
THE MAIN DRIVERS OF ENVIRONMENTALLY RESPONSIBLE BEHAVIOUR IN LITHUANIAN HOUSEHOLDS

Dalia Streimikiene*

*Lithuanian Sports University, Institute of Sport Science
and Innovations, Kaunas, Lithuania*

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Abstract

Preserving environmental and natural resources is one of the most important challenges for ensuring the sustainability of well-being over time. One can notice that measuring of environmental indicators related to environmentally responsible behaviour is complicated and demanding task. It is also important to define the main drivers of environmentally responsible development. The objective of this paper is to provide comparative analysis of indicators of environmentally responsible behaviour in the Baltic States by comparing and assessing them in terms of the EU-28 average and to present the main drivers of environmentally responsible behaviour in Lithuania. Environmentally responsible behaviour is related to resource and energy savings, use of renewable energy sources, waste sorting and recycling, wastewater disposal etc. Comparative assessment of environmentally responsible behaviour indicators in the Baltic States indicated that all these indicators are below the EU-average, except the use of renewable energy sources. The main drivers of consumption behaviour in Lithuania were assessed by applying households surveys in order to define the major issues of concern and to develop relevant policies targeting these issues. Age, gender, education, and income of Lithuanian residents do not have impact on environmentally responsible behaviour in Lithuanian households (energy saving, buying energy efficient electric appliances, willingness to pay electricity from renewable energy sources use of biofuels). Only environmental awareness has impact on energy saving behaviour at home and use of biofuels in cars and waste recycle.

Keywords: environmentally responsible behaviour, drivers of behavioural changes, resource productivity, energy productivity, renewable energy sources, waste recycling.

JEL Classification: Q41, Q5, Q58, C91

Introduction

* Author's contact: dalia.streimikiene@lei.lt

The environmental indicators are being used to assess the quality of life. The environmental indicators related to the quality of life are usually being assessed by applying the following groups of indicators: environmental quality, environmentally responsible behaviour and consumption of environmental services provided (Streimikiene and Kiausiene, 2014). These groups of indicators have mutual relationship as environmentally responsible behaviour positively influence environmental quality and guarantees higher consumption of services which environment can provide.

Sustainable consumption of environmental and natural resources is a significant challenge of sustainable development and well-being over time. The development and measurements of environmental indicators and especially those related to environmentally responsible behaviour is a difficult task as the size of the impacts of current environmental trends on future well-being is uncertain and because there are just few comparable indicators that meet agreed standards among all countries. Therefore benchmarking and making comparison between countries are difficult.

Kollmuss and Agyeman (2002) developed a study and proved that demographic factors, and such external factors as institutional, economic, social, and cultural issues and internal factors such as motivation, pro-environmental knowledge, awareness, values, attitudes, emotion, control, responsibilities, and priorities play important role in shaping pro-environmental behaviours among nations. The environmental awareness include environmental values, environmental attitudes, willingness to act based on ecological knowledge and in the end actual pro-environmental behaviour.

However, it was proved by several studies (Kollmuss and Agyeman, 2002) that increased environmental awareness does not always provide for actual pro-environmental behaviour. There is the gap between the various components of environmental awareness because of the complexity of reality and other important economic, structural etc. factors paying important role in shaping pro-environmental behaviour.

Lutzeheiser (1993) concluded that according to paradigm of behavioural economics the society can have impact on individual preferences through socialization process and social norms. Government are able to promote environmentally responsible behaviour by implementing policies to promote sustainable consumption and pro-environmental behaviour. Governments can also influence development of social norms and attitudes through implementation of information-based instruments (dissemination of information through communication campaigns and social marketing through mass media) and in this way contribute to increasing the acceptability of developed policies.

The objective of paper is to provide comparatives analysis of indicators of environmentally responsible behaviour in Baltic States by comparing and assessing them in terms of EU-28 average and to present the main drivers of environmentally responsible behaviour in Lithuania based on conducted case study. The main research objectives are as follows:

- To review literature on environmental responsible behaviour and it's drivers.
- To analyse indicators of environmentally responsible behaviour in the Baltic States and compare with the EU-28 indicators using official statistics provided by Eurostat.
- To analyse the results of empirical study dealing with the main drivers of environmentally responsible behaviour in Lithuania.
- To discuss results of study and develop policy recommendations.

The first chapter of the paper presents the review of literature on environmentally responsible behaviour and its major drivers in residential sector. The second chapter analyses indicators of environmentally responsible behaviour in the Baltic States and compares with the EU-28 average based on statistics provided by Eurostat. The third chapter briefly describes methodology of case study conducted in Lithuania and results. Finally, conclusions are developed addressing the main findings and policy implications of the conducted study.

1. The main drivers of environmentally responsible behaviour

Pricing has the main impact on consumption decisions however other factors also play an important role. As countries differ in terms of cultural values, psychological characteristics etc. it is important to explore these issues in analysing the main drivers of environmentally responsible behaviour in country. Therefore, the main idea is that environmentally responsible behaviour is essentially driven by economic and non-economic factors. Non-economic factors can be divided into: technological, policy and others. Others include cultural, psychological and institutional factors. Attitudinal variables, also very important as they portray an individual, are state of mind or feeling. A definition of “attitude” in social psychology is the valuation of a concept or an object (Sjoberg and Engelberg, 2005). Studies (Sjoberg and Engelberg, 2005; Lutzenheiser, 1993; 2002, Fransson and Garling, 1999) summarise the literature related to environmental concerns, arguing that these concerns are only weakly correlated with socio-demographic and psychological factors.

Institutional issues also playing important role as represent the institutional capital having positive impact on behaviour patterns and attitudes of the people. Policies aiming at overcoming market failures have impact on residential consumption and environmentally responsible behaviour (Streimikiene, 2014).

Generally the policies are being developed and implemented because of market failures. One of the most widely known market failures in the environmental economics are externalities. However there are other market failures having impact on residential energy use. Policy makers may need to use policies and measures to remove other failures in addition to the instruments more directly targeting the environmental externality, such as energy tax.

The slow adoption of environmentally preferable goods is mainly due to market failures such as information failures and high search costs. Information-based instruments, such as energy labels for appliances and building certificates are being introduced in combination with energy taxes by the Government. In addition there are differences in access to information across households which prevent some household groups from expressing their underlying demand for environmental quality. Low-income households face constraints to access the credit market, preventing them from making investments in environmentally preferable goods (buying alternative fuel vehicles, energy efficient equipment, etc.) which would be cost effective for them to undertake (Levinson and Niemann 2004). Therefore policy makers need to adopt policies and measures to address these market failures and barriers.

A variety of approaches toward changing user behaviours have been proposed, such as providing technical alternatives, regulatory rules, financial incentives, information, social

example etc. (Geller, 2002; Geller et al., 1982; Gardner and Stern, 2002; Vlek and Keren, 1992; Vlek and Steg, 2002; Vlek, 1996; 2000). Whichever strategies are considered, their effectiveness largely depends on indicating the actual behaviour determinants. Behaviour determinants depend on individual background or psychological characteristics, among other aspects (Dinu, Grosu and Saseanu, 2015). Changes in human behaviours may be encouraged by addressing individual persons' and groups' knowledge, beliefs, and preferences, for instance, through marketing, advertising, and information strategies. However, such "demand-side management" may have limited effects. Behavioural changes and adaptations may also be induced by modifying choice situations through demand-side management measures (Borden and Schettino, 1979; Geller, 2002).

The EU barometer provides some information about attitudinal variables, such as the households' view towards "green" consumption across the EU which are varying across the EU countries. Different preferences can help to explanation of this fact. Because preferences differ, it is obvious that two households with identical observable characteristics (income, education, sex and so on) may demand different baskets of goods, including energy goods. Detailed research (Lutzenheiser, 1993) shows that similar households living in similar housing display widely varying consumption patterns. The conclusion is that if preferences are heterogeneous across the population, the response to price changes may well differ between otherwise identical households. The preferences and attitudes are related with individual characteristics of households as well with cultural values and psychological characteristics. Several studies indicated that environmental education and awareness play important role in developing environmentally responsible behaviour patterns (Zvirbli and Buracas, 2012; Hungerford, Peyton and Wilke, 1980; Harvey 1977; Childress, 1978; Arbuthnot, 1977, Stapp et al., 1969), therefore it is important to define how environmental awareness and other socio-demographic characteristics influence environmentally responsible behaviour.

2. Environmentally responsible behaviour indicators

Pro-environmental or environmentally responsible behaviour is related to sustainable consumption of natural resources and energy savings, use of renewable energy sources, waste sorting and recycling, wastewater collection and disposal. The main indicators of pro-environmental or environmentally responsible behaviour in EU can be developed based on Eurostat data. These indicators are: resource and energy productivity, the share of renewables in final energy consumption, packaging waste recycling rate and sewage sludge production and disposal per capita indicators. These indicators have direct positive impact on quality of life as they are the main drivers of environmental quality indicators (Streimikiene and Kiausiene, 2014). Therefore the increase of these indicators is the desired trend and the Baltic States can be compared in terms of these indicators by indicating the best performing country based on higher values of these indicators. The trends of these indicators for the Baltic States after the EU accession can reveal the impact of the EU environmental policy on environmentally responsible behaviour indicators.

Wastewater treatment is an important issue in pro-environmental behaviour. There are different types of waste water disposal. Mainly sewage sludge generated from wastewater cleaning being disposed in agriculture as fertilizer. Sewage sludge disposal per capita is a good indicator of pro-environmental behaviour.

The waste is another important issue of environmentally responsible behaviour. Recycling of waste is aimed to reduce negative impact of waste and it is promoted by the EU environmental policies. Therefore recycling of waste was selected as environmentally responsible indicator in waste sector.

Very important indicator in addressing environmentally responsible behaviour in the country is resources productivity. Resource productivity is GDP divided by domestic material consumption (DMC). DMC measures the total amount of materials directly used by an economy. It is defined as the annual quantity of raw materials extracted from the domestic territory of the focal economy, plus all physical imports minus all physical exports. It is important to note that the term "consumption" as used in DMC denotes apparent consumption and not final consumption. DMC does not include upstream flows related to imports and exports of raw materials and products originating outside of the focal economy. When examining resource productivity trends over time in a single geographic region, the GDP that should be used is in units of Euros in chain-linked volumes to the reference year 2005 at 2005 exchange rates. If comparisons of resource productivity between countries are made then the GDP in purchasing power standards should be used.

Energy productivity is important indicator of pro-environmental behaviour and it is assessed by dividing GDP by primary energy consumption. This indicator shows energy use efficiency in specific country and can be used as a good benchmark for comparing countries in terms of achievements in pro-environmental behaviour.

Promotion of renewable energy sources is the priority of the EU energy and environmental policy. The increase of usage of renewable energy sources is the main issue of sustainable energy development and has the positive impact on climate change mitigation and GHG emission reduction. Increase use of renewable energy sources has positive impact also on and security of energy supply as renewable energy sources are local energy supply sources. Renewables also has positive impact on increase of employment as generates new jobs (Streimikiene and Sarvutyte-Grigaliuniene, 2013). This indicator can be used for assessment of environmentally responsible behaviour and indicates the priorities in energy resource consumption.

The dynamics of the main indicators of environmentally responsible behaviour in the Baltic States and the EU-28 is presented in Table no. 1.

Table no: 1. Development of environmentally responsible behaviour indicators in the Baltic States and comparison with the EU-28

	2004	2005	2006	2007	2008	2009	2010	2011
Sewage sludge production and disposal per capita, kg								
EU (28)	18	18	20	20	22	22	22	22
Estonia	22	22	20	21	17	17	16	16
Latvia	16	13	10	10	10	10	11	11
Lithuania	19	19	21	23	16	16	15	15

Recycling of packaging waste, %								
EU (28)	54	55	57	59	61	63	63	64
Estonia	34	40	46	50	44	57	56	63
Latvia	46	47	42	40	47	45	49	51
Lithuania	33	33	37	43	52	58	60	63
Resource productivity in EU, EUR/kg								
EU (28)	1.39	1.4	1.42	1.43	1.46	1.57	1.65	1.6
Estonia	0.35	0.39	0.39	0.35	0.38	0.36	0.38	0.42
Latvia	0.31	0.3	0.31	0.32	0.37	0.39	0.34	0.32
Lithuania	0.49	0.51	0.55	0.51	0.49	0.62	0.57	0.56
Energy productivity in EUR per kg of oil equivalent								
EU (28)	6	6.1	6.3	6.5	6.6	6.7	6.6	-
Estonia	1.8	2	2.3	2.2	2.2	2.1	1.8	-
Latvia	2.7	2.9	3.1	3.3	3.3	2.9	2.7	-
Lithuania	2.1	2.4	2.6	2.7	2.7	2.5	3.2	-
The share of renewable energy sources in final energy consumption, %								
EU (28)	8	9	9	10	11	12	13	13
Estonia	18	18	16	17	19	23	25	26
Latvia	33	32	31	30	30	34	33	33
Lithuania	17	17	17	17	18	20	20	20

The amount of sludge generated per inhabitant depends on a variety of factors and countries use different pathways for its disposal. The rate of sludge disposal in the Baltic States is lower than the EU-28 average. In terms of recycling of package waste just Latvia is slightly below the EU-28 level. As one can see from data in Table no. 1, Estonia is the best performing country in terms of almost all environmentally responsible behaviour indicators. Lithuania is best performing country in terms of waste recycling as in 2010 Lithuania showed the best results in waste recycling though in 2004 this was in the worst performing countries among the EU member states. Latvia has the highest share of renewable energy sources in final energy consumption among the EU member states.

In terms of energy and resource productivity, the Baltic States are significantly below the EU 28 level though there are positive trends in the Baltic States. Therefore one can conclude that almost all indicators of environmentally responsible behaviour in the Baltic States are below the EU-28 except indicators related to the use of renewable energy sources. Especially Latvia distinguishes with high use of renewable energy sources because of developed hydro energy in the country. The usage of renewables in the country is more related to local conditions (hydrology, solar radiation, wind speed) than with policies and

environmentally responsible behaviour and people values and attitudes have quite limited impact on increase of usage of renewable in the specific country.

3. Results of empirical study for assessment of environmentally responsible behaviour patterns in Lithuania

3.1 Methodology

The empirical study was conducted in Lithuania in 2014 April 11 – 23 seeking to reveal the main drivers of environmental behaviour of Lithuanian households related to energy consumption. The study was performed by VILMORUS for the project funded by the European Social Fund under the Global Grant measure (No. VP1-3.1-ŠMM-07-K-03-032).

Number of Respondents: N = 1002. The survey was conducted at home of respondents. The multi-stage random sampling approach was applied. The research error – 3.1%.

The several questions related with environmentally responsible behaviour were included in questionnaire:

- Do you prefer energy saving appliances when buying?
- Do you save energy at home?
- Are you willing to pay more for electricity produced from renewable?
- Do you use biofuels in car?
- Do you recycle waste?

All these questions allow understanding the involvement of Lithuanian households in implementation of sustainable consumption patterns: increase in resources productivity, energy productivity, use of renewable energy, waste recycling etc.

The main drivers of environmentally responsible behaviour were assessed by applying correlation analysis between the main drivers of environmentally responsible behaviours: education level, income, the share of income paid for energy bills, environmental awareness etc. and selected answers on five questions related with environmentally responsible behaviour of Lithuanian residents.

3.2 Results of empirical study conducted in Lithuania

The 1st question presented in Questionnaire was included with the aim to define the preferences of Lithuanian inhabitants in buying appliances. The inhabitants were asked: do they prefer energy efficiency appliances in buying process?

In Figure no. 1 the distribution of respondents in terms of answering to the first question are presented.

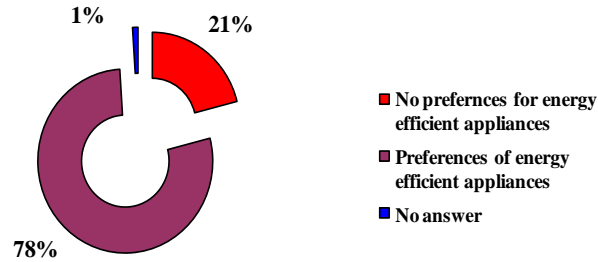


Figure no. 1: The distribution of respondents according the answers to the first question

As one can see from data presented in Figure no. 1, about 80% of respondents answered that they prefer energy efficient appliances then buying new appliances. More than 20% of respondents do not take into account energy use efficiency of electric appliances when buying. Just 1% of respondents didn't answer this questions. This result shows quite high preference of Lithuanian consumers to buy energy efficient appliances.

The second question in Questionnaire was related with energy saving behaviour of Lithuanian households. The respondents were asked: do they save energy at home?

The distribution of answers of respondents according to the second question is presented in Figure no. 2.

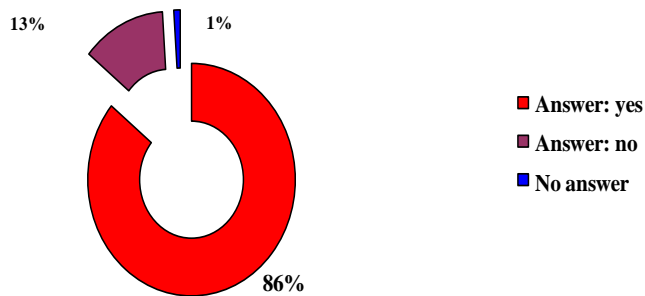


Figure no. 2: The distribution of respondents according the answers to the second question

As one can see from data provided in Figure no. 2 most of the Lithuanian households (87% of respondents) are saving energy at their homes. Just 13% of respondents do not save energy at home. 1% of respondents ignored and didn't answer to this question.

The third question in Questionnaire aimed to assess the willingness of households to pay more for the electricity produced form renewables and in such way to promote production of electricity from renewable energy sources. The willingness of Lithuanian households to pay more for electricity produced from renewable is presented in Figure no. 3.

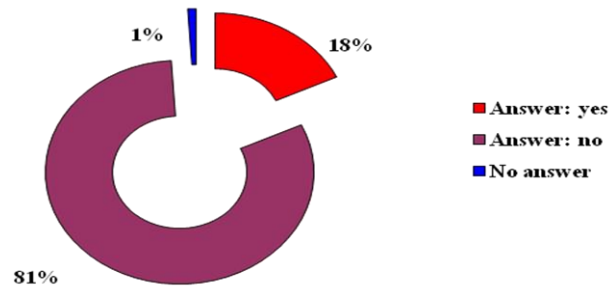


Figure no. 3: The distribution of respondents according the answers to the third question

As one can see from Figure no. 3 most of the Lithuanian consumers are not keen to pay more for electricity produced from renewables. 81% of respondents were not willing to pay more for electricity produced from renewable energy sources. Just 18% of respondents are willing to pay more for green electricity. 1% of respondents didn't reply to this question.

The fourth question in Questionnaire aimed to evaluate Lithuanian households preferences in buying biofuels for their cars. The distribution of respondents based on answers to the fourth question is presented in Figure no. 4.

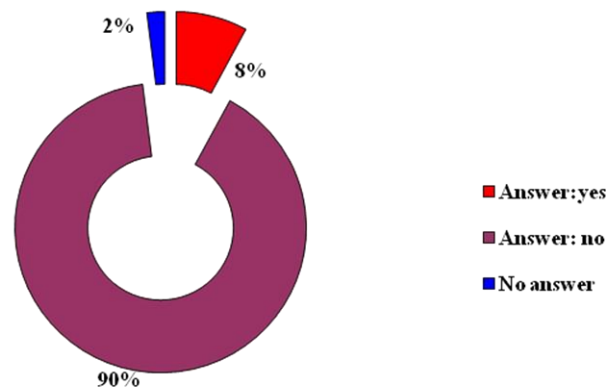


Figure no. 4: The distribution of respondents according the answers to the fourth question

One can notice from Figure no. 4 that 90% of respondents do not use biofuels in their cars. Just 8% of respondents use biofuels in their cars and 2% of respondents ignored this question.

Respondents were asked about waste recycling in the fifth question aiming to evaluate pro-environmental behaviour in this field. The distribution of answers to the 5th question related to waste recycling is given in Figure no. 5.

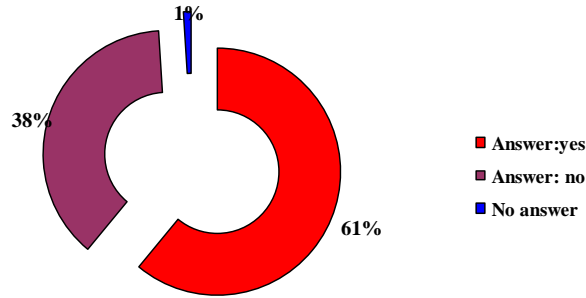


Figure no. 5: The distribution of answers according waste recycling patterns

Information provided in Figure no. 5 shows that 61% of Lithuanian respondents are recycling the waste and 38% of respondents do not recycle the waste. 1% of respondents ignored this question.

The survey conducted in Lithuania showed high preferences of energy saving behaviour among Lithuanian households and quite low preferences of Lithuanian households to support renewable energy sources. The preferences and involvement in waste recycling is also quite low among Lithuanian households. The results of such low involvement of households in waste recycling have impact on low recycling rates for packaging waste in Lithuania (Table no. 1). However situation is improving. The survey conducted in Lithuania indicated that though most of Lithuanian households are involved in energy saving, the country distinguishes with very low energy productivity rates among the EU member states. This can be explained by structural problems of Lithuanian economy as industry, transport having highest energy intensity make the high share of total GDP.

The impact of the main drivers of environmentally responsible behaviour (gender, age, income, education, environmental awareness) was assessed by calculating Person's correlation coefficients. In Table no. 2 the correlation matrix is presented.

Table no. 2: Correlation matrix

		Gender	Age	Income per month, LTL:	Education	Use of biofuels in transport	Preferences for energy saving appliances	Willingness to pay for renewables	Energy saving at house-holds	Waste recycle
Gender	Pear-son Correlation	1	-0,0316	0,0156	0,0851	0,01390	-0,01072	-0,010	0,0117	0,0002
	Sig. (2-tailed)		0,3172	0,6221	0,0071	0,6603	0,7347	0,7617	0,7117	0,994
Age	Pear-son Correlation	-0,032	1	-0,0756	-0,1316	0,0315	-0,0202	0,0903	-0,0356	0,016
	Sig. (2-tailed)	0,317		0,0167	2,9E-05	0,3198	0,5224	0,0042	0,2599	0,617
Income per month, LTL	Pear-son Correlation	0,016	-0,075	1	0,0243	0,0733	0,0344	-0,003	0,0152	0,014

		Gender	Age	Income per month, LTL:	Education	Use of biofuels in transport	Preferences for energy saving appliances	Willingness to pay for renewables	Energy saving at house-holds	Waste recycle
	Sig. (2-tailed)	0,622	0,0166		0,4407	0,0203	0,2768	0,9348	0,6314	0,669
Education	Pear-son Correlation	0,085	-0,131	0,0244	1	-0,039	-0,0624	-0,036	0,0334	-0,04
	Sig. (2-tailed)	0,007	2,91E-05	0,4407		0,2203	0,048	0,2557	0,2903	0,2684
Environmental awareness	Pear-son Correlation	0,0818	-0,006	0,0652	0,1431	-0,5139	-0,0698	-0,0120	-0,5139	-0,796
	Sig. (2-tailed)	0,0096	0,834	0,0390	5,3E-06	0,6584	0,0273	0,7035	0,6584	0,0117

As one can see from Table no. 2 age, gender, education, and income do not have impact on environmentally responsible behaviour in Lithuanian households (energy saving, buying energy efficient electric appliances, willingness to pay electricity from renewable energy sources; use of biofuels). Just environmental awareness has impact on energy saving behaviour at home and use of biofuels in cars and waste recycle.

Policies targeting behavioural changes in household needs to be implemented in Lithuania seeking to achieve resource and energy saving, renewable and waste disposal targets. These are information campaigns on energy saving, waste disposal etc. for households using mass media and social advertisement measures, establishment of institutions responsible for providing information on energy savings and conducting home energy audits on customers request, provision of tailored information and feedback based on home energy audits, setting more frequent and more informative energy bills for customers etc.

The transport sector also needs more policies attention as this is the most energy intensive sector. Lithuania obviously lacks effective policies and measures influencing behavioural changes in this sector. The financial instruments to support use of hybrid and electric vehicles, measures to promote eco driving, and traffic management measures are necessary in Lithuania. The improvement of road infrastructure and public transport modernization are also promising.

Conclusions

Analysis of environmentally responsible indicators in energy sector of the Baltic States indicated similar trends in increase of these indicators since the EU accession. However all indicators of environmentally responsible behaviour in the Baltic States are below the EU-28 average except indicators related to the use of renewable energy sources. However use of renewable energy sources is related with local conditions such as hydrology, wind speed, solar radiation etc. and policies as well as environmentally responsible behaviour attitudes have limited impact on increase of renewable energy consumption.

The main drivers of energy consumption behaviour in Lithuania were assessed by applying households surveys in order to define the major issues of concern and to develop relevant policies targeting these issues.

Age, gender, education, and income of Lithuanian residents do not have impact on environmentally responsible behaviour in Lithuanian households (energy saving, buying energy efficient electric appliances, willingness to pay electricity from renewable energy sources; use of biofuels). Just environmental awareness has impact on energy saving behaviour at home and use of biofuels in cars and waste recycle.

The most important role in implementing the EU policies targeting sustainable development can be placed on promotion of environmentally responsible behaviour which can be achieved through environmental education.

The Government of Lithuania should focus more on promotion of environmentally responsible behaviour in Lithuania in order to achieve resource and energy saving, renewable and waste disposal targets. These are information campaigns on energy saving, ecological driving, waste disposal etc. for households using mass media and social advertisement measures, establishment of institutions responsible for providing information on energy savings and conducting home energy audits on customers request, provision of tailored information and feedback based on home energy audits, setting more frequent and more informative energy bills for customers etc.

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