

Energy awareness in the age of AI: the role of digital tools in shaping energy-conscious consumer behavior

Ágnes Fűrész

PhD Student, Hungarian University of Agriculture and Life Sciences,

Doctoral School of Economic and Regional Sciences, Hungary

fureszagi@gmail.com

Abstract

Artificial intelligence (AI) is emerging as a key enabler of energy efficiency, a fundamental pillar of sustainable energy use and climate action. Leveraging real-time data analysis, predictive modeling, and automated decision-making, AI-powered technologies offer new ways to optimize energy consumption. The energy crisis of 2021 made evident that boosting efficiency is not only an economic necessity but also a societal demand, as rising prices drove consumers to adopt more deliberate and resource-conscious behaviors. This study is based on a quantitative online survey involving over 400 Hungarian participants, examining how AI-driven digital tools—such as adaptive platforms, automated feedback systems, and intelligent energy interfaces—can contribute to the spread of sustainable energy consumption practices and the deepening of energy awareness. The paper explores the potential of AI-integrated digital tools to foster more sustainable consumption patterns and raise public energy awareness. The study shows that such technologies can help reduce reliance on fossil fuels, support the integration of renewable sources, and align with long-term energy transition strategies. Scalable, cost-effective, and behaviorally impactful, AI-driven solutions may play a transformative role in shaping the future of energy use.

Keywords: energy efficiency, consumer behavior, renewable energy, artificial intelligence, energy consciousness

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Introduction

Energy efficiency and energy awareness have become central issues at both global and societal levels, particularly in the context of sustainability goals and climate change mitigation (Kozma et al., 2021). In recent years, market instability, the volatility of fossil fuel prices, and concerns about the security of energy supply have highlighted the importance of energy-efficient solutions in a new light (Szeberényi & Bakó, 2023). The energy crisis that emerged in 2022 had a particularly severe impact on Hungary, where rising energy prices forced a significant proportion of households to reconsider their consumption habits. As a result, energy-conscious attitudes rapidly became one of the most important tools of adaptation. Energy-saving practices spread widely among the Hungarian population, including changes in heating habits, the use of energy-efficient appliances, and the reduction of non-essential energy consumption. At the same time, the energy crisis underscored an undeniable fact: energy awareness is not only an economic

necessity but also a key element in achieving climate protection goals, alongside energy efficiency (Csiszárík-Kocsir & Varga, 2023).

The concept of energy awareness is a multidimensional phenomenon that encompasses individual knowledge, attitudes, and behavioral patterns. It is rooted in internal motivational mechanisms that determine whether consumers are willing to make energy-saving decisions (Steg & Vlek, 2009). In contrast, energy efficiency is more of a technological concept, referring to the optimization of energy use within a given system or process while maintaining the same output (Patterson, 1996). These two definitions are closely interconnected: energy-conscious behavior significantly influences the acceptance and use of energy-efficient technologies.

Literature review

The social effectiveness of artificial intelligence (AI)-based solutions largely depends on the acceptance of the technology and the level of digital competence, particularly with regard to Generations Y, Z, and Alpha (Kolny, 2022). According to Davis's Technology Acceptance Model (TAM), users are willing to adopt new digital tools if they perceive them as useful and easy to use (Davis, 1989). The limitations of energy awareness are not specific to Hungary.

In many countries of Central and Eastern Europe, similar social and economic factors hinder the spread of energy-efficient solutions. In the region – for example, in Poland, Bulgaria, and Romania – centrally regulated pricing prevailed for a long time, where artificially low energy prices reduced the incentive for households to save energy (Bartiaux et al., 2014). Behavioral inertia, that is, long-established and difficult-to-change consumption habits, also obstructs adaptive and conscious energy use. Research has shown that in the CEE region, households are typically willing to modify their consumption only in response to strong price increases (Mišík et al., 2024). Another common challenge is the prevalence of energy poverty. A significant proportion of the population in Central and Eastern Europe is financially unable to undertake energy-efficiency investments, which particularly limits the spread of insulation, heating modernization, or digital solutions (Bouzarovski & Tirado Herrero, 2016). Levels of technological trust and digital adoption are also lower in this region, limiting the application of AI-based systems for optimizing household energy use (OECD, 2021; European Commission, 2023). However, positive examples can also be observed: in Estonia and Slovenia, AI-based household systems have been successfully introduced, providing real-time data processing and feedback to support consumer awareness and significantly reduce energy use (Milev et al., 2022; Haring et al., 2020). In Hungary, however, digital literacy and technological trust show significant regional disparities, which may limit the impact of AI systems on energy awareness (Szigeti et al., 2024). This is particularly highlighted by the “smart village” approach, which emphasizes that the digital development of rural areas, including the adoption of energy-conscious technologies, largely depends on the level of local human capital, opportunities for community learning, and the mobilization of endogenous resources (Káposzta & Honvári, 2023). The emergence of digitally advanced villages is closely linked to regional development levels, infrastructure, and community adaptability. This is a crucial factor in the dissemination of energy awareness in rural areas (Némediné Kollár, 2022).

Energy consumption habits are often shaped by financial constraints, the condition of the housing stock, and the extent of energy poverty. In these countries, improving energy awareness requires complex social

interventions, particularly considering the specific characteristics of the household sector. Energy efficiency and energy awareness are key factors in promoting sustainable development, especially in the context of the energy crisis and climate change. The spread of artificial intelligence (AI) and machine learning (ML) technologies in the energy sector creates new opportunities for reducing consumption, managing demand and supply more efficiently, and encouraging energy-conscious behavior (Ukoba et al., 2024). Promoting energy-efficient technologies and consumer practices not only contributes to the reduction of global carbon emissions but also mitigates the burden of rising energy prices on households and businesses (Gielen et al., 2019). Among the Hungarian population, energy awareness has shown significant progress in recent years, but conscious energy use is still not a general practice (Szakály et al., 2021). Research indicates that in Hungary there are regional and social differences in energy awareness (Szigeti et al., 2021). While a significant proportion of the population recognizes the importance of energy efficiency, the widespread adoption of energy-efficient behaviors is still hindered by financial barriers, lack of information, and distrust toward modern technological solutions. The 2022 energy crisis – characterized by a drastic and volatile rise in energy prices – had a substantial impact on consumer energy use patterns (Ajzen & Fishbein, 1975). Despite increasing attention to energy awareness, energy-efficient solutions, and methods, several obstacles continue to prevent their widespread adoption among the Hungarian population, including:

- **Established consumption habits:** A large part of the Hungarian population follows long-standing patterns of energy use that often reflect wasteful practices (Szakály et al., 2021). During periods of low energy prices – particularly under the government’s utility price cuts – there were no strong economic incentives for households to invest in efficiency measures or change their consumption practices (Gadenne et al., 2011).
- **Limited financial means and living conditions:** Research also revealed that one of the main barriers to energy efficiency is the lack of financing (48.9 percent) and inadequate financial or living conditions (11.8 percent).
- **Limited or incomplete knowledge:** Some consumers are either unaware of their options (2.8 percent) or lack knowledge about how and to what extent they could save energy at home (6.7 percent), as well as how individual decisions affect their consumption and the environment. This is particularly true in rural and low-income households, where financial difficulties reduce the relevance of environmental awareness and long-term savings.
- **Financial barriers to investment:** The acquisition and installation of energy-efficient technologies – such as insulation, window replacement, or modern heating systems – represent a major financial burden for many households (39.9 percent). While demand for such investments has grown due to the energy crisis, many households still lack sufficient resources, so energy-saving often remains limited to daily consumption reduction (e.g., lowering heating, using less lighting) rather than comprehensive technological upgrades.
- **Cultural and perceptual barriers:** Energy has long been perceived as a “basic service” in Hungary, to which few attributed real value. Some residents regarded utilities as a “necessary evil,” so energy efficiency was not strongly associated with sustainability goals. A portion of respondents do not consider energy efficiency important at all (3.4 percent), and some see no value in renewable-based systems (1.9 percent).

Energy awareness, energy efficiency, AI, and online communication have become closely interconnected in sustainable energy management (Gielen et al., 2019). Overall, the combined application of AI and online communication represents not only a technological innovation but also a tool for shaping attitudes, playing a key role in transforming household energy consumption patterns. Through intelligent systems and digital platforms, consumers can become not only more conscious of their own energy use but also active participants in sustainable and efficient energy consumption (Rozite et al., 2023).

Materials and methods

The research employed a quantitative approach through an online questionnaire conducted via the SurveyPlanet platform. The primary aim of the survey was to examine how the energy crisis influenced the Hungarian population's attitudes toward renewable energy sources and their level of energy awareness. The questionnaire was structured into four thematic blocks: (1) knowledge related to renewable energy, (2) consumer attitudes, interests, and preconceptions toward renewable energy sources, (3) experiences of renewable energy users and the drivers behind their decisions, and (4) demographic questions. Central elements of the study included respondents' energy awareness, efficiency, level of information, and willingness to invest in renewable energy.

The study is based on quantitative research, with data collection carried out between October and November 2024 using an online questionnaire made available through the SurveyPlanet platform. A total of 417 individuals completed the survey. In terms of territorial distribution, the majority of respondents were located in Budapest and Pest County. As a result, the research primarily reflects the energy awareness and technological characteristics of the central regions, and it has only limited national representativeness. Nevertheless, it allows for the initial identification of regional differences. The sample was non-representative, and participation was voluntary, primarily involving individuals who either operate household-scale power plants (HMKE) or have an interest in renewable energy. Respondents were reached through renewable energy-related social media groups, online forums, and personal networks. The questionnaire consisted of 43 closed and semi-open questions, allowing for the structured collection of opinions and experiences. Data processing was conducted electronically, based on the basic statistical summaries provided by the SurveyPlanet platform, supplemented by qualitative considerations.

The following research questions were defined:

1. How can AI-based systems complement the online communication channels currently most frequently used in promoting renewable energy?
2. What potential lies in AI-supported feedback systems (e.g., energy consumption applications) to strengthen household energy awareness?
3. How can artificial intelligence facilitate the delivery of targeted educational content to audiences who are open to renewables but lack sufficient information?
4. What regional differences can be observed in the knowledge, application, and level of energy awareness regarding renewable energy sources in Hungary, with particular focus on the relationship between the central regions (Budapest, Pest County) and rural areas?

Results

The research findings are significant, as the identified consumer attitudes, behavioral patterns, areas of interest, and media consumption habits highlight the fields where artificial intelligence (AI) can be applied in practice.

According to respondents, 87.5% of the Hungarian population is not energy-conscious, while only 12.5% hold a different view. Although this value appears extremely high, it still carries considerable potential. By utilizing appropriate online platforms, a broader segment of consumers can be reached and educated in both energy efficiency and awareness. More than half of respondents (65.2%) obtain information about renewable energy or energy efficiency through digital platforms, underlining the potential of the digital space. Social media platforms play a strong role in daily life, as reflected by the fact that 18.3% primarily use them as their main source of information. This significant proportion represents not only a relevant target group for online communication but also an opportunity for energy efficiency: for example, a free downloadable application could enable energy providers to achieve meaningful progress. Respondents' information-seeking habits clearly demonstrate the primacy of digital channels in shaping energy awareness (Keszezy & Zsukk, 2017).

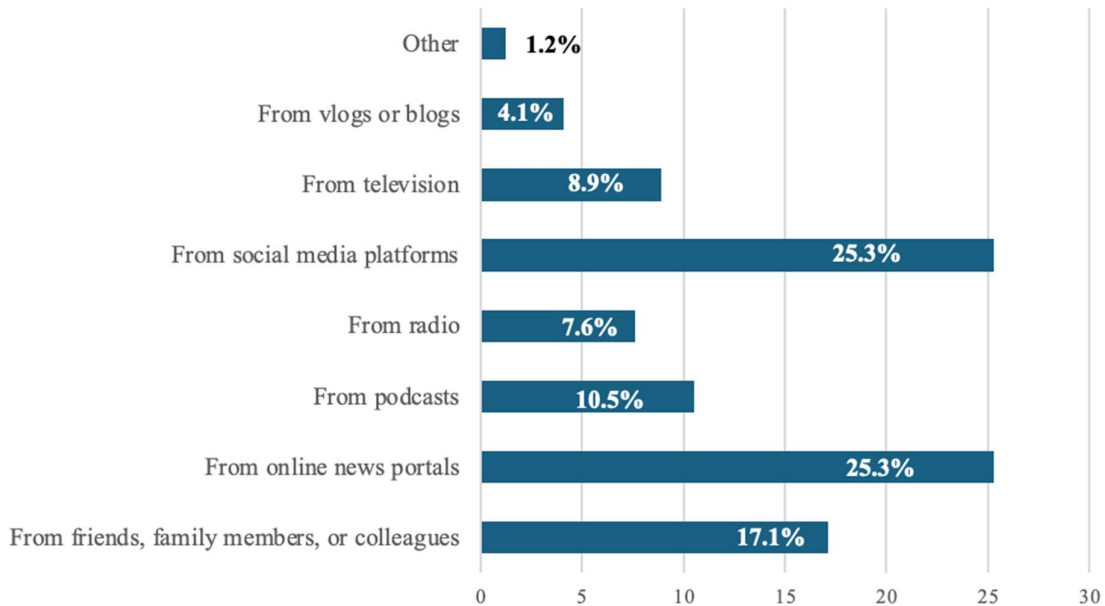


Figure 1. Distribution of respondents according to their sources of information on world events
Source: Own compilation based on primary research, 2024, n=417

As shown in Figure 1, the majority of respondents most frequently rely on online news portals (25.3%) and social media platforms (25.3%) for information on energy efficiency and renewable energy sources. These platforms typically use AI-based algorithms for content recommendation and targeted advertising,

making them particularly suitable for delivering personalized energy awareness campaigns. AI tools applied in social media and news portals – such as recommendation systems, predictive ad optimization, and behavior-based segmentation – allow users to encounter messages tailored to their interests, online activities, and even energy-use attitudes. In this way, AI serves not only as a technological tool but also as an educational and behavioral-shaping instrument.

Meanwhile, 17.1% of respondents rely on direct, personal sources – such as friends, family, or colleagues – which emphasizes the importance of social influence. Here, AI could play a role by enhancing community functions: for instance, through recommendation systems, gamified challenges, or community recognition mechanisms, it could encourage knowledge sharing and the spread of best practices. Less frequently used sources – such as blogs and vlogs (4.1%) – could also be reactivated with AI support if content is delivered in the appropriate format and channel based on user behavior analysis. Thus, AI can increase not only the effectiveness of knowledge transfer but also engagement and sustained interest. This reinforces the claim that the success of shaping energy-conscious attitudes strongly depends on *how and where* content is delivered – an area where AI can be crucial. This is further supported by the previously noted, digitally active respondent group (65.2%).

Examining the energy supply patterns of participants, the results indicate that 39.8% of households rely on natural gas, 34.9% on electricity, 5.7% on heat pumps, 11.9% on firewood, and the remaining 7.7% on other sources (Bozsik et al., 2024). This is significant because a deeper understanding of households' energy consumption patterns and supply methods enables energy providers to design more tailored and practical solutions to support efficiency. Notably, 39.9% of respondents stated they cannot afford energy-efficient systems, which suggests that digital solutions may be the primary means of nudging these consumers toward efficiency.

When asked about the barriers to installing renewable energy systems, respondents clearly identified financial constraints as the most critical obstacle (Nándor Bozsik et al., 2024). Specifically, 34.3% highlighted the lack of capital for installation as the primary barrier, demonstrating that investment costs continue to represent a major deterrent for households.

Figure 2 illustrates that the second most common response (18.3%) refers to the lack of adequate subsidies, closely followed by the issue of excessively long payback periods (16.9%). These findings confirm that, in order to increase household investment willingness, not only financial incentives but also a transparent and predictable economic environment are necessary (Kolozsi et al., 2022). A further 10.3% believe that, under the current economic and social conditions, switching to renewables is not worthwhile in Hungary, while only 1.9% consider the uncertainty caused by the energy crisis to be a risk factor. Artificial intelligence may also provide solutions to these barriers. On the one hand, the development of AI-based investment recommendation systems could take into account users' financial, demographic, and housing characteristics to suggest personalized, low-cost energy efficiency solutions – for example, smart plugs, timer switches, or smaller-scale renewable systems. On the other hand, an AI-supported decision-support

platform could automatically connect users with relevant subsidies, grant opportunities, or favorable financing schemes.

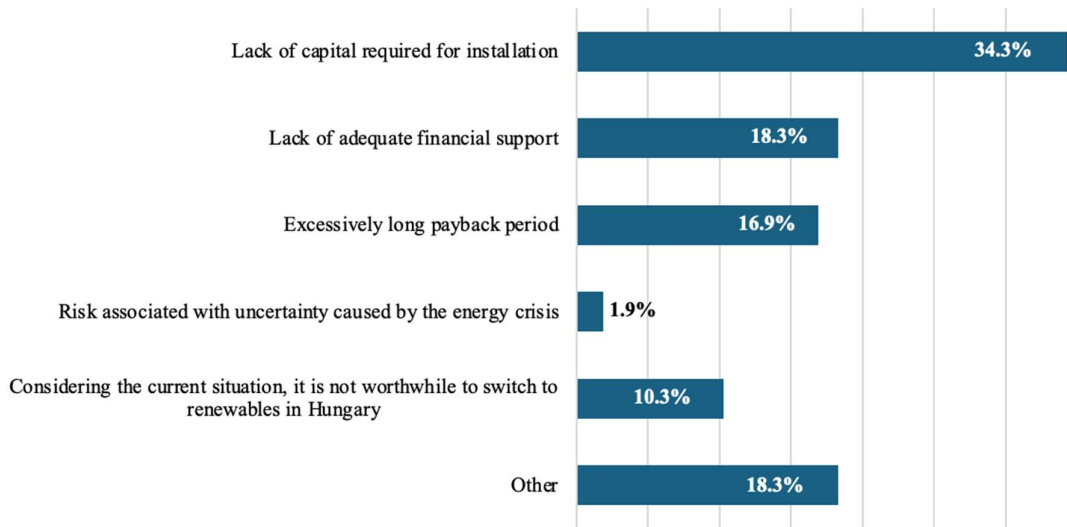


Figure 2. Distribution of respondents according to the reasons for not switching to renewable energy sources

Source: Own compilation based on primary research, 2024, n=417

The responses also reveal that uncertainty about investment returns – as reflected in the proportion pointing to long payback periods – is an important factor. In this case, AI-powered calculators and predictive models could offer valuable support: by using real-time data, they can calculate the expected return, payback period, and risk factors of an investment. This would enable users to make more informed decisions, reducing the uncertainty associated with such projects (Gróf et al., 2024). Finally, the perception that “switching to renewables is not worthwhile” often stems more from information deficits or misperceptions than from actual economic calculations. AI can also play a role here through targeted educational and awareness-raising communication: for instance, by delivering personalized content (success stories, infographics, sample calculations) tailored to users’ media consumption habits, thereby increasing trust and openness toward renewables.

The age distribution of respondents provides important insights into energy awareness and attitudes toward renewable energy sources. The majority of participants belonged to the 36–65 age group: 26.3% were aged 36–45 and 30% were 46–55, meaning that more than half of respondents came from these categories. The proportion of 26–35-year-olds was also significant (18.9%), while younger (18–25: 6%) and older groups (56–65: 8.3%, over 65: 4.1%) were less represented. No respondents were under 18. This pattern aligns with the observation that the most affected, decision-making age groups show the greatest interest in energy efficiency and renewables. Their life situations – such as family formation, housing-related expenses, and long-term financial planning – make energy-conscious approaches especially relevant, and they therefore show higher receptiveness to technological and communication innovations. It is noteworthy that AI-based technologies – such as personalized feedback systems, smart applications, and targeted digital campaigns – may be particularly effective in this active, digitally competent age group. They are not only more responsive to AI-mediated education and behavioral shaping but also have the potential to become leaders of the energy-conscious transition.

The territorial distribution of respondents reveals marked regional disparities (Holczinger & Sárvári, 2025). A total of 44.7% came from Pest County, while 28.1% were from Budapest, meaning that more than 70% of participants were concentrated in the central region. Rural areas – such as Szabolcs-Szatmár-Bereg, Somogy, Vas, Tolna, or Heves counties – were barely represented, and in many cases, no responses at all were received from these areas.

There are important indicators regarding the relationship between access to renewable energy sources, technological openness, and the use of digital communication tools, which show a strong correlation with regional development and infrastructure (Holczinger & Sárvári, 2025). The high response rate in Budapest and Pest County suggests that in these regions there is greater interest in renewable energy, stronger energy awareness, wider use of digital information and feedback tools, and significant purchasing power for renewable energy systems. The responses confirm that these regions are not only more technologically advanced but also more open at the household level to AI-based solutions that support the optimization of energy consumption and promote more conscious individual energy use. This result directly addresses the research question concerning regional differences in the knowledge, application, and level of awareness of renewable energy sources. Based on the data, it can be confirmed that conditions are more favorable in the central regions – particularly in Budapest and Pest County – for the development of AI-supported energy-conscious behavior.

Conclusions

The results of the research confirm that the energy crisis has intensified energy awareness among the Hungarian population and increased interest in renewable energy sources. Among respondents, energy efficiency considerations and sustainable consumption patterns have gained prominence (Gorina et al., 2024), driven by rising energy prices and market instability. The findings also highlight the crucial role of AI-based solutions and online communication channels in developing energy awareness. The use of intelligent technologies can help households and businesses more easily identify and address wasteful practices (Yussuf et al., 2024), while actively participating in sustainability efforts.

The results indicate that respondents generally show a positive attitude toward renewable energy, motivated primarily by economic and environmental factors (Varga & Csiszárík-Kocsir, 2024). Online communication – particularly social media – plays a defining role in disseminating information, raising interest, and shaping energy awareness.

The demographic distribution of respondents provides further context for interpretation. The overwhelming majority of participants were from Budapest and Pest County, while other regions – especially rural areas – were much less represented. This territorial imbalance suggests that knowledge of renewable energy, the adoption of energy efficiency considerations, the use of digital communication channels, and the application of energy systems are more widespread in the central regions. This is consistent with recent studies that emphasize how the territorial dimensions of socio-economic inequalities influence long-term development opportunities, indirectly affecting sustainability and technological adaptation capacity (Káposzta et al., 2023).

The findings suggest that urban areas with more developed infrastructure, better access to information, and higher technological openness – particularly Budapest and its surroundings – provide more favorable

conditions for the spread of renewable energy. This outcome supports the research question concerning regional differences in the awareness and adoption of renewable energy sources.

A significant share of participants reported practicing energy-saving behaviors (e.g., 32.7% saving electricity, 28.5% using energy-efficient appliances). Since these practices are largely informed by online sources (such as social media, online groups, and thematic sites), artificial intelligence can serve as an effective tool for fine-tuning communication. AI can personalize educational content, display targeted advertisements, and apply predictive analytics to determine when and where messages will have the greatest impact. A share of respondents already use smart home technologies (7.8%) or regularly unplug devices (17.5%). These habits form a solid basis for expanding AI-supported systems. Intelligent applications can provide real-time feedback on energy use and automated recommendations for reducing consumption. Moreover, AI-driven behavioral analysis can detect wasteful patterns and offer tailored optimization suggestions (e.g., heating schedules, automated lighting).

The high awareness of solar and wind energy, compared with the lower recognition of biomass and geothermal energy, indicates that some renewable sources are less present in public discourse. AI provides an opportunity to identify target groups' interests and knowledge levels and deliver personalized educational content (such as interactive animations or chatbot-based explanations). Adaptive learning systems can provide continuous feedback and refine content according to learning efficiency.

Nearly three-quarters of respondents were from central regions – primarily Budapest and Pest County – indicating higher levels of energy awareness and digital tool use in these areas. The underrepresentation of rural regions, however, highlights regional disparities in the accessibility and recognition of renewable energy sources, further deepening social inequalities. AI can address these gaps by enabling geographically targeted communication and education – for example, delivering region-specific content or automatically presenting locally relevant support schemes.

In light of these findings, it becomes evident that strengthening energy awareness at the regional level is key to promoting the spread of renewable energy. The active participation and technological openness of central regions demonstrate that developed infrastructure and information access are closely linked to environmentally conscious behavior. At the same time, financial constraints remain a major barrier for many respondents, particularly regarding renewable installations and energy efficiency investments. The application of AI in financial decision support – such as payback calculators, personalized simulations, and cost forecasts – can help reduce perceived risks and encourage commitment to long-term sustainable solutions.

The lower participation from rural areas further underlines the need for targeted education and accessible technological support. AI can serve as a bridge between these contexts by delivering personalized, locally optimized messages, offering regionally applicable solutions, and thereby contributing to a more balanced increase in nationwide energy awareness.

Based on these conclusions, future research and energy awareness campaigns should prioritize the integration of AI into educational, communicative, and behavioral-shaping tools. The application of AI-supported, targeted, and dynamic communication strategies can be a more effective means of enhancing interest in and acceptance of renewables, particularly among digitally active but not yet committed audiences (Granić & Marangunić, 2019). This is especially relevant in light of representative research on

younger generations, which shows that youth energy awareness often stems not from environmental motivations but from the expectation of financial benefits – a finding that calls for a rethinking of educational and communication strategies (Szeberényi et al., 2022).

Recommendations

The recommendations address the potential applications of artificial intelligence (AI) on two levels. The first part discusses the strategic role of AI in enhancing energy awareness, while the second part provides practice-oriented suggestions, identifying concrete development directions. The structured approach aims to combine theoretical grounding with tangible implementation opportunities. Integrating AI-based solutions in the future will be key to deepening energy awareness, particularly in the fields of online communication, education, and behavioral change (Li et al., 2025). Accordingly, the following supplementary findings and recommendations are proposed:

1. AI as an enabler of more effective online communication: Online communication channels – such as social media, targeted advertising, and thematic groups – frequently rely on AI-based algorithms (e.g., Facebook or Google ad optimization, personalized content delivery). AI-supported tools play a crucial role in the dissemination of information on renewable energy, enabling personalized messaging, audience segmentation, and behavior-based content filtering.
2. AI as an educational and feedback tool: The findings reveal that consumer decisions regarding renewable energy are largely shaped by information acquisition. AI-based applications, calculators, and chatbots can support energy-conscious decision-making. Digital platforms powered by AI are capable of providing real-time feedback, decision support, and tailored advice, thereby fostering energy-conscious attitudes and increasing openness to renewable energy adoption.
3. AI in shaping behavior: Based on the preferred content types and platform use of respondents, it is evident that AI can influence behavior patterns through targeted digital messaging. Behavioral analysis and predictive mechanisms can ensure that the right content reaches the user at the right time, thereby encouraging environmentally conscious energy use.

In light of these findings, it is recommended that future research and energy awareness campaigns prioritize the integration of AI into the toolkit of education, communication, and behavior-shaping. The use of AI-supported, targeted, and dynamic communication strategies may be a more effective tool for fostering interest in and acceptance of renewable energy, particularly among digitally active audiences (Iorgovan, 2024). Based on the behavioral patterns, attitudes, and consumer habits revealed in this study, the following AI-driven practical proposals can be made to advance energy awareness and energy efficiency:

1. AI-based digital educational platform with targeted communication: Given that 87.5% of the Hungarian population is perceived as not energy-conscious, while 66.6% of respondents seek information on energy efficiency through digital platforms, the development of an AI-driven educational interface is recommended. Such a platform would segment target groups by interests, attitudes, and media consumption patterns, provide personalized content, and consider user motivations (e.g., cost savings, environmental protection, comfort).

2. Intelligent mobile application with personalized energy-saving recommendations: For the digitally active yet less receptive group toward energy-efficient technologies (39.9%), an AI-powered application could provide tailored energy-saving advice based on household energy supply types (e.g., natural gas, electricity, heat pumps). The app would enable continuous monitoring of consumption, promote low-cost daily energy-conscious practices, and include gamification features (e.g., weekly challenges, reward systems) to motivate users (Bahman Huseynli, 2024).
3. AI-based consumer motivation mapping for energy providers: Since 76.5% of respondents emphasized the responsibility of energy providers in promoting awareness (Nemeskéri et al., 2023), AI can help utilities create detailed motivation maps. These maps would take into account financial status, energy habits, and attitudes, supporting the design of tailored services (Li & Yuan, 2024), as well as targeted incentive programs (e.g., leasing energy-efficient devices or installment-based payment schemes).
4. AI-driven low-cost energy efficiency recommender system: Considering that 48.9% of respondents lack sufficient capital to install energy-efficient systems, the development of an AI-based recommender system is justified. Such a system would assess individual user conditions (financial, demographic, housing characteristics), propose feasible low-cost but impactful solutions (e.g., smart plugs, timer switches, small-scale renewable systems), and calculate expected savings and payback periods (Dzwigol et al., 2024), complemented with educational content and implementation guidance.

The application of AI represents not only a technological opportunity but also a social responsibility in building an energy-conscious future. To ensure that sustainability goals achieve genuine societal embeddedness, it is essential that the design and implementation of AI tools take into account users' informational, motivational, and financial characteristics. Through adaptive, personalized digital solutions, energy awareness can become an integral part of everyday practice rather than an abstract objective.

The findings demonstrate that there is existing openness toward energy-related issues within Hungarian society (Chang & Nam, 2021), but this needs to be reinforced through supportive systems that consider regional disparities, financial constraints, and levels of digital literacy. AI can play a key role in tailoring support to these conditions, bridging the gap between knowledge, motivation, and action. Thus, AI can serve not only technological innovation but also a fairer and more inclusive energy transition.

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