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Strategies of Energy Suppliers and Consumer Awareness in Green Energy Optics

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Abstract: This research aims to identify (1) whether consumers have an impact on the energy sector, (2) to what extent consumers have an impact on the energy sector, and (3) whether there is so-called energy communism. We understand this phenomenon as the process of energy suppliers imposing energy sources on which the end consumer has zero or very little influence. The research, therefore, focused on a B2C analysis, in five selected countries: the USA, Canada, Australia, the UK, and Poland (N = 500). The research subjects are a homogeneous group in terms of the sources of green energy, and the volume of production of this type of energy and its increments. The investigation was conducted using the procedure appropriate for the triangulation of research methods. Three hypotheses were verified. The first one was rejected, which aimed to determine whether individual consumers are guided by green energy in their choices. The second hypothesis—that energy suppliers do not take into account customer needs/expectations and pursue their strategies—was partially confirmed but was also directed for further exploration. The third hypothesis was whether the consumer is free to make the decision to switch energy suppliers—if so, what is the hierarchy of the most and least decisive factors in the choice of supplier? The verification of this hypothesis indicates that there is no specific pattern that consumers follow when choosing an energy supplier.

Keywords: green energy; willingness to pay; enterprise strategy

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1. Introduction

Energy resource issues have taken on particular importance in the context of the energy crisis, which with its relevance has overshadowed the consequences of the crisis caused by the global pandemic [1]. Energy is, after all, a factor that affects the quality and length of people's lives, and its availability—or rather lack thereof—causes a range of different negative consequences [2]. It is therefore, like water and air, indispensable to life, and as civilisation progresses, demand for it increases [3]. According to R. Brouwer's team [4]: *Climate change has evolved from an "inconvenient hypothesis" to an "inconvenient truth"*.

Observing the global energy market, one can identify a wide variety of strategic actions with converging objectives, i.e., focusing on preserving the existing status quo, taking the form of a dramatic struggle, both for new energy sources and for consumers. These actions take the form of mergers and acquisitions [5], but also actions based on diverse competitive activity, resource redundancy, adaptation, cooperation, and networking [6]. The strategic activities of energy organisations can be classified into the following strategic thoughts, i.e., the planning approach, the positional approach, the resource approach, the innovation approach, and the aforementioned network approach [5]. The research conducted in these scopes confirms that organisations mainly focus on classic strategic solutions, using mainly resource-based tools, followed by positional and planning-based tools. The activities with the highest returns on investment, i.e., those using product, process, eco-innovation [7], and others, as well as network arrangements and their benefits, are not central to competitive positioning processes in the case of the energy sector. Energy suppliers and producers are therefore engaged in a variety of market activities, outbidding each other and diversifying energy sources in an attempt to adapt to changing energy standards and regulations. At the end of the energy value chain, however, is the consumer, who should be able to influence these activities. Two main components therefore emerge that strategically determine the functioning and cause the development of the energy market: consumers and suppliers. The authors are aware of the other elements of Porter's forces that influence the market, but in the context of the analyses carried out so far—their focus will be on these two selected ones.

The aim of the research is to identify (1) whether consumers have an impact on the energy sector, (2) to what extent consumers have an impact on the energy sector, and (3) whether there is a so-called energy communism. We understand this phenomenon as the process of energy suppliers imposing energy sources on which the end consumer has zero or very little influence. The research, therefore, includes B2C analyses, in five selected countries: the USA, Canada, Australia, the UK, and Poland. This is a homogeneous group in terms of green energy sources, as well as green energy production volumes and growth, as presented in the following sections.

The article consists of seven parts. The introduction is the first one. Then, the following three sections constitute a theoretical review of the literature on the topic as follows: (a) introduction to renewable energy sources—derivation of hypothesis 1, (b) dominant strategies of energy companies in the countries selected for analysis, i.e., the USA, Canada, the UK, Australia, and Poland—theoretical foundations of hypothesis 2, and (c) consumers and their expectations towards the energy market—analyses forming the foundation of hypothesis 3. Thus, the theoretical parts identify the research hypotheses. The next three sections are the empirical treatment: (a) a description of the research procedure and the research sample, (b) a presentation of the verification of the hypotheses and the research results, and (c) the conclusions, together with a discussion of the results and limitations of the research.

It should be noted that the article is a continuation of the research presented in the paper "Identification of the Strategy of the Energy & Utilities Sector From the G7 Group Countries, From the Perspective of a Dominant Strategy Approach". This publication inspired the authors to explore further and change the focus from the organisation to the consumer [5]. Based on previous research in the publication, the authors assume that the companies in question have a defined strategy that is theoretically defined—a planning, positional, RVB, innovative and entrepreneurial, and network approach. The authors also assume that the given strategy directly implies the strategic behaviour of the company, which also affects the customer and its position of relevance in the company's activities.

The research is also linked to the identification of a research gap which is due, among other things, to the regulatory environment and the need for energy transition around the world [8]. An important element of the new energy arrangements is environmental awareness and community engagement, which in Europe has been termed "prosumer" [9]. There are many studies on willingness to pay for green energy [10], which, however, do not take into account such a diversified research sample. Another element that is worth paying attention to is the clear lack of a strategy for the actions of states, enterprises, and consumers [11]. Topics related to selected areas of the energy sector are discussed, but there is no comprehensive study on the strategies of states and enterprises [12]. The authors of the study focus their considerations on the strategy of energy suppliers and the awareness of recipients about the willingness to pay for green energy.

2. Renewable Energy Sources—Problem Statement Part I

The availability of energy, which means not only its physical usability but also its affordability, is crucial for the development of any country in the world [13,14]. The current energy crisis is the consequence of several different situations that have occurred over the past three years, most notably a pandemic that has paralysed the entire world. In

2019, global diesel production and consumption was 27,801 thousand barrels per day, compared to 25,765 thousand in 2020 [15]. The reduction in demand and the subsequent return to overproduction of energy, combined with the Russian-Ukrainian conflict are the two main reasons that have accelerated the green economy [16,17], thus leading to the need to minimise human activities in the brown economy [18]. This wide range of factors that have guided the actions of the world's economies also includes the need to reduce the use of fossil fuel, which is a major source of greenhouse gas emissions [19]. The transition to green energy has therefore become a necessity, necessitated by elements of the downstream environment: environmental, political-legal, and economic. As a result, increasing investment by various research and development organisations in the area of renewable energy utilisation can be observed [20], as well as increased global activity in promoting policy cooperation in this field [21]. As it turns out, this is currently one of the most effective ways of minimising the effects of energy and economic crises [22].

The green economy is most often identified with sectors (e.g., energy), general issues (e.g., pollution), principles, and policies in which economic instruments that influence the degree of socio-economic development in the context of the role of the environment are key. The priorities for the creation of a green economy are (a) the development of renewable energy sources; (b) the improvement of energy efficiency in individual economic sectors, production and service establishments, as well as households; (c) the restructuring of industry (primarily traditional industry); and (d) the creation of new, environmentally friendly industries [23]. Related to this category is green energy, which is defined as electricity that is generated through the use of renewable energy sources, including technologies such as photovoltaic panels, windmills, geothermal sources, and the use of biomass [13] (types of green energy are presented in Table 1.

Table 1. Total renewable energy in the countries selected for analysis.

CAP (MW)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
USA	263,279	272,622	286,380	308,002	331,723	348,336	367,056	388,933	419,978	457,857
Canada	84,363	86,409	89,354	95,457	97,328	98,501	99,807	100,392	100,632	102,932
Australia	14,649	16,068	17,370	18,415	19,339	20,492	22,645	27,826	34,536	36,617
UK	15,902	20,027	24,895	30,800	35,433	40,043	44,028	46,800	47,387	50,293
Poland	4094	5116	5638	6919	7881	7982	8301	9360	12,275	15,424

Source: Renewable Capacity Statistics 2022.

The following countries were selected for the study: the USA, Canada, Australia, the UK, and Poland. Based on the Renewable Capacity Statistics 2022 report (IRENA, 2022) produced by the International Renewable Energy Agency (IRENA), those countries selected have shown more than a doubling of renewable energy use over the past 10 years. A second criterion for the selection of the units analysed was the analyses carried out on the strategies of energy producers [5]. In addition, Poland was added to the group of countries that were analysed from the point of view of the natural interests of the researchers.

The capacity of the different types of renewable energy, in selected countries, additionally broken down by source is presented in Appendix A. Data are presented in megawatts (MW), rounded to the nearest 1 megawatt.

A detailed analysis of the report shows a small share of offshore wind energy as well as concentrated solar power in the portfolio of green energy sources. Geothermal energy is not included [24], due to a lack of data in the key countries included in the analysis, i.e., Canada, the UK, Australia, and Poland. Nevertheless, the analysis shows that the share of green energy in total electricity is gradually increasing, and, in the case of Canada, its initial value demonstrates the high level of awareness of the country's population, as well as the country's excellent preparation for the transition to total off-grid, thanks to hydroelectric power, wind farms, and solar power.

Green energy is related to green productivity (GP), which, according to the Asian Productivity Organisation (APO), is defined as [25]: [. . .] *a strategy for enhancing productivity and environmental performance simultaneously to achieve overall socio-economic development. Its aim is well-rounded socio-economic development that leads to sustained improvement in the quality of human life. It is the combined application of appropriate productivity and environmental management tools, techniques, and technologies that reduce the environmental impact of an organization's activities, products, and services while enhancing profitability and competitive advantage*. The green productivity model differs from the classical model primarily in that it recognises the relevance of a systems approach to productivity, involving both the nation and organisations. Furthermore, it views production not in terms of units produced, but in terms of the value identified by the company's customers and stakeholders. This means that a product has no value until it is accepted by its customers, which most often happens through a sales transaction. Outputs ('outputs') are also viewed differently in this model—not only in terms of the individual product, but also the emissions and waste that result from the energy consumption of production processes, transport, packaging, etc. [26]. These conclusions are linked to the so-called Porter hypothesis, according to which environmental pollution is always a form of inefficiency [27]. The object of Porter's and other researchers' research [28–30], have been business organisations. The authors' attention therefore turned to consumers and, more specifically, their level of awareness [31] in their choice of energy suppliers, with an emphasis on those types of energy that do not generate inefficiency, i.e., green energy suppliers.

The ecological awareness of consumers is growing successively, and it turns out that 80% of Poles feel the need to change their energy system to a greener one. Mainly because they protect the environment (72%), reduce global warming (58.1%), and give energy independence (46.6%). Less than 41% pointed to the cost-effectiveness of RES and almost 24% to their contribution to reducing water losses. When asked whether green energy was important to them, only less than 3% answered in the negative and 6% were unable to give a clear answer to this question. This survey (CAWI) was conducted with a sample of 1000 respondents on behalf of SunSol, in June 2021 [32]. There is a growing awareness of the necessity and importance of making changes towards a green economy and energy, which is further exacerbated by the creation of eco-fashion via social media [33], not only in Poland but also worldwide [34]. Analysing the collected data, the research team decided to verify the following hypothesis:

Hypothesis 1 (H1). *Consumers voluntarily switching energy suppliers are driven by their choice of green energy.*

It should be noted that hypothesis 1 focuses on the voluntariness of switching energy suppliers, which in turn may be linked to (a) increased awareness of the relevance of green energy for individual consumers, as well as (b) stimulated by energy suppliers, which leads to consideration and another hypothesis.

3. Dominant Strategy in Companies—USA, Canada, UK, Australia, Poland—Problem Statement Part II

Strategy is etymologically the art of commanding an army or the theory and art of achieving general long-term goals, especially in the military field (theory and art of warfare), business, politics, and other fields, as well as the activities of the art of war involving the preparation and conduct of war and its campaigns and battles. According to game theory, strategy is a plan of action in any possible situation. It defines the moves that a player will make, at each stage of the game, in every possible situation that occurs as a result of both our actions (moves) and the actions of other players. Thus, we can consider the competitive struggle as a game whose participants are the rival companies, but also all the other groups of their "stakeholders" (customers, suppliers, customers, employees, investors, banks financing their activities, government administration, etc.—the participants in the game). In contrast, the classic Porterian definition of strategy states that strategy is the positioning of a business in a given industry sector [35]. It can be said that a strategy is a coherent concept of action based on several key and complementary choices with the overall objective of seizing opportunities, building competitive advantage, and achieving above-average performance [36]. On top of that, "strategy is a set of choices, made by the top management, using the resources of the company and the opportunities of the environment to improve the efficiency of the operation" [37]. It is worth also emphasizing that "strategy is a coherent response to a challenge. A true strategy is neither a document nor a forecast, but rather an overall approach based on a diagnosis of the challenges. The most important element of a strategy is a coherent view of the resources at work, not a plan" [38].

The basis of strategy in the various approaches is a certain consistent and repeatable pattern of behaviour over time that governs a company's decisions and actions. Sometimes this pattern is called the "strategic framework", the "dominant thread" or "configuration", the "entangled choices", but most often the concept of "dominant logic" is used [39].

Furthermore, according to other proposals, strategy serves to transform one's business theory into performance. Its purpose is to provide the organisation with the ability to achieve the desired results in a highly unpredictable environment. "Strategy allows an organisation to remain deliberately opportunistic in its actions" [40] A well-formulated strategy allows the organisation to direct and allocate resources, based on its competencies, anticipated changes in the environment and the actions of intelligent opponents [41].

One of the more interesting definitions of strategy is to say that strategy is the dynamics of a company's relationship with its environment, for which the necessary actions are taken to achieve its objectives and/or to increase efficiency through the rational use of resources. This definition is crucial for further discussion.

Transferring strategies to the field of the countries studied, regulation, and company strategies in a given country, it is worth pointing out that in 2012 the UK presented another reform of its energy sector. A shift can be observed in the UK's new energy policy away from the market model towards more state interventionism. Diversification of supply and minimising the risks of over-reliance on imports have become priorities for the UK government in its Energy Security Strategy [42].

In contrast, Canada has a vision that Canada can lead and not follow opportunities in energy markets. This strategic approach to energy systems by definition will include transportation, housing, employment, and financial markets This strategy is a fundamental rail on which plans, tactics, and policies can be built. This vision identifies how the provinces can work together using all the tools available to them, maximizing long-term resource development while minimizing environmental damage [43]. From the perspective of the state itself and there are necessary actions it needs to take because the energy market is becoming highly competitive and requires issues such as:

- increasing dependence on inherently high-cost and remote resources (although natural gas in North America is a perhaps temporary exception to this trend);
- the need for reinvestment in aging energy infrastructure;
- the inevitable costs of higher environmental and social standards;
- and the emerging cost of carbon mitigation.

The State Strategy of Denmark indicates strategic energy planning as key elements that shall secure a future energy system that is both energy efficient and flexible. Strategic energy planning includes all possible elements of municipalities' energy plans, and coordination with municipal plans, security of supply strategies, and climate strategies. The municipalities should conduct energy planning to create an optimal interplay between the energy demands and energy supplies (heating, cooling, and electricity) in such a way that the energy resources are optimally used. Energy planning encompasses the whole energy chain and differs thereby from heat planning, which solely looks at the choice of heat supply. In summary, it can be said that an energy strategy should have characteristics such as: a flexible system, effective, renewable energy, security of supply, interplay between energy demand and supply, cover the whole energy chain, focus on local energy saving, being built short-term, mid-term, long-term, holistic approach, contain sustainable development, include community goals, national goals, show stakeholder involvement, improving welfare, reliability, show cost structure of energy production, comprehensive energy system, and be more inter-disciplinary [44].

In turn, the European Union indicates that the strategy of action of countries as well as companies should focus on three directions: flexible transformation of the volume and structure of renewable energy sources in accordance with objective social needs for energy; continuous development of the conditions aiming to increase the flexibility and adaptability of needs; and development of technological, institutional, and cultural conditions required for the harmonisation of the two sides [45].

At the same time, companies should ensure that their energy strategy focuses on assessing the firm's internal and external energy impacts. Among the questions it should consider are: how much energy does our firm use, and what does it cost? What impact does this spending have on key financial indicators such as the cost of goods sold? Are we capitalizing on opportunities to use renewables? What is our carbon footprint and that of our suppliers? How does this align with customer, investor, and employee expectations, and how do we compare with competitors [46]?

In their strategic actions, companies should consider, among other things, two potential market development scenarios—the roller coaster scenario and the stuck on carbon scenario (Table 2), which determine the respective strategic actions of companies.

Table 2. Two alternate energy/environment scenarios of the future.

Scenario	Scenario 1: Roller Coaster	Scenario 2: Stuck on Carbon
Future Energy Markets:	Shift to Alternatives	Abundant Hydrocarbons
Global Climate Changes:	Abrupt Effects	Incremental Effects
Global Environmental Values and Priorities:	Global Agreement; National Discords	Global Disagreement; National Accords
World Economic Growth:	Developing Global Economy	Economic Nationalism

Source: [47].

It is also worth pointing out that companies with already higher environmental ratings present a statistically significantly larger size, belong to more environmentally sensitive industries as compared with firms with lower environmental ratings, and disclose environmental information according to GRI guidelines [48]. This can make it much easier for companies to make strategic changes in terms of regulatory and customer requirements. Companies themselves can also adopt a proactive and reactive strategy. In a proactive attitude, energy is an integrated part of the strategic targets for the firm, and primary as well as secondary production processes are integrated into the saving activities. The energy manager has a central role in the company hierarchy and is able to make important decisions. In a reactive attitude, the focus of energy activity is typically on secondary production processes. Energy savings happen coincidentally through "end-of-pipe" solutions. The energy manager is marginal in the process of decision-making [49]. In all, this approach is about utilizing the energy system differently in order to find alternative revenue that is more profitable than the current solutions. As such, a more profitable and energy optimal solution can be found in combining non-optimal production operations with each other and/or rebuilding a plant with more respect to the laws of thermodynamics [50].

Looking at both the strategy of states and the strategy of companies, where energy is the main driver, one may be tempted to consider their strategy of operation from the point of view of strategic management schools (Table 3). From the point of view of corporate management, we can consider several schools of strategic management: the economy of scale (planning), Porter's competitive advantage (positional), building value (RBV), innovation (innovative and entrepreneurial), and network effects within the ecosystem (network) schools.

Table 3. Cognitive premises of approaches to strategy selected for the research.

Selected Approaches to Strategy	Name of the Strategy Approach	Basic Cognitive Assumptions of Selected Approaches to the Strategy	Keywords for Selected Approaches to the Strategy
Classic approaches to strategy (1950–2008)	planning	The implementation of the Ricardian rent. The guideline for action is to focus on the economies of scale and scope.	economy scale, Ansoff
	positional	The implementation of the Chamberlin's rent. The guideline for action is to build the structure of market shares in order to take a privileged competitive position.	industry analysis, Porter, portfolio, matrix, value chain
	resource	The implementation of the Ricardian rent. The guideline for action is to build value for shareholders based on the RBV on the basis of a bundle of key competences.	Resources Based View, core competences, competences
Modern approaches to strategy	innovative	Realization of the Schumpeter's rent. The guideline for action is to focus on breakthrough innovations also achieved in open innovation systems.	Schumpeter, disruptive innovation, open innovation
(2008–2020)	network	The realization of the rent resulting from the network effect. The guideline for action is to build a network of dependencies in a way that allows for synergy.	network, network effect

Source: [5].

Referring to the research carried out in the article titled "Identification of the Strategy of the Energy and Utilities Sector from the G7 Group Countries, from the Perspective of a Dominant Strategy Approach" (Niemczyk, Borowski, et al., 2022a) and the additional research by the authors extending the research sample to further companies, it can be pointed out that the case in this sector is dominated by classic approaches to strategy. Two schools in particular play a key role in the energy sector. These are:

- A resource approach, where resources are at the heart of these organizations and build value through the ability to find and exploit unique resources. Competition for access to deposits, in addition to key know-how, knowledge, competencies, and experience of employees in the field of deposit exploitation, as well as access to technology. These are only a few selected examples characterizing the strategies of energy and utilities companies in the field of the resource approach.
- A positional approach, resulting in a shaping of the competitive position in the sector of differentiating the Chamberlin's rent. Aggressive competition between entities in the sector is caused by, for example, the homogeneity of the product, building new barriers to entering the sector, as well as ensuring that exit from it is not simple. These are the selected tools for shaping their position by competing energy production companies. Other schools' innovative-entrepreneurial and network approaches in this sector do not play a significant role.

This may be influenced by the approach to the energy sector, which requires a large investment in the very development of companies in this sector, as well as the high dependence of companies on the strategy of the state. This does not change the fact that this will also determine the approach to the customer and the very strategy of the company.

In summary, among the strategies of states, regulators, as well as companies embedded in the energy sector, it should be noted that the main strategic features of a company will focus on building key organisational assets and their position in the market among competitors, leading to the hypothesis:

Hypothesis 2 (H2). *Energy suppliers do not take into account customer needs/expectations and pursue their own strategies.*

If this hypothesis is positively verified, we can speak of energy communism, which will be understood as the process of energy suppliers imposing energy sources on which the end consumer has zero or very little influence.

4. Willingness to Pay for Green Energy—Problem Statement Part III

The positive willingness to pay (WTP) for green energy is highlighted by numerous academic studies [51–55]. This means that this category is widely explored, representing an important point of research. From a theoretical perspective, WTP and the methodologies it uses were designed over a century ago to identify prices for pure public goods and services [56]. However, a number of studies can be found in the literature that use willingness to pay for climate stability, and selected findings are presented in this section of the paper [57]. Willingness to pay refers to the maximum willingness of individuals to pay for the use of a particular service or for the consumption of a particular product [58,59].

Pricing is of great importance not only for individual consumers, especially in times of economic crises, but also for producers, and therefore for business organisations. One of the main challenges for effective pricing is to correctly estimate the value of products to customers, i.e., to determine the WTP [60]. Willingness to pay is estimated in the context of environmental [60,61], as (a) garnering a dollar estimate on the basis of what others actually pay to access environmental goods (travel cost method), (b) determining price differences across otherwise similar assets that vary only in their access to environmental goods (hedonic pricing), and contingent valuation methods (CVM) [62], which use surveys to elicit willingness to pay associated with hypothetical scenarios [57].

The results of the survey indicate that respondents are primarily driven by differentiators of a financial nature, i.e., price and tax benefits, which are linked to the switch to green energy [63,64]. These surveys mostly look at individual regions and individual energy sources versus willingness to pay in context:

(a) ratio of households to wind power in Sweden [65];
(b) the impact of green energy projects (wind turbines) on the national landscape and how to reduce this impact as much as possible—Scotland [66];
(c) identification of factors influencing the growth of the renewable energy market, as well as recommendations for the area in Germany [67]; the authors emphasised the role of state policy, and market liberalisation, which creates a window of opportunity;
(d) fresh air, which is recognised as a 'luxury' good in China [68]; as well as the strong role of outreach activities in shaping demand for green solutions in residential construction [69];
(e) the use of the CV model to estimate willingness to pay in Korea [70];
(f) mechanisms for potential investments in renewable energy using green energy tariffs and the Renewable Obligation Certificate (ROC) scheme [71], as well as the use of mixed logit models, which estimate the distribution of utility coefficients in the UK [72]; results from these studies suggest that although the adoption of renewable energy is valued by households, the value is not large enough to cover the individual costs of domestic investment;
(g) the implementation of bioenergy programmes using biomass in Spain [73], which, according to studies, would result in an increase in the welfare of society;
(h) identifying willingness to pay for support of increased R&D to replace fossil fuels in the USA [74];
(i) Green energy prices by three groups of payers: "concerned", "protest", and "willing to pay"in Australia [75];
(j) specific conditions of the downstream environment—a study conducted one year after the Fukushima tragedy, in two groups of consumers in the USA and Japan, in relation to two alternative energy sources: nuclear and renewable energy; for the Japanese population, a significant aversion to nuclear energy was shown [24];
(k) the social acceptance of green energy in light of the policy implications and health consequences for residents of polluted countries, using the example of Greece [55];

in this research, it is particularly noteworthy to highlight the impact of a prolonged economic recession on the increased motivation of residents to make cost-effective energy choices (solar and wind energy);

(l) the different demographic characteristics of the Turkish population [76].

From the multitude and variety of studies carried out in the context of willingness to pay, a rather broad set of customer expectations emerges that, in addition to price, determine its choices. Thus, it can be assumed that in the plethora of diverse factors that will guide the consumer in switching energy supplier, it will be price. At the same time, the consumer is able to pay more for green energy. This is evidenced by multivariate analyses and studies in diverse groups in terms of demographic as well as geographical characteristics [24]. Hence, hypothesis 3 takes the following form:

Hypothesis 3 (H3). *The consumer is willing to pay more for green energy.*

Interestingly, when carrying out desk research on willingness to pay for green energy, no scientific study was found that linked the following issues:

willingness to pay—green energy—enterprise strategy

The triad of these keywords forms the basis for the identification of the research assumptions, the hypotheses, which were identified as a result of the analysis of the source materials. The research procedure, as well as the sample selection and the research methods coded are presented in the following section.

5. Research Methodology: Description of the Research Procedure and Research Sample

The research was carried out using a procedure appropriate to the triangulation of research methods. The following research methods were used:

(a) desk research—in an exploratory approach,

(b) quasi-quantitative research using a survey questionnaire, CAWI technique (Computer-Assisted Web Interview survey) as the main survey,

(c) qualitative research FGI (Focus Group Interview)—as a deepening of the research results (Figure 1).

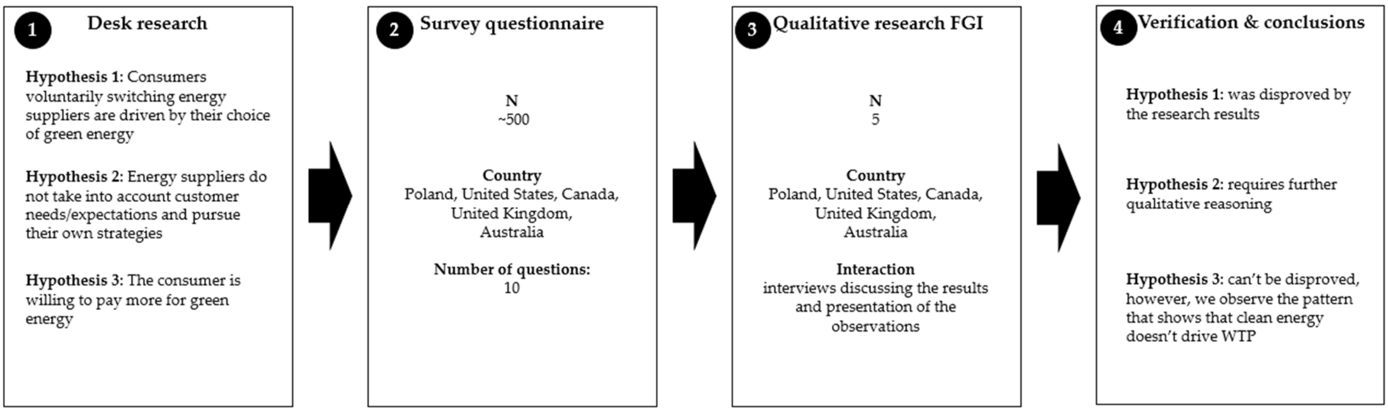

Figure 1. Research process for the presented study. Source: own study.

The research also included a triangulation of research perspectives, i.e.,

(a) perspective on the scientific output in this area (review);

(b) the perspective of the consumer, making decisions on the choice of energy supplier;

(c) the perspective of energy market experts.

The research is a pilot study in which preliminary testing of the research hypotheses is carried out. Every effort has been made to ensure that the research is representative. Unfortunately, the cost of the research for a representative study would be very high, so the pilot study is quasi-representative.

The research process used desk research analysis to establish the research problems. This was followed by the conceptualisation of variables and indicators and the structuring of research hypotheses. The next step was the selection of the research platform, the construction of the survey questionnaire, and the interview scenario. The surveys were then implemented, the database was verified, and analyses were conducted. The research was carried out using the CAWI technique, on the platform—https://www.pollfish.com/ (accessed on 12 November 2022) among consumers of the following countries: the USA, Canada, Australia, the UK, and Poland. The number of survey units surveyed in each stratum (N = 500, 100 people from each country).

The sampling method precluded the implementation of the study using random sampling techniques, due to the lack of a sampling frame. The selection of the research sample consisted of dividing consumers into strata by country of origin, followed by a random selection within each stratum of research units—people who have the freedom to make decisions about their choice of energy supplier. Within each stratum, the same number of survey units were selected in each country in the pilot study. This is because the main aim of the study was to compare consumer preferences in different countries and to verify statistical hypotheses.

The conceptualisation of the indicators was done taking into account: the main objective of the study, the identified research problems, and factors related to the specificity of consumer decision-making in this area (choice of energy supplier). This is based on the following principle:

Hypothesis 1 (H1). *Consumers voluntarily switching energy suppliers are driven by their choice of green energy.*

We identified whether the consumer has the freedom to decide to switch energy suppliers, and if not what limits them? If given the choice, do they choose clean energy (green energy)?

Hypothesis 2 (H2). *Energy suppliers do not take into account customer needs/expectations and pursue their own strategies.*

We identified whether the consumer is free to make the decision to switch energy suppliers, and if not what is limiting them—the energy supply company they use. This hypothesis implies the need for in-depth research.

Hypothesis 3 (H3). *The consumer is willing to pay more for green energy.*

We identified whether the consumer is free to make the decision to switch energy suppliers. If so, what is the hierarchy of the most and least decisive factors in the choice of supplier? In addition, the level of consumer awareness of the sources of energy that powers their house/apartment was verified.

6. Results

The research sample was drawn from Poland, the USA, Canada, the UK, and Australia. The survey sample size was 500 electricity consumers (Male—43.54%, Female—56.46%). The survey was conducted between September and October 2022. Energy suppliers are the companies present in a given national market (Figure 2).

Hypothesis 1 (H1). *Clean energy vs. customer preferences.*

To better understand customer preferences vs. green energy, a MaxDiff analysis was conducted. The analysis allows us to compare various product/offer features against each other and create a utility distribution chart. MaxDiff calculates the utility attributes more realistically. Contrary to most methods, it is less declarative and simulates the actual choice preferences. It allows for the division of utilities into positive ones, which are strong preference differentiators, and negative ones, which detract utility for a customer.

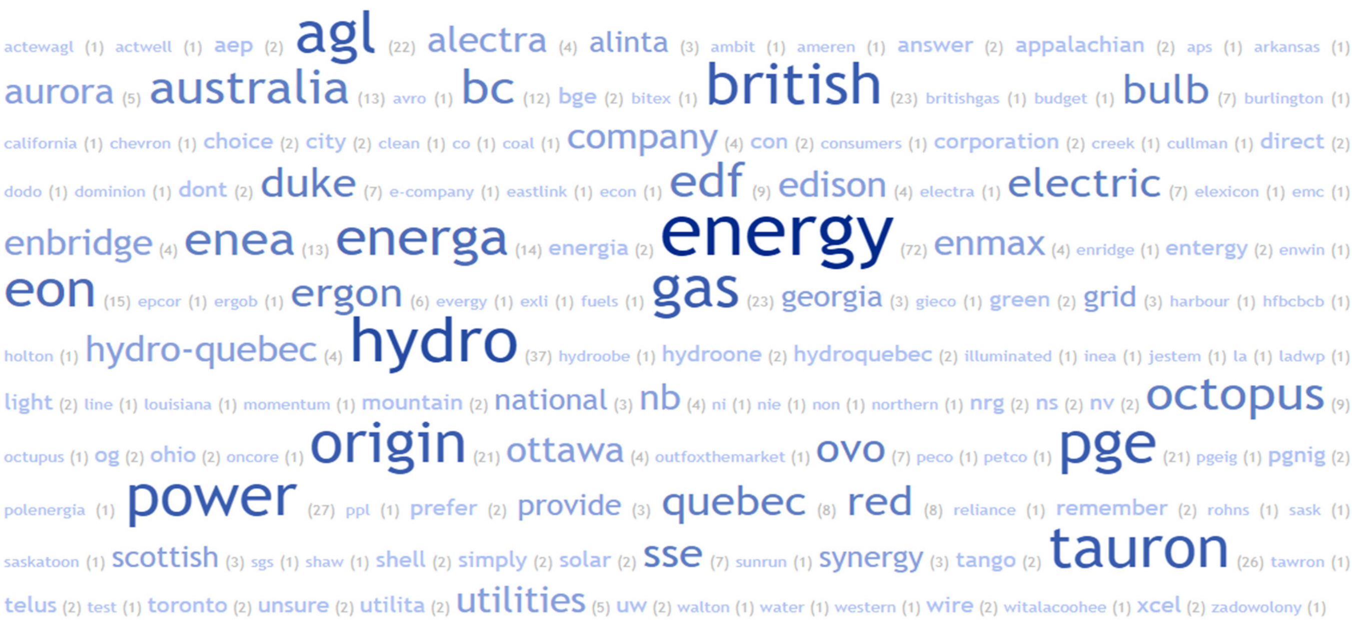

Figure 2. Frequency of the name of the company supplying electricity to B2C. Source: own study.

Responders in each country were asked: *"Out of the following options, which reasons to switch the energy provider are the most and least convincing for you?"* The results are consistent across all countries. Survey responders were asked to determine which reasons are the best and worst for them when switching energy providers.

Figure 3 shows that switching to renewable energy sources provides minor positive differentiation. Still, the reasons are far less preferred than the potential savings or the challenge of increased energy bills.

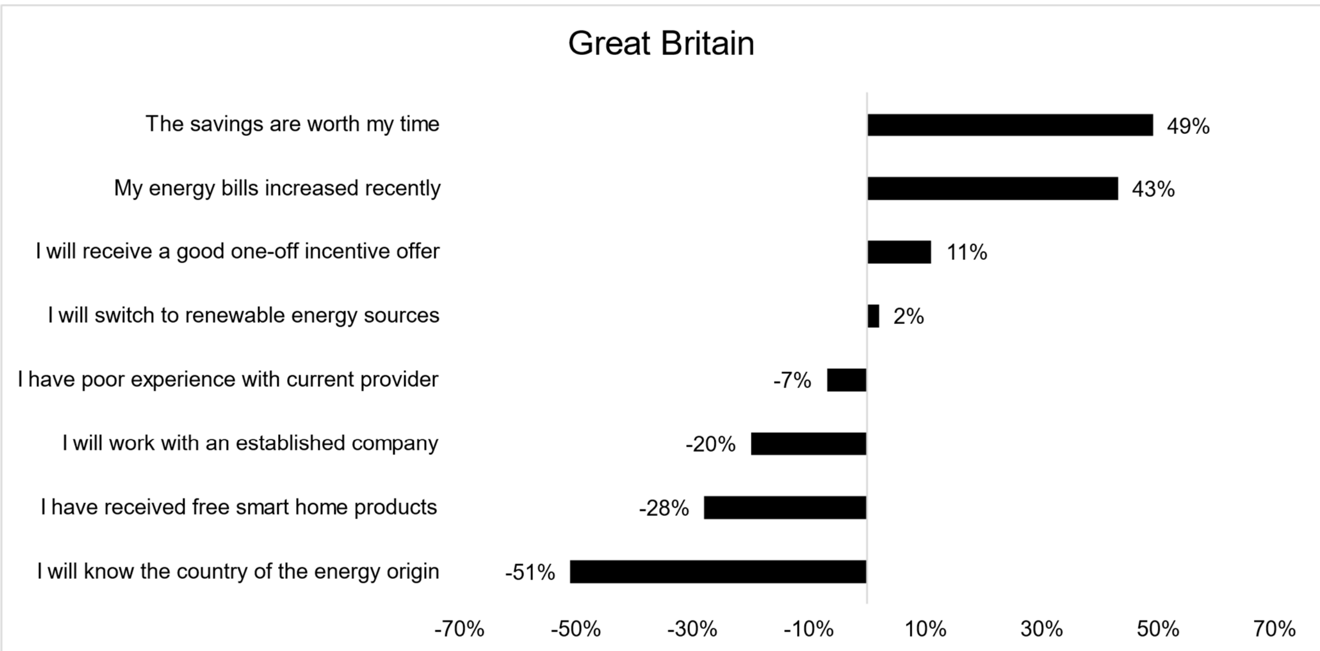

Figure 3. Utility attributes for various energy provider reasons in Great Britain. Source: own study.

Similarly, Figure 4 shows that results in the United States present the same narrative. When savings are worth the client's time and energy bills increase over time, only then do customers have a strong urge to switch energy providers. In other words, rational calculations drive the willingness to change the provider.

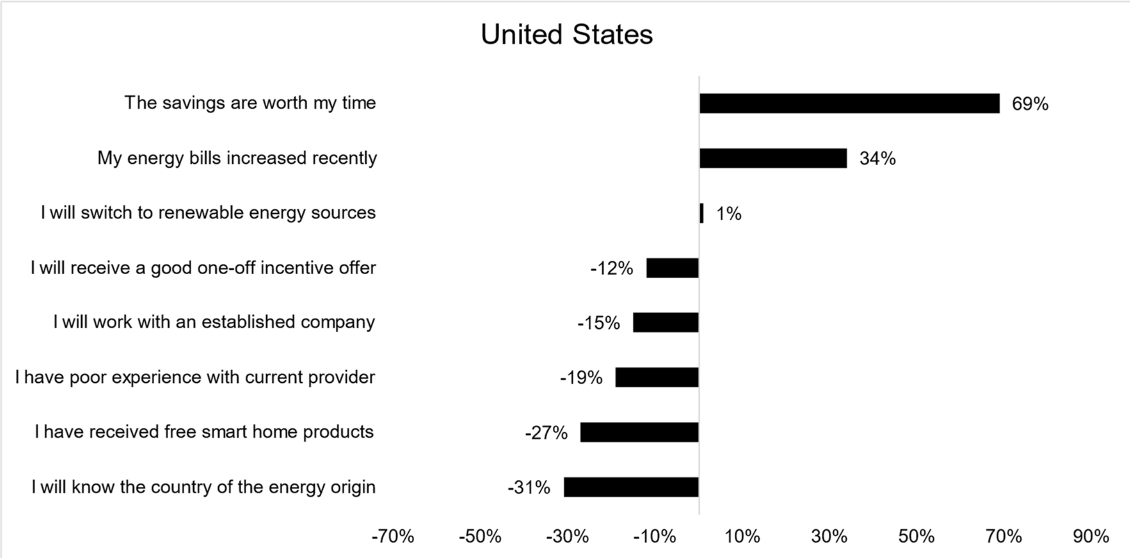

Figure 4. Utility attributes for various energy provider reasons in the United States. Source: own study.

Figure 5 for Canada is consistent with Figures 3 and 4 results. Similar to the US, green energy plays an almost marginal role and does not increase the overall value of the energy provider offers.

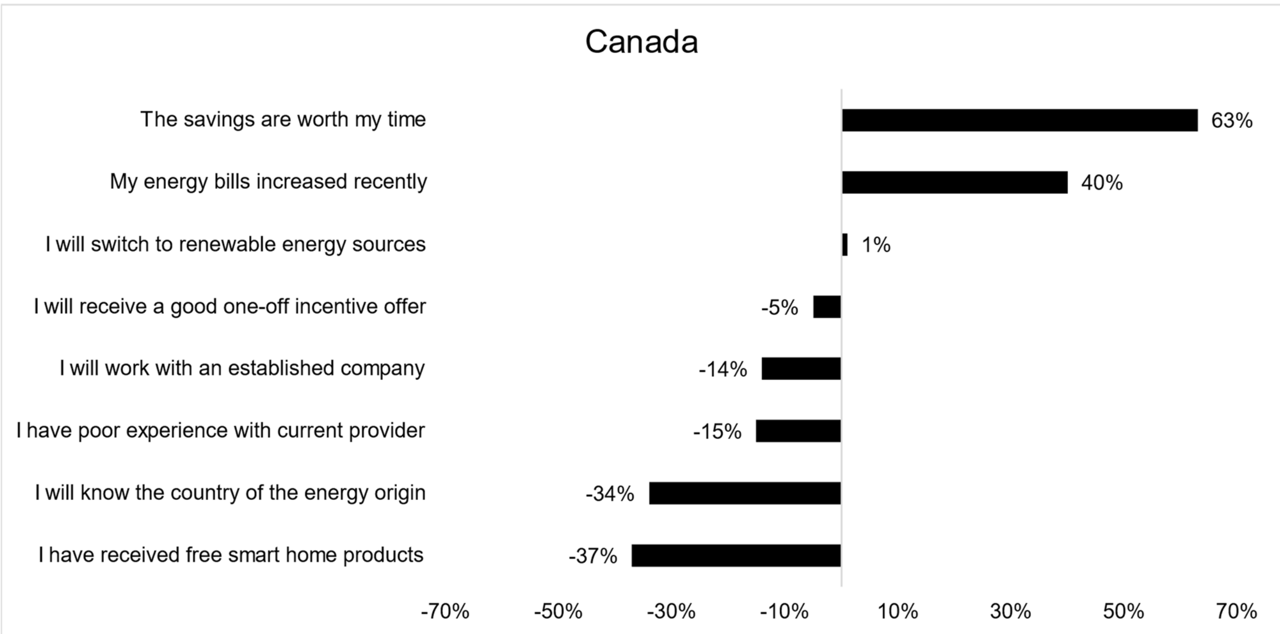

Figure 5. Utility attributes for various energy provider reasons in Canada. Source: own study.

Figure 6 represents the results for Australia. They are consistent with the previous observations; however, we see a slightly higher tendency to favour clean energy.

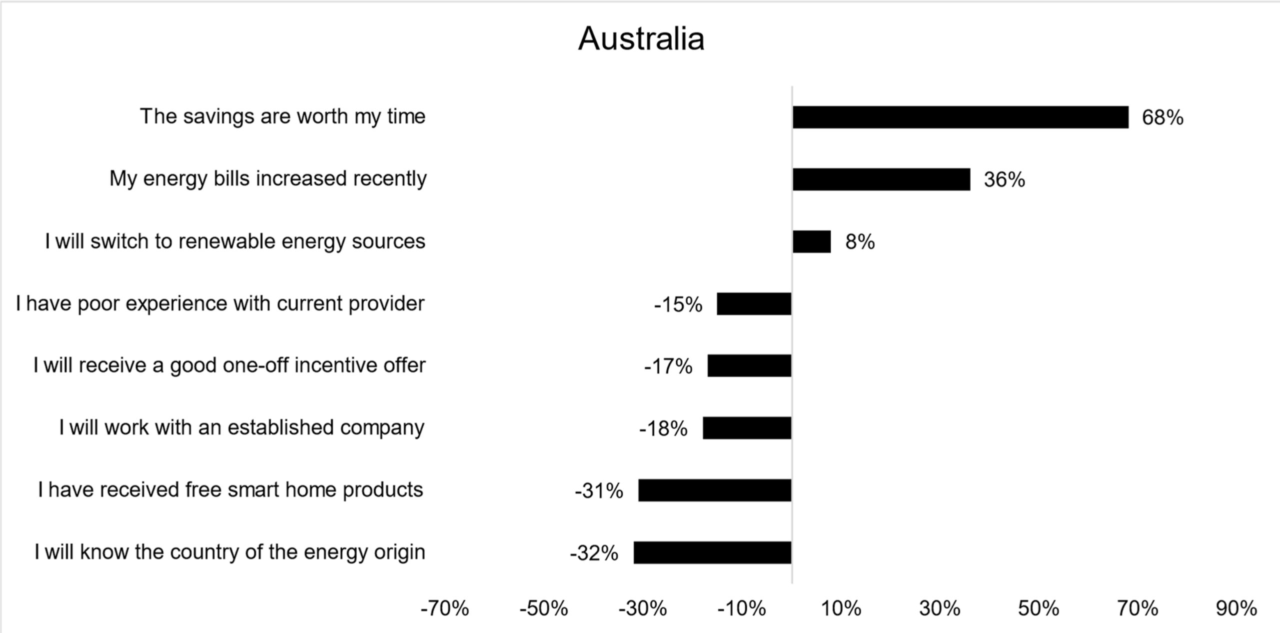

Figure 6. Utility attributes for various energy provider reasons in Australia. Source: own study.

We observe the highest clean energy preference in Poland, one of Europe's most "coal-heavy" countries. Figure 7 results provides an insight into how energy providers' offers need to be created.

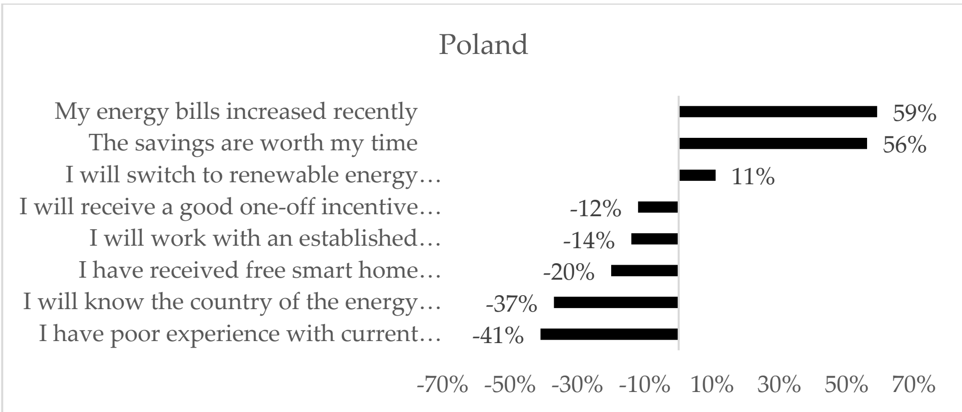

Figure 7. Utility attributes for various energy provider reasons in Poland. Source: own study.

Considering the initial results for five countries, we conclude that customers do not favour green energy over the cost savings factors, and it does not play a significant role in their decisions. Therefore, we cannot confirm Hypothesis 1. We observe a contrary result: when customers freely change their energy provider, they do not consider clean energy factors.

However, as a recommendation for business, we observe that energy providers should communicate clear, rational cost savings benefits, especially considering recent energy cost increases due to the current geopolitical situation. Yet, on top of that, they might also add a clean energy component, which has a positive utility and may play as a "nice to have" feature for some customers.

Hypothesis 2 (H2). *Customer preferences and energy provider switching roadblocks.*

During the ideation and desk research stage, the authors have thought of potential explanations for customers' decisions to switch/not switch to the new provider. One of the reasons we wanted to validate was a lack of knowledge when it came to choosing offers. We have asked responders in various countries to answer the question: *"What is your current decision status when choosing an electric energy provider at home?"*.

Figure 8 represents the answers across all countries. We observe a generally high awareness of the ability to choose a new energy provider, albeit, at the same time, there is a strong status quo effect in place. The results are observed across all countries' data.

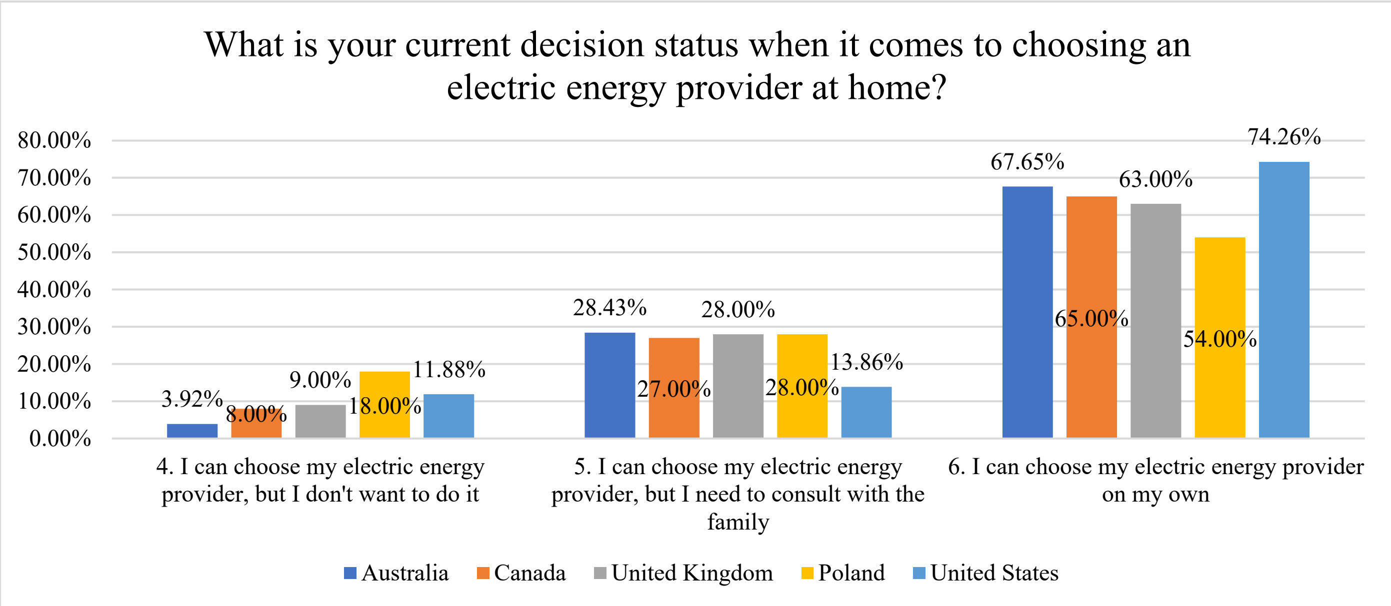

Figure 8. Choosing energy provider status by country. Source: own study.

Moreover, most responders in each country know that they can choose electric energy providers independently. While the results differ from country to country, we observe the same pattern.

Interestingly enough, we observe a typical answer pattern. None of the responders mentioned the following answers:

- *"1. I cannot choose the electric energy provider; my landlord does it for me"*
- *"2. I cannot choose the electric energy provider; someone in my family does it for me"*
- *"3. I cannot choose the electric energy provider due to contracts I already have"*

To conclude, while we still need to validate the research further, energy providers can acquire customers from the other market players and may capitalize on this opportunity. We need to conclude further qualitative research to validate Hypothesis 2, but we see that customer preferences and knowledge do not create a strategic challenge for energy providers.

Triangulating the results with the customer preferences also outlines a clear strategy for energy providers. They must communicate the cost savings and recently increased costs connected with switching to a new vendor with a green energy option.

Willingness to pay for clean energy

When it comes to finding the willingness to pay for clean energy, we had to connect results from two questions:

(a) *"If you choose only one type of electric energy you could use in your house, what would it be?"*

(b) Standardized items from the Van Westendorp Price Sensitivity Meter survey [77].

The first question (Table 4) was used as a segmentation item, while the second allowed the calculation of the relative differences between the minimal, maximal, and median of answers. While the results are preliminary, gathered on a relatively low sample by country, and not representative of the whole population, we did not conclude full statistical inference as it would not be methodologically correct. However, the initial results create a solid foundation for further research with a higher sample-gathering budget.

Table 4. Electric energy preferences when given only one choice, N by country.

	Wind Energy	Solar Energy	Water Energy	Nuclear Energy	Coal Energy	Sum
GB	23	55	5	16	1	**100**
US	8	71	4	11	7	**101**
AU	8	76	5	5	6	**100**
PL	9	62	1	14	11	**97**
CA	10	39	28	16	4	**97**
Sum	**58**	**303**	**43**	**62**	**29**	**495**

Source: own study.

Ultimately, our sample vs. preferred energy choice shows that solar energy is the most preferred across most countries. On the other hand, coal energy is the least preferred. On top of that, there are country-level nuances, which we might want to research further in the next publications. For instance, a few additional observations: lower preference for solar energy in Canada (possible reason: latitude of country and less sun throughout a year) or lower preference for nuclear power in Australia (possible reason: nuclear energy ban from 1998).

In our cross-question representation, 0% is a median baseline for the results. Everything above indicates higher willingness-to-pay (WTP), and everything below it lowers it. When there was a N below 5 responders, the results are not shown.

Figure 9 represents a pattern in which some customers are willing to pay more for solar and water energy, while wind energy does not drive substantial differentiation. Nuclear power might also create an additional WTP.

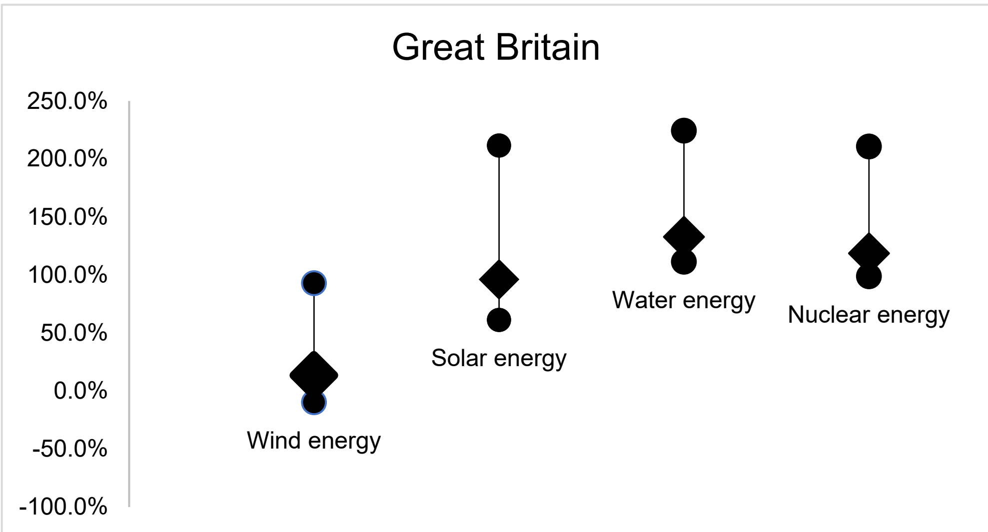

Figure 9. Willingness to pay for various types of electric energy in Great Britain. Source: own study.

Figure 10 shows the results for the United States. We observe that solar energy has a generally higher preference and drives WTP. Wind and nuclear power also increase it, but they are moderately common in the US, so they are not anything necessarily new.

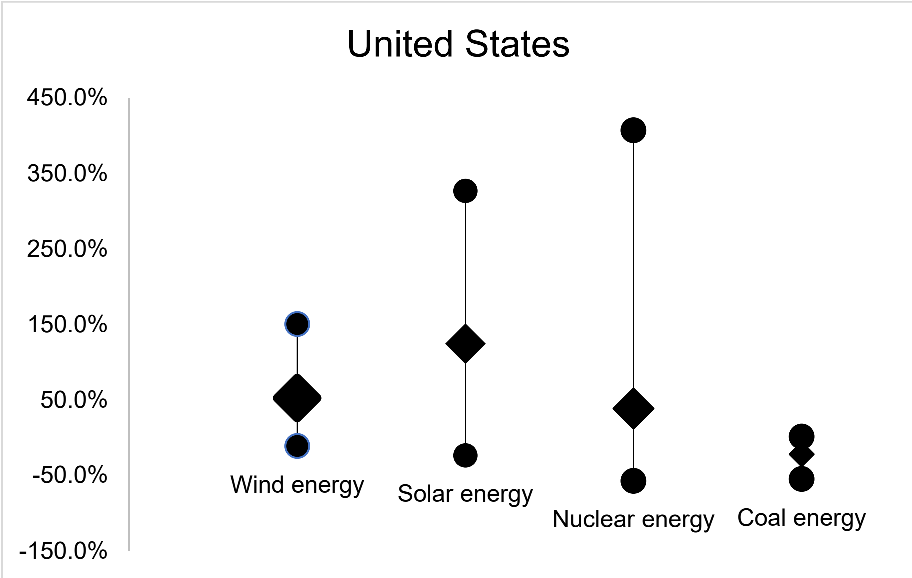

Figure 10. Willingness to pay for various types of electric energy in the United States. Source: own study.

Figure 11 shows that water and solar energy drives WTP; however, we also see it with coal energy. Therefore, we cannot say in the case of Australia whether the responders prefer green energy and want to pay for it on a higher basis.

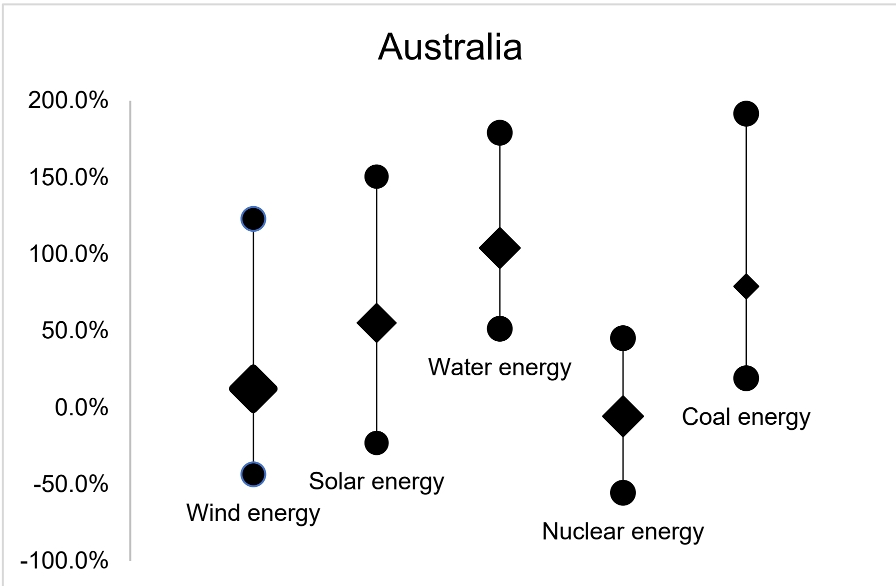

Figure 11. Willingness to pay for various types of electric energy in Australia. Source: own study.

Figure 12 represents Canadian customers' preferences and their WTP by energy type. While a pattern might emerge, we do not see a strong tendency. Overall clean energy drives willingness to pay, but on a much lower multiple than for other countries.

Figure 13 represents Poland. There is a substantial preference increase towards solar and nuclear energy vs. wind; however, if we take medians under consideration, coal energy drives WTP as well. The reason might be the inflation of energy supplies, especially coal. The shortage of supply surges prices and creates an additional willingness to pay for an energy source, which is still used by over 90% of Polish households.

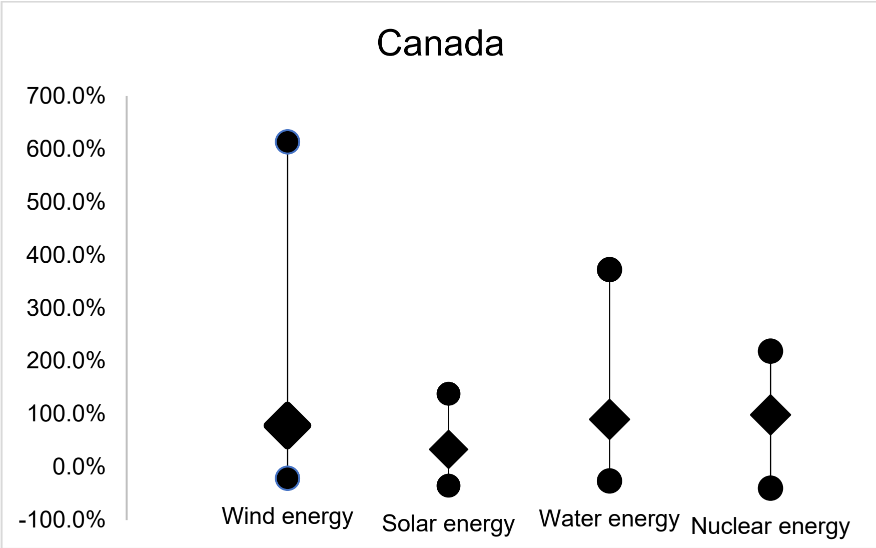

Figure 12. Willingness to pay for various types of electric energy in Canada. Source: own study.

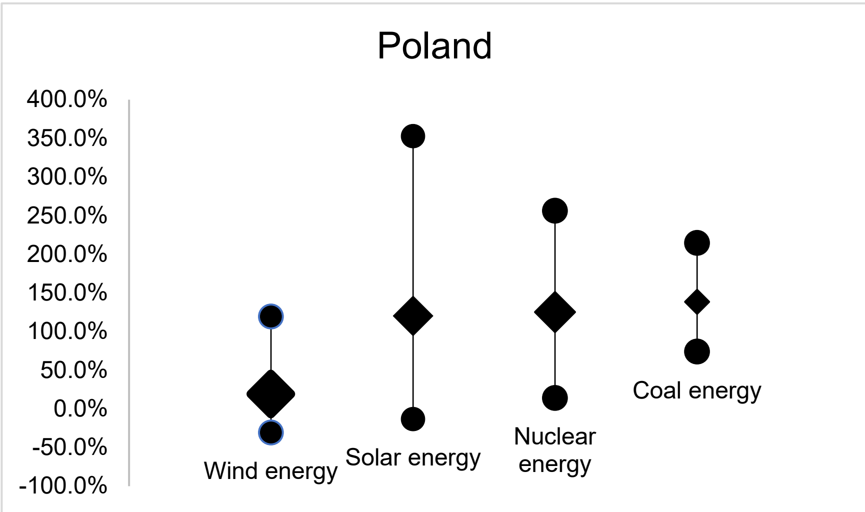

Figure 13. Willingness to pay for various types of electric energy in Poland. Source: own study.

To conclude the results for Hypothesis 3, we believe that clean energy drives willingness to pay for some customers, but that does not change the overall customer perception (Hypothesis 1 results). We observe sample limitations. Therefore, we recommend boosting it for the following publications and running statistical inference tests with a standard distribution assumption to validate the hypothesis fully. As for now, we do not see a clear pattern emerging, and we cannot disprove the results from the literature that clean energy drives the overall willingness to pay.

7. Discussion & Conclusions

Conducting the study in five selected countries is a significant limitation. It is justifiable to carry out explorations in diverse locations, given the unique nature of the region. In this way, it is possible to recognise the factors analysed in the context of all sources of green energy, not just those that are most prevalent. In addition, subsequent studies should take into account the unique characteristics of a region's population as well as its level of pollution. Furthermore, the conclusions in this study use consumer preferences, so it is not possible to say how their stated intentions differ from the actions they take.

In our quantitative study, Hypothesis 1 was disproved by the research results. Hypothesis 2 requires further qualitative reasoning, but the results show a strong foundation.

Hypothesis 3 cannot be disproven with the current sample size and research method; however, we observe the pattern that shows that clean energy does not drive WTP. It stands to the contrary of other publications identified during the literature search.

Nevertheless, the article is a prelude to further considerations of an empirical nature, as it made the authors realise that there are extremely strong links between the strategic development of an organisation and opportunities: increased financial benefits and cost reductions in the context of environmental protection. The already mentioned hypothesis of M.E. Porter and the work of S. Ambec and P. Lanoie open the door to further explorations in the context of green energy and the organisational opportunities studied by the team over the years [78].

It is also worth mentioning that one of the disturbances in the assessment of results may also be government programs that are designed to stimulate the market to move towards green energy. Poland has such a program [79], as do the UK [80], the USA [81], Canada [82], and Australia [83]. In the opinion of the authors, this can cause unnatural market behaviour and changes that confound any research involving green energy sources. However, such stimulation of the market also shows that the topic is important, and the end customer is constantly changing.

An additional limitation of the study may be the characteristics of the countries. The countries presented in terms of economic character have similar economic conditions and economies. The authors are not talking here about the size of GDP, but about the general characteristics and strategies of the countries.

The sample size is also a limitation. The sample includes 500 pilot surveys. The attempt can be extended based on the presented research results; the final study is being prepared.

An important limitation is also the fact that the consumer market consumes far less energy than the business organisation market. The research team therefore set out to identify the research hypotheses analysed (1–3) in the context of the B2B market.

The practical application of the presented study can be translated into the preparation of a strategy of cooperation with the client in the case of offering new power supply options in the area of green energy.

Practical application is also manifested in the possible price-list approach to energy sales. On the basis of the available data, the company with the presented data can offer energy products based on green energy in a very attractive way.

A company building an action strategy for a selected group of customers can address their needs more precisely and can clearly ignore some needs.

The study may be developed in the future with additional countries with different characteristics than those presented in the current study. This will allow you to look at the variety of strategies and approaches to energy strategy.

The study in the future may specify the research groups and their price flexibility in more detail. Which will allow you to define the exact flexibility regarding payments.

It is worth taking into account the impact of state policy on the selected sector and the area of the sector in the next study. The impact of government programs, regional strategy, such as the strategy of the European Union as well as taking into account geopolitical conditions.

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Appendix A

Table A1. Level of green energy production in selected countries-by source.

CAP (MW)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Hydropower										
USA	101,107	101,589	102,162	102,240	102,692	102,703	102,801	102,649	105,767	101,894
Canada	75,537	75,511	75,474	79,405	80,304	80,831	81,396	81,399	81,404	82,740
Australia	8271	8271	8271	8271	8271	8271	8523	8523	8523	8523
UK	4437	4453	4474	4677	4733	4770	4773	4773	4775	4793
Poland	2351	2355	2364	2370	2385	2390	2391	2397	2400	2384
Renewable hydropower (including mixed plants)										
USA	82,442	82,903	83,386	83,374	83,665	83,644 o	83,722	83,624	83,797 o	79,982 o
Canada	75,363	75,337	75,300	79,231	80,130	80,657	81,222	81,222	81,227 u	82,563 u
Australia	7461	7461	7461	7461	7461	7461	7713 o	7713 o	7713 o	7713 o
UK	1993	2009	2030	2077	2133	2170 e	2173	2173 o	2175 o	2193 o
Poland	945	949	958	964	972	967	968	974 e	977 e	1164
Pure pumped storage										
USA	18,665	18,686	18,776	18,866	19,027	19,059	19,079	19,025	21,969 o	21 912 o
Canada	174	174	174	174	174 o	174 e	174 e	177	177 e	177 e
Australia	810	810	810	810	810	810	810	810 o	810 o	810 o
UK	2444	2444	2444	2600	2600	2600	2600	2600 o	2600 o	2600 o
Poland	1406	1406	1406	1406	1413	1423	1423	1423 e	1423 e	1220 o
Marine energy										
USA	-	0 u	0 e	0 u	0 u	0 o	-	-	-	-
Canada	20	20	20	20	20	20	20 e	20 e	20 e	20 e
Australia	1	1	1	1	1	1 e	1 e	1 o	1 e	1 e
UK	9	8	9	9	9	13	18	20	22 o	22 o
Poland	-	-	-	-	-	-	-	-	-	-
Wind energy [1]										
USA	59,075	59,973	64,232	72,573	81,286	87,597	94,516	104,052	118,732	132,738
Canada	6201	7801	9694	11,214	11,973	12,250	12,816	13,413	13,627	14,304
Australia	2561	3221	3797	4181	4324	4812	5442	6279	8603	8951
UK	9030	11,282	13,074	14,306	16,126	19,585	21,767	24,095	24,485	27,130
Poland	2564	3429	3836	4886	5747	5759	5766	5837	6298	6958
Onshore wind energy										
USA	59,075	59,973	64,232	72,573	81,257	87,568	94,487	104,023 o	118,703 o	132,696 o
Canada	6201	7801	9694	11,214	11,973	12,250	12,816 u	13,413 u	13,627	14,304
Australia	2561	3221	3797	4181	4324	4812	5442	6279	8603 o	8951 o
UK	6035	7586	8573	9212	10,833	12,597	13,551	14,125	14,102 o	14,430 u
Poland	2564	3429	3836	4886	5747	5759	5766	5837	6298	6958 u
Offshore wind energy										
USA	-	-	0 u	0 u	29	29	29 o	29 o	29 o	42 o
Canada	-	-	-	-	-	-	-	-	-	-
Australia	-	-	-	-	-	-	-	-	-	-
UK	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-
Solar energy [2]										
USA	8613	13,045	17,651	23,442	34,716	43,115	51,570	60,826	75,562	95,209

Table A1. *Cont.*

CAP (MW)	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Canada	766	1210	1843	2519	2665	2932	3095	3327	3342	3630
Australia	3799	4568	5287	5946	6689	7354	8625	12,969	17,344	19,076
UK	1753	2937	5528	9601	11,914	12,760	13,073	13,346	13,462	13,689
Poland	1	2	27	108	187	287	562	1539	3955	6257
Solar photovoltaic										
USA	8137	11,759	15,984	21,684	32,958	41,357	49,812	59,068	73,814 o	93,713 o
Canada	766	1210	1843	2519	2665	2932	3095	3327	3342	3630
Australia	3796	4565	5284	5943	6686	7352	8623	12,967	17,342 o	19,074 o
UK	1753	2937	5528	9601	11,914	12,760	13,073	13,346	13,462 o	13,689 o
Poland	1	2	27	108	187	287	562	1539	3955	6257
Concentrated solar power										
USA	476	1286	1667	1758	1758	1758 o	1758 o	1758 o	1748 o	1496 o
Canada	-	-	-	-	-	-	-	-	-	-
Australia	3	3	3	3	3	2	2	2 o	2 e	2 e
UK	-	-	-	-	-	-	-	-	-	-
Poland	-	-	-	-	-	-	-	-	-	-
Bioenergy										
USA	11,321	12,392	12,526	13,115	13,049	12,985	12,774	12,267	12,271	13,574
Canada	2013	2041	2497	2473	2540	2642	2654	2410	2416	2416
Australia	827	817	824	826	864	864	864	864	875	876
UK	3117	3791	4254	4808	5251	5514	6997	7165	7243	7259
Poland	583	735	816	961	974	968	1004	1010	1045	1045
Solid biofuels and renewable waste										
USA	9015 o	9966 o	9977 o	10,590 o	10,519 o	10,404 o	10,159 o	9841 o	9840 o	11,140 o
Canada	1897	1925	2381	2357	2424	2503	2515 e	2271 e	2271 e	2271 e
Australia	597	597	598	598	674 o	674 e	674 e	674 e	678 e	678 e
UK	1742	2377	2723	3180	3477	3695	5161	5333	5405 o	5418 o
Poland	455	582	629	745	749	738	778	777	784	784 e
Renewable municipal waste										
USA	1205 o	1222 o	1222 o	1270 o	1270 o	1270 o	1270 o	1270 o	1270 o	1270 o
Canada	39	39	39	39	39	38	38 e	38 e	38 e	38 e
Australia	-	-	-	-	-	-	-	-	-	0 o
UK	257	273	340	465	514	545	568	661	723 o	733 o
Poland	-	-	-	8	22	30	43	45	50	50 e
Biogas										
USA	2102	2271	2394	2370	2375	2416	2379	2303	2308 o	2310 o
Canada	116	116	116	116	116	139	139 e	139	145 u	145 u
Australia	230	220	226	228	190 o	190 o	190 o	190	197 o	198 o
UK	1375 o	1414 o	1531 o	1628 o	1774 o	1819 o	1836 o	1832 o	1838 o	1841 o
Poland	128 o	153 o	187 o	216 o	225 o	229 e	225 e	233 e	261 e	261 e
Renewable energy share of electricity capacity										
USA	15.4	16.0	16.8	18.2	19.8	20.9	21.9	23.3	25.3	27.5
Canada	63.3	64.6	65.5	66.3	66.4	66.8	67.1	67.1	66.8	68.3
Australia	22.5	24.3	25.5	26.9	28.8	30.8	32.9	37.8	42.2	42.8
UK	16.6	21.4	25.8	32.0	35.9	38.2	40.7	44.6	45.1	46.5
Poland	11.6	14.3	15.7	18.5	20.7	18.6	19.3	21.5	24.9	29.9

Source: IRENA, International Renewable Energy Agency, Report titled: Renewable Capacity Statistics 2022. Numbers followed by the letter "o" are figures that have been obtained from official sources such as national statistical offices, government departments, regulators, and power companies. The letter "u" follows figures that have been obtained from unofficial sources, such as industry associations and news articles. The letter "e" follows figures that have been estimated by IRENA from a variety of different data sources. All data from the IRENA questionnaire is presented without any indicator. [1] Rotational kinetic energy generated from windmill rotation (which also relates to offshore wind energy) is transmitted to power plants and converted to electricity. The conversion of airflow into energy results has no environmental impact. Production varies depending on wind levels, but 24-h output is possible [24]. [2] Light energy from the sun is converted into electricity by solar panels. Solar energy has no environmental impact. The output varies depending on the amount of solar radiation (e.g., during cloudy and rainy weather) [24].

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