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Energy saving practices and behavioral economics

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Abstract. Households are responsible for about one-third of total greenhouse gas emissions and possess significant potential for enhancing energy efficiency. Behavioral economics integrates conceptual frameworks from psychology, sociology, and economics to examine decision-making processes, focusing on identifying biases, both cognitive and behavioral, as well as social norms that influence human behavior.
This study focuses on the application of behavioural economics to household energy efficiency strategies. Key cognitive and behavioural barriers and incentives were identified from expert interview data, supported by a review of behavioural economics and energy efficiency research.
Cognitive barriers were identified at the decision-making stage, where the main barriers were the ricochet effect, the illusion of a reduced carbon footprint, errors in the perception of calculations, errors resulting from lack of awareness and errors of slanted thinking. Although savings remain the main motivation for energy saving practices, environmental concerns are becoming increasingly important.

Key words: behavioural economics, subject-object relations, transforming social practices, behavioural economics, energy saving, sustainable development.

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Энергосберегающее поведение и поведенческая экономика

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Аннотация. Известно, что домохозяйства на треть составляют общие выбросы парниковых газов и имеют наибольший потенциал для повышения энергоэффективности. Поведенческая экономика объединяет концептуальные основы психологии, социологии и экономику для изучения процессов принятия решений, делая акцент на изучении предубеждений, когнитивных и поведенческих, и социальных норм, направляющих поведение человека.
В данном исследовании сосредоточено внимание на применении поведенческой экономики в рамках стратегии повышения энергоэффективности в домохозяйствах.
На основе данных экспертных интервью, подкрепленных обзором исследований поведенческой экономики и энергоэффективности, были выделены основные когнитивные и поведенческие барьеры и стимулы.
На этапе принятия решения были выделены когнитивные барьеры, где главным был эффект рикошета, иллюзия снижения углеродного следа, ошибки в восприятии подсчетов, ошибки, в результате недостаточной информированности и ошибки косности мышления. Не смотря на то, что экономия остается главным мотивом энергосберегающих практик, забота об экологии становится все более важной.
Основные методы работы с когнитивными ошибками состоят в таких приемах как наджинг, поддержка социальных норм и экологических практик, создание доступных форм информационной поддержки, упрощение реализации энергосберегающих практик, образование население.

Ключевые слова: поведенческая экономика, субъект-объектные отношение, трансформация социальных практик, поведенческая экономика, энергосбережение, устойчивое развитие.

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Introduction

Behavioral economics is a field of study that integrates methodologically different insights from psychology and economics to understand the way which how individuals make decisions in different situations. It challenges the traditional economic assumption that individuals are consistently rational and self-interested. Instead, behavioral economics recognizes that human behavior is influenced by cognitive biases, heuristics, and social factors. This field has generated significant interest and debate due to its implications for policy-making and understanding economic phenomena.

In energy policy discussions, the issue of the energy efficiency gap has garnered significant attention due to its perceived potential for mutually beneficial outcomes. Efforts have been focused on identifying the underlying causes of this gap and determining appropriate policy interventions. Traditionally, energy policy has been heavily influenced by STEM disciplines, largely prioritizing technological development while overlooking the significance of human and social factors in shaping energy demand. However, there has been a recent shift towards incorporating insights from social science disciplines, particularly behavioral sciences, into energy policy discussions [Founds 2018].

Policy makers can adopt a scientific approach to for problems solving, taken into account scientific frames for stakeholders input to understand and address the energy saving gap. This approach has emphasized individual behavior change and the demand for scientific insights that often isolate the individual from a broader societal context. The failure of individuals to make optimal investment decisions in energy saving practices adoption has led to the integration of economic and behavioral science insights to identify decisional barriers and drivers related to the energy saving gap and determine the necessary instruments to address it [Cattaneo 2019]. Overall, a deeper understanding of the energy efficiency gap and the associated barriers and drivers is essential for informing effective policy interventions [Dütschke 2018]. The methodological area of behavioral economics offers valuable insights into understanding individuals' energy-saving behaviors. Its important because of three main reasons.

Firstly, electric utilities have to carry out the energy efficiency policy programs, and regulators can be to evaluated by their costs/ benefits for price regulation. Secondly, energy efficiency can be reduced with different causing utilities: cover fixed service costs and pricing adjust. Thirdly, utilities may use their political power to delay or stop energy efficiency programs unless regulatory prices make sure their revenue is maintained when demand goes down. Although energy efficiency policies can help address market failures and inefficiencies, they rely on assumptions about consumer behavior that may not be accurate. The field of behavioral economics illustrates that human decision-making is prone to biases and errors that challenge policy evaluation and increase the need for regulatory intervention in the energy market [Sapci 2014].

Unlike traditional economic theories that assume rational and self-interested decision-making, behavioral economics recognizes that human behavior is influenced by psychological factors, cognitive biases, and social considerations. This article oriented on the problem of investigation the frame behavioral economics works on cognitive process of decision making and energy-saving practices and their implications for energy policy.

A significant portion of the annual emissions in developed nations stems from the energy usage in residential settings. Households wield significant influence on climate change, with their impact varying widely based on prevailing socio-ecological practices, climatic regions, heating fuel types, electricity consumption rates, waste generation levels, transportation frequency, as well as the engineering and technical characteristics of households. In Russia, the primary consumers of thermal energy comprise the industrial sector (34%), households (33%), and the service sector (10%) [Galperova 2019].

Moreover, private households represent a key focus for behavior-based interventions. Households have the potential to conserve energy through two primary methods: firstly, by adjusting their utilization of energy services, for example as for reducing the use of lighting, and secondly, by altering their purchasing habits and investing in energy-efficient appliances, for instance, by acquiring a highly efficient washing machine. Behavioral interventions aimed at promoting energy conservation can thus target either the purchasing decisions or, more directly, the

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consumption behaviors. Notably, certain practices within households exhibit high carbon intensity (reflected in the ratio of greenhouse gas emissions to the amount of energy consumed within a specific timeframe). These include the use of inefficient energy sources, elevated consumption of energy services and products, reliance on automobiles, and substantial levels of food wastage [Impact of Climate Change... 2022].

Thesis of behavioural economics

One of the fundamental theses in behavioral economics is bounded rationality, proposed by Herbert Simon. Bounded rationality asserts that individuals often make decisions that are rational within the constraints of their cognitive abilities and the information available to them. This challenges the traditional economic concept of perfect rationality and complete information, emphasizing the limitations in human cognition when making decisions [Simon 1957, 40–47].

Behavioral economics highlights the presence of cognitive biases in decision-making. These biases, such as anchoring, framing, and loss aversion, lead individuals to deviate from rational choice theory. For instance, the endowment effect, where individuals overvalue items they own, contradicts the traditional economic assumption of individual rationality in evaluating choices [Kahneman 1979]. Behavioral investigation in energy consumption highlights various cognitive biases that affect energy consumption decisions. As an example, the endowment effect might cause human to place a higher value on their current energy usage and resist changes, while present bias may lead person to prioritize immediate comfort over long-term energy-saving investments. These biases can hinder the adoption of energy-efficient technologies and behaviors [Allcott 2010]. The imperative which deals with climate change and reduce energy consumption has brought to the forefront the need to understand human behavior in the field of energy use. Studies have shown that cognitive biases, or behavioral rationality patterns, play a pivotal role in shaping individual choices related to energy use and conservation. By identifying and comprehending these biases, stakeholders can develop more effective strategies to promote energy-efficient behaviors.

Prospect theory, developed by Daniel Kahneman and Amos Tversky, challenges the traditional economic model of decision-making under uncertainty. It proposes that individuals do not weigh potential losses and gains equally and are risk-averse in the domain of gains, yet risk-seeking in the domain of losses. This asymmetry in decision-making contradicts the assumptions of expected utility theory [Kahneman 1979].

Social Preferences

Behavioral economics incorporates social preferences into the analysis of decision-making. Research has shown that individuals often exhibit altruistic or reciprocal behaviors that cannot be fully explained by self-interest alone. This challenges traditional economic models that are based on the assumption of purely self-interested individuals [Fehr1999].

Nudge theory, popularized by R. Thaler and Sunstein C., emphasizes the use of choice architecture to influence individuals' decisions without restricting their options. This approach leverages findings from perspective of behavioral economics to design policies that guide individuals toward better choices while maintaining their freedom. Nudge theory has broad implications for public policy and has gained attention from policymakers worldwide [Thaler 2008]. Applied to energy conservation, nudges can encourage people to adopt energy-saving practices by leveraging social norms, default options, and salience. For example, providing energy consumption feedback or defaulting thermostats to energy-saving settings can prompt individuals to reduce their energy usage.

Behavior

Behavioral economics highlighting the key role of cultural and social norms and social influence in shaping energy-saving practices. Studies have shown that individuals are mostly involved in energy-saving behaviors when they perceive that such actions are common among their peers. Leveraging social networks and community-based interventions can effectively promote energy conservation by harnessing social influence mechanisms [Allcott 2011] Individuals' economic behavior in energy consumption involves promoting the use of initiatives, technologies, and installations to optimize energy usage. However, addressing the energy efficiency gap presents a considerable challenge, as consumers often do not prioritize the most energy-efficient investments, despite the potential for cost savings. This disparity can be due to the realization

that energy savings alone are insufficient to prompt investment in energy-efficient solutions or products. Non-monetary benefits, such as enhanced comfort, reduced construction and installation time, as well as emotional satisfaction from making environmentally responsible choices, alternatively, the act of comparing oneself favorably to others can significantly impact consumer decisions. Moreover, consumers' time preferences, as expressed through their discount rate, play a crucial role in the embrace of energy-efficient products.Additionally, consumers' time preferences, as indicated by their discount rate, play a pivotal role in the adoption of energy-efficient products. Specifically, individuals with a preference for immediate gratification may opt for products with lower initial costs, even if they result in higher future expenses, thus disincentivizing investments in energy-efficient solutions that typically require higher upfront costs [Allcott 2012].

Framing and Messaging is the way, which information is presented and framed can significantly impact energy-saving decisions. Behavioral economics suggests that framing energy-saving behaviors as a gain rather than a loss, emphasizing the positive outcomes and benefits, can increase the likelihood of adoption. By understanding how individuals respond to different frames and messages, policymakers can design more effective energy-saving campaigns and interventions [Tiefenbeck 2013]. Behavioral Interventions and Technology Adoption Behavioral economics examines individual decision-making processes concerning the adoption of energy-efficient technologies. Factors such as inertia, uncertainty, and decision fatigue can impede technology adoption despite its potential for energy savings. By addressing these behavioral barriers through targeted interventions, such as simplifying decision-making processes and reducing perceived risks, behavioral economics can facilitate the uptake of energy-efficient technologies [Davis 2016].

In the last decade, a coalition of social scientists from diverse academic fields has contributed to developing and applying social practice theory to comprehend routine energy consumption [Shove 2003; Røpke 2009]. This theory shows potential for revitalizing energy consumption theory and laying the groundwork for novel approaches in energy conservation policy. This conceptualization of the consumer sharply contrasts with the prevailing view that portrays individuals as autonomous decision-makers whose intentions and actions dominate consumption patterns. Policies derived from this perspective deprive consumers of the practical knowledge shaped by experience and everyday habits. These policies are deemed to be 'disconnected from experience,' and "separate the mind from the world" [Frederiks 2015; Carrol 2014].

The urgency of addressing climate change mandates a swift reduction in energy consumption, making increased energy efficiency crucial. Previously, energy efficiency promotion primarily focused on the physical, technical, and economic aspects, prioritizing technologies and cost savings while overlooking human behavior. The integration of behavioral economics has started to incorporate human aspects into energy efficiency policy, but it is still in its early stages. While economics and behavioral sciences have allowed for a focus on individual decision-making, the broader collective and social dimensions have been substantially overlooked in energy policy discussions. Sociology's emphasis on the interplay between social structures and individual actions offers valuable insights beyond merely identifying barriers and drivers of investment choices.

Methodology and Methods

An expert survey was conducted with a total of 40 participants in 2019–2023, including representatives from the energy sector engaged in advancements deals with energy efficiency and conservation within public administration, consulting, business, scientific community, NGO, and education. The survey encompassed inputs from both renewable energy sources and traditional energy sector representatives, without specific consideration of the informants' gender and age. We addressing inquiries pertaining to policy development in the energy and energy efficiency domain, incentives for energy conservation, primary cognitive and behavioral barriers, as well as strategies to surmount these obstacles.

Results and discussing

According to sociological surveys of the main sociological centers in Russia, we can summarized that the main strategies of energy saving practices of the Russian citizens are focused on reducing the energy-use time and water resources for the purpose of money and nature resource saving. VCIOm in 2013 surveyed 1600 people in 130 populated areas across 42 regions, territories, and

republics of Russia. More than the half of the VCIOM respondents stated that they were able to save on electricity bills due to the measures taken, with rural residents and inhabitants of small towns (62-64%) being the primary beneficiaries. Meanwhile, a third of the respondents, mainly from large cities, expressed difficulty in achieving energy efficiency. The motivations for those saving electricity included economic necessity (56%), upbringing and habit (31%), and environmental values and planetary resource conservation (9%). Notably, the latter predominantly prevailed in mega-cities and large urban areas (16–17%)[1].

Additionally, the survey results from FOM as of June 9, 2021, showed a positive trend, with 83% of Russians reporting efforts to conserve electricity at home. Furthermore, 73% of the participants indicated that they conserve energy regardless of whether payment is required, and regardless of their location (at work, on vacation, visiting others). A smaller portion (up to 10%) utilized energy-efficient devices such as LED bulbs, devices, and 1% used AI, applications, and implemented the concept of a smart home. However, behavior related to reducing electricity consumption was found to be the most challenging and required the introduction of additional incentives [Nauges 2017]. Experts noted that raising prices "tends to irritate citizens and increase levels of distrust." However, offering a choice between price increases and mandatory energy consumption reductions at current prices could potentially stimulate citizens more than constant price hikes. A third (34%) of Russians expressed willingness to pay more for green energy. Only 4% of respondents believe that the energy industry negatively affects the environmental situation, while industrial activity takes the primary blame (60%). Meanwhile, 47% evaluate the overall environmental situation as poor and unsatisfactory.

Moreover, it is deemed crucial that developers are held responsible for meeting the specified indicators outlined in the project documentation, as emphasized by an energy certification specialist.

The primary barrier, according to experts, lies in the technological capacity to implement energy-efficient practices. An energy efficiency and construction expert indicated that the potential for saving on heating is contingent on the technical capabilities of the equipment, and further noted that the opportunity for renovation is underutilized. Following technological constraints, the level of environmental awareness and culture emerges as another significant factor. A green energy specialist highlighted the lack of a clear explanation to the public regarding the necessity of energy conservation, compounded by a prevalent distrust of authorities. Experts underscored the importance of launching information campaigns to address these issues, emphasizing the need for increased dissemination of objective information and improved communication between authorities and the population. Educational initiatives were also encouraged, with an energy engineer advocating for educational programs to elucidate the significance of energy-efficient household equipment and the impact of individual behavior on the economy, ecology, and public health.

Through a comprehensive review of relevant literature, we seeks with experts to elucidate the various cognitive biases at play in energy-saving practices, providing insights into how these biases can be harnessed to facilitate positive behavioral change. We also discussed potential strategies for mitigating the adverse effects of cognitive biases, paving the way for a more sustainable energy future.

Firstly, based on the results of the surveys there was discussed cognitive biases with experts, which often can be identified with energy saving — practices:

1. A group of cognitive biases associated with the inability to evaluate data includes generalizing specific cases, the availability heuristic, fundamental attribution error, and selective perception. Time devoted to eco-enlightenment, systemic, critical thinking, "cognitive restructuring," and reframing for correcting cognitive distortions have in most cases allowed working through these cognitive errors [De Meester 2013]. Cognitive biases and energy consumption research has identified several cognitive biases that can influence energy based decisions and pattern behavior. For instance, the 'prospect theory' suggests that individuals tend to value potential losses gains, impacting their actions for invest in energy-efficient technologies

1 Spasti planetu — ili koshelek: dlya chego my ekonomim elektroenergiyu? [Save the planet – or your wallet: why do we save electricity?] Text : electronic. *VTsIOM* : official website. Available at https://wciom.ru/analytical-reviews/analiticheskii-obzor/spasti-planetu-ili-koshelek-dlya-chego-my-ekonomim-elektroenergiyu. Publication date 06/28/2013 (in Russ.)..

or behaviors [Fischoff 2007]. The 'present bias' leads individuals to prioritize immediate gratification over long-term benefits, potentially hindering their adoption of energy-saving practices. Furthermore, the 'availability heuristic' may lead individuals to underestimate future energy costs and thus undervalue energy efficiency measures [Dolan 2015].

2. Errors related to the assessment of one's own abilities, knowledge, and skills. People usually do not objectively assess the ecological nature of their actions because they cannot look at the situation in comparison and do not make calculations [Gifford 2019]. Errors related to the rigidity of thinking and the unwillingness to look at habitual things from a different perspective are largely due to convenience and the desire to maintain habits [Gram-Hanssen 2018; Economidou 2020].

3. A group of beliefs associated with compensatory actions best explains rational behavior theories. It's main thesis is that in the decision-making process, costs and benefits are always calculated, and the advantages of different behavior models are analyzed by consumers. The calculation and materialization of ecological benefits can lead to a rebound effect (or Jevons effect)[1]. Traditionally, researchers analyze the rebound effect by observing the improvement in energy efficiency and comparing the actual decrease in energy usage to the anticipated reduction in the absence of any consumer or market responses. These responses are anticipated due to changes in relative prices and real income resulting from the enhancement in energy efficiency. The rebound effect is measured as the percentage of the anticipated energy use reduction that is "lost" due to consumer and market reactions.

For example, some persons, thinking that they are doing a lot for the environment, may not feel the need to do even more environmentally friendly actions. It has been repeatedly found that methods for calculating individual and corporate emissions, tools for measuring ecological damage, and other instruments for compensating for environmental harm, as well as fees for citizens for air travel, can lead people to think that they have already "paid off" and discharged their "debt," and therefore should not increase their level of ecological awareness and deepen or scale up their socio-ecological practices [de Longchamp 2018]. The "illusion of a negative carbon footprint" is based on the cognitive process of averaging, which does not take into account the characteristics and ecological impact of the sum of elements in a set to maintain a balance between "ecological" and "non-ecological" actions [Sunika-blank 2012]. Behavior regulation can be implemented through the use of nudging, which encourages specific behaviors while preserving the freedom of choice, and boosting, which enhances knowledge and skills, thereby enabling individuals to make essential decisions independently [Weizsäcker 2013].

The decision between the zero energy cost breakthrough and energy policy improvement is influenced by the specific context. The first of this, which assesses the influence of an external energy efficiency enhancement on consumer and market reactions, provides a broader understanding of how changes in energy efficiency can impact energy usage and valuable for determining the extent to which the rebound effect contributes to social welfare by offering more affordable energy services that consumers appreciate. But the policy program energy efficiency enhancements often involve alterations in costs and characteristics, making it difficult to empirically distinguish these reactions. It is crucial to comprehend all relevant consumer and market responses.

Enhanced energy efficiency makes positive societal benefits, creates a intricate feedback loop that impacts energy-saving behavior, leading to shifts in the pricing of energy services, subsequently influencing consumer consumption patterns and overall energy usage. The comprehension and quantification of these effects pose significant challenges.

- zero-cost breakthrough,
- the reduction in energy service costs prompts consumers to adapt their consumption patterns,
- resulting in alterations to their energy demand.

These adaptations may encompass a shift towards consumption more energy-efficient products, goods due to augmented purchasing power. Each of these adjustments bears the potential to either increase or decrease the overall energy consumption by the consumer [Thiesen 2008].

According experts opinion and cross-countries

1 Energy Efficiency and Sustainable Consumption The Rebound Effect. Palgrave Macmillian, 2009. DOI: 10.1057/9780230583108.

observes we found the five common ways which had used for the managing energy saving — behaviour.

Table 1. **Stimulating methods**

Nudging	Utilizing subtle environmental or decision-making alterations can effectively promote energy-saving behaviors. For instance, visual attitudes, or table with personalized energy usage feedback to individuals can serve as a motivational factor toward reducing consumption
Social norms management	Emphasizing social norms as a tool for promoting energy conservation has been proven influential. Studies have demonstrated that clear communication of energy-saving behaviors of others can significantly impact individuals' adoption of similar practices. For example, energy reports comparing household energy usage with the neighborhood average can stimulate efforts towards energy efficiency
Incentives and Rewards	Financial incentives and rewards have shown to be effective motivators in driving energy-efficient behaviors. Implementing energy efficiency rebate programs or offering discounts on energy-efficient appliances can incentivize consumers to make sustainable choices. Additionally, the application of gamification techniques, such as energy-saving competitions or reward points, further engages individuals in energy conservation efforts
Simplification and Default Settings	Simplifying energy-related decisions and setting defaults that encourage energy efficiency have been found to increase the adoption of sustainable practices. For instance, establishing programmable thermostats at energy-saving temperatures by default or presenting pre-selected energy-efficient options during the purchasing process reduces the cognitive effort required to make energy-efficient choices
Education and Awareness	Enhancing energy literacy and raising awareness about the significance of energy efficiency can lead to behavioral change. Education programs providing clear instructions on energy-saving techniques, along with potential cost savings, can empower individuals to take action. Furthermore, public campaigns, online resources, and dissemination of energy-saving tips can enhance awareness and promote sustainable behaviors.

The infrastructure and perspective of energy — saving

The average annual temperature in Russia is increasing at a rate almost three times higher than the global average. This poses a significant threat to the residential infrastructure and ecosystems in the Arctic, Siberia, the Far East, and southern territories, elevating the risk of emergencies and disasters [Impact of climate change... 2022]. Household activities have a colossal impact on climate change, and their contribution varies significantly depending on established socio-ecological practices and climatic zones, the type of fuel used for heating, the rate of electricity consumption, the amount of waste generated, the frequency of transportation use, and the engineering and technical characteristics of households. The population's high level of prosperity and income is reflected in their household spending patterns, with a significant portion allocated to housing-related expenses and energy supply. The growing desire for comfort and convenience in living, coupled with escalating energy costs, encourages the adoption of energy conservation measures, especially considering that the cost of saving one unit of energy is significantly lower than the cost of its production. Energy consumption in this sector encompasses heating, air conditioning, hot water supply, cooking, lighting, and household appliances. The use of different energy sources is influenced by income levels, energy costs, supply options, building thermal characteristics, climate, appliance efficiency, energy source availability, and energy conservation policies. The extent of energy source usage in households is determined by various factors, increasing in line with population growth, rising incomes, and comfort requirements, while simultaneously decreasing due to measures aimed at enhancing new home quality, energy conservation efforts, improved living standards, and the purchase of more efficient appliances [Galperova 2019].

In late 2022, electricity generation in Russia experienced a 0.6% increase compared to 2021, reaching 1,167 billion kWh, as calculated by Rosstat[2]. Thermal power plants persist as the primary electricity supplier for the country's integrated energy system, contributing approximately 69% of the nation's total electricity generation in 2022. Over this 12-month period, thermal power plants throughout Russia generated 737 billion kWh of electricity, marking a 3.1% year-on-year increase. Nuclear power production in 2022 totaled 224 billion kWh, reflecting a 0.5% increase over the previous year. Hydroelectric power plants, on the other hand, generated 200 billion kWh of electricity at the end of 2022, which represents a 7.7% decrease compared to 2021. Furthermore, electricity generation from RES (renewable resources) was around 7 billion kWh,

2 Russian Statistical Yearbook 2022 : Stat. book /Rosstat – R76. Moscow, 2022. 691 p. Available at https://rosstat.gov.ru/storage/mediabank/Ejegodnik_2022.pdf (accessed 08/10/2023).

18.2% from 2021, according to Rosstat data[1].

The Ministry of Energy of the Russian Federation reported that electricity consumption 5.4% increase in 2021, and reaching for 1.108 trln kWh, (production surge of over 6%), totaling 1.131 trillion kWh. Anticipating a 1.5-2% consumption increase by the end of 2022, the department's forecasts aligned with the year-end results. In December 2022, as indicated in Rosstat materials, overall electricity generation in Russia declined by 0.7%. Notably, production at thermal power plants surged by 16.4%; however, output from nuclear power plants and hydroelectric stations decreased by 8.9% and 11.9%, respectively[2]. Along with energy consumption, there is a growing need to strengthen measures to ensure energy conservation and energy efficiency.

Energy conservation refers to the adoption of organizational, legal, technical, technological, economic, and other measures aimed at reducing the use of energy resources. Throughout the process of energy conservation, the beneficial effects of energy usage, including the RES and alternative energy into economic base, are encompassing energy-saving initiatives. The economic benefits of energy conservation outweigh the costs associated with additional energy resource consumption. In essence, energy efficiency is a component of energy conservation. However, unlike energy efficiency, which targets lower energy consumption, energy conservation focuses on the prudent and efficient use of energy resources [Patrakeeva 2022].

The growth in energy demand can be explained by different factors, such as the level of economic development, industrial structure, geographical size, and air temperature. While these factors are often used to account for Russia's relatively high energy intensity, they do not represent the full extent of energy consumption. This implies a certain law: the higher a country's GDP, the larger its territory, the lower the average air temperatures, and the higher the proportion of industrial production in the total output, the higher the energy consumption. High fuel costs, in conjunction with constraints on tariff growth, impede the adequate fuel supply to power facilities and municipal housing and utilities, as well as the allocation of funds for infrastructure renovation and modernization. Consequently, the physical deterioration of these facilities increases, leading to a higher occurrence of incidents and accidents. In simple terms, the reliability, safety, and accessibility of energy services for all consumers diminish.

The primary challenge identified pertains to the socio-demographic and technical aspects of households. In Russia, nearly 100 million individuals reside in apartment buildings, many of which require energy-efficient renovations. Following the departure of international standards such as "Leed," "Breem," and "Wellness" from Russia, was developed Russian standard known as "Clever". This standard encompasses the evaluation of energy efficiency, green building, and other facets of sustainable resource consumption and efficiency.

Experts express significant criticism regarding the potential for overall energy savings, particularly considering the characteristics of Russian households. One part experts highlighted that the construction of houses in Russia does not align with global energy-saving standards, the second part found that always possible to find perspective of energy effectiveness in Russian households.

The experts in alternatives energy highlighted the impact of factors: orientation of the house concerning the rose wind, solar alignment, the choice of energy — saving construction materials for building, optimal thermal insulation, wind and waterproofing, which could result in substantial energy savings of 30 to 40%.

Furthermore, it is noted that in households with a pre-existing level of energy efficiency, the onus for transformation and feasible modernization lies on the consumer. This includes the adoption of energy-efficient equipment and the installation of heat-saving windows, doors, and ventilation systems.

- the population is placing a growing emphasis on energy resources and conservation, largely due to their significant impact on utility payments. Numerous individuals are opting to invest in energy-efficient light bulbs and other energy-saving equipment as a means to reduce their utility expenses;
- achieving energy efficiency necessitates institutional reforms, with infrastructure and technical implementation requiring proactive measures from the authorities. Additionally,

1 Ibid.

2 Otchet o funktsionirovanii YEES Rossii v 2022 godu [Report on the functioning of the UES of Russia in 2022]. Available at https://www.so-ups.ru/fileadmin/files/company/reports/disclosure/2023/ups_rep2022.pdf (accessed 08/10/2023).

a hierarchical structure must be established to integrate energy policy across all facets of public life.

- The centralized and monopolized nature of the Russian energy system presents both stability and operational reliability. However, it also poses challenges for societal transformation due to limited stakeholder involvement resulting from a lack of competition. Nonetheless, there remains potential for the integratio and scaling of social and environmental practices;
- necessity of implementing structural economic measures to support energy efficiency and conservation, including low lending rates for green developers, an equivalent of the feed-in tariff, and fostering natural competition. In addition, experts and economists have suggested the implementation of "more rigorous regulations for various stakeholders", including consumers and network operators, with the aim of reducing reliance on traditional energy sources and increasing the utilization of alternative sources.

Drawing from the analysis of international studies, it becomes evident that the current policy aimed at promoting energy conservation within the population significantly influences behavior, with the core principle being the implementation of sufficiency. The insights derived from expert interviews and the reviewed literature lead us to assert that the evidential foundation of social programs promoting energy conservation should encompass arguments concerning the benefits of energy efficiency and a healthful lifestyle, while also addressing cognitive misconceptions. It is imperative to encourage an environmentally conscious lifestyle without compromising its quality. An expert in the field of energy efficiency highlighted the importance of emphasizing the private benefits for health and the known long-term health advantages associated with such practices.

Discussion

As proposed by [Whitmarsh 2011], the interplay between social norms, institutions, and individual behavior underscores points of convergence between sociological approach, offering the potential for more effective solutions to the energy saving goal. The integration of diverse perspectives has demonstrated success in addressing energy consumption and sustainable transition contexts. Within the sociological perspective, the constructivist paradigm posits that realities and issues, such as the zero net gap, are socially constructed [Harris 2013]. This approach highlights the importance of considering varied viewpoints and methodologies to comprehensively tackle complex challenges in the energy sector.

By considering multifaceted perspectives, such as sociology, economics, and behavioral sciences, a deeper understanding of the complexity surrounding energy saving can be attained. For instance, behavioral science's exploration of decision-making heuristics can inform policymakers about the accuracy of their perceptions of social issues [Bergan 2021]. Moreover, if we taking into account citizens' experiences, values, and behaviors concerning their residences is essential for a holistic comprehension of energy efficiency and for the formulation of impactful policies we can adopt a reflective approach that incorporates diverse social science perspectives can enhance the validity and societal significance of energy policy suggestions..

Recommendations

The principles of behavioral economics can be effectively applied in developing recommendations in the field of energy policy at different levels

Table 2. **Recommendations**

Consumers	• Provide detailed information on energy consumption using clear and simple metrics and comparisons among peers to stimulate energy conservation. • Offer individualized incentive programs and promote positive energy savings using direct stimulus measures.
Households	• Provide access to "smart" home technologies such as smart thermostats and meters to optimize energy consumption. • Educate households on energy-saving methods and provide incentives to participate in programs to upgrade home devices to more energy-efficient ones.
Technology	• Invest in research and development to improve the energy efficiency of technologies and industrial processes. • Promote the implementation of innovative technologies, such as energy storage and renewable energy sources.

Government	• Implement tax incentives and subsidies for companies investing in energy-efficient technologies and processes. • Create regulations that stimulate the elevation of energy efficiency standards in construction and transportation.
Energy companies	• Implement dynamic pricing to stimulate the reduction of peak energy consumption. • Invest in the development of energy transmission networks and infrastructure to improve efficiency.

Conclusion

Energy efficiency policy is often justified by market failures, implying that consumers may not act in their own best interest when it comes to investing in energy efficiency. Despite initial expectations, a ten percent increase in energy efficiency might not lead to a proportional reduction in energy use and could potentially increase energy consumption in certain scenarios. This challenges the traditional belief that enhancing energy efficiency will automatically decrease energy usage. The rise of behavioral economics has brought attention to the biases and errors in consumer decision-making and raises concerns about the extent to which consumers' choices can be trusted. This perspective also prompts questions about whether climate change policy advocates should intervene to 'correct' consumer choices when their mistakes inadvertently reduce carbon emissions, in addition to addressing errors that increase emissions. Behavioral economics has transformed the understanding of decision-making processes, offering valuable insights that challenge traditional economic paradigms. By recognizing the influence of psychological factors on economic behavior, behavioral economics has provided a nuanced understanding of human decision-making, with profound implications for various fields, including public policy, finance, and marketing.

The current climate change mitigation policy course places little emphasis on behavior change, but future research directions should address behavioral barriers to climate change mitigation in households. The analysis conducted revealed that behavioral and psychological barriers are not taken into account when forming social policy tools, which should be a subject for future research. Deeper research into the motivation, incentives, and attitudes related to energy conservation is necessary. The sufficiency policy should be aimed at reducing actual energy usage, maintaining comfort levels no higher than acceptable, reducing the number of non-energy-efficient household appliances/equipment/vehicles, and phasing in the use of energy-efficient equipment. Timely adjustments to energy consumption in households and public spaces should be made by municipalities.

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