# Renewable Energy in Hungary: Awareness, Challenges, and Opportunities

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A significant portion of sustainability relies on the utilization of renewable energy sources. To achieve broader adoption and integration, educating the populace becomes imperative. This study seeks to assess the level of general knowledge pertaining to renewable energy sources within the Hungarian population. It aims to ascertain from which communities or online platforms individuals primarily derive information regarding these energy sources, as well as to discern the type of content participants would be most receptive to, thereby fostering a deeper understanding of renewable energy sources. The primary research methodology employed an online questionnaire, which gathered responses from a total of 836 participants. While the research sample cannot be deemed fully representative, the larger sample size facilitates the exploration of pertinent correlations and relationships utilizing statistical variables. The findings reveal that 81% of the Hungarian population surveyed exhibits the highest familiarity with solar energy, while biofuels garnered the least familiarity at 47%. Additionally, it is notable that a majority of individuals primarily receive information about renewable energy sources from close acquaintances and television news. Podcast programs are identified as significant educational platforms, and individuals predominantly seek information on this subject through posts on online news portals and social media groups.

**DOI**
https://doi.org/10.18690/um.epf.5.2024.49

**ISBN**
978-961-286-867-3

**Keywords:**
renewable energy, sustainability, online communications, alternative energy, consumer's awareness

**JEL:**
D83, Q20, Q29

University of Maribor Press

## 1 Introduction

Looking back at the historical trajectory of the energy sector in Hungary, it has traversed a distinctive path. Despite the backdrop of an energy crisis in the 1970s, scant attention was paid to energy and its associated policies, rendering the energy sector a largely unfamiliar domain among the populace (Kiss, 2022). However, this crisis precipitated a transformative shift in consumer attitudes, whereby the previous apathy was swiftly supplanted by a newfound curiosity and receptiveness towards understanding energy (Csáki, 2021). This transformation can be attributed in part to the emergence of a generation more attuned to financial matters and environmental stewardship, alongside a significant rise in energy prices, which underscored the value of energy in the eyes of the public (Káposzta-Nagy, 2022). Moreover, the impact of the COVID-19 pandemic on consumer behavior has also contributed to a heightened awareness of energy matters (Csutora et al., 2024).

The burgeoning consciousness surrounding energy is palpable in everyday life, as evidenced by the scope and facets of various initiatives aimed at addressing environmental challenges (Csiszárik-Kocsir & Varga, 2023). Consequently, the energy sector finds itself increasingly tasked with the responsibility of providing alternative solutions to ensure a stable, long-term energy supply to consumers, all while remaining economically viable and aligning with sustainability imperatives. Beyond ensuring security of supply, the energy sector also bears an educational responsibility: it must lay the groundwork for fostering a generational awareness of renewable energy. However, this responsibility is a shared one, incumbent upon both the public and energy providers. While consumers must adopt energy-conscious behaviors and utilize energy responsibly, energy suppliers must also play a role in promoting awareness and facilitating the adoption of sustainable energy practices (Latapí Agudelo et al., 2020).

## 2 Literature review

Thanks to recent events and the proliferation of the internet and digital spaces, consumers now have numerous opportunities to access information and acquire fundamental, meaningful knowledge about renewable energy from diverse sources (Siphesihle-Nagy, 2021). Public receptivity and interest are further bolstered by the engagement of countless prominent companies and public organizations in the green

movement (Gergely, 2009), which lends renewables a sense of relevance and credibility while imbuing the concept of energy with tangible meaning and value. By bringing to the forefront one of society's most pressing issues, the price-sensitive public has shifted towards a perspective that prioritizes sustainability and environmental concerns over mere price considerations. However, dispelling the misconception that readily available goods are inherently less valuable will require considerable time (Rekettye, 2018).

Indeed, few things are more valuable than energy in the 21st century, serving as the cornerstone of modern civilization without which economies and societies can falter precipitously (Wani & Mir, 2015). Energy awareness, as an attitude, is indispensable for future generations, as we contend against dwindling resources, both in terms of energy sources and sustainable production, operation, and security of supply. The green transition looms large, presenting myriad challenges for industry stakeholders, encompassing issues such as generation capacity, energy mix, and system management (Czvikovszky et al., 2019; Kucséber, 2022).

An active dialogue has emerged between consumers and energy suppliers, breaking the decades-long silence and indifference that characterized their interactions. The challenges and exigencies of the climate crisis and carbon neutrality are becoming more widely acknowledged (Paul, 2021), thus paving the way for greater visibility for renewable energy. Prior to recent developments, neither financial nor energy awareness had taken root, given the preceding generations' limited interest in these matters. Generational disparities are evident in various domains, including attitudes towards renewable energy. In Hungary, where six generations coexist, diverse decision-making mechanisms, factors, modes, styles, and media consumption habits are observed among these cohorts (Törőcsik, 2016). While Generation Z predominantly relies on digital platforms for information gathering (Rimóczi & Kozik, 2023), earlier generations tend to rely on personal contacts (Horváth & Bauer, 2016) for information on renewable energy usage, related tenders, or energy in general.

Although energy awareness is still in its nascent stages in Hungary, the growing popularity of renewable energy and the underlying motivation transcending financial considerations indicate the emergence of energy-conscious and environmentally friendly attitudes. However, it is imperative to recognize that certain segments of

society are instilling energy-conscious approaches in their children, thereby nurturing a generation adept at energy literacy and conscious consumption (Pólya & Máté, 2021). Fostering energy awareness is a transnational effort, and the role of the public in the energy system extends beyond that of mere investors, buyers, or prosumers who invest in and install renewable energy systems. Communication perhaps has never been more critical for renewables than it is today, especially when consumers exhibit disinterest in understanding the workings of the energy industry and perceive energy market players solely as profit-driven entities. The primary step involves recognizing one's own role in actively contributing to carbon neutrality through more energy-conscious behaviour. Improving and shaping public attitudes towards renewable energy, alongside identifying the factors and concerns influencing acceptance, are essential tasks, both professionally and corporately (Lucas et al., 2021).

Historically, consumers have been viewed merely as solvent demand factors in the equation, but contemporary global environmental challenges necessitate their active participation in addressing the climate crisis. Online communication serves a crucial role not only in education but also in gauging public perceptions and attitudes towards renewable energy, thus informing the definitions of awareness, support, participation, and commitment that subsequently materialize under the umbrella of social acceptance. Nonetheless, online communication also plays a part in engendering consumer interest in energy, elucidating how the energy market functions, and even reframing concepts of utility and energy (Aldabas et al., 2015).

## 3 Methodology

The objective of the study is to map the connections between renewable energy and online communication and to identify the communication tools related to the education of renewable energy sources and the development of energy-conscious attitudes.

The target group of the quantitative study was primarily composed of consumers utilizing alternative energy, those interested in renewable energy sources, and individuals open to renewable energy sources. Participants were randomly selected from social media groups whose main theme is sustainability and environmental awareness. Emphasis was placed on assessing their knowledge, experience, and

opinions, as well as their online media consumption habits and interests. The survey also included owners of small household power plants in Hungary and individuals interested in renewable energy sources, with the assumption that social media, including specific groups on Facebook dedicated to renewable energy sources, their narrow circle of acquaintances, and a wide range of online communication tools such as social media advertisements, are factors influencing consumer choice of supplier.

The online questionnaire comprised a total of 43 questions in the aforementioned categories, although only a portion of the questionnaire results are presented in this research. The questions used in this research were based on the results of a previous research (Szeberényi, 2020). Data collection occurred from the beginning of October 2023 until the end of November 2023, with 836 respondents completing the questionnaire. While the number of completed items is sufficient to draw relevant conclusions, our research is not considered representative.

Data were recorded electronically on the Surveyplanet platform, where responses were analyzed and processed. Three research questions were identified for the study: 1. What knowledge do consumers have about renewables? 2. How are consumers informed about renewable energy? 3. How does online communication support society's acceptance and understanding of renewable energy as an alternative, environmentally friendly energy source?

## 4 Results and discussion

Renewable energy has emerged as a prominent topic of discussion in recent years, both offline and online, sparking fervent debates among industry professionals and the general populace alike. This lively discourse surrounding alternative energy sources has played an important role in disseminating information on the subject across various strata of Hungarian society. Concurrently, research findings indicate that a considerable segment of the surveyed population possesses familiarity with some form of alternative resource. Solar energy emerges as the most widely recognized, with 81% of respondents acknowledging it, closely followed by wind energy at 77%, and hydro energy ranking third at 65%. Conversely, biofuel emerges as the least recognized renewable energy source among respondents, garnering

recognition from only 47% of participants. Intriguingly, 19.5% of respondents demonstrate awareness of all renewable energy sources.

In relation to these results, a number of other published research results and studies highlight the importance of solar energy as the most recognized and used renewable energy source. For instance, the results on the Statista (2024) website also indicate that solar energy was the most significant sustainable energy source for renewable energy production in Hungary in 2022, producing 4.6 terawatt hours of renewable energy. Other mentionable plan is the summary provided by the International Energy Agency (2022) reveals Hungary's ambitious target of achieving 90% clean electricity by 2030, predominantly through the utilization of solar energy. Additionally, Hungary aims for an early phase-out of coal in power generation, slated for completion by 2025. It also highlights the government's plans to increase solar capacity to exceed 6000 MW in 2030 and 12 GW by 2040.

Furthermore, in addition to traditional offline media, the significant role of online communication is underscored by the fact that 19.4% of respondents encountered information about renewable energy sources through social media, while 8.3% came across the topic via online advertisements. Nonetheless, traditional avenues of information dissemination still hold sway, as a substantial proportion of respondents continue to derive information from their personal networks (24.5%). Despite the advent of the internet, television remains a popular medium, with 23% of individuals obtaining information about renewables through this platform, while 19.4% do so via social media. Additionally, traditional Above-the-Line (ATL) mediums, such as billboards, wield influence, with 5.3% of respondents citing them as sources of renewable energy messaging. The section of the survey pertaining to consumers' awareness of renewable energy serves as a reflective lens, with 56.7% of respondents opining that a significant portion of Hungarian society possesses only superficial knowledge on the subject. Conversely, 39.5% believe that the proliferation of internet resources empowers environmentally-conscious individuals to access requisite information. A mere 3.8% of respondents express confidence in the media's ability to furnish a comprehensive range of information on renewable energy sources. Concerning the distribution of respondents based on their sources of information on renewable energy sources, findings indicate reliance on online news portals (22%), general social media platforms (11.9%), energy suppliers' websites (8.1%), and personal networks (13.1%). Notably, social media platforms maintained

by energy suppliers (6.3%) emerge as significant sources of information, albeit being surpassed by books and trade magazines (8.3%) and platforms associated with energy communities focused on renewables, such as blogs and vlogs (7.2%). Podcasts also warrant attention, garnering mention by 7.5% of respondents, signalling their potential as a modern and effective online communication tool. Furthermore, the energy crisis and its reverberating effects, including skyrocketing prices, have upended the daily lives of countless consumers, prompting exploration into participants' perceptions of the crisis as an external event and its impact on their interest and receptiveness towards renewables. A considerable proportion of respondents (18.7%) express increased openness towards renewables as consumers, while 4.8% opine that the crisis has heightened their interest in the subject. Notably, despite the surge in green movements and activism, the broader appeal of environmental protection remains limited. Majority of respondents (70.7%) attribute their decisions to invest in renewables to rising energy prices, underscoring the role of external influences in driving consumer behaviour.

In terms of responsibility, respondents assert a collective obligation to lead energy-conscious lifestyles, indicative of a commendable level of energy awareness and willingness to assume responsibility within society. Notably, respondents prioritize the responsibility of the state over that of energy suppliers in disseminating information about the potential of renewable energy. Nonetheless, energy suppliers are not absolved of responsibility, as a significant proportion of respondents (76.5%) believe that it falls upon them to encourage the public to adopt energy-conscious lifestyles and impart knowledge about renewables.

## 5 Conclusions

In Hungary, prior to the energy crisis of 2022, renewable energy occupied a peripheral position, with a considerable portion of consumers exhibiting low levels of energy awareness. However, during the crisis period and subsequent years, there was a notable shift towards heightened awareness, attributed to evolving societal attitudes. This phenomenon underscores the challenge of catalyzing proactive engagement on certain issues, such as energy, climate protection, and finance, in the absence of external catalysts prompting action.

Achieving broader adoption of renewable energy hinges on three critical factors. Firstly, education plays a pivotal role in imparting foundational knowledge about electricity and dispelling prevalent beliefs and misconceptions surrounding renewable energy sources and their functionality. Secondly, the development of an effective online communication strategy is imperative to support educational efforts regarding renewables. This entails providing consumers with quality, engaging content that fosters active dialogue and facilitates knowledge acquisition. Thirdly, instilling a sense of value and importance regarding energy is essential to pique consumers' interest in learning and practicing energy awareness. Understanding the finite nature of certain energy sources, such as fossil fuels, underscores the need for consumers to assume responsibility for their energy consumption.

Leveraging a diverse array of online communication tools can aid in reaching consumers effectively. Findings from the study underscore the potential of the digital realm, with a significant proportion of respondents expressing openness to receiving newsletters and podcasts/episodes on renewable energy, as well as engaging with such content on social media platforms. Regarding the social media presence and activities of service providers, respondents actively follow and engage with the content generated by these entities, indicating a perceived responsibility on the part of energy companies to promote energy-conscious attitudes. Indeed, consumers explicitly expect relevant service providers to play an active role in fostering energy awareness.

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