

Analysis of energy efficiency improvement and climate change mitigation policy in Lithuania

Z. Simanaviciene¹, A. Volochovic¹ & A. Simanavicius²

¹*Department of Economics, Kaunas University of Technology, Lithuania*

²*Lithuanian Sport University, Lithuania*

Abstract

Energy efficiency improvement and climate change mitigation policy in the EU and Lithuania is primarily focused on the energy supply side and the industrial energy users. Many studies in Lithuania have shown that without building a new nuclear power plant, but only implementing all provided energy efficiency improvement measures in Lithuania, these goals will not be achieved. But energy saving and sustainable use options in Lithuanian households remained forgotten.

Most of the studies focused on the social and psychological factors influence to energy-saving behavior, examining cognitive variables, such as values, outlook and attitudes impact on energy savings. Other authors have emphasized the importance of social processes. In this article analyse and summarize performed Lithuanian climate change mitigation policies in household's evaluation using SWOT and PEST analysis. Research shows that in order to improve energy efficiency in households, a lot of attention is paid to education and heat consumption efficiency improvement. In order to assess the ongoing climate change mitigation policies in Lithuania, PEST and SWOT analysis were performed. Sectors distinguished for analysis: home, transport, energy sector and education and training.

Keywords: behavior, households, energy savings, impact.

1 Introduction

Over the last three decades, energy savings in households by different authors is recognized as very relevant and important research topics. The 1970s oil crisis and the inevitable lack of energy accounted for the main reason which prompted the



examination of household energy consumption. Currently, in the world economy science development an important role plays a behavioral economics research, dedicated for insight of the irrational behavior of market (Brekke and Johansson-Stenman [1]; Maibach *et al.* [2]; Akerlof and Shiller [3]; Elster [4]; Gatersleben *et al.* [5]; Stern [6]; Lutzenhiser [7]; Tonglet *et al.* [8]; Jager [9]; Howard and Shetch [10]; Koppl and Whitman [11]; Lee [12]). In climate change mitigation economy a great attention is given to behavioral economics and to psychology area (Marechal [13]; Brown [14]; Oikonomou *et al.* [15]; Poortiga *et al.* [16]; Uzzel and Rathzel [17]. Energy-saving and greenhouse gas emissions mitigation by households can take place in two ways: by changing the behavior and by introducing of product innovations (Steg [18]; Steg *et al.* [19]; Steg *et al.* [20]; Schiller *et al.* [21]). Behavioral changes are primarily related to the implementation of the principles of sustainable consumption (Abrahame *et al.* [22]; Godwy [23]; Gonzales *et al.* [24]; Girod and de Haan [25]; McMakin *et al.* [26]). Product innovation is the replacement of energy-inefficient appliances and the replacement of old cars with new ones, renovation of heating systems, renewable energy use at home etc. (Faiers and Neame [27]; Zarnikau [28]; Brownstone *et al.* [29]; Ek [30]). Product innovation is related to the expenses, but behavior changes does not require any expenses, and vice versa saves people money (Borchers *et al.* [31]; Brandon and Lewis [32]; Reusswig [33]; Abrahamse and Steg [34]; Abrahamse *et al.* [35]). Most of authors focused on the social and psychological factors influence on energy-saving behavior, examining cognitive variables, such as values, attitudes and worldviews impact on energy performance. Other authors have emphasized the importance of social processes (Homans [36]; Garmendia and Stagl [37] and formation of sustainable behavior in communities (Nunes [38]). Also a significant part of the study was to reveal the information and different types feedback influence on energy savings behavior (Roberts and Baker [39]; Ueno [40]; Darby [41]; Iyer *et al.* [42]). Another important research unit includes environmental behavior shaping ethical, cultural, worldview and human capital issues (Wallerand *et al.* [43]; Bamberg and Schmidt [44]; Barnet and Serletis [45]). Despite extensive research in this area, however, there is a lack of unified and reasonable energy-saving potential behavioral changes in household's evaluation methodology that can be adapted to each particular country. While in Lithuania behavioral studies of energy-saving and greenhouse gas emissions reduction and sustainable consumption and sustainable lifestyle were not made, while Lithuania's dependence on imported fuels is growing, along with increasing energy prices. While some authors in Lithuania, examined the greenhouse gas emissions reduction in households Streimikiene and Mikalauskiene [46], Simanavičienė *et al.* [47]) in Lithuania does not even tentatively estimated Lithuanian household energy consumption and greenhouse gas emissions reduction potential for behavioral change, although this should be one of the most important Lithuanian climate change mitigation policies aimed at the targets of consumer side. Therefore, the purpose of Article is to analyse and summarize the performed Lithuanian climate change mitigation policies in household's evaluation using SWOT and PEST analyzes.



2 SWOT and PEST analysis: climate change mitigation policies in Lithuania

In Lithuania one of the main climate change mitigation policy document is the National Strategy for Sustainable Development. This strategy is beginning with the process itself definition, identifying the priorities and principles, analyzing the current development issues, which to solve sustainable development goals are set and to achieve them concrete objectives are set and establishes a sustainable development and implementation of the objectives of the evaluation indicators. For implementation of the strategy on climate change management in Lithuania additional legislation governing the execution of strategy are admitted.

Thus, the Lithuanian energy savings and climate change mitigation policy focus is concentrated on the economic market instruments, but with the possibility to apply other effective greenhouse gas emission mitigation measures: investment in more efficient technology and education. Measures applied in Lithuanian climate change management reveals a unique concentration of this policy to the public sector: building renovation (modernization), new social housing construction or other building renovation (modernization) and the adaptation for social housing, energy efficiency measures in public spaces, the installation of renewable energy source use in public buildings, boilers using fossil fuels replacement to biofuels boilers in public buildings thermal systems. Also a bit of attention paid to the business sector: environment friendly technologies that reduce emissions of greenhouse gases, installation. The measures, aimed at the household sector are concerned only with the new efficient technologies and the promotion of public education. To assess the ongoing climate change mitigation policies in Lithuania, the PEST and SWOT analysis are provided.

2.1 PEST analysis as a strategic planning tool

PEST analysis is typically performed based on macro-policy environment. This analysis is also useful for strategic planning tool that can allow the select new policies. PEST is an acronym standing for Political (Political), Economical (economy), social (social) and Technological (Technology) features.

P – Political factors can have a significant impact on the overall energy consumption. It is worth considering, whether the situation in the country is stable, what is the tax rate, and ultimately what is the public attitude to the economy. Political factors affect the authority's regulation limits. Indicated factors that help or hinder the authorities to implement Government priority strategic objectives (priorities) to carry out Government program implementation measures and can force the authority to change or transform the strategic business plan;

E – Economic factors reflect inflation and the interest rate in the country, the cost per capita, GDP growth perspectives. Economic factors show the development of country's economy, energetics (in the relevant field or sector);

S – Social factors include demographics, values, lifestyle and other changes, specific to certain societal development phase, as well as environmental and cultural factors. In different countries, the social and cultural factors of energy



consumption in households operate differently, and it is important that this factor would be considered. It is worthwhile to consider such aspects as the main religion, consumer interests, and attitudes toward green products/services approach to environmental protection.

T – Technological factors are important for evaluating new technologies, the flow of information impact to the regulated institution area, management organization and inter-institutional relations. It is useful to think about whether the country is able to produce new products/services cheaply and good quality, and are innovative products offered or any other communication with customers are in practice, and do it have been informed about new energy-saving methods.

For Lithuanian energy efficiency and climate change mitigation measures PEST analysis, the following sectors are highlights: housing, transport, energy industry, education and training.

2.2 SWOT analysis as a tool for assessing the situation

SWOT analysis is applied to the design or analysis of the strategic plans. So SWOT analysis – is some kind of strengths, weaknesses, opportunities and threats of social formation, detection and analysis method.

SWOT analysis – is a general analysis technique suitable for the application of both the initial decision-making, and to develop strategic plans. On the one hand, the SWOT analysis – this is the last step in the situation evaluation, when summarizing the research, available information, i.e. when there is a clear social situation and its features, characteristics of the institutions network, along with a needs analysis. On the other hand, the SWOT analysis – this is the first step in the creation of any derivative social development plan, finding new activities and opportunities. Exactly SWOT analysis helps to appear of realistic visions and more specific goals, which starts a strategic plan.

SWOT analysis involves two steps. First, the most important facts and data are collected. Second, the data collected and information is evaluated and it is decided whether the factors identified are the advantages and disadvantages and what they allow, what are the possible negative impact and etc. In summary, the conducted institution SWOT analysis – this is the internal situation and the surrounding environment evaluation. In other words, it is found, what the situation is at the moment, what activities are supposed, what are the conditions for this activity as well as which direction is intended to go.

3 Climate change mitigation policies in selected sectors analysis

For the climate change mitigation analysis sectors were distinguished: housing, transport, energetic sector and education and training. Sectors distinguished for analysis: housing, transport, energetic sector, education and training.

3.1 Climate change mitigation policies in the housing sector

Summarizing up climate change mitigation policy in the housing sector, the analysis leads to the conclusion that the political environment and partly economic environment is favorable for the housing sector. However, the development of the sector stops the high price of the technology, underdeveloped financing mechanisms and the general lack of knowledge. Sector development opportunities in this sector are associated with more active participation in solving the problems of housing, which is directly related to the individual environmental consciousness and financial capabilities.

3.2 Climate change mitigation policies in the energy sector analysis

Summarizing the analysis of climate change mitigation policy in the energy sector, it can be said that the for the final energy savings promotion, attention is not given, also a lack of effective renewable energy promotion, too little attention is paid to renewable energy sources. An important threat to the public's unwillingness to pay for a cleaner environment, the so-called green energy is not yet seen as a virtue, and society still fails to realize the importance of energy efficiency.

3.3 Climate change mitigation policy in the transport sector analysis

Summarizing the analysis of climate change mitigation policy in the transport sector, essential weaknesses are – old vehicles and outdated infrastructure, little attention is paid to the development of non-motorized transport. Although it is declared in the strategies for energy efficient vehicles and fuels promotion, but the conditions for them have not been created. An opportunity in this sector would be to develop appropriate projects, that it would be possible to use the EU structural funds, thereby increasing the energy efficiency in transport. The threat can be attributed to the increasing amount of greenhouse gases in the atmosphere, if it won't be limited the use of old cars, will not be prepared traffic organization.

3.4 Climate change mitigation policies in education and science and households analysis

From provided climate change mitigation policies in education and science field SWOT analysis, it can be said that Lithuania paid little attention to public environmental education. Opportunity lies in the rapid development of information technology – it provides the opportunity to use modern media to educate and inform society.

In conclusion on climate change mitigation policy sectors analysis in Lithuania, we will indicate the climate change mitigation policies in household's strengths, weaknesses, opportunities and threats (Table 1).



Table 1: SWOT analysis of Lithuanian climate change mitigation policies in households. (Source: made by authors.)

Strengths	<ul style="list-style-type: none"> • <i>The housing sector</i>: a series of measures are designed for apartment buildings energy efficiency: Apartment building modernization program, the housing strategy, opportunity to access EU structural funds. • <i>Transport sector</i> development priorities are set in the strategic development documents. • <i>Education</i>: Public awareness raising special publications in print media – newspapers, popular magazines and periodicals, reports and interviews for radio and television broadcasts, which authors are often Lithuanian scientists. • National Energy Efficiency Programme for 2006–2010 goal – to increase energy resources and energy consumption efficiency, the use of renewable energy resources in all areas of the economy. • Regulated lighting and marking of household electrical appliances. • Favorable leasing terms by banks to purchase household appliances.
Weaknesses	<ul style="list-style-type: none"> • <i>The housing sector</i> – the high price of the technology, underdeveloped financing mechanisms and the general lack of knowledge. Low incomes and limited investment opportunities due to the fact that energy saving measures are implemented very slowly. • <i>Energy</i>: The lack of legislative framework, lack of coordination and economic measures to promote the use of alternative fuels, lack of information about energy efficiency project financing options, the banks low interest loans for energy-saving projects, complex co-generators to the electricity network procedures. • The main “green” electricity and heat production support tool is the purchase rate, based on the obligation to buy this kind of energy for a fixed price. • <i>Education</i>: the country is still has a lack of information about climate change and its current and likely impacts. Lack of community awareness and participation in addressing climate change by reducing emissions of greenhouse gases. Too little attention is devoted to environmental education. There are problems in the field of environmental education – lack of perceived personal contribution, liability for environmental damage resulting from participation in the process of environmental necessity. • Few measures aimed at household energy conservation promotion.
Opportunities	<ul style="list-style-type: none"> • National Energy Strategy and National Energy Efficiency Programme for 2006–2010 will provide an opportunity to reduce fossil fuel use, to accelerate the development of the use of biofuels, alternative, renewable sources of energy use. • The good technological conditions to develop alternative fuels and non-motorized transport infrastructure in medium sized cities. • Public education by producing energy from local, renewable and waste energy resources. • Transport sector: to modernize urban traffic management systems, development of urban transport infrastructure – the construction of roundabouts, expand inland water transport system to carry out a policy that gives priority to more energy efficient transport. • The rapid development of information technology offers the opportunity to use modern media to educate and inform the society about climate change. • Making an appropriate projects in order to use the EU structural funds, thus increasing energy efficiency. • Household energy saving promotion programming.
Threats	<ul style="list-style-type: none"> • High cost prevents significant energy saving potential technologies (walls, roof insulation, etc.) application. • The so-called green energy is still not seen as a virtue, and society still fails to realize the importance of energy efficiency. • Expanding cities and diminishing importance of public transport. • Insufficient attention to environmental education, climate change-related problems in the actualization could impede the implementation of strategic objectives. • Because of old and inefficient transport growth, decline of public transport use will increase greenhouse gas emissions.

By assessing the climate change mitigation policies in households in Lithuania, it is important to note that there are conducted household surveys (Stočkutė [48]), which reveals the position of households on energy efficiency. JSC “Sostines namai” and JSC “Viessmann” studies revealed the position of the Lithuanian population by increasing the thermal efficiency and the level of awareness: 16 percent of respondents do not know nothing about biofuels or wind, water and solar energy, geothermal heating. By Lithuanian representative population survey, 69 per cent of Lithuanian population even with rising heating prices do not intend to invest in measures to conserve heat. Such attitudes can be explained by information loss on alternative heating methods and their payback shortage ignorance of how to reduce home energy. The Department of Statistics in the first half of 2010 has conducted a survey of energy consumption by the household energy consumption in households in 2009. The study concluded that less than 1 percent of households living in detached houses, for the house heating and hot water have installed heat pumps. (The heat pump collects heat in the ground, water or air, passes it to the housing and the housing system distributes the heating system.) Other important source of renewable energy is solar energy. According to the survey, households in Lithuania rarely uses solar panels for heating. Only a few of the surveyed households indicated that they have installed solar panels. Solar panels installation requires a substantial investment from the public, and government support for renewable energy promotion is not yet sufficient. So, these studies (Stočkutė [48]) confirms that not enough attention is given in household education.

4 Conclusions

Summarizing the climate change mitigation policy analysis in Lithuania, it should be noted that with the studies conducted, the GHG emission reduction measures in Lithuania should first be directed to energy efficiency. Energy saving is the most efficient and cost-effective way to reduce the greenhouse gas emissions in all GHG emissions sectors (Streimikiene [49]). However, summarizing the analysis carried out it is noted that Lithuania electricity end-use efficiency, have received little attention. Although it is declared in strategic documents, but almost no concrete measures are taken (e.g. smart energy metering installation).

Labeling of household appliances are now the main means of electrical efficiency in the domestic sector innovation, because it allows to distinguish between efficient appliances and to ensure that the minimum non-compliant devices will enter the market. Apartments and public buildings renovation and consumer information is the biggest tools designed increase of end use energy efficiency.

References

- [1] Brekke, K. A., Johansson-Stenman, J. The Behavioral Economics of Climate Change. *Oxford Review of Economics*, 23 (2), pp. 280-297, 2008.
- [2] Maibach, E. W., Rose-Renouf, L. A., Leiserowitz, A. Communication and Marketing as Climate Change-Intervention Assets. *Am J Prev Med*, 35, pp. 488-500, 2008.



- [3] Akerlof, G. A., Shiller, R. J. *Animal spirit*. Princeton, New Jersey: Princeton University Press, 2009.
- [4] Elster, J. Rationality and the Emotions. *The Economic Journal*, Blackwell Publishing, Nr. 438, pp. 1386-1397, 1996.
- [5] Gatersleben, B., Steg, L., Vlek, C. Measurement and determinants of environmentally significant consumer behavior. *Environment and Behavior*, 34, pp. 335-362, 2002.
- [6] Stern, P. Toward a Coherent Theory of Environmentally Significant Behavior. *Journal of Social Issues*, 56, pp. 407-424, 2000.
- [7] Lutzenhiser, L. Behavioral Assumptions Underlying California Residential sector Energy Efficiency programs. California Institute for Energy and Environment. Online: http://ciece-dev.eecs.berkeley.edu/energyeff/documents/ba_ee_res_wp.pdf, 2009.
- [8] Tonglet, M; Phillips, P; Read, A. Using the Theory of Planned Behaviour to investigate the determinants of recycling behavior: a case study from Brixworth, UK. *Resources, Conservation and Recycling*, 3, pp. 191-214, 2004.
- [9] Jager, W. *Modelling Consumer Behaviour*. Universal Press, Groningen: Online: <http://dissertations.ub.rug.nl/FILES/faculties/ppsw/2000/w.jager/thesis.pdf>, 2000.
- [10] Howard, J., Shetch, J. *The theory of buyer behaviour*. New York: John Wiley, Online: <http://www.jagsheth.net/docs/A%20Theory%20of%20Buyer%20Behavior2.pdf>, 1969.
- [11] Koppl, R., Whitman, G. Rational Choice Hermenutics. *Journal of Economic Behaviour & Organization*, 3, pp. 295-317, 2004.
- [12] Lee, J. Adapting Triandis's Model of Subjective Culture and Social Behaviour Relations to Consumer Behaviour. *Journal of Consumer Psychology*, Nr. 9, pp. 117-126, 2000.
- [13] Marechal, K. The economics of climate change and the change of climate in economics. *Energy policy*, 35, pp. 5181-5194, 2007.
- [14] Brown, M. Market failures and barriers as a basis for clean energy policies. *Energy policy*, 29, pp. 1197-1207, 2001.
- [15] Oikonomou, V., Becchis, F., Steg, L., Russolillo, D. Energy Saving and Energy Efficiency Concepts for Police Making. *Energy Policy*, 11, pp. 4787-4796, 2009.
- [16] Poortiga, W., Steg, L., Velek, C. Wiersma, G. Household preferences for energy-saving measures: a conjoint analysis. *Journal of Energy Psychology* 24, pp. 49-64, 2003.
- [17] Uzzel, D., Rathzel, N. Changing relations in global environmental change. *Global Environmental Change*, Nr. 19, p. 326-335. Online: http://www.elsevier.com/wps/find/journaldescription.cws_home/30425/description#description, 2009.
- [18] Steg, L. Promoting households energy conservation. *Energy Policy*, 36, pp. 4449-4453, 2008.
- [19] Steg, L., Dreijerink, L., Abrahamse, W. Acceptability of energy policies. *Environment and Behavior*, Nr. 38, p. 92-111, 2006.



- [20] Steg, L., Dreijerink, L., Abrahamse, W. Factors influencing the acceptability of energy policies: A test of VBN theory. *Journal of Environmental Psychology*, 4, pp. 415-425, 2005.
- [21] Schiller, S. R., Prindle, B., Cowart, R., Rosenfeld, A. H. Energy Efficiency and Climate Change Mitigation Policy. 2008 ACEEE Summer Study on Energy Efficiency in Buildings, American Council for an Energy Efficient Economy, Washington, DC., pp. 1-15, 2008.
- [22] Abrahamse, W., Steg, L., Vlek, C. & Rothengatter, T. The effect of tailored information, goal setting, and tailored feedback on household energy use, energy related behaviors, and behavioral antecedents. *Environmental Psychology*, 27 (4), pp. 265-276. Online: <http://sustainablecities.org.nz/wp-content/uploads/Abrahamse-et-al-2007-tailoring-article-JEP.pdf>, 2007.
- [23] Godwy, J. M. Behavioral economics and climate change policy. *Rensselaer Working papers in Economics*. 0701, pp. 1-38, 2007.
- [24] Gonzales, M. H., Aronson, E., Costanzo, M. A. Using social cognition and persuasion to promote energy conservation: A quasi-experiment. *Journal of Applied Social Psychology*, 18, pp. 1049-1066, 1988.
- [25] Girod, B., de Haan, P. GHG reduction potential of changes in consumption patterns and higher quality levels: evidence from Swiss household consumption survey. *Energy policy* 37, pp. 5650-5661, 2009.
- [26] McMakin, A., Malone, E., Lundgren, R. Motivating Residents to Conserve Energy without Financial Incentives. *Environment and Behavior* Nr. 34, p. 848-863. Pacific Northwest National Laboratory. Online: <http://www1.eere.energy.gov/femp/pdfs/motivateresidentstoconserveenergy.pdf>, 2002.
- [27] Faiers, A., C. Neame, C. Consumer Attitudes towards Domestic Solar Power Systems. *Energy Policy*, 34, pp. 1797-1806, 2006.
- [28] Zarnikau, J. Consumer demand for Green Power and Energy Efficiency. *Energy Policy*, 31 (15), pp. 1661-1672, 2003.
- [29] Brownstone, D., Bunch, D. S., Train, K. Joint mixed logit models of Stated and Revealed Preferences for alternative-fuel vehicles. *Transportation Research B* (34), pp. 315-338, 2000.
- [30] Ek, K. Public and Private Attitudes Towards "Green" Electricity: The Case of Swedish Wind Power. *Energy Policy* 33 (13), pp. 1677-1689, 2005.
- [31] Borchers, A.M., Duke, J.M., Parsone, G.R. Does willingness to pay for green energy differ by source? *Energy Policy*, 35, pp. 3327-3334, 2007.
- [32] Brandon, G., Lewis, A. Reducing Household Energy Consumption: A Qualitative and Quantitative Field Study. *Journal of Environmental Psychology*, Nr. 19, pp. 75-85. Online: <http://rrwww.idea.library.com> on, 1999.
- [33] Reusswig, F. Sustainability Transitions Through the Lens of Lifestyle Dynamics, Sustainable Production Consumption Systems Knowledge, Engagement and Practice. Amsterdam: Springer Netherlands, pp. 35-59, 2010.
- [34] Abrahamse, W., Steg, L. How do socio-demographic and psychological factors relate to households' direct and indirect energy use and savings?

- Economic Psychology*, 30, pp. 711-720. Online: <http://www.rug.nl/staff/e.m.steg/abrahamsestegenergy.pdf>, 2009.
- [35] Abrahamse, W., Steg, L., Vlek, C. & Rothengatter, T. A review of intervention studies aimed at household energy conservation. *Environmental Psychology*, 25(3), pp. 273-291. Online: <http://www.science-direct.com/science/article/pii/S027249440500054X>, 2005.
- [36] Homans, G. *Social Behaviour Its Elementary Forms*. London: Routledge & Kegan P. p. 406, 1961.
- [37] Garmendia, E., Stagl, S. Public participation for sustainability and social learning: concepts and lessons from three case studies Europe. *Ecological Economics*, 69, pp. 1712-1722, 2010.
- [38] Nunes, P. Using factor analysis to identify customer preferences for the protection of a natural area in Portugal. *European Journal of Operational Research*, 2002.
- [39] Roberts, S., Baker, W. Towards Effective Energy Information: Improving consumer feedback on energy consumption. *Centre for Sustainable Energy*. Online: <http://www.cse.org.uk/pdf/pub1014.pdf>, 2003.
- [40] Ueno, T. Effectiveness of displaying energy consumption data in residential houses Analysis on how the residents respond. In: Printed Proceedings, European Council for an Energy-Efficient Economy. Online: http://www.ce.cmu.edu/~gdrg/readings/2006/02/21/Tsuji_EnergyDisplays.pdf, 2005.
- [41] Darby, S. The Effectiveness of Feedback on Energy Consumption – A Review for Defra of the Literature on Metering, Billing and Direct Displays. Environmental Change Institute, Oxford University. Online: <http://www.eci.ox.ac.uk/research/energy/downloads/smart-metering-report.pdf>, 2006.
- [42] Iyer, M., Kempton, W., Payne, C. Comparison groups on bills: Automated, personalized energy information. *Energy and Buildings*, 8, pp. 988-996, 2006.
- [43] Wallerand, R., Deshaies, P., Cuerrier, P. Mongeau, C. Ajzen and Fishbein's Theory of Reasoned Action as Applied to Moral Behaviour: A Confirmatory Analysis. *Journal of Personality and Social Psychology*, 1, pp. 98-109, 1992.
- [44] Bamberg, S., Schmidt, P. Incentives, Morality, or Habit? Predicting Students Car Use for University Routes with the Models of Ajzen, Schwartz, and Triandis. *Environment and Behavior*, 35, pp. 264-285, 2003.
- [45] Barnett T, W., Serletis, A. Consumer preferences and demand systems. *Econometrics*, 147, pp. 210-224, 2008.
- [46] Streimikiene, D., Mikalauskiene, A. Klimato kaitos švelninimo priemonių parinkimas, taikant daugiakriterinius sprendimų priėmimo metodus [The selection of measures for mitigation of climate changes by using multi-criteria decision making techniques]. *Energetika [Energetics]*, 54 (2), pp. 62-69, 2008.
- [47] Simanavičienė, Ž., Volochovič, A., Gižienė, V. Energy behaviour in households: basic patterns of behavior and their impact on energy savings

in households // Proceedings of the 11th Eurasia Business and Economics Society Conference (EBES), September 12-14, 2013, Ekaterinburg, Russia. Istanbul: EBES, pp. 216-226, 2013.

- [48] Stočkutė E. Ar saulės energija gali pakeisti šildyti naudojamą kurą? Online: <http://www.spec.lt/get.php?f.23664>, 2008.
- [49] Streimikiene, D. Lietuvai pagal naujausius Europos komisijos metodologijos siūlymus nustatomų išipareigojimų dėl ES šiltnamio dujų mažinimo tikslų iki 2020 m. įgyvendinimo galimybių analizė, poveikio vertinimas ir pasiūlymai dėl Lietuvos pozicijos. Online: http://www.am.lt/VI/article.php3?article_id=8175, 2008.

