for adopting alternative energy. Furthermore, 13.4% emphasized the aspiration to achieve full independence from providers, and 6.1% identified the energy crisis as a direct driver of their decision.

In addition to financial, environmental and independence-related factors, the analysis revealed the growing significance of educational incentives. The willingness of consumers to engage in energy-conscious behavior appears to be closely linked to the accessibility, clarity and credibility of the information they receive. Nearly seven out of ten respondents rated mass-reach digital and television communication as effective channels for promoting renewable energy awareness, highlighting that the reliability of the message and the medium constitutes a decisive influence alongside economic and ecological considerations.



**Fig. 1** Motivational factors for adopting renewable energy

*Source: own editing*

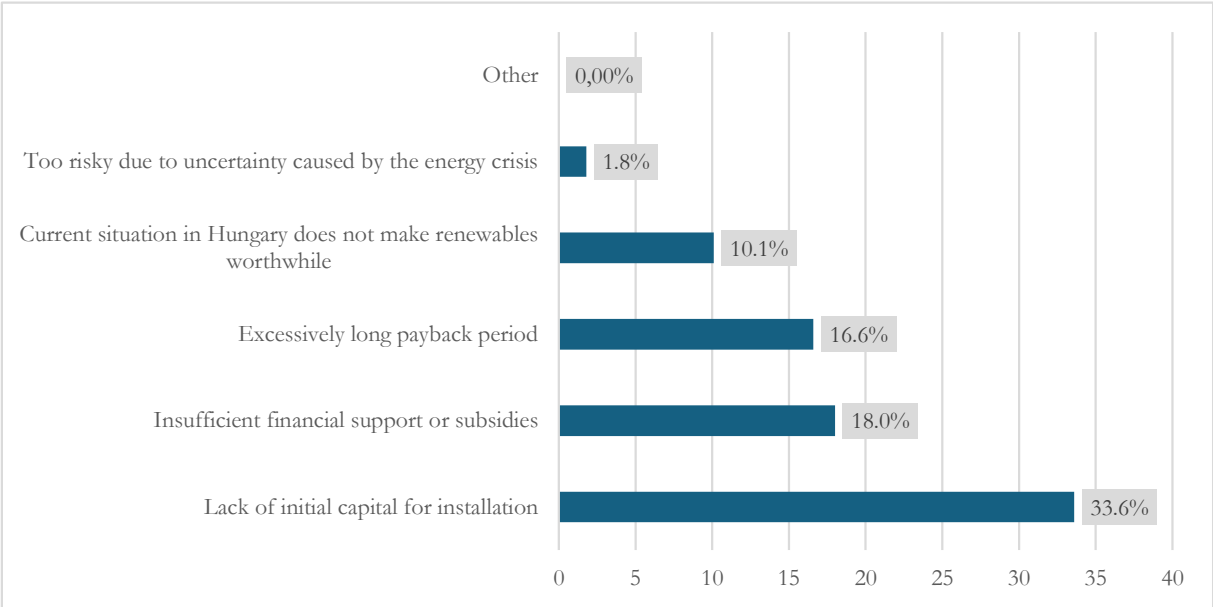
As illustrated in Figure 1, the energy crisis emerges as a decisive factor shaping consumer attitudes toward renewable energy. On the one hand, the crisis itself functions as a direct trigger for considering alternative energy sources; on the other, its negative consequence – namely rising energy prices – acts as an additional catalyst for adoption. Taken together, these findings confirm that the energy crisis constitutes a significant external driver influencing the decisions of Hungarian consumers. Beyond the individual categories shown in the figure, the distribution can also be grouped into three broader motivational domains. Financial drivers dominate, with more than half of respondents (51.2%) citing either offsetting utility costs (26.8%) or rising energy prices (24.4%) as their primary rationale. Value-based considerations, such as environmental protection (23.2%) and the aspiration for independence from providers (13.4%), together account for 36.6%. By contrast, a smaller proportion (6.1%) reported that the energy crisis itself directly triggered their decision. This distribution suggests that the crisis exerted its greatest influence indirectly, through economic pressures, while intrinsic values and security-related considerations continue to play a secondary but non-negligible role. Financial considerations, particularly the objective of reducing utility expenses, therefore remain the most decisive motivators. Yet, environmental protection also appears as a prominent internal driver, encouraging respondents to participate more actively in addressing global warming and the climate crisis. This internal concern fosters a willingness to assume responsibility for personal energy consumption and to minimize unnecessary waste. Externally, the combined impact of escalating energy prices and the broader energy crisis exerts considerable pressure on households (Smith & Johnson, 2021). Under such circumstances, personal economic interests increasingly converge with ecological concerns, reinforcing both the importance of energy awareness and the attractiveness of transitioning toward renewable energy sources.

The significance of these motivators, however, is not uniform across the population. Younger cohorts tend to emphasize environmental protection and long-term sustainability, whereas older respondents are more responsive to immediate financial considerations. Regional and socio-economic differences are also evident, with households in less affluent areas being disproportionately sensitive to price increases. These variations suggest that tailored policy measures and differentiated communication strategies are essential to address the diverse drivers of energy awareness. It is also noteworthy that only a small proportion of respondents (6.1%) explicitly identified the crisis itself as their primary motivator. These findings underline that the energy crisis influenced behavior mainly in an indirect manner, through rising prices and heightened economic uncertainty, rather than through the immediate perception of crisis. The observed patterns have clear policy and institutional implications. They highlight the importance of designing interventions that simultaneously address short-term financial concerns and reinforce long-term environmental values. Energy providers and policymakers are therefore expected to act not only as regulators of costs but also as facilitators of lasting behavioral change through credible education and effective communication.

Finally, the convergence of economic and ecological concerns suggests a potential trajectory for future consumer behavior. Once financial pressures ease, intrinsic values related to environmental protection may gain further prominence, providing a stable foundation for the long-term development of energy awareness. This dynamic illustrates how the crisis, despite being primarily an external shock, may ultimately foster deeper and more enduring shifts in consumer attitudes.

### 3.3. Financial considerations

The Hungarian population is highly sensitive to price fluctuations, striving for predictability, security, and stability. As a result, the energy crisis and its consequences have profoundly affected consumer behavior. In the aftermath of the crisis, a financially conscious segment has emerged that is particularly proactive in acquiring information and preparing for anticipated risks. Many within this group have opted for renewable energy sources, as these provide a sense of self-sufficiency and control, offering both emotional and financial



**Fig 2.** Barriers to renewable energy adoption among Hungarian consumers  
*Source: own editing*

security in the event of another sharp increase in energy prices. Notably, 13.8% of respondents view renewable energy systems as a pathway to self-sufficiency and regard them as a worthwhile investment prompted by the crisis. Despite this growing interest, significant barriers continue to constrain the wider

diffusion of renewable energy systems. The most frequently cited obstacles are presented in Figure 2, which illustrates the relative weight of financial and contextual factors discouraging adoption.

As shown in the figure, the lack of initial capital represents the most significant barrier, with 33.6% of respondents indicating that they cannot afford the upfront costs of installation. A further 18.0% pointed to insufficient financial support schemes, while 16.6% considered the excessively long payback period a major deterrent. Additionally, 10.1% believed that under current conditions in Hungary renewable investments are not worthwhile, and a smaller share (1.8%) perceived such investments as too risky due to uncertainty associated with the energy crisis. These results clearly demonstrate that, even for financially motivated households, decisions are shaped by careful risk-benefit calculations, and that state support mechanisms play a decisive role in facilitating broader adoption.

### 3.4. Rising energy prices

The energy crisis-induced increase in energy prices has elicited diverse responses from Hungarian consumers, which can be grouped into four distinct categories:

1. **Economically Constrained Households:** These households immediately adopted energy-saving practices, substantially reducing their consumption, in some cases making drastic adjustments to their daily routines (Azizi et al., 2019). Where finances permitted, they invested in renewable energy systems or undertook smaller efficiency measures, such as insulation or window replacement.
4. **Fuel-Poverty Affected Segment:** In areas characterized by energy poverty, respondents reported even more substantial reductions in energy use. Where alternative fuels were available, residents increasingly relied on fossil resources to satisfy basic energy needs.
5. **Knowledge-Oriented Consumers:** This group actively sought knowledge and guidance to stabilize their situation. They invested time and resources in learning about conservation methods, adjusted their consumption to align with their budgets, and adopted practical measures to reduce energy expenses.
6. **Comfort-Oriented Consumers:** By contrast, households that were not financially constrained by higher prices maintained their existing levels of consumption and comfort, continuing their previous energy practices without major adjustments (Slupik et al., 2021).

These consumer types and their main characteristics are summarized in **Table 1**.

**Table 1.** Consumer responses to rising energy prices during the energy crisis

| Consumer type                              | Main reaction                                       | Typical behavior                                                          | Illustrative examples                         |
|--------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------|
| <b>Economically Constrained Households</b> | Immediate consumption reduction                     | Adopt energy-saving habits, reduce daily activities, invest if affordable | Installing insulation, window replacement     |
| <b>Fuel-Poverty Affected Segment</b>       | Substantial reductions, reliance on cheaper sources | Cut energy use drastically, switch to cheaper or traditional fuels        | Increased use of fossil fuels (wood, coal)    |
| <b>Knowledge-Oriented Consumers</b>        | Proactive adaptation through knowledge              | Research energy-saving tips, adjust consumption                           | Monitoring bills, adopting practical measures |

|                                   |                                   |                                                                  |                                                        |
|-----------------------------------|-----------------------------------|------------------------------------------------------------------|--------------------------------------------------------|
|                                   |                                   | to budget, apply conservation methods                            |                                                        |
| <b>Comfort-Oriented Consumers</b> | Continuation of prior consumption | Unaffected by rising prices, maintain comfort and service levels | Keeping same heating/cooling, unchanged use of devices |

*Source: own edited*

This typology illustrates the heterogeneous nature of consumer responses to the energy crisis: while some groups adopted significant restrictions or proactive measures, others remained largely unaffected, highlighting the uneven social and economic impacts of rising energy costs (Várgedő, 2022). As shown in Table 1, price-sensitive residents were the quickest to adopt energy-saving practices, reducing their consumption and, where possible, investing in smaller-scale efficiency improvements. By contrast, households in energy-poor regions reported even more drastic reductions, often relying on cheaper fossil fuels such as wood or coal. Information-seeking consumers adopted a proactive approach, dedicating time and resources to researching and applying conservation strategies. Meanwhile, consumer hedonists remained largely unaffected by price increases, maintaining their previous levels of comfort and consumption. The distribution presented in Table 1 therefore underlines the necessity of differentiated policy approaches and communication strategies: measures aimed at energy-poor households must address acute vulnerability, whereas financially secure groups may require targeted incentives to shift their consumption habits. At the same time, the proactive behavior of information-seeking consumers demonstrates the potential of education and awareness-raising campaigns, suggesting that knowledge transfer can serve as an effective tool to foster more sustainable energy practices across different segments of society.

### 3.5. Environmental awareness and energy crisis

Individuals strongly motivated by environmental protection, reducing their ecological footprint, and prioritizing their children's future were already striving for energy and environmental consciousness before the energy crisis (Jaciow et al., 2022; Radácsi & Szigeti, 2024). Some participants in the research had installed renewable energy sources years earlier to actively contribute to mitigating global warming. Their commitment is evidenced by the time invested in learning about renewable technologies and their willingness to pay more for environmentally friendly solutions if these contribute to the preservation of the planet (Ul-Mulk & Reynaud, 2018). In recent decades, there has been a growing tendency to adopt renewable energy sources primarily to achieve household-level energy autonomy. Such investments not only improve financial stability and living standards but also stem from an intrinsic drive to reduce dependence on external providers and to limit vulnerability to fluctuating energy costs. The energy crisis further reinforced this pattern, as many respondents believed that alternative energy could provide greater autonomy and security, counterbalancing the uncertainty and distrust associated with conventional suppliers.

Survey data confirm these perceptions. The results show that 12.6% of participants reported that the crisis directly increased their personal interest in renewable energy, 18.4% perceived that the crisis has led more households to turn to renewables, and 64.1% observed a general increase in societal openness toward renewable energy. These findings highlight that the crisis did not only stimulate economic rationality but also strengthened collective awareness and receptiveness. Savings from energy efficiency measures offer additional advantages, allowing households to reinvest in further improvements as needed (Farghali et al., 2023). Consequently, individuals who have become more receptive to energy-conscious perspectives due to the crisis represent a more accessible target group for future educational and awareness-raising initiatives.

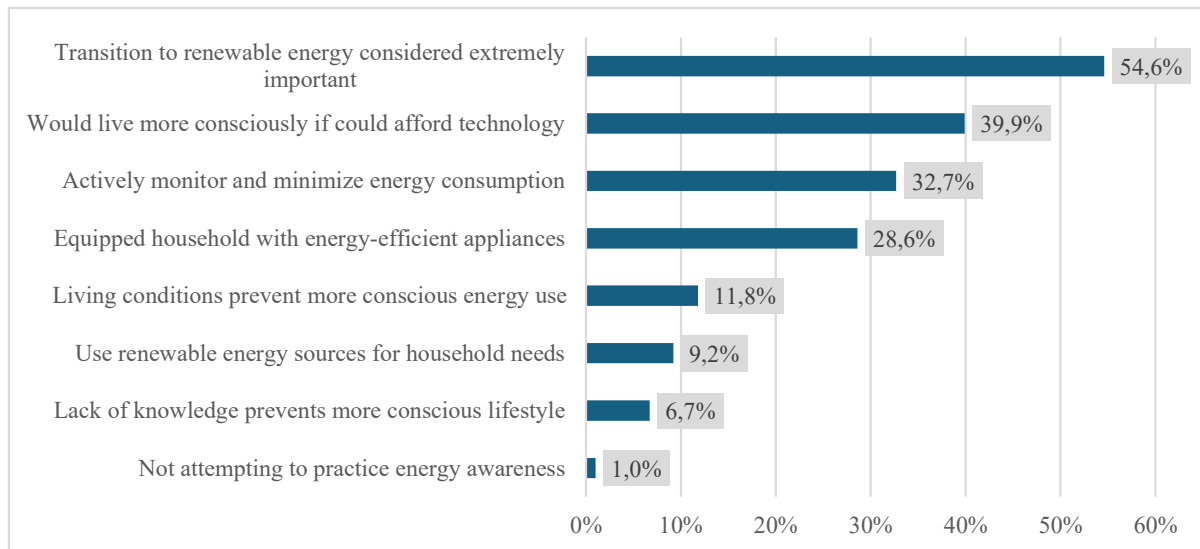
### **3.6. Responsibility**

In examining the issue of responsibility, the survey results indicate that participants believe all individuals share responsibility for adopting an energy-conscious lifestyle and regard mindful energy use as a common societal interest. This perception reflects a relatively high level of awareness and willingness to assume responsibility among a significant portion of the population. Respondents nevertheless assign greater responsibility to the state than to energy providers, particularly in the context of communicating the opportunities offered by renewable energy sources. Energy providers, however, cannot be exempted from responsibility: many participants emphasized that promoting energy-conscious living and educating the public about renewable energy should also be considered part of their mandate (Kozma & Bosnyák-Simon, 2022c). Consumers with a strong sense of personal responsibility are more likely to become active participants in both energy consciousness and environmental protection. Their heightened sensitivity leads them not only to adopt energy-conscious behavior but also to expect a similar commitment from energy providers towards sustainability (Kollmuss & Agyeman, 2002).

Survey data further clarify these expectations. When asked about their interest in educational content prepared by energy providers, approximately 45% of respondents expressed strong interest, 35% indicated conditional openness (“maybe”), and 13% reported that they already consume similar content, while only 5% were not interested. This distribution demonstrates a strong societal expectation for energy providers to act not merely as suppliers but also as reliable sources of knowledge, thereby complementing the state’s efforts to foster energy awareness. At the same time, respondents consistently assigned the greatest responsibility to the state, particularly with regard to regulating the market and communicating the benefits of renewables. Nevertheless, a substantial share also highlighted that energy providers bear responsibility for raising awareness and promoting sustainable practices, while individuals themselves were seen as accountable through everyday energy-saving behaviors. Taken together, these findings reinforce the view that energy awareness is a shared societal task, requiring coordinated contributions from the state, providers, and consumers alike (Szeberényi et al., 2022).

### **3.7. Consumer energy awareness**

Although an energy-conscious mindset has developed within certain consumer groups, the real breakthrough was prompted by the energy crisis and its negative consequences, which jolted the entire population out of its apathy towards energy issues. Recent events have made consumers aware that their current lifestyles are unsustainable both economically and environmentally, necessitating a reconsideration and modification of their energy consumption. The energy crisis has compelled not only businesses but also households to take urgent measures, with rising energy prices prompting consumers to become more conscious about their energy use. In the study, 54.6% of participants consider the transition to renewable energy to be extremely important. Although Hungarian residents are often perceived as not being particularly energy-conscious, individuals rate their own energy awareness at 6.65 on a self-assessment scale. They are committed to an energy-conscious lifestyle, actively striving to live according to this principle, only 1% not attempting to practice energy-conscious living (see Figure 3).



**Fig. 3** Indicators and barriers of energy awareness among respondents

*Source: own edited*

Figure 3 clearly illustrates the implementation of energy awareness in the respondents' lives. Specifically, 28.6% have equipped their households with energy-efficient appliances, while 32.7% actively monitor and strive to minimize their energy consumption. Additionally, 9.2% of the respondents use renewable energy sources to meet their energy needs. These examples effectively demonstrate their commitment to an energy-conscious approach.

Beyond behavioral indicators, the survey also explored which factors most strongly influenced openness to renewable energy. The results highlight the energy crisis and soaring energy prices as the most decisive external drivers, while climate change and environmental concerns emerged as key internal motivators. Furthermore, the desire for independence from providers and the availability of subsidies and state or EU support schemes were also significant. These findings confirm that energy awareness is shaped not only by individual household practices but also by global challenges and institutional frameworks, underscoring the interplay of economic, ecological and policy-related factors. Energy awareness is commonly defined by respondents as being conscious of energy consumption, minimizing energy waste and employing responsible energy practices. It is also linked to concepts such as energy conservation and efficiency. Additionally, the adoption of renewable energy sources, the abandonment of wasteful energy consumption habits, and the optimization of energy use through understanding and adjusting consumption patterns are frequently mentioned. The overarching goal is to transform daily life to achieve minimal energy usage.

Despite the variety of expressions used by respondents to describe energy awareness, the consensus is that it is primarily perceived as attentiveness and mindfulness regarding energy use, aimed at avoiding waste and unnecessary consumption. Among the respondents, 39.9% would live more energy-consciously if they could financially afford the technology, 11.8% cited their living conditions as a reason for their inability to use energy sources more consciously, and 6.7% lacked sufficient knowledge to develop an energy-conscious lifestyle.

## 4. Conclusions

As a consequence of the energy crisis, attention has increasingly turned to energy consumption habits and, by extension, to energy awareness. A growing number of consumers have redefined what this concept means for them personally and how their existing practices can be adjusted to ensure both economic and environmental sustainability. Financial considerations, however, continue to exert a decisive influence: when behavioral change is not perceived as economically advantageous, the willingness to adopt more conscious habits remains limited. In the absence of such willingness, meaningful engagement in energy awareness cannot be achieved. This tension between positive attitudes and the practical realities of financial constraints reflects a broader dilemma that is common in transitional societies, where aspirations often exceed the resources available to implement them.

The results nevertheless point to a gradual shift toward more conscious consumption patterns. A considerable share of respondents indicated that they would adopt renewable energy sources, provided that their financial situation and living conditions allow it. At present, energy awareness manifests predominantly in the form of conservation efforts, such as the reduction of wasteful habits and the monitoring of consumption. Yet these relatively modest practices still represent a solid foundation for the transformation of consumer attitudes. Over time, they can help nurture future generations for whom energy awareness will likely evolve into an integral element of daily life and mindset (Sárvári, 2022a). Furthermore, respondents with limited knowledge of the subject demonstrated notable openness to additional information, underlining the importance of educational initiatives, transparent communication, and the availability of reliable resources in shaping long-term awareness and motivation.

In summary, these findings reveal that while financial and infrastructural limitations continue to determine the extent of energy-conscious behavior, the social foundations for greater awareness are already in place. The crisis has acted as a catalyst that not only altered daily routines but also redefined expectations regarding sustainable living. In this sense, the energy crisis can be regarded as both a disruptive shock and a developmental opportunity: disruptive because it forced households to reconsider deeply ingrained consumption habits, and developmental because it accelerated the spread of attitudes and practices that can support a sustainable energy future (Kozma, 2018). The conclusion is therefore clear: by reinforcing existing tendencies through education, policy support, and technological accessibility, Hungary can foster an energy-conscious society that is better prepared to face both economic uncertainties and environmental challenges in the decades to come (Bozsik et al., 2024).

## Conflict of Interest Statement

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## References

- Azizi, Z. M., Mokhtar Azizi, N. S., Abidin, N. Z., & Mannakkara, S. (2019). Making Sense of Energy-Saving Behaviour: A Theoretical Framework on Strategies for Behaviour Change Intervention. *Procedia Computer Science*, 158, 725–734. <https://doi.org/10.1016/j.procs.2019.09.108>
- Baranyai, E., & Banai, Á. (2022). Feeling the heat: Mortgage lending and central bank options. *Financial and Economic Review*, 21(1), 5–31. <https://doi.org/10.33893/fer.21.1.5>
- Bozsik, N., Tánczos, T., & Bozsik, N. (2024). Az Európai Unió megújuló energiaforrásainak szerepe a széndioxid-kibocsátás és az energiafüggőség csökkentésében. *Külügyi Szemle*, 23(2), 3-27. [https://doi.org/10.47707/Kulugyi\\_Szemle.2024.2.1](https://doi.org/10.47707/Kulugyi_Szemle.2024.2.1)
- Cheng, T.-M., & Wu, H. C. (2014). How do environmental knowledge, environmental sensitivity, and place attachment affect environmentally responsible behavior? An integrated approach for sustainable island tourism. *Journal of Sustainable Tourism*, 23(4), 557–576. <https://doi.org/10.1080/09669582.2014.965177>
- Farghali, M., Osman, A. I., Mohamed, I. M. A., Chen, Z., Chen, L., Ihara, I., Yap, P.-S., & Rooney, D. W. (2023). Strategies to save Energy in the Context of the Energy crisis: a Review. *Environmental Chemistry Letters*, 21. <https://doi.org/10.1007/s10311-023-01591-5>
- Gadenne, D., Sharma, B., Kerr, D., & Smith, T. (2011). The influence of consumers' environmental beliefs and attitudes on energy saving behaviours. *Energy Policy*, 39(12), 7684–7694. <https://doi.org/10.1016/j.enpol.2011.09.002>
- Gajdzik, B., Wolniak, R., Nagaj, R., Żuromskaitė-Nagaj, B., & Grebski, W. W. (2024). The Influence of the Global Energy Crisis on Energy Efficiency: A Comprehensive Analysis. *Energies*, 17(4), 947. <https://doi.org/10.3390/en17040947>
- Gârdan, I. P., Micu, A., Paștiu, C. A., Micu, A. E., & Gârdan, D. A. (2023). Consumers' Attitude towards Renewable Energy in the Context of the Energy Crisis. *Energies*, 16(2), 676. <https://doi.org/10.3390/en16020676>
- Hassan, M. G., Hirst, R., Siemieniuch, C., & Zobia, A. F. (2009). The impact of energy awareness on energy efficiency. *International Journal of Sustainable Engineering*, 2(4), 284–297. <https://doi.org/10.1080/19397030903121968>
- Jaciow, M., Rudawska, E., Sagan, A., Tkaczyk, J., & Wolny, R. (2022). The Influence of Environmental Awareness on Responsible Energy Consumption—The Case of Households in Poland. *Energies*, 15(15), 5339. <https://doi.org/10.3390/en15155339>
- Kollmuss, A., & Agyeman, J. (2002). Mind the Gap: Why Do People Act Environmentally and What Are the Barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260. <https://doi.org/10.1080/13504620220145401>
- Kolozsi, P. P., Ladányi, S., & Straubinger, A. (2022). Measuring the Climate Risk Exposure of Financial Assets: Methodological Challenges and Central Bank Practices. *Financial and Economic Review*, 21(1), 113–140. <https://doi.org/10.33893/fer.21.1.113>
- Kolozsi, P. P. (2023). Új közgazdaságtan a fenntarthatóságért. *Pénzügyi Szemle = Public Finance Quarterly*, 69(1), 115–119. [https://doi.org/10.35551/psz\\_2023\\_1\\_8](https://doi.org/10.35551/psz_2023_1_8)

- Kozma, D. E., & Bosnyák-Simon, N. (2022c). A fenntarthatóság környezeti elemeinek megjelenése a hazai nagyvállalatok gyakorlatában. In Soproni Egyetem Kiadó eBooks (149–164). [https://doi.org/10.35511/978-963-334-411-8\\_s3\\_kozma\\_bosnyak-simon](https://doi.org/10.35511/978-963-334-411-8_s3_kozma_bosnyak-simon)
- Kozma, D. E. (2018). A Fenntartható Fejlődési Célok (SDGs) és a GDP közötti kapcsolat vizsgálata. *Gazdaság és Társadalom*, 3-4, 67–89. <https://doi.org/10.21637/gt.2018.3-4.05>
- Mansor, R., & Sheau-Tingi, L. (2019). The psychological determinants of energy saving behavior. *IOP Conference Series: Materials Science and Engineering*, 620, 012006. <https://doi.org/10.1088/1757-899x/620/1/012006>
- Meyer, N., Magda, R., & Bozsik, N. (2021). The role of renewable energies in the new EU member states. *Journal of Eastern European and Central Asian Research (JEECAR)*, 8(1), 18–25. <https://doi.org/10.15549/jeecar.v8i1.536>
- Radácsi, L., & Szigeti, C. (2024). The illusion of the Holy Grail of decoupling: Are there countries with relatively high SDGI and moderately low ecological footprint? *Environmental and Sustainability Indicators*, 22, 100379. <https://doi.org/10.1016/j.indic.2024.100379>
- Rausser, G., Strielkowski, W., & Mentel, G. (2023). Consumer Attitudes toward Energy Reduction and Changing Energy Consumption Behaviors. *Energies*, 16(3), 1478. <https://doi.org/10.3390/en16031478>
- Sárvári, B. (2022). A zöld pénzügyi kapacitásfejlesztés trendjei és dilemmái. *Hitelintézeti Szemle*, 21(4), 207–218. o.
- Ślupik, S., Kos-Labędowicz, J., & Trzęsiok, J. (2021). An Innovative Approach to Energy Consumer Segmentation—A Behavioural Perspective. The Case of the Eco-Bot Project. *Energies*, 14(12), 3556. <https://doi.org/10.3390/en14123556>
- Smith, J., & Johnson, L. (2021). Consumer Attitudes Towards Energy Efficiency and Renewable Energy Sources: A Comparative Study. *Journal of Sustainable Energy and Environment*, 12(3), 45–60.
- Szakály, Z., Balogh, P., Kontor, E., Gabnai, Z., & Bai, A. (2020). Attitude toward and Awareness of Renewable Energy Sources: Hungarian Experience and Special Features. *Energies*, 14(1), 22. <https://doi.org/10.3390/en14010022>
- Szeberényi, A., Rokicki, T., & Papp-Váry, Á. (2022). Examining the relationship between renewable energy and environmental awareness. *Energies*, 15(19), 7082. <https://doi.org/10.3390/en15197082>
- Ul-Mulk, R., & Reynaud, E. (2018). Sustainable attitudes and behavioural intentions towards renewable energy: a comparative analysis of developed and developing countries. *Recherches En Sciences de Gestion*, 129, 151-178. <https://doi.org/10.3917/resg.129.0151>
- Várgedő, B. (2022): Klímakockázati stresszteszt: a karbonár-sokk csődvalószínűsége kifejtett hatása a magyar bankrendszerben. *Hitelintézeti Szemle*, 21(4), 57–82. <https://doi.org/10.33893/FER.21.4.57>
- Wall, W. P., Khalid, B., Urbański, M., & Kot, M. (2021). Factors Influencing Consumer's Adoption of Renewable Energy. *Energies*, 14(17), 5420. <https://doi.org/10.3390/en14175420>
- Zhao, S., Song, Q., & Wang, C. (2019). Characterizing the Energy-Saving Behaviors, Attitudes and Awareness of University Students in Macau. *Sustainability*, 11(22), 6341. <https://doi.org/10.3390/su11226341>



This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license