



LIETUVOS
SOCIALINIŲ TYRIMŲ
CENTRAS



VYTAUTAS MAGNUS
UNIVERSITY
— M C M X X I I —

A G N Ė B U D Ź Y T Ė

RISK PERCEPTION AND SOCIAL ACCEPTABILITY OF ENERGY TECHNOLOGIES IN THE CONTEXT OF CLIMATE CHANGE

S U M M A R Y O F D O C T O R A L
D I S S E R T A T I O N

S O C I A L S C I E N C E S ,
S O C I O L O G Y (S 0 0 5)

K a u n a s
2 0 2 1

KAUNAS UNIVERSITY OF TECHNOLOGY
LITHUANIAN SOCIAL RESEARCH CENTRE
VYTAUTAS MAGNUS UNIVERSITY

AGNĖ BUDŽYTĖ

**RISK PERCEPTION AND SOCIAL ACCEPTABILITY OF
ENERGY TECHNOLOGIES IN THE CONTEXT OF CLIMATE
CHANGE**

Summary of Doctoral Dissertation
Social Sciences, Sociology (S 005)

Kaunas, 2021

This doctoral dissertation was prepared at Kaunas University of Technology, Faculty of Social Sciences, Arts and Humanities, Institute of Social Sciences, Arts and Humanities, during the period of 2016–2020. The studies were supported by the Research Council of Lithuania.

Scientific supervisor:

Assoc. Prof. Dr. Aistė BALŽEKIENĖ (Kaunas University of Technology, Social Sciences, Sociology, S 005).

Editor: Brigita Brasienė (Publishing house “Technologija”)

Dissertation Defence Board of Sociology Science Field:

Prof. Dr. Vylius LEONAVIČIUS (Vytautas Magnus University, Social Sciences, Sociology, S 005) – **chairman**;

Dr. Vladas GAIDYS (Lithuanian Social Research Centre, Social Sciences, Sociology, S 005);

Dr. Dainius GENYS (Vytautas Magnus University, Social Sciences, Sociology, S 005);

Prof. Dr. Tapio LITMANEN (University of Jyväskylä, Social Sciences, Sociology, S 005);

Dr. Vaidas MORKEVIČIUS (Kaunas University of Technology, Social Sciences, Sociology, S 005).

The official defence of the dissertation will be held 10 a.m. on 18th of June 2021 at the online meeting of Dissertation Defence Board of Sociology Science Field.

Address: K. Donelaičio Str. 73, 44249 Kaunas, Lithuania.

Tel. no. (+370) 37 300 042; fax. (+370) 37 324 144; e-mail doktorantura@ktu.lt.

Summary of doctoral dissertation was sent on 31 March, 2021.

The doctoral dissertation is available on the internet <http://ktu.edu> and at the library of Kaunas University of Technology (K. Donelaičio Str. 20, 44239 Kaunas, Lithuania).

KAUNO TECHNOLOGIJOS UNIVERSITETAS
LIETUVOS SOCIALINIŲ TYRIMŲ CENTRAS
VYTAUTO DIDŽIOJO UNIVERSITETAS

AGNĖ BUDŽYTĖ

**ENERGIJOS TECHNOLOGIJŲ RIZIKOS SUVOKIMAS IR
SOCIALINIS PRIIMTINUMAS KLIMATO KAITOS
KONTEKSTE**

Daktaro disertacijos santrauka
Socialiniai mokslai, sociologija (S 005)

Kaunas, 2021

Disertacija rengta 2016–2020 m. Kauno technologijos universiteto, Socialinių, humanitarinių mokslų ir menų fakulteto, Socialinių, humanitarinių mokslų ir menų institute. Mokslinius tyrimus rėmė Lietuvos mokslo taryba.

Mokslinis vadovas:

doc. dr. Aistė BALŽEKIENĖ (Kauno technologijos universitetas, Socialiniai mokslai, sociologija - S 005).

Redagavo: Virginija Stankevičienė

Sociologijos mokslo krypties disertacijos gynimo taryba:

Prof. dr. Vylius LEONAVIČIUS (Vytauto Didžiojo universitetas, socialiniai mokslai, sociologija S 005) – **pirmininkas**,

Dr. Vladas GAIDYS (Lietuvos Socialinių Tyrimų Centras, socialiniai mokslai, sociologija S 005),

Dr. Dainius GENYS (Vytauto Didžiojo universitetas, socialiniai mokslai, sociologija S 005),

Prof. dr. Tapio LITMANEN (Jyväskylä universitetas, socialiniai mokslai, sociologija S 005);

Dr. Vaidas MORKEVIČIUS (Kauno technologijos universitetas, socialiniai mokslai, sociologija S 005).

Disertacija bus ginama viešajame, nuotoliniame Sociologijos mokslo krypties disertacijos gynimo tarybos posėdyje 2021 m. birželio 18d. 10val.

Adresas: K. Donelaičio g. 73-402, 44249 Kaunas, Lietuva.

Tel. (370) 37 300 042; faks. (370) 37 324 144; el. paštas doktorantūra@ktu.lt

Disertacijos santrauka išsiųsta 2021m. kovo mėn. 31d.

Su disertacija galima susipažinti internetinėje svetainėje <http://ktu.edu>, Kauno technologijos universiteto (K. Donelaičio g. 20, 44239 Kaunas), Vytauto Didžiojo universiteto (K. Donelaičio g. 52, Kaunas) bibliotekose ir Lietuvos socialinių tyrimų centre (A. Goštauto g. 9, LT-01108 Vilnius).

INTRODUCTION

Relevance of the research. Advances in science and technology, which have become a prerequisite for the prosperity of the modern world, are increasingly stimulating debate about the generated benefits as well as hard-to-measure and increasingly obvious threats. The concern that today, the world is more dangerous than in any previous eras is linked with the new capabilities of man and the unforeseen consequences that come from it. That fills the XXI century with fear and unease, while becoming the main incentive for further development of the society (Beck, 1992). One of the biggest challenges, sources of worry and modern society's reality is climate change, which has been named as the most important environmental problem that will have drastic effects on the society and ecosystems around the world. Climate change requires the realization that there must be essential changes to the core of the relation between society and nature (Bhatasara, 2015). The current situation is often explained using a relatively new geological period term Anthropocene, which throughout the planet's history will be remembered as the moment when man dominated over nature and as equal to the other processes of nature leaving its trace, like any other geophysical force (Crutzen, 2002). Anthropocene is as well often described as a reminder that "we" (humanity) are transitioning from Holocene (stable and the naturally formed period during which societies were formed) into the environment that was formed by humans, about which we know very little (Lidskog, Waterton, 2016). These circumstances mean that Anthropocene does not just encompass a new geological era, but most importantly, it needs to be understood as a new state of society.

It is thought that man will remain a dominant force for thousands, if not millions, of years (Crutzen, 2006), but the fact that humanity is transitioning from one era to another prompts a discussion on a global scale on what kind of world do we want to live in and how to stop the negative effects of humanity's activities (Lidskog, Waterton, 2016). Rising new environmental issues and uncertainty about the future makes the anthropocene discourse interdisciplinary: while the representatives of natural sciences are researching the effects of humanity's activity, social sciences emphasize the relation between specific social relationships and their surroundings (Lundershausen, 2018). However, as noted by Lidskog and Waterton (2016), the boundaries between different sciences are fading, since more and more scientists are raising sociological questions and attempting to understand the scope of man's knowledge and responsibility and the ability to control social systems on a global scale. This discourse and questions become essential when trying to find the best solution when shaping the future of humanity, creating political trends

and means, since as described by sociologist Bronislaw Szerszynski (2012), the truth of Anthropocene is not hidden in what humanity does but in what it will leave behind.

Zinn (2016) notes that such uncertainty about the future changes the relation between nature and risk fundamentally. Nature's nature, which is to take what is available and use it to fulfil various needs, becomes a risk factor, requiring protection from technological and economic expansion. Humanity's activity affects the environment as well as destroys it. Protection and prevention programs are not effective anymore, as such decisive and even risky solutions are needed to solve these issues. One of the most important questions that needs to be answered is about the balance between the good of humanity and the good of nature, which could lead to a consensus about the relation between humanity and nature. As noted by Froestad and Shearing (2017), humanity's wellbeing is inevitably linked with various forms of energy, which throughout the entire existence of humanity has changed significantly and has changed the everyday activities of humans as well. Froestad and Shearing as well note that the current society is "built on fire" and various ways to use it, which transformed humans from a hunter-gatherer society into an industrial-capitalism society. The long road from the first use of fire to the refined fossil fuels and nuclear reactors changed the relationship from "human to nature" to "human to human", which created a developed economy and quite high living standards as well as caused ecological crisis, which societies of today have to face.

Economic interests and environmental protection are forces that were long considered incompatible, but rising threats and the necessity to take risks encourages further economic expansion to be performed in an environmentally friendly way (Zinn, 2016). The increased acceptance and usage of sustainable development and circular economy ideas create a vision of achievable goals in economic development, environmental protection and social equality (Dryzek, 1997). International agreements (e.g., The Paris Agreement, Kyoto Protocol and various other national and international strategies) emphasize the necessity of decarbonising the economy and avoiding anthropogenic climate change scenarios becoming a reality (Edwards, 2017). However, as noted by Bernauer (2013), trying to lower the threats that climate change poses, collective global involvement is a must. After all, different values, political and religious views and overall worldviews create different answers to the environmental protection problems from individual people (Marega et al., 2019). A division appears among the population that can be influenced by various factors, such as: unique local customs and individual climate change related experiences (Taylor et al., 2014), various political means that are being used, different social norms and various other factors (Rajapaksa et al., 2018). As such, it is

important to understand various national properties when trying to achieve successful adaptation and realization of climate change reduction programmes.

From this point of view, Anthropocene as an expression of all the effects of human activity that encompass changes in day to day environment as well as draws boundaries of the changing social world that are based on understanding the risk of not taking the appropriate steps to stop climate change in time as well as the ever increasing severity of the consequences of it that can destroy the world we are used to. As such, more and more scientists, politicians, engineers, businessmen, etc. emphasize the necessity to realize strategies for the adaptation to climate change as well as the mitigation of it.

Risk perception is named as one of the most important factors shaping further societal development directions and political agendas, which in the context of climate change, in a way, reflects the acknowledgement of the problem as well as resolves to act on it while understanding the cost of action or inaction.

The research shows that risk perception is an essential component that can encourage the realization of essential social, economic and political changes (Leiserowitz, 2006) as well as change the status quo (Durfee, 2006). From this point of view, the sphere of energetics gets them the most attention when talking about fundamental reorganization. The ever increasing need to change from fossil fuel to the use of renewable energy technology and ensuring a stable source of energy as well as the need that energy production is in full agreement with environmental protection shows that the well-established view based on just the affordability of energy has to change. The concept of energy transition is becoming the centre of attention in political discourse, requiring essential decisions, while emphasizing that it is necessary to coordinate institutional or economic changes as well as societal and cultural changes (Berkhout et al., 2012). Sovacool and Griffiths (2019) noted that material artifacts are inseparable from culture; as such, the interaction of society and technology decides the creation of a spectrum for norms and practices. As such, according to the authors, the prevailing belief that the transition to renewable energy needs to be based on just techno-economic reasons can encourage the adoption of wrong conclusions, if cultural arguments are not taken into account (ibid, 2019).

In the interaction between climate change and the transition of energetics, the rising need to discuss and predict possible scenarios needs to encompass cultural components that unavoidably are linked to both society as well as its future and the well-being of future generations. In this aspect, it is vital to take into account society's understanding of the risks of energy technology and identify the main components linked to the regulations of climate change, encompassing both personal and collective factors, and

evaluate how these factors interact with the acceptance of energy technology. Sovacool and Griffiths (2019) as well note that culture can be the main obstacle creating and implementing climate friendly technologies and behavioural practices; as such, it is necessary to find fitting arguments and links that are able to encourage change in society and increase awareness. Thus, risk perception, the acceptance of technology and climate change policies become especially meaningful energetic transition components and a prerequisite for necessary social changes.

There is very little research about the acceptance of energy technologies and risk perception of the Lithuanian population, and there is a lack of detailed analysis of questions in the context of environmental protection. A similar subject was examined by V. Leonavičius and D. Genys (2017), who did an energy safety investigation and set the energy safety level. The views of the population on nuclear energy was researched by A. Balžekienė, E. Butkevičienė, L. Rinkevičius, V. Gaidys (2009); society's opinion on Ignalina nuclear power plant was investigated by V. Gaidys and L. Rinkevičius (2008), while the discourse on nuclear energy in mass media was evaluated by R. Baločkaitė, L. Rinkevičius (2009). The research on the topics of risk perception and the creation of risk perception is a bit more expansive in Lithuania. The research in this area was conducted by D. Janušauskienė, E. Vileikienė, L. Nevinskaitė, I. Gečienė-Janulionė, who investigated the understanding of subjective threats in whether the inhabitants of Lithuania feel safe. The understanding of threats to society's well-being, social optimism and the influence of social and institutional trust and self-confidence was investigated by I. Matonytė, A. Lašas, V. Jankauskaitė, V. Morkevičius. A. Rimaitė, L. Rinkevičius (2008) investigated the effect of sociocultural factors on the formation of risk perception. Social risk perception and mass-media discourse configurations in Lithuania were analysed by A. Balžekienė, A. Telešienė, L. Rinkevičius (2008); the outlines of societal risk in the news on mass-media were analysed by E. Zolubienė (2014); the risk construction in the viewpoint of policy theories was discussed by V. Leonavičius (2014).

The main question of the research strives to reveal how the climate change attitudes affect the Lithuanian public's risk perception and social acceptability of energy technologies and aims to reveal what are the possible obstacles for the energy transition.

The aim of the research is to reveal factors explaining risk perception and social acceptability of energy technologies of the Lithuanian populace in the context of climate change.

Objectives:

- referencing risk society, reflexive and ecological modernization and system theory approaches: conceptualize the relationship between

risk and energy technology in the context of global environmental challenges;

- following theoretical risk perception and social acceptance in society conceptualizations, identify the factors that are important for energy technology risk perception and social acceptance to formulate an analytical risk perception and social acceptance model based on them;
- to carry out an empirical study, the results of which would explain the factors shaping the risk perception and social acceptability of energy technologies and reveal the links between these factors and the climate change attitudes of the Lithuanian population.

The research object for the dissertation is the risk perception and social acceptability of energy technologies.

The meaning and relevance of the work. In the international academic community, there are widely developed distinctive traditions and scientific research trends to investigate technology risk perception and social acceptance. By performing quantitative, qualitative and mixed approach investigations, questions that are linked to both energy and environmental protection are analysed, and when they are looked at in the context of the problem, global environmental protection issues and the necessity to realize the energetic transition are timely and valuable. In this context, there is a lack of research conducted in Lithuania to the knowledge of the author of the dissertation. When attempting to understand the obstacles that may form when realizing the energy transition in Lithuania, it is vital to take into account the influence of the Lithuanian population opinion and the cultural obstacles, which can form from it.

It is as well noticeable that at the current moment, the amount of quantitative research being done in Lithuania is very low; as such, the chosen methodological approach and qualitatively and representatively collected quantitative data on the topic of climate change is another point of topicality for this work.

Research data and methods. The investigation was done based on the quantitative research methodology. Representative surveys of the Lithuanian populous were carried out, and quantitative data analysis was applied by using “IBM SPSS Statistics 25” analysis tool. A detailed description of the investigation methodology is given in the second chapter.

Hypotheses for the empirical part of the research:

H.1. The collective influence factors that have the highest effect on renewable and non-renewable energy technology risk perception encompass trust in institutions and care about the energy safety.

H.2. The most important collective influence factors, which shape the social acceptance of renewable and non-renewable energy technology, encompass energetic safety, political measures and contextual circumstances.

H.3. The personal manifestation factors that have the highest effect on renewable and non-renewable energy technology risk perception encompass environmental protection views and views on climate change, which are linked with environmental protection identity and the distance from the psychological effect of climate change.

H.4. The most important personal manifestation factors, which shape renewable and non-renewable energy technology social acceptance, are environmental protection and climate change views linked with the ecological worldview and concern about the climate change and the effects of it.

H.5. Education, age and family income are essential socio-demographic characteristics that shape social acceptability and risk perception of renewable and non-renewable energy technologies in the Lithuanian population.

H.6. Perception of energy technology risk is significantly related to the social acceptability of energy technologies of the Lithuanian population and can act as a mediator to the latter.

Structure of the dissertation. The dissertation was divided into three main chapters that consist of smaller subchapters. They help to fully reveal the object of the research and implement the research objectives, which have been set. In the introductory part of the dissertation, the relevance of the analysed topic, scientific novelty, problematic area of the research phenomenon, hypotheses raised for the empirical part of the research and the problematic questions are presented.

In the first part of the dissertation, the theoretical constructs that allow a comprehensive understanding of the relationship between energy technology and risk perception in the perspective of global challenges are discussed. Based on the ideas of Taylor-Gooby and Zinn (2006), Renn (2008), Battistelli and Galantino (2018), Luhman (1990, 1993) and other authors, the chapter conceptualizes the interdisciplinary concept of risk and the perception of technology risk. It as well reveals the relationship between energy technology and climate change based on the ideas of ecological modernization, emphasizing further technological progress that is necessary. Linking these ideas to the need to implement the energy transition, the chapter presents the concept of the energy transition, discussing both energy technology controversies and the retrospective of Lithuanian peoples' attitudes towards energy technology. The chapter as well identifies the factors shaping energy technology risk perception and their social acceptability and presents the empirical research model.

The second part of the dissertation reviews the general methodological principles of the research. The stages of empirical research implementation, data collection and operationalization procedures are presented. The research hypotheses are formulated to help achieve the aim of the research.

The third chapter presents the results of the analysis of the empirical research obtained by analysing the data of the project “Social Perception of Climate Change: The Case of Lithuania in the International European Comparative Perspective” implemented by KTU. Using descriptive, correlation, factor, regression and mediation analysis techniques, the hypotheses that were formulated for the research project were tested, the final discussion was presented, and the conclusions of the research were formulated.

1. THEORETICAL FRAMEWORK OF THE RESEARCH

The need to decarbonise the modern world encourages wider solutions, multi-faceted policies, coordination and integration of information tools as well as pricing and financing programmes based on the conceptual social science theories and the results of empirical research (Brown, Wang, 2015). Empirical studies highlight the need to assess the prevailing views of the population as well as different aspects of perception, which will ensure maximum preparedness for energy transition and prevent potential conflicts by analysing different aspects of environmental approaches.

In order to determine the relationship between the risk perception of energy technologies and the social acceptability of energy technologies in the context of climate change, the approaches of several theoretical perspectives that are relevant to the research phenomenon were taken into account, which combine realistic-constructive and individualistic-structural classification (Leonavičius, Genys, 2017). Climate change, as a multidimensional phenomenon, promotes the inclusion of different perspectives and levels of theoretical approaches. Global environmental challenges, which pose a real threat to the further development of civilisation as well lead to the inclusion of technological risk dimension into the field of research and emphasise that technological progress, the need for which lies in the ideas of ecological modernisation, are creating new risks and threats. In this way, society produces new risks, the management of which is transferred to the institutionalised systems, because the risks are democratic and global in nature. In this situation, risk management continues to encourage responsible authorities to ensure the good of the public through the most rational technological progress, which in this case is the implementation of the energy transition. Thus, in the face of the global ecological crisis, there is an emerging risk society, in which the anxiety about the future becomes a force of solidarity with society; as such, climate change and the various attitudes associated with it create a unique

environment. Growing public concern creates the preconditions for changing established societal practices by moving towards more environmentally friendly alternatives and behavioural models, hereby empowering cooperation between individuals and collective actions, adapting old methods and developing new, forward-looking social systems.

Given that, as one of the key solutions to both reducing the environmental impact of human actions and adapting to climate change, the need to ensure energy transition is identified; this, in turn, suggests that further societal progress is dependent on the technological adaptation dimension associated with ecological modernisation. The need to implement further development without negative effects on the environment is a priority objective for most political and societal organisations. These objectives are as well reflected in the political discourse of various nations, including Lithuania, and seek to ensure both economic and administrative efficiency and environmental protection, which determines that environmental policy-making becomes based on the implementation of initiatives based on cooperation and creates the emergence of a modern, environmentally friendly system. Thus, the concept of ecological modernisation points to a certain ideological change, which calls for economic and environmental issues to be addressed through various environmental provisions, and appeals to the trust in science, technology and progress, as is inherent in the characteristics of modernity (Seippel, 2000). However, the risks arising from technological progress in this area as well need to be assessed, the perception of which can be based on various future consequences.

Considering only various sources of public anxiety, it can be ensured that different social systems gain the freedom to make decisions, when choosing those who retain arguments of rationality and protection against negative consequences. Thus, the involvement of the public in the decision-making process and the knowledge of those most affected by these decisions can help to ensure that actions are taken with informed consent, preventing potential outrage and creating new behavioural practices and examples of success. Maintaining such a negotiating position in the formulation of energy policies, which takes into account the fears and concerns of the population, can help to ensure public acceptance of the solutions implemented as well as increase the acceptability of energy technologies and help to build a responsible relationship between the present and the future.

The multifaceted formulation and evaluation of the problem is a prerequisite for encouraging society to carry out modernisation processes by reflexively assessing the impact of its actions and choices, considering the growing concern about the consequences of the current reality created by humanity, taking into account various aspects of human practices and their

impact on both present and future societies as well as global environmental problems. Thus, in order to develop constructive steps towards a sustainable future, the need to understand the complexity of the situation becomes a prerequisite for further action. Taking into account the synthesis of theoretical perspectives, this dissertation identifies the main directions and concepts of further research and is based on the attitudes of the Lithuanian population on the climate change and their interaction with the social acceptability and risk perception of energy technologies. The aspects of the approach to climate change, which include both values and political preferences and general concerns about climate change, are considered to be significant factors that can answer the problem raised by the dissertation: what attitudes towards climate change in the Lithuanian population are most important in assessing the risk perception and social acceptability of energy technologies, how the latter affects the risk awareness of energy technologies and social acceptability, what obstacles of the energy transition in Lithuania can this reveal, and how does technology accept risks (see Figure 1).

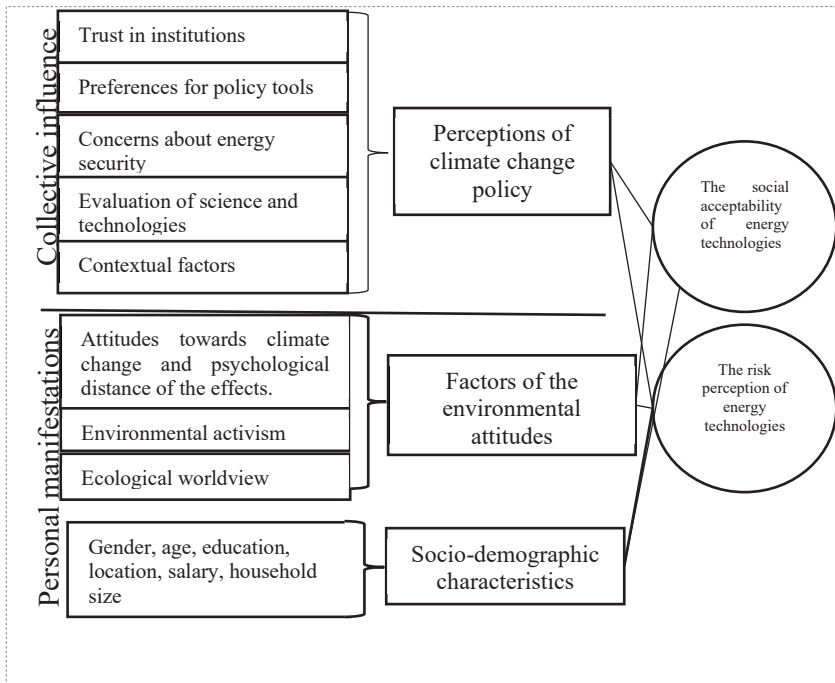


Figure 1. Research model, created by the author

Given that the risk perception and the social acceptability of energy technologies are complex and multidimensional concepts, the explanation of which cannot be limited to one theoretical approach, the empirical model of the dissertation research has been taken into account; the proposals were found in literature but in the form of unique integrated approaches, which can explain the phenomenon of the study and the interaction of different concepts. Based on the structured integrated risk perception model presented by Renn and Rohrman, it is useful for the dissertation study to apply a distinction between individual and collective influences, taking into account the theoretical concepts of level 3 (socio-political institution) and the fourth (cultural context) as the most relevant to the field of study. These structural levels are conceptually close to the interpretation of the social acceptability of energy technologies. According to Upham et al. (2015) and Wüstenhagen et al. (2007), a macro-level perspective is based on the general level of social acceptability of the country and is conditioned by socio-political institutions and cultural contexts, which is particularly relevant for the analysis of the situation in Lithuania.

By directing a study for the general public level and in response to the previous social studies, it has been noted that political, environmental and socio-demographic factors are important for the social acceptability of energy technologies, which in turn include aspects of individual and collective influences presented in the Renn and Rohrman model. Thus, the synergy between the provisions of both theoretical structures assumes that the same theoretical concepts based on both personal manifestations (environmental provisions, ecological worldview and socio-demographic characteristics) and collective influences (in terms of understanding climate change policy: trust in institutions, support for policies, etc.) can be used to explain the perception of risks and social acceptance of energy technologies.

Although it is noted that various risks, which exist in reality, have certain probabilistic values, it is necessary to ensure a complex approach into the conduct of public risk assessment and perception studies, linking the interaction of objectively measured as well as subjectively assessed risks with cultural and institutional perspectives (Matonytė et al., 2017). In this place, the relationship between the perception of technological risk and social acceptability, which is influenced by contextual, personal and institutional influences, is striking directions for further progress in the society. Thus, given that the common life of society and various concepts of social acceptability of risks and technologies are shaped by social constructivism, in order to implement certain solutions efficiently and successfully, in this case to implement the energy transition, it is necessary to assess the influence of directly related as well as semantically distant factors, which, as Sjöberg

(2003) observes, is more difficult to measure but reveals more interesting results.

Thus, the conceptual/theoretical study model was constructed based on a detailed analysis of theoretical literature and seeks to empirically verify the impact of personal manifests and collective factors in the process of understanding the risks of energy technologies and social acceptability. Depending on the nature of different factors, the components of collective influence, i.e., political aspects of climate change: trust in institutions, concerns about energy security, support for policies, scientific consensus, contextual factors and elements of personal environmental provisions: personal activism, environmental worldview, climate change provisions and socio-demographic characteristics, are analysed.

2. RESEARCH METHODOLOGY

This dissertation study, based on a quantitative research strategy, according to Bryman (2012), involves collecting and analysing quantitative data. The methods of quantified data collected, mainly based on deductive logic, aims to discover certain laws in society by dividing the social world into empirical components (variables), for which the interconnectedness, links, frequencies and systematicity of various aspects of the social world and subject issues can be explored by providing appropriate quantitative values (Payne, Payne, 2004). Such approach and the chosen methods allow social reality to be a matter of law (Creswell, 1994), in which quantitative data permit the disclosure of the prevailing subjective descriptions of the subjective phenomenon or subject matter. In this dissertation, these provisions are used to reveal the influence of different aspects of the views of the Lithuanian population on climate change, the perception of risks of energy technologies and their social acceptability while identifying both the most significant constructs and their relationships.

The quantitative study used for the analysis, as Watson observes (2015), has a unique feature, which is the ability to test theoretical constructs, formally formulate hypotheses and apply statistical analysis methods and has its own advantages over qualitative studies. Shelley (2013) notes that quantitative research is commonly used by researchers to have specific questions that arise from the theory or when trying to answer a practical problem. Thus, in this regard, quantitative studies describe the real-world view, distancing themselves from how research "is supposed to be" (Cohen, Manion, 1980). The studies of quantitative nature, ensuring greater reliability of data, create opportunities for data comparability over time, regions or countries, ensuring both the objectivity of the researcher and the validity of the data collected (Choy, 2014).

The study data was collected through the project "Social Perception of Climate Change: The Case of Lithuania in the International European Comparative Perspective" (KLiKS) funded by the Scientific Council of Lithuania. The project manager is Prof. Dr. A. Telešienė (KTU), LMT financing agreement No S-MIP-17-126. This project was based on the Cardiff University research project "European perceptions of climate change" (EPCC, supervised by Nick Pidgeon). Therefore, the research instruments and the methodology of the opinion survey among Lithuanian residents were adapted accordingly. These instruments were as follows: a questionnaire composed of questions prepared by Cardiff University, questions initiated by project promoters in Lithuania (not used in the dissertation study), questions necessary to the author of the dissertation and socio-demographic issues prepared by the surveyors "Baltic Research".

The ethics of the study are ensured by informing and making available to all the participants in the study the objectives and significance of the study as well as the intended use of the data. The anonymity of respondents and their data is ensured both in the collection of the data and in the analysis of the data.

In light of the above mentioned general study model and regarding the distinction between personal and collective influence factors arising from the theoretical perception of the risks of energy technologies and the conceptualisation of social acceptability, Figure 2 below displays a chart of the operationalisation questionnaire for the study variables.

The diagram presents two variables dependent on the study. The perception of the risks of energy technologies was measured in the questionnaire of Lithuanian residents with questions K.39.1 to 39.10, which were formulated in the form of a list of 10 energy technologies as follows: "Different renewable and non-renewable sources are used to extract energy. In your opinion, what threats do these energy production technologies using these sources pose?"; respondents were asked to evaluate each of the energy presented technologies on the 5-point Likert scale, where 1 causes no threat, 5 causes a very serious threat. In this case, it is important to note that in the dissertation, the risk is conceptualised as "a characteristic of the process of decisions taken by groups or individuals with uncertainty about the future, which may have negative, unintended consequences for certain individuals of value", but in order to learn subjective attitudes of the population, the question is formulated using the concept of threat, treating the technology as a hazard agent rather than the intents of individuals. Thus, highlighting subjective threat assessments, it can be said that in the future development (energy transition), the population may not support the development of specific technologies, even on the grounds of their positive benefits.

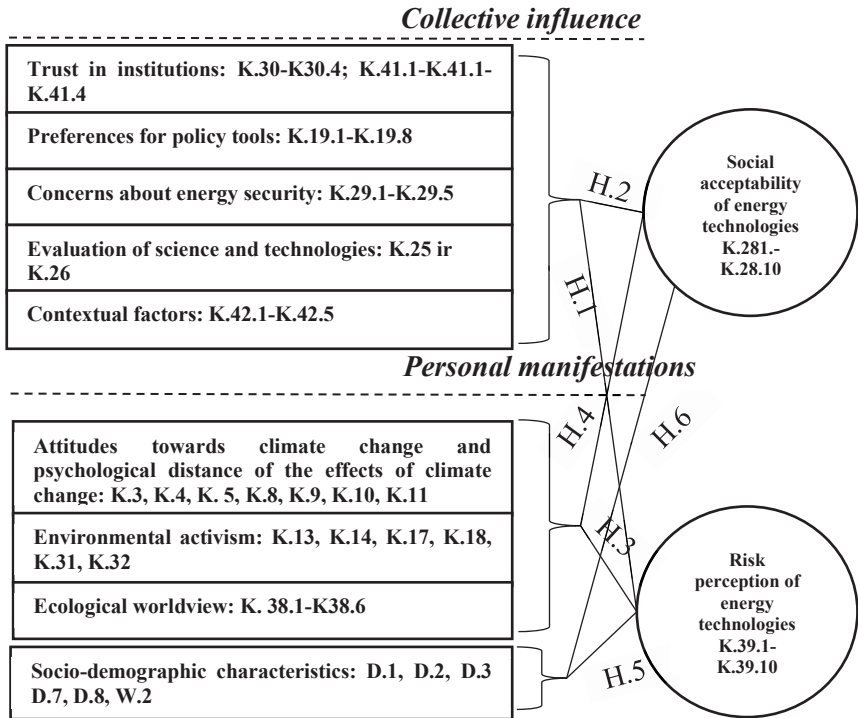


Figure 2. Scheme of research concepts, variables and hypotheses, created by the author

The second dependent variable, i.e., the social acceptability of energy technologies, was measured in the questionnaire by questions K.28.1–28.10, which was formulated as follows: "What is your opinion on such sources for energy production in Lithuania? Tell us about each of the submissions, whether your opinion is positive or negative." In this case, the question was used from the original study questionnaire carried out by Cardiff University. The aim was to assess the attractiveness/acceptability of each of the technologies. It can be noted that the assessment of an object/technology as attractive/unattractive indicates the individual's knowledge of an object and makes an important contribution to the development of the approach to it (Fishbein, Ajzen, 1975); a favourable/unfavourable approach to a particular object is as well a significant contributor to the acceptability/inadmissibility leading to the formation of regulations, which lead to the assessment of energy technologies as well as possible behaviour when using them.

The hypotheses for the empirical research were presented in the introduction. The hypothesis testing was performed using descriptive, correlation, factor, regression and mediation analysis techniques.

3. RESULTS OF THE EMPIRICAL RESEARCH ON ENERGY TECHNOLOGY RISK PERCEPTION AND SOCIAL ACCEPTABILITY IN THE CONTEXT OF CLIMATE CHANGE

The acceptability of renewable energy technologies and their favourable acceptance in the society are prerequisites for the successful implementation of the energy transition. It has been observed that in order to develop and adapt appropriate policy and communication tools, it is necessary to understand how people perceive energy systems (Sütterlin, Siegrist, 2017) and how the population evaluates the technologies that make them and their risks. Thus, the dissertation seeks to find out which energy technologies are acceptable to the Lithuanian population, which technologies they perceive as the riskiest.

The respondents were asked to comment on 10 energy sources, including both renewable (solar, wind, biomass and hydropower) and non-renewable (coal, oil, natural and shale gas) technologies and other alternatives (waste incineration and nuclear energy) (see Table 1). After evaluating the energy technology assessments of the Lithuanian population, it was established that the population considers nuclear energy and other technologies based on fossil fuels to be the riskiest technologies. Renewable energy alternatives are considered the least risky ones.

Table 1. Evaluation of risks possessed by the energy technologies

	N	Average	Std. Deviation	Disp.
Nuclear energy	960	4.11	.904	.817
Oil	959	3.67	.848	.718
Coal	958	3.61	.863	.746
Waste incineration	944	3.45	1.011	1.023
Shale gas	877	3.26	1.111	1.235
Natural gas	962	2.90	.958	.918
Biomass	936	2.67	1.024	1.049
Hydro energy	943	2.50	.951	.904
Solar power	981	1.95	.886	.785
Wind energy	982	1.93	.878	.771
Valid N (List wise)	781			

The dissertation research as well revealed that the relationship between risk perception and technology acceptability undoubtedly exists among the Lithuanian population (see Figure 3). With a high-risk perception, the acceptability of the technology is low (e.g., nuclear energy, high risk assessment, low social acceptability), otherwise with a low risk assessment, the acceptability of the technology is high (e.g., wind energy).

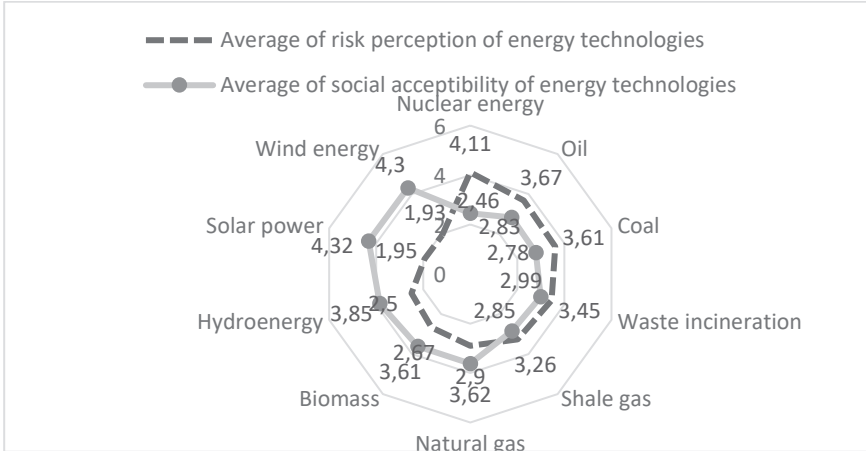


Figure 3. The relationship between energy technology risk perception and social acceptability

The interrelationships between energy technology risk perception and social acceptability are as well confirmed by the correlation analysis. The risk perception and social acceptability of both renewable (-.556 **) and non-renewable (-.306 **) energy technologies were found to be related to moderate and strong negative relationships, indicating that increasing risk perception reduces the acceptability of all energy technologies.

It has been found that the most important aspect of energy security among the Lithuanian population is still related to energy affordability, although the population tends to agree that energy production should not have a negative impact on the economic development, and the supply should be reliable and stable. However, the importance of the environmental component is noticeable as well. For the Lithuanian population, it is important that energy production does not have a negative impact on the environment and climate, although there is a relatively low concern about climate change among the citizens of Lithuania. The negative effects of climate change on Lithuania are

delayed both in time and space, which causes worry that the energy transition based on the climate change arguments may be difficult.

It is the mitigation of the effects of climate change that has been identified as a significant factor shaping the social acceptability of non-renewable energy technologies. The applied regression analysis technique revealed that the acceptability of non-renewable technologies is mostly related to the distance of exposure, anthropocentric worldview and confidence in the institutions' ability to ensure the security of energy technologies. These factors have been identified as important risk perception factors for non-renewable energy technologies among the Lithuanian population as well. The social acceptability of renewable energy technologies is far more important than factors of collective influence or personal manifestations. This part of the analysis has highlighted the aspects of energy security and policy measures that make a significant contribution to shaping societal attitudes towards renewable energy technologies and their development. The perception of risk of renewable energy technologies in Lithuania can as well be related to energy security, trust in institutions ensuring security and environmental identity.

Applying the regression analysis technique, the independent variables were identified, which were significant predictors of both dependent variables. It has been established that an important variable for both the perception of the risks of renewable energy technologies and their social acceptability is the concern of the Lithuanian population for energy security. In the case of non-renewable energy technologies, the importance of confidence and the impact of climate change have become clear. Risk perception has been identified as a significant predictor of social acceptability of energy technologies as well. Thus, in order to assess the relationship between energy technology risk perception and social acceptability fully, a mediation analysis was applied that examined how the impact of independent variables on the social acceptability of energy technologies is altered by risk perception.

This study has found that risk perception is a significant mediator and can both weaken and enhance the impact of independent variables on the acceptability of energy technologies. The obtained results made it possible to confirm the ferry hypothesis H.6 from the empirical part of the study.

Summarizing all the results of the study, it can be observed that most of the hypotheses raised in the empirical part of the study were confirmed (H.1, H.2, H.3, H.6). Hypothesis H.4 was partially confirmed as only personal assessment of the impact of climate change was found to be significantly related to the acceptability of non-renewable energy technologies. Hypothesis H.5, meanwhile, was rejected because neither age nor family income was significantly related to the acceptability of these technologies.

CONCLUSIONS

1. This dissertation strives to conceptualize the relation of risk and energy technology by using ecological and reflective modernization, system theory, and risk society's theoretical approaches. For the analysis of risk as a social construct, a valuable insight can be gained from the mentioned theoretical works of perspective authors, in which risk and energy technology relation can be linked to global environmental protection challenges. It has been noticed that the current world leading environmental protection risks have derived first and foremost from scientific and technological advancement, the appearance of which added to the useful, societal well-being enriching technology as well as the emergence of hard to notice and measure threats. Energy and its technologies are considered the most prolific air and water pollution sources and climate change catalysers in the human history spanning thousands of years, and the different stages of fire use that have always encouraged the progress of civilization now raise critical questions that are vital while striving for further progress. This relation between society and technology marks the start of a new era, in which inaction and the continued delay of decisions can have consequences from which we cannot recover from, and the increasing uncertainty about the future raises higher and higher risk to what gives individuals and society value. The questions about humanity's existentialism in the future are based on the environmental crisis arguments and require to pay more attention to the control of the integral property of technology, i.e., risk. While realizing essential changes in the sector of energy that can ensure the energy needs and the balance of risk that comes from technology, only one solution can be seen, i.e., energy transition based on longevity. While modernizing the existing and creating new technological and institutional systems, while shaping a new relation between economics and ecology, more and more often it is emphasized that society needs to understand what values are used as a basis for these visions and what methods will be used to realize them. Connecting with technologies that are considered an indistinguishable characteristic of the future requires structural changes to various social systems that can consolidate new behavioural models and rules: risk can turn society into an organized force. As such, further modernization becomes impossible without involving people that will be affected by it, in other words, the society itself in the decision process.

2. Keeping in mind that energy is considered as a stable expression of cultural society's practices and the basis of society's agreements and practices that is attempted to be changed in the progress of further

modernization raises questions of uncertainty and safety. As such, in the intersection of environment and technology, every decision that can have counteraction encourages to evaluate whether individuals are ready to take on the possible risk and analyse what factors encourage the understanding of it. In this dissertation, paying the most attention to the relation of technology and views on climate change, the dimensions of personal manifestation and collective influence were identified that contribute to the formation of risk perception through social and political-institutional factors, combined by the influence of cultural context used when investigating the social acceptance of technologies. Considering that risk perception and the acceptance of technology is being constructed in social interaction and the existence of risk itself is a condition of the present and the future, a model from the empirical investigation has been constructed, which strives to evaluate the views of the Lithuanian populous on energy technologies in the context of global challenges. Such a view on analysis can be useful for policy makers, since the understanding of widespread views of the populace concerns and fears reveals the main areas that must be taken care of in order to ensure that the changes being realized in Lithuania will be accepted and maintained, and society itself will understand the necessity and inevitability of the changes.

3. The data for the research was obtained from the Research Council of Lithuania funded project: “Social Perception of Climate Change: The Case of Lithuania in the International European Comparative Perspective”. During the course of the project, representative data of the Lithuanian populace from the questionnaire was accomplished. In fact, 1029 respondents attended the questionnaire, and through a direct survey, quantitative data was collected from their answers, and because it was possible to interpret data for the entire population of Lithuania. The questionnaire, which was made of 54 questions that included various climate change aspects was an adequate measure to evaluate the attitude towards climate change and various energy technologies of the Lithuanian people. One of the most important aspects is to be able to evaluate Lithuania’s ability to implement essential changes in both energy and environmental sectors. By using descriptive, factual, correlational and regressive analysis methods, it was possible to get empirical data, which allows to make these conclusions:

3.1. The Lithuanian populace accepts that the climate of the world is changing; however, only a third of the respondents think that it is caused by human activity. Education is an important factor, which helps to identify the effect of anthropogenic actions on the environment. It can be mentioned that only a small portion of Lithuanian’s are concerned about the climate

change, and only half of the respondents answered that Lithuania is already feeling the effects of the climate change. Lithuanian people tend to distance themselves from the negative effects of climate change in both time and space. In a way, the Lithuanian populace believes that the effects will be more apparent in other countries compared to the effects felt in their own country.

3.2. The vast majority of the Lithuanian populace believes that being eco-friendly is an important part of them and their national identity. In contrast to that idea, only a third of the respondents were motivated to take personal actions against the climate change. Low involvement and motivation to solve global environmental issues is mostly linked to a low concern for climate change as well as pre-existing problems with psychological distancing in both time and space.

3.3. Even though the trust of institutions in Lithuania and their ability to solve global environmental issues is low, the people of Lithuania oblige policy makers to take most of the responsibility for solving environmental issues and trust them to find ways and measures how to involve the rest of the public in solving these issues, because the populace has little concern for climate change and is not willing to work independently towards a solution for the rising issues of climate change. In this case, appropriate and balanced measures become one of the most important arguments for the country's population, since it could generate benefits for them, while enabling their participation in the fight against the climate change. The use of capacity policies would fit the need of the populace and would have a positive impact on their motivation.

3.4. The arguments of energy security, which involve the interests of the current generation and have a positive impact on the future generations, are relevant to Lithuania. The largest concerns for energy security in Lithuania are affordability of energy, environmental protection, stable energy supply and consistent economic growth. The contextual circumstances of Lithuania's energy sector reveal that people are convinced that all energy safety needs can be met by developing renewable energy sources and CHP plants.

3.5. There is a clear distinction between renewable and non-renewable energy technologies in the perception of Lithuanians. The majority of people welcome renewable energy technologies and have a positive outlook on them; however, non-renewable energy technologies have a negative outlook. The positive outlook of renewable technologies shows that these technologies are highly acceptable in Lithuania and people perceive lower risks from them compared to non-renewable or other energy technologies.

3.6. The contrasts of personal manifestations and collective influences can be used to analyse the risk perception and social acceptability of renewable and non-renewable energy sources, because there were statistically significant links between these factors and the researched concepts that leaned to different sides, depending on the type of energy.

3.7. The attitude towards climate change that reduces the risk perception of non-renewable and other energy technologies is based on the view that climate change is a problem of other countries. This decrease in risk perception of non-renewable energy technologies is as well amplified by the peoples' trust in the ability of institutions to ensure the safety of these technologies and the attitude that Lithuania needs its own nuclear power plant. The assessment of personal impact of climate change directly impacts the rising risk perception of non-renewable and other energy sources.

3.8. The perceived risk of renewable energy sources in Lithuania is especially low. This attitude is mostly caused by collective influences, such as concern over energy security and the trust in institutions to ensure the safety of such technologies. The largest influence to the decreasing risk perception of renewable energy sources is caused by personal manifestations, such as environmental identity and the effect that climate change can have.

3.9. The social acceptance of renewable energy sources is mostly formed by ideas of energy safety. In order to ensure that the attitude towards these technologies will remain adequate, it is necessary to use political measures that increase capacity, which form social acceptance of renewable technologies.

3.10. The social acceptance of non-renewable energy sources is mostly formed by pre-existing attitudes that the effects of climate change will be mostly felt in other countries and the perception that humans will dominate over nature. Because of these and other factors, such as trust in institutions and the benefits of non-renewable energy, the public's opinion can be easily skewed towards accepting non-renewable energy sources. In order to avoid this, it is necessary to highlight the effect that climate change will have on Lithuania and individuals.

3.11. The study of the relationship between the risk perception and the social acceptability of energy technologies revealed that the two concepts are closely interrelated. It has been observed that the growing awareness of risk reduces the social acceptability of energy technologies, which may have negative consequences for the implementation of energy transition in Lithuania. It has been found that the risk perception as a mediator is an important variable that can have a significant impact on the effect of factors

of collective and personal manifestations in the analysis of social acceptability of technologies. It has been observed that the positive influence of energy security concerns on the social acceptability of energy technologies can be attenuated when the risks associated with renewable energy technologies are perceived to be relatively high. In the case of non-renewable energy technologies, it has been observed that trust in the ability of institutions to ensure the security of energy technologies as well as the impact of climate change mitigation can be influenced by risk perceptions. Therefore, in order to implement the energy transition in Lithuania successfully, it is necessary to create adequate public awareness of the potential risks of renewable and non-renewable energy technologies and promote public interest in global environmental challenges and their impact on Lithuania.

4. In summary, it could be stated that for Lithuania to realize energy transition plan, which is based on the development of renewable energy sources, it is necessary to inform the public about the global challenges that it can face and find ways and measures to encourage the populace to involve themselves in stopping climate change and taking personal responsibility for it. The attitudes of the Lithuanian people that have been analysed in this dissertation create favourable conditions that have been formed from the information that was gotten from the public's perception. As such, it is possible to improve people's knowledge with new ideas and insights by returning this information alongside climate change factors in the public's social life. This analysis has some restrictions, such as taking account of only a narrow dimension of the effects of climate change (as it has been shown, it can have a significant influence over the risk perception and social acceptance of energy technologies) and the entire 15-variable NEP scale not being used in this research because of the large coverage of the questionnaire (which could have potentially affected the results of the research). However, concrete aspects of attitudes, which form the risk perception and social acceptance of energy technologies, have been identified and in a way compensate the shortcomings of this research. Therefore, it can be said that the changes in energy sector are acceptable to the Lithuanian populace; however, it is necessary to evaluate the peoples' expectations and worries while developing energy transition projects.

LIST OF REFERENCES

1. Beck, U. (1992). *Risk Society Towards a New Modernity*. London: SAGE Publications Ltd.
2. Berkhout, F., Marcotullio, P., & Hanaoka, T. (2012). Understanding energy transitions. *Sustainability Science*, 7, 109–111. doi:DOI: 10.1007/s11625-012-0173-5
3. Bernauer, T. (2013). Climate change politics. *Annual Review of Political Science*, 16, 421-448. doi:<https://doi.org/10.1146/annurev-polisci-062011-154926>
4. Bhatasara, S. (2015). Debating sociology and climate change. *Journal of Integrative Environmental Sciences*, 12(3), 217-233. doi:<https://doi.org/10.1080/1943815X.2015.1108342>
5. Brown, M.A., Wang, Y. . (2015). *Green savings: How policies and markets drive energy*. Santa Barbara: Praeger.
6. Bryman, A. (2012). *Social research methods*. New York: Oxford University Press.
7. Choy, L. (2014). The Strengths and Weaknesses of Research Methodology: Comparison and Complimentary between Qualitative and Quantitative Approaches. *IOSR Journal Of Humanities And Social Science*, 19(4), 99-104. doi:10.9790/0837-194399104
8. Cohen, L., Manion, L. (1980). *Research Methods in Education*. London: Groom Helm Ltd.
9. Creswell, J. W. (1994). *Research design: Qualitative and quantitative approaches*. London: Sage Publications, Inc.
10. Crutzen, P. (2002). The Anthropocene: geology of mankind. *Nature*, 415(23), 23-24. doi:<https://doi.org/10.1038/415023a>
11. Crutzen, P. (2006). The “Anthropocene”. Esantis K. T. Ehlers E., *Earth System Science in the Anthropocene* (p. 13-18). Berlin, Heidelberg: Springer. doi:https://doi.org/10.1007/3-540-26590-2_3
12. Dryzek, J. S. (1997). *The Politics of the Earth: Environmental Discourses*. Oxford : Oxford University Press.
13. Durfee, J. L. (2006). “Social Change” and “Status Quo” Framing Effects on Risk Perception. *Science Communication*, 27(4), 459–495. doi:doi:10.1177/1075547005285334
14. Edwards, P. N. (2017). Knowledge infrastructures for the Anthropocene. *The Anthropocene Review*, 4(1), 34–43. doi:<https://doi.org/10.1177/2053019616679854>
15. Fishbein, M., Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.

16. Froestad J., Shearing C. (2017). Energy and the Anthropocene: security challenges and solutions. *Crime, Law and Social Change*, 68(515), 515–528. doi:<https://doi.org/10.1007/s10611-017-9700-8>
17. Leiserowitz, A. A. (2006). Climate change risk perception and policy preferences: The role of affect, imagery, and values. *Climatic Change*, 77, 45-72. doi: <https://doi.org/10.1007/s10584-006-9059-9>.
18. Leonavičius, V., Genys, D. . (2017). *Energetinio saugumo sociologija. Teorija ir praktika*. Kaunas: Vytauto Didžiojo Universitetas.
19. Lidskog, R., Waterton, C. (2016). Anthropocene – a cautious welcome from environmental sociology? *Environmental Sociology*, 2(4), 395-406. doi:<https://doi.org/10.1080/23251042.2016.1210841>
20. Lundershausen, J. (2018). The Anthropocene Working Group and its (inter-)disciplinarity. *Sustainability: Science, Practice and Policy*, 14(1). doi:<https://doi.org/10.1080/15487733.2018.1541682>
21. Marega, O., Chagnon, P., Frère, S., Hellequin, A.P., Flanquart, H., Calvo-Mendieta, I., Berry, B., Cornet, S. (2019). Climate Change: What Are the Implications of Worldview, Political Orientation, Values on Climate Belief and Engagement in the French Context? *Journal of Sustainable Development*, 12(4), 112-127. doi: <https://doi.org/10.5539/jsd.v12n4p112>
22. Matonytė, I., Morkevičius, V., Lašas, A., Jankauskaitė, V. (2017). Grėsmių visuomenės gerovei suvokimas: socialinio optimizmo, socialinio ir institucinio pasitikėjimo bei pasitikėjimo savimi įtaka. *Politologija*, 1(85), 3-55. doi:<https://doi.org/10.15388/Polit.2017.1.10669>
23. Payne, G., Payne, J. (2004). *Key concepts in social research*. London: Sage.
24. Rajapaksa, D., Islam, M., Managi, S. (2018). Pro-Environmental Behavior: The Role of Public Perception in Infrastructure and the. *Sustainability*, 10(4). doi: <https://doi.org/10.3390/su10040937>
25. Renn, O., Rohrmann, B. (2000). *Cross-Cultural Risk Perception: A Survey of Empirical Studies*. Dordrecht: Springer.
26. Seippel, Ø. (2000). Ecological Modernization as a Theoretical Device: Strengths and Weaknesses. *Journal of Environmental Policy & Planning*, 2, 287–302. doi:[https://doi.org/10.1002/1522-7200\(200010/12\)2:4<287::AID-JEPP59>3.0.CO;2-V](https://doi.org/10.1002/1522-7200(200010/12)2:4<287::AID-JEPP59>3.0.CO;2-V)
27. Shelley, G. (2013). Quantitative Research. Esantis J. Albanese, *The Encyclopedia of Criminology and Criminal Justice* (p. 1-8). New Jersey: John Wiley & Sons, Inc.

28. Sjöberg, L. (2003). Distal factors in risk perception. *Journal of Risk Research*, 6(3), 187–211. doi:<https://doi.org/10.1080/1366987032000088847>
29. Sovacool, B. K., Griffiths, S. (2019). The cultural barriers to a low-carbon future: A review of six mobility and energy transitions across 28 countries. *Renewable and Sustainable Energy Reviews*, 119(109569). doi:<https://doi.org/10.1016/j.rser.2019.109569>
30. Sütterlin, B., Siegrist, M. (2017). Public acceptance of renewable energy technologies from an abstract versus concrete perspective and the positive imagery of solar power. *Energy Policy*, 106, 356-366. doi:<https://doi.org/10.1016/j.enpol.2017.03.061>
31. Szerszynski, B. (2012). The end of the end of nature: the Anthropocene and the fate of the human. *The Oxford Literary Review*, 165–184. doi:<https://doi.org/10.3366/olr.2012.0040>
32. Taylor, A., B.; Dessai, S.; Bruine de Bruin, W. (2014). Public perception of climate risk and adaptation in the UK: A review of the literature. *Climate Risk Management*. *Climate Risk Management*, 1-16. doi: <https://doi.org/10.1016/j.crm.2014.09.001>
33. Upham, P., Oltra, C., Boso, A. (2015). Towards a cross-paradigmatic framework of the social acceptance of energy systems. *Energy Research & Social Science*, 8, 100-112. doi:<https://doi.org/10.1016/j.erss.2015.05.003>
34. Watson, R. (2015). Quantitative research. *Quantitative research. Nursing Standard.*, 29(31), 44-48. doi:[doi:10.7748/ns.29.31.44.e8681](https://doi.org/10.7748/ns.29.31.44.e8681)
35. Wüstenhagen, R., Wolsink, M., Bürer, M.J. (2007). Social acceptance of renewable energy innovation: An introduction to the concept. *Energy Policy*, 35(5), 2683-2691. doi:<https://doi.org/10.1016/j.enpol.2006.12.001>
36. Zinn, J. (2016). Living in the Anthropocene: towards a risk-taking society. *Environmental Sociology*, 2(4), 385–394. doi:<http://dx.doi.org/10.1080/23251042.2016.1233605>

Author's scientific activities

Publications

1. Balžekienė, A., Budžytė, A. (2021) The Role of Environmental Attitudes in Explaining Public Perceptions of Climate Change and Renewable Energy Technologies. *Sustainability* 13, 4376. <https://doi.org/10.3390/su13084376>
2. Telešienė, A., Balžekienė, A., Budžytė, A., Rabitz, F., Vilčinskas, V., Zolubienė, E. (2020) Klimato kaitos nuostatos, elgsena ir komunikacija Lietuvoje. Monograph Manuscript submitted for publication.
3. Budžytė, A. (2020) Public Energy Preferences from the Perspective of Climate Change Mitigation. In: Leal Filho W., Nagy G., Borga M., Chávez Muñoz P., Magnuszewski A. (eds) *Climate Change, Hazards and Adaptation Options. Climate Change Management*. Springer, Cham. https://doi.org/10.1007/978-3-030-37425-9_44
4. Balžekienė, A., Budžytė, A., Telešienė, A. (2020). Lietuvos gyventojų požiūriai į klimato kaitą ir energijos gamybos šaltinius. Trumpoji tyrimo rezultatų ataskaita. Kaunas, Technologija.
5. Olteanu, A., Rabitz, F., Jurkevičienė, J., Budžytė, A. (2019). The case for a semiotic method in Earth system science. *Sign Systems Studies* 47 (3-4):552-589. <https://doi.org/10.12697/SSS.2019.47.3-4.09>
6. Budžytė, A., Balžekienė, A. (2018). Public perceptions of institutional responsibility in climate change risk in Baltic Nordic countries. *Journal of Security and Sustainability Issues* 7(4): 675-684. [https://doi.org/10.9770/jssi.2018.7.4\(5\)](https://doi.org/10.9770/jssi.2018.7.4(5))

Conference presentations

1. 23–27 August 2020 BUP Symposium 2020: Research and Innovation for a Sustainable Baltic Sea Region (Visby, Sweden/online). Balžekienė A., Budžytė, A. *“The role of Environmental Attitudes in Explaining Public Perception of Climate Change and Renewable Energy Technologies”*
2. 18 May 2020 KLIKS project final seminar “Klimato kaitos nuostatos, elgsena ir komunikacija Lietuvoje. Gairės socialiniams pokyčiams” (Vilnius, Lithuania/online). Budžytė, A. „Ar Lietuvos gyventojai palaiko įvairias politikos priemones?“
3. 7–8 November 2019 5th SRA Nordic Conference „Risk Management for Innovation” (Copenhagen, Denmark). Balžekienė

<p>A., Budžytė, A. <i>“Using NEP scale to explain public risk perception of energy technologies”</i></p> <ol style="list-style-type: none"> 4. 20–23 August 2019 14th ESA conference “Europe and Beyond: Boundaries, Barriers and Belonging” (Manchester, United Kingdom). Budžytė, A. <i>“Moving Towards Environmentally Responsible Society: Risk Perception and Social Acceptability of Energy Technologies in Lithuania”</i> 5. 20–23 August 2019 14th ESA conference “Europe and Beyond: Boundaries, Barriers and Belonging” (Manchester, United Kingdom). Vilčinskis, V., Budžytė, A. <i>“Factors Explaining Energy Consumption Behaviour Intentions in Lithuania”</i> 6. 4–5 July 2019 BUP Symposium 2019: Understanding and managing the extreme impacts of climate change (Warsaw, Poland). Budžytė, A. <i>“Public energy preferences in the perspective of climate change mitigation”</i> 7. 3–5 September 2018 4th Energy and Society Conference “Energy Transitions in a Divided World” (ESA, RN12 Environment & Society, Exeter, United Kingdom). Budžytė, A. <i>“How preventable actions on energy technologies distort the perception of environmental issues?”</i> 8. 15–21 July 2018 World Congress of Sociology “Power, Violence and Justice: Reflections, Responses, Responsibilities” (XIX ISA World Congress of Sociology, Toronto, Canada). Budžytė, A. <i>“The Risk Perception of Energy Technologies: Perspective of Environmental Challenges”</i> 9. 30–31 January 2018 Scientific Conference “Regional Risks and Risks to the Regions” (General Jonas Žemaitis Military Academy of Lithuania, Vilnius, Lithuania). Budžytė, A., Balžekienė, A. <i>“Public Perceptions of Institutional Responsibility in Climate Change Risk in Baltic Nordic Countries”</i>
<p>Participation in scientific projects</p>
<ol style="list-style-type: none"> 1. 2019–2022 Scientific project “Mapping of Risk Perception in Lithuania: Spatial and Socio-psychological Dimension”. The project is funded by a grant from the Research Council of Lithuania (Contract no. P-MIP-19-365). Position in the project – junior researcher. Project Manager Assoc. Prof. Dr. Aistė Balžekienė. 2. 2017–2020 International project “Public Perceptions of Climate Change: Lithuanian case in a European Comparative Perspective”. The project is funded by a grant from the Research Council of

Lithuania (Contract no. S-MIP-17-126/SV3-0511). Position in the project – junior researcher. Project Manager Prof. Dr. Audronė Telešienė.

3. 2018-04–2019-04 KTU funded scientific project “Semantic networks in the environmental sciences“. Position in the project – junior researcher. Project Manager Dr. Florian Rabitz.
4. 2017-10–2018-04 Erasmus+ project "Risk and Security Governance Studies within Baltic–Nordic Academic Community of Practice" Project funded with support from the European Commission (No. 2015-1-LT01-KA203-013467). Position in the project – project coordinator. Project Manager Assoc. Prof. Eglė Gaulė.

Trainings, internships

1. 1–2 July 2020 Methodological training: Spatial Analysis with ArcGIS Pro (ESRI, Lithuania)
2. 22–26 June 2020 Methodological training: Putting ArcGIS to Use Across Your Organization (ESRI, Lithuania)
3. 5 January–15 March, Erasmus+ Internship at Jyväskylä University, Department of Social Sciences and Philosophy (Jyväskylä, Finland)
4. 5–9 August 2019 Methodological training: Introduction to Structural Equation Modelling: Confirmatory Factor Analysis with Mplus (GESIS, Germany)
5. 27–28 May 2019 Methodological training: Application of Regression Analysis in Social Sciences (KTU, Lithuania)
6. 18 October 2018 Methodological training: Social Research Data Management: European Perspectives (KTU, Lithuania)
7. 2–3 October 2018 Workshop for PhD students “Researching risk And Uncertainty” held by European Sociological Association Research network 22 “Sociology of Risk and Uncertainty” (KTU, Lithuania)
8. 15–17 May 2018 Methodological training: Introduction to multilevel modelling (KTU, Lithuania)
9. 3–5 October 2017 BUP The Second Regional Workshop EduBalt: Developing capacity for teaching sustainable development in the Baltic Sea region (the Baltic University Programme (BUP), Ratnieki, Latvia)

ABOUT THE AUTHOR

Agnė Budžytė

Academic background:

- 2016–2020 Doctoral studies at Kaunas University of Technology (Sociology).
- 2014–2016 Master studies at Kaunas University of Technology (Master of Arts degree in Social policy).
- 2010–2014 Bachelor studies at Kaunas University of Technology (Bachelor's degree in Sociology).

Occupation:

- 2017–Present Lecturer at Kaunas University of Technology.
- 2016–Present Junior Researcher at Kaunas University of Technology.
- 2018–2019 Human Resources and Office Manager at TEC Consulting.
- 2016–2017 Loans Manager at Credit Union “Sūduvos parama”.
- 2014–2015 Payment Posting Specialist at “Intermedix Lithuania”.
- 2010–2014 Social Services Assistant at Kaunas City Municipality Centre of Social Services.

Research interests: risk sociology, risk perception, environmental risks, social impact of technologies, sustainable development, climate change, environmental sociology, energy and society, quantitative methods.

Other awards and achievements:

2020 Scholarship for academic achievements from the Research Council of Lithuania;

2019 Scholarship for academic achievements from the Research Council of Lithuania;

2018 elected as the most active PhD student in the field of science at KTU;

2017 elected as the most active PhD student in the field of science at KTU.

E-mail: a.budzyte@ktu.lt; a.budzyte@gmail.com

REZIUMÉ

ĮVADAS

Tyrimo aktualumas. Mokslo ir technologijų pažanga, tapusi šiuolaikinio pasaulio gerovės užtikrinimo sąlyga, vis dažniau skatina diskutuoti ne tik apie gaunamą naudą, bet ir sunkiai išmatuojamas ir vis akivaizdesnes grėsmes. Susirūpinimas, jog šiuolaikinis pasaulis yra pavojingesnis už ankstesnes epochas, siejamas su naujomis žmogaus galimybėmis ir iš to kilusiomis neplanuotomis pasekmėmis. Dėl to visuomenėje didėjantis nerimas ir baimė tampa stimulu tolimesniam visuomenės progresui (Beck, 1992). Bene didžiausias iššūkis, nerimo objektas ir šiuolaikinės visuomenės realybė – klimato kaita, įvardijama kaip reikšmingiausia aplinkos problema, sukelianti įvairiausių pasekmių ne tik visuomenei, tačiau ir pasaulinėms ekosistemoms. Tai turi įtakos siekiant įgyvendinti esmines permainas, iš pagrindų keičiant visuomenės ir gamtos santykį (Bhatasara, 2015). Dabartinė situacija dažnai aiškinama vartojant gana naują geologinio laikotarpio terminą – *antropoceną*, kuris planetos istorijoje bus įvardijamas kaip žmogaus dominavimo gamtoje momentas, lygiavertis kitiems gamtos procesams, paliekantis pėdsaką, kaip ir bet kokia kita geofizinė jėga (Crutzen, 2002). Antropocenas taip pat dažnai apibūdinamas ir kaip priminimas, kad „mes“ (žmonija), pereiname iš holoceno (stabilaus ir natūraliai susiformavusio laikotarpio, kuriame kūrėsi visuomenės) į žmogaus veiklos suformuotą gamtinę aplinką, apie kurią žinoma labai mažai (Lidskog, Waterton, 2016). Taigi antropocenas ne tik apima naują geologinę erą, bet, visų svarbiausia, turi būti suprantamas kaip nauja socialinė visuomenės būseną.

Manoma, kad žmogus tūkstantmečius, o gal net milijonus metų išliks dominuojančia jėga (Crutzen, 2006), tačiau tai, kad žmonija pereina iš vienos epochos į kitą, globaliu mastu skatina diskusijas apie tai, kokiame pasaulyje norima gyventi ir kaip stabdyti neigiamas žmogaus veiklos pasekmes (Lidskog, Waterton, 2016). Kylantys nauji aplinkosaugos iššūkiai bei nežinomybė dėl ateities, antropoceno diskursą daro tarpdisciplinišką: gamtos mokslų atstovams tiriant žmogaus veiklos poveikį, socialinių mokslų atstovai akcentuoja specifinių socialinių santykių ir jų aplinkos sąveiką (Lundershausen, 2018). Tačiau, kaip pabrėžia Lidskog'as ir Waterton'as (2016), ribos tarp mokslinių krypčių nyksta, nes vis daugiau mokslininkų kelia kur kas labiau sociologijai būdingus klausimus, bandydami suprasti žmogaus žinojimo ir atsakomybės mastą bei galimybes valdyti globalaus lygio socialines sistemas. Visi šie diskursai ir klausimai tampa būtini bandant rasti geriausius sprendinius formuojant žmonijos ateitį, kuriant politikos kryptis ir priemones, nes, kaip apibendrina sociologas Bronislawas Szerszynski'is

(2012), antropoceno svarba slypi ne žmonijos veiksmuose, bet pasekmėse, t. y. kokius pėdsakus, ji po savęs paliks.

Zinn'as (2016) teigia, kad toks neapibrėžtumas dėl ateities iš esmės keičia gamtos ir rizikos santykį. Gamtos prigimtis iš to, kas buvo suteikta natūraliai, laisvai ir naudojama įvairiems poreikiams tenkinti, tapo rizikos ašimi, kurią reikia apsaugoti nuo technologinės ir ekonominės plėtros. Žmogaus veikla ne tik veikia aplinką, bet ir ją naikina, o apsaugos ir prevencijos programos nebėra efektyvios. Taigi nagrinėjant / sprendžiant šias problemas būtini ryžtingi ir net rizikingi sprendimai. Vienas iš svarbiausių klausimų, kuriuo siekiama rasti konsensuą tarp žmogaus ir gamtos ryšio, yra siejamas su žmonijos ir gamtos gerovės balansu. Kaip pabrėžia Forestad'as ir Shearin'as (2017), žmogaus gerovės įgyvendinimas neišvengiamai susijęs su įvairiomis energijos formomis, kurios per visą žmonijos egzistavimo laikotarpį reikšmingai kito, keisdamos ir kasdieninės žmogiškosios veiklos praktikas. Froestad'as ir Shearing'as taip pat mini, jog dabartinė visuomenė yra sukurta „ant ugnies“ bei skirtingų jos naudojimo būdų, kurie medžiotojų-rinkėjų visuomenę transformavo į industrinio kapitalizmo visuomenę. Nuo pirmosios ugnies panaudojimo iki perdirbto iškastinio kuro ir branduolinių reaktorių praėjo nemažai laiko. Santykis *žmogus gamtai*, virto ryšiu *žmogus žmogui*. Taip buvo sukurta ne tik išvystyta ekonomika, užtikrinanti gana aukštus gerovės standartus, bet kartu tai lėmė ir ekologinę krizę, su kuria ir dabar susiduria šiuolaikinė visuomenė.

Ekonominiai interesai ir aplinkos apsauga ilgai buvo laikomi tarpusavyje nesuderinamais dalykais, tačiau kylančios grėsmės ir būtinybė priimti riziką paskatino tolimesnę ekonomikos plėtrą vykdyti per aplinkai draugišką perspektyvą (Zinn, 2016). Vis plačiau taikomos darnaus vystymosi ir žiedinės ekonomikos idėjos kuria ekonomikos augimo, aplinkos tausojimo ir socialinio lygiateisiškumo srityse įgyvendinamų tikslų vizijas (Dryzek, 1997). Pasirašytuose tarptautiniuose susitarimuose (pvz., *Paryžiaus susitarimas*, *Kioto protokolas* ir įvairios kitos tarptautinės bei nacionalinės strategijos), akcentuojama būtinybė dekarbonizuoti ekonomiką ir kiek įmanoma vengti blogiausių antropogeninių klimato kaitos scenarijų tapimo realybe (Edwards, 2017). Tačiau, kaip pabrėžia Bernauer'is (2013), norint sumažinti klimato kaitos keliamas grėsmes, būtinas globalus kolektyvinis įsitraukimas. Vis dėlto skirtingos vertybės, politinės ir religinės nuostatos bei puoselėjama pasaulėžiūra kuria skirtingus individų atsakus į aplinkosaugos problemas (Marega et.al, 2019). Atsirandanti takoskyra tarp gyventojų taip pat gali būti sąlygota ir unikalių vietinių kontekstų, turimos patirties, susijusios su klimato kaita (Taylor et al., 2014), taikomų skirtingų viešosios politikos priemonių, vyraujančių skirtingų socialinių normų ir kitų veiksnių (Rajapaksa

et al., 2018). Taigi darosi svarbu suprasti nacionalines ypatybes, siekiant sėkmingo prisitaikymo ir klimato kaitos mažinimo programų įgyvendinimo.

Šiuo atžvilgiu antropocenas, kaip visos ligšiolinės žmogaus veiklos padarinių išraiškos, ne tik apima pokyčius kasdien gyvenamojoje aplinkoje, tačiau kartu nubrėžia savotiškas kintančio socialinio pasaulio tvarkos ribas, grindžiamas suvokimu, jog rizika, nesiimant atitinkamų veiksmų bei iš neveiklumo kylantys sudėtingi padariniai, gali apskritai sunaikinti pasaulį, prie kurio esame įpratę. Taigi, vis daugiau mokslininkų, politikų, inžinierių, verslininkų ir kitų sričių atstovų akcentuoja būtinybę įgyvendinti ne tik prisitaikymo prie klimato kaitos, bet ir jos švelninimo strategijas.

Kaip vienas svarbiausių veiksnių formuojant tolimesnes visuomenės pažangos kryptis ir politinę darbotvarkę yra įvardijamas rizikos suvokimas, kuris klimato kaitos kontekste savotiškai atspindi ne tik problemos pripažinimą, bet ir ryžtą veikti, suprantant savo veikimo ar neveikimo pasekmes. Atlikti tyrimai atskleidžia, jog rizikos suvokimas – būtina dedamoji, galinti ne tik paskatinti būtinų socialinių, ekonominių ar politinių pokyčių įgyvendinimą (Leiserowitz, 2006), bet ir apskirtai pakeisti vyraujančią *status quo* (Durfee, 2006). Šiuo atžvilgiu energetikos sritis, susilaukianti bene didžiausio dėmesio, atskleidžia būtinybę iš esmės reorganizuoti šį sektorių. Vis ryškėjantis poreikis pereiti nuo iškastinio kuro prie atsinaujinančios energijos technologijų naudojimo, užtikrinant ne tik stabilų tiekimą, bet ir garantuojant energijos gamybą, suderintą su maksimalia aplinkos apsauga, rodo, jog nusistovėjęs įsitikinimas, besiremiantis tik energijos įperkamumo aspektu, privalo keistis.

Energetinio perėjimo koncepcija tampa dėmesio centru politinio diskurso metu, kuriame siekiama priimti esminius sprendimus pabrėžiant, jog būtina suderinti ne tik institucinius ar ekonominius, bet taip pat būtina įtraukti socialinius ir kultūrinius (energijos vartojimo praktikų ir nuostatų) pokyčius (Berkhout, et al., 2012). Sovacool'as ir Griffiths'as (2019) teigia, jog visuomenės ir technologijų sąveikos metu, materialūs artefaktai kuria normų ir veiklos praktikų spektrą. Teigiama, jog perėjimas prie atsinaujinančios energijos grindžiamas vien tik technoekonominiais sumetimais, neatsižvelgiant į visuomenėje paplitusias praktikas, įsitikinimus ir elgesio įpročius, gali paskatinti padaryti netinkamas išvadas (ibid, 2019). Todėl, rengiant ir prognozuojant tolimesnius klimato kaitos ir energetinio perėjimo scenarijus, susijusius su visuomenės ir ateities kartų gerove, privalo įvertinti ir kultūrinės, ir kontekstines energijos dedamąsias. Atsižvelgiant į visuomenėje vyraujančią energijos technologijų rizikos suvokimą ir identifikuojant pagrindinius jį formuojančius komponentus, siejamus su klimato kaitos nuostatomis, apimančiomis tiek asmeninius, tiek kolektyvinius veiksmus bei įvertinant, kaip šie veiksniai prisideda prie energijos technologijų socialinio

priimtino, galima atskleisti pagrindines, klimatui palankių technologijų bei elgesio praktikų kliūtis. Taigi, rizikos suvokimas, technologijų socialinis priimtumas ir klimato kaitos nuostatos tampa reikšmingomis visapusiško energetinio perėjimo bei socialinių pokyčių prielaidomis, padedančiomis atrasti tinkamus argumentus ir jų tarpusavio ryšius, galinčiomis paskatinti pokyčius visuomenėje ir didinti jos narių sąmoningumą.

Tyrimų apie Lietuvos gyventojų energijos technologijų priimtumą ir rizikos suvokimą gana mažai, o išsamios šių klausimų analizės aplinkosaugos aspektu taip pat stokojama. Paminėtina, kad panašią tematiką nagrinėjo Energetinio saugumo tyrimą ir energetinio saugumo lygio nustatymą atlikę V. Leonavičius ir D. Genys (2017), gyventojų požiūrius į branduolinę energetiką tyrė A. Balžekienė, E. Butkevičienė, L. Rinkevičius, V. Gaidys (2009), visuomenės nuomonę dėl *Ignalinos atominės elektrinės* aiškino V. Gaidys ir L. Rinkevičius (2008), branduolinės energetikos diskursus Lietuvos žiniasklaidoje vertino R. Baločkaitė, L. Rinkevičius (2009). Šiek tiek plačiau tyrimai Lietuvoje vykdyti rizikos suvokimo ir rizikos suvokimo konstravimo temomis. Šioje srityje tyrimus atliko D. Janušauskienė, E. Vileikienė, L. Nevinskaitė, I. Gečienė-Janulionė, atlikusios tyrimą „Subjektyvus grėsmių suvokimas: ar Lietuvos gyventojai jaučiasi saugūs?“, „Grėsmių visuomenės gerovei suvokimas: socialinio optimizmo, socialinio ir institucinio pasitikėjimo bei pasitikėjimo savimi įtaka“ domėjosi I. Matonytė, A. Lašas, V. Jankauskaitė, V. Morkevičius; A. Rimaitė, L. Rinkevičius (2008) tyrė sociokultūrinių veiksnių įtaką rizikos suvokimo formavimuisi; socialinio rizikos suvokimo ir žiniasklaidos diskurso Lietuvoje konfigūracijas analizavo A. Balžekienė, A. Telešienė, L. Rinkevičius (2008); socialinius rizikos kontūrus žiniasklaidoje televizijos naujienose vertino E. Zolubienė (2014); rizikos konstravimą valdysenos teorijų požiūriu aptarė V. Leonavičius (2014).

Disertacijoje **probleminiu klausimu** siekiama išsiaiškinti, *kaip Lietuvos gyventojų energijos technologijų rizikos suvokimą ir socialinį priimtumą veikia klimato kaitos nuostatos bei kokias energetinio perėjimo kliūtis tai gali atskleisti?*

Tyrimo tikslas – atskleisti Lietuvos gyventojų energijos technologijų rizikos suvokimą ir socialinį priimtumą formuojančius veiksniai klimato kaitos kontekste.

Tyrimo tikslui įgyvendinti suformuluoti šie **uždaviniai**:

- konceptualizuoti rizikos ir energijos technologijų santykį globalių aplinkosaugos iššūkių kontekste remiantis rizikos visuomenės, refleksyvios ir ekologinės modernizacijos bei sistemų teorijos priegomis;
- identifikuoti energijos technologijų rizikos suvokimui ir socialiniam priimtumui svarbius veiksniai, kurių pagrindu

suformuoti analitinį rizikos suvokimo ir socialinio priimtimumo modelį, paremtą teorinėmis rizikos suvokimo ir socialinio priimtimumo visuomenėje konceptualizacijomis;

- atlikti empirinį tyrimą, kurio rezultatai atskleistų energijos technologijų rizikos suvokimą ir socialinį priimtimumą formuojančius veiksniai bei atskleistų šių veiksmių sąsajas su Lietuvos gyventojų klimato kaitos nuostatomis.

Disertacijos tyrimo objektas – energijos technologijų rizikos suvokimas ir socialinis priimtimumas.

Empirinei tyrimo daliai suformuluotos šios **tyrimo hipotezės**:

H.1 – Didžiausią įtaką atsinaujinančios ir neatsinaujinančios energijos technologijų rizikos suvokimui turintys kolektyvinės įtakos veiksniai apima pasitikėjimą institucijomis ir susirūpinimą energetiniu saugumu.

H.2 – Svarbiausi atsinaujinančios ir neatsinaujinančios energijos technologijų socialinį priimtimumą formuojantys kolektyvinės įtakos veiksniai apima požiūrius į energetinį saugumą, politikos priemones bei kontekstines aplinkybes.

H.3 – Didžiausią įtaką atsinaujinančios ir neatsinaujinančios energijos technologijų rizikos suvokimui turintys asmeninių manifestacijų veiksniai, apimantys aplinkosaugos ir klimato kaitos nuostatas, siejami su ekologine tapatybe ir psichologine klimato kaitos poveikio distancija.

H.4 – Svarbiausi atsinaujinančios ir neatsinaujinančios energijos technologijų socialinį priimtimumą formuojantys asmeninių manifestacijų veiksniai, apimantys aplinkosaugos ir klimato kaitos nuostatas, siejami su ekologine pasaulėžiūra, susirūpinimu klimato kaita bei klimato kaitos poveikiu.

H.5 – Išsilavinimas, amžius ir šeimos pajamos yra esminės sociodemografinės charakteristikos, formuojančios Lietuvos gyventojų atsinaujinančios ir neatsinaujinančios energijos technologijų socialinį priimtimumą ir jų rizikos suvokimą.

H.6 – Energijos technologijų rizikos suvokimas yra reikšmingai susijęs su Lietuvos gyventojų energijos technologijų socialiniu priimtimumu ir gali veikti kaip pastarojo mediatorius.

Darbo naujumas ir reikšmė. Tarptautinėje akademinėje bendruomenėje technologijų rizikos suvokimui ir socialiniam priimtimumui tirti plėtojamos savitos tradicijos ir mokslinių tyrimų kryptys. Anksčiau atlikti tyrimai atskleidė, jog pats visuomenės pasipriešinimas technologijoms ar jų plėtrai nėra naujiena, tačiau skirtingi laikotarpiai, kintantis problemų, galios, ekonomikos, politinės ideologijos, moralės, religijos ir kt. veiksmių santykis, svariai prisidėjo prie šio pasipriešinimo atsiradimo (Otway, Winterfeldt, 1982). Taigi, net ir dabar atliekant kiekybinių, kokybinių ir mišrių prieigų tyrimus,

analizuojami skirtingi tiek su energetika, tiek su aplinkosauga susiję klausimai. Atsižvelgiama į ekonomines, politines, religines, kontekstines žinojimo ir kitas aplinkybes, padedančias suprasti visuomenės nuostatų formavimąsi.

Pasaulyje ryškėjantys klimato kaitos padariniai bei didėjantis susirūpinimas tiek tarp valdžios institucijų, tiek tarp valstybių piliečių, reikalauja novatoriškiau ir kompleksiščiau analizuoti visuomenės pasiruošimą įgyvendinti būtinus pokyčius. Tolstant nuo matematinio rizikos priimtumo skaičiavimo, vis daugiau dėmesio sutelkiama į socialinius technologijų priimtumo ir rizikos suvokimo aspektus. Tokiu būdu siekiama formuoti socialiai atsakingos ir sąmoningos visuomenės pagrindą. Nors nacionaliniu mastu Lietuvos energetikos sektoriaus reformos yra nukreiptos į klimato kaitos poveikio mažinimą, tačiau tyrimų, analizuojančių gyventojų požiūrių į energijos technologijų ir klimato kaitos santykį stokojama. Tai kelia susirūpinimą, nes neįvertinus šalies gyventojų problemos supratimo bei neatsižvelgus į klimato kaitos nuostatų įtaką, energetinis perėjimas gali būti itin sudėtingas. Šia disertacija siekiama užpildyti šią spragą, derinant energijos technologijų rizikos suvokimo, socialinio priimtumo ir klimato kaitos koncepcijas, taikant kiekybinio tyrimo metodologiją ir ieškant savalaikių priemonių socialiai atsakingos visuomenės kūrimui.

Tyrimo duomenys ir metodai. Disertacijoje atliktas tyrimas grindžiamas kiekybine tyrimo metodologija. Atliktos reprezentatyvios Lietuvos gyventojų apklausos duomenų pagrindu, taikyta kiekybinė duomenų analizė naudojant „IBM SPSS Statistics 25“ analizės įrankį. Išsamus tyrimo metodologijos aprašas yra pateikiamas 2 skyriuje.

Disertacijos struktūra. Parengta disertacija suskirstyta į tris pagrindinius skyrius, kuriuos sudaro mažesni poskyriai, padedantys visapusiškai atskleisti tyrimo objektą ir įgyvendinti iškeltus tyrimo uždavinius. Disertacijos įvadinėje dalyje pateikiamas analizuojamos temos aktualumas, mokslinis naujumas, probleminė tiriamojo reiškinio sritis, empirinei tyrimo daliai keltos hipotezės bei probleminis klausimas.

Pirmojoje disertacijos dalyje aptariami teoriniai konstruktai, leidžiantys visapusiškai suprasti energijos technologijų ir rizikos suvokimo santykį globalių iššūkių perspektyvoje. Skyriuje, remiantis Taylor-Gooby'io ir Zinn'o (2006), Renn'o (2008), Battistelli ir Galantino (2018), Luhman'o (1990,1993) bei kitų autorių idėjomis, konceptualizuojama tarpdisciplininė rizikos samprata bei technologijų rizikos suvokimas. Taip pat atskleidžiamas energijos technologijų ir klimato kaitos santykis, grindžiamas ekologinės modernizacijos idėjomis, kuriose akcentuojama būtina tolimesnė technologijų pažanga. Šias idėjas siejant su būtinybe įgyvendinti energetinį perėjimą, skyriuje pateikiama energetinio perėjimo samprata, aptariamos tiek energijos technologijų kontroversijos, tiek Lietuvos gyventojų požiūrių į energijos

technologijas retrospektyvą. Šiame skyriuje taip pat identifikuojami energijos technologijų rizikos suvokimą ir jų socialinį priimtinumą formuojantys veiksniai bei pateikiamas empirinio tyrimo modelis.

Antroje disertacijos dalyje aptariami bendrieji tyrimo metodologiniai principai. Pristatomi empirinio tyrimo įgyvendinimo etapai, duomenų rinkimo ir operacionalizacijos procedūros. Suformuluojamos empirinio tyrimo hipotezės.

Trečiojoje dalyje pateikiami empirinio tyrimo analizės rezultatai, gauti nagrinėjant KTU įgyvendinto projekto „Socialinis klimato kaitos suvokimas: Lietuvos atvejis tarptautinėje Europos lyginamojoje perspektyvoje“ duomenis. Taikant aprašomosios, koreliacinės, faktorinės, regresinės ir mediacijos analizės technikas, tikrinamos tiriamajai daliai suformuluotos hipotezės, pateikiama baigiamoji diskusija ir suformuluotos tyrimo išvados.

IŠVADOS

1. Šioje disertacijoje remiantis ekologinės ir refleksyvios modernizacijos, sistemų teorijos, bei rizikos visuomenės teoriniais požiūriais, siekta konceptualizuoti rizikos ir energijos technologijų santykį. Vertingų išvalgų rizikos analizei galima rasti minėtų teorinių perspektyvų autorių darbuose, kuriuose pirmiausia rizikos ir energijos technologijų santykį galima sieti su globaliais aplinkosaugos iššūkiais. Nustatyta, jog dabartinį pasaulį lydinti aplinkosaugos rizikos, visų pirma kildinamos iš mokslo ir technologijų pažangos, prisidėjusios ne tik prie naudingų, visuomenės gyvenimą praturtinančių technologijų atsiradimo, tačiau ir sunkiai pamatuojamų ir pastebimų grėsmių iškilimo. Energija ir jos technologijos laikomos reikšmingiausiu oro ir vandens taršos bei klimato kaitos katalizatoriumi per tūkstančius metų siekiančią žmonijos istoriją bei skirtingus ugnies režimus, nuolat skatinusios civilizacijos progresą, dabar kelia kritinių klausimų, būtinų siekiant tolimesnės pažangos. Ši technologijų ir visuomenės sąveika žymi naujos eros pradžią, kurioje neveiklumas ir sprendimų atidėliojimas gali turėti nebeatitaisomų padarinių, o stiprėjantis netikrumas dėl ateities kelia vis didesnę riziką tam, kam individai ir visa civilizacija suteikia vertę. Žmonijos egzistencializmo ateityje klausimai, paremti aplinkos krizės argumentais, reikalauja kur kas daugiau dėmesio skirti neatsiejamai technologijų savybei – rizikai valdyti. Įgyvendinant esminius pokyčius energetikos sektoriuje, galinčius užtikrinti energetinių poreikių tenkinimą ir iš technologijų kylančios rizikos balansą, matoma vienintelė išeitis: tvarumu paremtas energetinis perėjimas. Modernizuojant esamas bei kuriant naujas technologines ir institucines sistemas, formuojant naują santykį tarp ekonomikos ir ekologijos, vis

dažniau akcentuojama ir tai, jog visuomenei būtina suprasti, kokiomis vertybėmis grindžiamos šios vizijos ir kokiais metodais jos bus įgyvendintos. Susisaistymas su technologijomis, kurios laikomas ir neatsiejama ateities charakteristika, reikalauja struktūrinių įvairių socialinių sistemų pokyčių, galinčių įtvirtinti naujus elgesio modelius ir taisykles, rizika verčia visuomenę organizuojančia jėga. Taigi, tolimesnė modernizacija tampa neįmanoma į sprendimų priėmimo procesą neįtraukiant ir tų, kurie bus jų paveikti, t. y. pačios visuomenės.

2. Atsižvelgiant į tai, kad energija suprantama kaip stabilumu pasižyminti kultūrinė visuomenės praktikų išraiška bei vidinių visuomenės susitarimų ir praktikų pagrindas, kuri tolimesnės modernizacijos metu bandoma pakeisti, kelia netikrumo ir saugumo klausimų. Taigi, aplinkos ir technologijų sankirtoje, kiekvienas sprendimas, galintis turėti atoveiksmį, skatina vertinti ar individai yra pasirengę priimti galimą riziką bei analizuoti, kokie veiksniai skatina jos suvokimą. Šioje disertacijoje didžiausią dėmesį skiriant technologijų ir požiūrių į klimato kaitą sąveikai, identifiкуotos asmeninių manifestacijų ir kolektyvinių įtakų dimensijos, prisidedančios prie rizikos suvokimo formavimosi per socialinius ir politinius-institucinius veiksmus, apjungiamus kultūrinio konteksto įtakos, panaudotos ir tiriant energijos technologijų socialinį priimtinumą. Manant, kad rizikos suvokimas ir technologijų priimtumas konstruojamas socialinėje sąveikoje, o pačios rizikos egzistavimas yra dabarties ir ateities sąlyga, sukonstruotas empirinio tyrimo modelis, kuriuo siekta įvertinti Lietuvos gyventojų požiūrius į energijos technologijas globalių iššūkių kontekste. Taip pat, manant, kad tik atsižvelgiant į įvairius visuomenės nerimo šaltinius (šiuo atveju išskirtinai klimato kaitą ir įvairius su ja siejamus), galima užtikrinti, jog skirtingos socialinės sistemos turės laisvę priimti sprendimus pasirenkant tuos, kurie išlaiko racionalumo ir apsisaugojimo nuo neigiamų pasekmių argumentus, kelta prielaida, jog tie patys veiksniai, formuojantys energijos technologijų rizikos suvokimą, geba paaiškinti ir šių technologijų priimtumą. Toks analizės pobūdis gali būti naudingas politikos formuotojams, nes supratimas apie vyraujančius šalies gyventojų požiūrius, susirūpinimą ir baimes atskleidžia pagrindines sritis, kurias būtina puoselėti norint užtikrinti, jog įgyvendinami pokyčiai Lietuvoje bus priimami ir palaikomi, o pati visuomenė supras pokyčių būtinumą ir neišvengiamumą.
3. Tyrimo duomenys yra gauti įgyvendinant Lietuvos mokslo tarybos finansuojamą projektą „*Socialinis klimato kaitos suvokimas: Lietuvos atvejis tarptautinėje Europos lyginamojoje perspektyvoje*“. Šio projekto metu atliekant reprezentatyvią Lietuvos gyventojų apklausą, kurioje dalyvavo 1029 respondentai, tiesioginės apklausos būdu gauti kiekybiniai

duomenys sudarė palankias sąlygas surinktus duomenis interpretuoti visos Lietuvos gyventojų populiacijos atžvilgiu. Klausimynas, apimantis įvairius klimato kaitos klausimus, tapo gana neblogo priemone, galinčia padėti įvertinti Lietuvos gyventojų požiūrius į klimato kaitą ir įvairias energijos technologijas bei jų tarpusavio santykį. Tai yra svarbu vertinant Lietuvos galimybes įgyvendinti esminius pokyčius tiek energetikos, tiek aplinkosaugos srityje. Taikant aprašomosios, faktorinės, koreliacinės ir regresinės analizės technikas, gauti empirinės duomenų analizės rezultatai leidžia formuluoti šias išvadas.

- 3.1. Lietuvos gyventojai pripažįsta, kad klimatas pasaulyje keičiasi, tačiau tik trečdalis respondentų mano, kad pagrindine klimato kaitos priežastimi galima laikyti žmogaus veiklą. Išsilavinimas yra svarbus veiksnys prisidedantis prie problemos identifikacijos sąsajų su antropogeninių veiksnių įtaka aplinkai. Taip pat, tarp Lietuvos gyventojų vyrauja sąlyginai mažas susirūpinimas klimato kaita ir vos pusė visų apklaustųjų pripažįsta, kad Lietuva jau dabar jaučia klimato kaitos padarinius. Didžiausią klimato kaitos poveikį siedami su neigiamomis pasekmėmis, Lietuvos gyventojai – klimato kaitą yra linkę nutolinti erdvėje ir laike, manydami, kad poveikis jiems asmeniškai nebus toks akivaizdus, kaip kitose šalyse.
- 3.2. Didžioji dalis Lietuvos gyventojų mano, kad buvimas draugiškais aplinkai yra svarbi jų ir nacionalinės tapatybės dalis, tačiau vos trečdalis yra motyvuoti imtis veiksmų kovoje su klimato kaita. Mažas išitraukimas ir menka motyvacija spręsti globalius aplinkosaugos klausimus, labiausiai susijęs su menku susirūpinimu klimato kaita apkritai, bei egzistuojančia problemos psichologine distancija laike ir erdvėje.
- 3.3. Nors Lietuvoje vyrauja mažas pasitikėjimas įvairiomis institucijomis bei jų gebėjimu spręsti globalius aplinkosaugos iššūkius, dėl menko šalies gyventojų susirūpinimo klimatu bei entuziazmo savarankiškai prisidėti prie problemos sprendimo stokos, politikos formuotojus vis tiek įpareigoja prisiimti didžiausią atsakomybę bei rasti priemonių ir būdų įtraukti ir likusią visuomenės dalį. Šiuo atžvilgiu, itin svarbiu argumentu laikytinas tikslingų ir subalansuotų priemonių derinys, galintis generuoti naudas šalies gyventojams bei netiesiogiai įgalinantis pačių gyventojų dalyvavimą. Pajėgumus didinančių politikos priemonių taikymas atitiktų ir gyventojų turimus lūkesčius, taip pat tikėtina, svariai prisidėtų prie teigiamos gyventojų motyvacijos.
- 3.4. Energetinio saugumo argumentai, reikalaujantys atsižvelgti į dabarties kartų interesus nemažinant ateities kartų galimybių,

aktualūs ir Lietuvai. Didžiausias nerimas dėl energetinio saugumo Lietuvoje siejamas su energijos įperkamumu, aplinkos apsauga bei stabiliu energijos tiekimu ir ekonomikos plėtra. Kontekstinės aplinkybės, susijusios su Lietuvos energetikos sektoriumi, atskleidžia gyventojų įsitikinimą, jog visus šiuos energetinio saugumo poreikius gali patenkinti atsinaujinančios energijos technologijos bei kogeneracinių jėgainių plėtra.

- 3.5. Lietuvos gyventojų požiūriuose į energijos technologijas vyrauja aiški diferenciacija tarp atsinaujinančios ir neatsinaujinančios energijos technologijų. Dauguma šalies gyventojų itin teigiamai vertina atsinaujinančios energijos technologijas, kai dauguma neatsinaujinančių – vertinamos neigiamai. Pozityvus atsinaujinančios energijos technologijų vertinimas rodo aukštą šių technologijų priimtinumą lygi Lietuvijoje, o pačios technologijos asocijuojamos su mažesnėmis rizikomis nei neatsinaujinančios ir kitos energijos technologijos.
- 3.6. Asmeninių manifestacijų ir kolektyvinės įtakos veiksnių skirtis gali būti naudojama analizuojant atsinaujinančios ir neatsinaujinančios energijos technologijų rizikos suvokimą ir socialinį priimtinumą. Tarp šių veiksnių ir tiriamųjų koncepcijų egzistuoja statistiškai reikšmingi ryšiai, kurių kryptys skiriasi, priklausomai nuo technologijų rūšies.
- 3.7. Klimato kaitos nuostatos, paremtos požiūriu, jog klimato kaita – kitų valstybių problema, yra svarbus veiksnys, mažinantis neatsinaujinančių ir kitų energijos technologijų rizikos suvokimą. Prie mažėjančio neatsinaujinančios energijos technologijų rizikos suvokimo taip pat prisideda pasitikėjimas institucijų gebėjimais užtikrinti šių technologijų saugumą bei nuostatos dėl poreikio Lietuvai turėti savo atominę elektrinę. Asmeninio klimato kaitos poveikio vertinimas – tiesiogiai prisideda prie didėjančio neatsinaujinančios energijos ir kitų technologijų rizikos suvokimo.
- 3.8. Atsinaujinančios energijos technologijų rizikos Lietuvoje vertinamos kaip itin žemos. Tokių nuostatų atsiradimui didžiausią įtaką turintys kolektyvinės įtakos veiksniai apima susirūpinimo energetiniu saugumu bei pasitikėjimu institucijų gebėjimais užtikrinti technologijų saugumą klausimai. Didžiausią įtaką mažėjančiam atsinaujinančios energijos technologijų rizikos suvokimui turintys asmeninių manifestacijų veiksniai apima – ekologinės tapatybės bei klimato kaitos poveikio distancijos argumentus.
- 3.9. Atsinaujinančios energijos technologijų socialinį priimtumą reikšmingiausiai formuoja susirūpinimo energetiniu saugumu

klausimai. Siekiant užtikrinti, jog visuomenės nuostatos šių technologijų atžvilgiu išliks palankios, būtina taikyti pajėgumus didinančių politikos priemonių programas, kurios taip pat prisideda prie atsinaujinančios energijos technologijų socialinio priimtimumo formavimosi.

3.10. Pagrindines prielaidas neatsinaujinančios energijos technologijų socialiniam priimtimumui formuoti ir jį stiprinti sudaro egzistuojančios nuostatos, kad klimato kaitos poveikis bus labiausiai jaučiamas kitose valstybėse bei pasaulėžiūriniai įsitikinimai siejami su žmogaus dominavimu gamtos atžvilgiu. Pasitikėjimo institucijomis bei neatsinaujinančios energijos technologijų generuojamos naudos energetiniam saugumui argumentai, taip pat reikšmingi neatsinaujinančios energijos technologijų primitinimui. Taigi siekiant to išvengti, būtina akcentuoti klimato kaitos poveikį Lietuvai bei individams asmeniškai.

3.11. Rizikos suvokimo ir technologijų socialinio priimtimumo santykio tyrimas atskleidė, jog abi šios koncepcijos tarpusavyje yra glaudžiai susijusios. Nustatyta, jog didėjantis rizikos suvokimas mažina energijos technologijų socialinį priimtimumą, o tai gali turėti neigiamų padarinių įgyvendinant energetinį perėjimą Lietuvoje. Taip pat nustatyta, kad rizikos suvokimas, veikdamas kaip mediatorius, yra svarbus kintamasis, galintis turėti reikšmingos įtakos kolektyvinių ir asmeninių manifestacijų veiksnių poveikiui, analizuojant technologijų socialinį priimtimumą. Nustatyta, kad teigiamas susirūpinimo energetiniu saugumu poveikis energijos technologijų socialiniam priimtimumui gali būti prislopintas, jei rizikos siejamos su atsinaujinančiomis energijos technologijomis bus vertinamos kaip sąlyginai didelės. Neatsinaujinančios energijos technologijų atveju nustatyta, kad pasitikėjimas institucijų gebėjimais užtikrinti energijos technologijų saugumą bei klimato kaitos poveikio nutolinimas, taip pat gali būti veikiamas rizikos suvokimo. Taigi, norint Lietuvoje sėkmingai įgyvendinti energetinį perėjimą, būtina užtikrinti tinkamą visuomenės informuotumą apie galimas atsinaujinančios ir neatsinaujinančios energijos technologijų rizikas bei skatinti gyventojų domėjimąsi globaliais aplinkosaugos iššūkiais ir jų poveikiu Lietuvai.

4. Apibendrinant galima teigti, kad Lietuvai planuojant įgyvendinti energetinį perėjimą, paremtą atsinaujinančios energijos technologijų plėtra, būtina informuoti ir lavinti visuomenę apie globalius iššūkius bei ieškoti būdų ir priemonių, galinčių paskatinti gyventojus aktyviau įsitraukti bei prisiimti asmeninę atsakomybę. Disertacijoje analizuoti Lietuvos gyventojų požiūriai sudaro sąlygas iš pačios visuomenės gautas žinias grąžinti į socialinį

gyvenimą, kuriame pasitelkiant identifikuotus, su klimato kaita siejamus veiksnius, galima viešąjį diskursą praturtinti naujomis išvalgomis ir idėjomis. Nors atliktas tyrimas turi ribojimų, kurie apima gana siaurą klimato kaitos poveikio dimensiją (kuri kaip paaiškėjo gali turėti reikšmingos įtakos energijos technologijų rizikos suvokimui ir socialiniam priimtinumui) bei klausimyne dėl didelės apimties netaikyta visa 15-os kintamųjų NEP skalė (kas galėjo šiek tiek paveikti tyrimo rezultatus), tačiau darbe identifikuoti konkretūs požiūrių aspektai, formuojantys energijos technologijų rizikos suvokimą ir socialinį priimtinumą, kompensuoja šiuos trūkumus. Taigi, besikeičianti energetinio sektoriaus vizija Lietuvos gyventojams yra priimtina, tačiau įgyvendinant energetinio perėjimo projektus – būtina atsižvelgti į gyventojų lūkesčius ir jaučiamą nerimą.

UDK 316.654:551.583+316.654:620.9](474.5)043.3)

SL344. 2021-04-20, 2,75 leidyb. apsk. I. Tiražas 50 egz. Užsakymas 114.
Išleido Kauno technologijos universitetas, K. Donelaičio g. 73, 44249 Kaunas
Spausdino leidyklos „Technologija“ spaustuvė, Studentų g. 54, 51424 Kaunas

