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Low Carbon Transport: Ready to Pay a Car Tax? The Lithuanian Case

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The paper analyses road transport indicators and citizens' attitudes as well as willingness to pay a car tax in Lithuania. The increasing motorization rate and a relatively old car fleet contribute to the increasing carbon emissions in the road transport sector, despite some improvement in renewable consumption. As one of the possible policy measures to change the car fleet and gain budget revenues, a car tax could be applied. Respondents express some willingness to pay a car tax; however, willingness to pay is much lower compared with the intended tax. Factors like income and age were the predictors of willingness to pay. Respondents with higher income were ready to pay a bigger car tax. In addition, rising environmental awareness could be a good step before introducing such taxes, as well as more detailed analysis of the best taxation approach is needed.

Keywords: low-carbon economy, transport, car tax, tax incentives, survey.

Introduction

In general, low-carbon economy or low fossil fuel economy is the economy, which is based on low-carbon emissions and reduction of carbon dioxide emissions in the world in order to mitigate greenhouse gas emissions and climate change (Sawin and Moomaw, 2009). The European Union (EU) aims at smart, sustainable and inclusive growth (Europe 2020), thus addressing energy and climate related challenges including the "20/20/20" target for climate and energy. The EU has also launched ambitious targets to reduce greenhouse gases (GHGs) by 80% until 2050 (Roadmap for Moving to a Competitive Low-Carbon Economy in 2050, 2011). The emission reduction target also includes the use of renewable energy sources and energy consumption reduction and efficiency gains.

Low-carbon society is the basis of a low-carbon economy, increasing people's participation within society (Selvakkumaran and Limmeechokchai, 2014). However, people must unite to achieve common goals and change something. In order to change the economy

into the low-carbon one, the economy must focus on all sectors of the country. However, stationary (industry, energy) sources of pollution can be controlled more easily than mobile sources (Bollen and Brink, 2014). Currently, 400,000 electric cars and more than 150 million two-wheelers are used (International Energy Agency, 2014). According to the Energy Technology Perspectives in 2050, the world should be about 2 billion light-duty vehicles, where these days there are about 900 million (IEA, 2014). Despite that, the transport sector could be the main sector where GHGs can be reduced based on human understanding and using low-carbon technologies for the transport sector. The foreseen target aims to reduce GHGs by 54–67% in the transport sector. However, the transport sector tends to delay in responding to the climate policy in comparison with other sectors; thus, transport sector decarbonization is more complicated because of its dependency on fossil fuels and constant demand (Schafer and Jacoby, 2006; Barker et al., 2007; Banister et al., 2011; Luderer et al., 2011; Luderer et al., 2012).

The transport sector of Lithuania accounts for around 23% of the total carbon dioxide emissions. Road transport is the main contributor and it is projected to increase as the number of passenger cars per thousand inhabitants increases by 1–2% annually in Lithuania. This fast growth of the transport car fleet outweighs the gains of the renewed car fleet and other achievements, and fuel consumption and pollution from the transport sector are growing. Stricter implementation of the "polluter pays" principle in the transport sector and promotion of more efficient and "green" cars as well as other means of environmentally friendly mobility forms is acknowledged (Dagiliute and Juknys, 2012). Therefore, this study aims to analyze road transport sector contribution to climate change and based on the survey indicate the possibilities of the main alternatives and economic measures (tax) to contribute to the renewal of the car fleet and in general shift to more environmentally friendly means of mobility.

Methods

Transport sector analysis and contribution to the climate change is based on the data from Statistics Office of Lithuania and Eurostat. Transport sector indicators under analysis include the car number per 1,000 inhabitants, final energy consumption (thousand toe) in road transport, renewables (thousand toe) used in the transport sector and carbon dioxide emissions (thousand tons). A population survey was conducted to determine the public opinion about climate change, its importance and awareness of low-carbon economy, its application and measures for its implementation, including a car tax. The survey was carried out in March through April, 2015. The questionnaire was placed on the web page www.apklausa.lt The questionnaire comprises questions on the following: (1) general knowledge on climate change and low-carbon economy; (2) citizens' behavior and willingness to pay a car tax (closed-end payment options are chosen for the possible bid); and (3) socio-economic determinants. In total, 207 respondents (Table 1) filled the questionnaire. Factors for willingness to pay (WTP) were assessed applying Chi-square (x^2) test. The convenience sample approach and a rather small sample size are study limitations and should be taken into account while comparing results with other studies; however, study results might be of interest for decision makers.

Table 1

Respondents' profile (survey results)

	%		%
llAge		**Education**	
< 25	52.2	Compulsory	2.9
26–50	43	Secondary	50.2
> 51	4.8	Higher education	46.9
Social status		**Incomes**	
Student/pupil	36.2	< 250	31.9
Employed (employed student)	57.2	251–560	48.8
Unemployed/retired/ maternity leave	6.3	> 561	19.3
Gender			
Male	45.9		
Female	54.1		

Results

Trends of road transport indicators

The transport sector is one of the main final energy consumers in Lithuania (23%). The biggest share of all energy used in the transport sector is consumed by road transport (Juknys and Dagiliute, 2004). Final energy consumption after the recent economic decline has been rather stable and slightly increasing (Fig. 1), reaching 1,661 thousand toe in 2014. Nearly the same pattern is characteristic for renewable energy consumption in road transport comprising up to 5% of the final energy consumption. Carbon dioxide emissions after the economic decline have recovered much faster and recently exceeded the level of the year 2008.

The number of cars per one thousand inhabitants is increasing (every year by about 1–2%) (Fig. 1). In 2014, new registration rules were applied; therefore, the statistical number of cars has decreased, reaching 410 cars per one thousand inhabitants. Cars that are not insured and do not have valid technical inspection are automatically removed from the register, although they are still operated. Another important issue is that new cars constitute a very small share of the total car pool (Dagiliute, 2018). In 2012, only 70 electric and 1,709 hybrid cars were registered in Lithuania. Hence, car pool renewal is rather weak in Lithuania.

Perceptions on climate change and low-carbon economy

Most of the respondents (79%) agree that climate change is a global problem; however, it is not very important at the European and the national level (Fig. 2). Some of the respondents think that climate change is not a relevant problem at all. The respondents most often (85%) indicate that people's perfunctory approach to environmental problems is one of the major factors resulting in climate change. However, 22% of the respondents remain rather sceptic and identify climate change as a spontaneous process, independent of humans.

About 16% of the respondents did not know what low-carbon economy could be. All others chose one of the provided definitions, most often linking low-carbon economy with energy sources. The majority (81%) of the surveyed people admitted lacking information about the Lithuanian environmental issues, climate change, and low-carbon economy. In addition, 46% of the respondents did not know or hear of the EU objectives and measures on climate change mitigation. Hence, information provision and awareness rising remain policy implementation tools. It should be positively evaluated that the majority (88%) of the respondents felt personal responsibility for environmental problems.

Fig. 1

Road transport indicators (2008 = 100%) (Eurostat data)

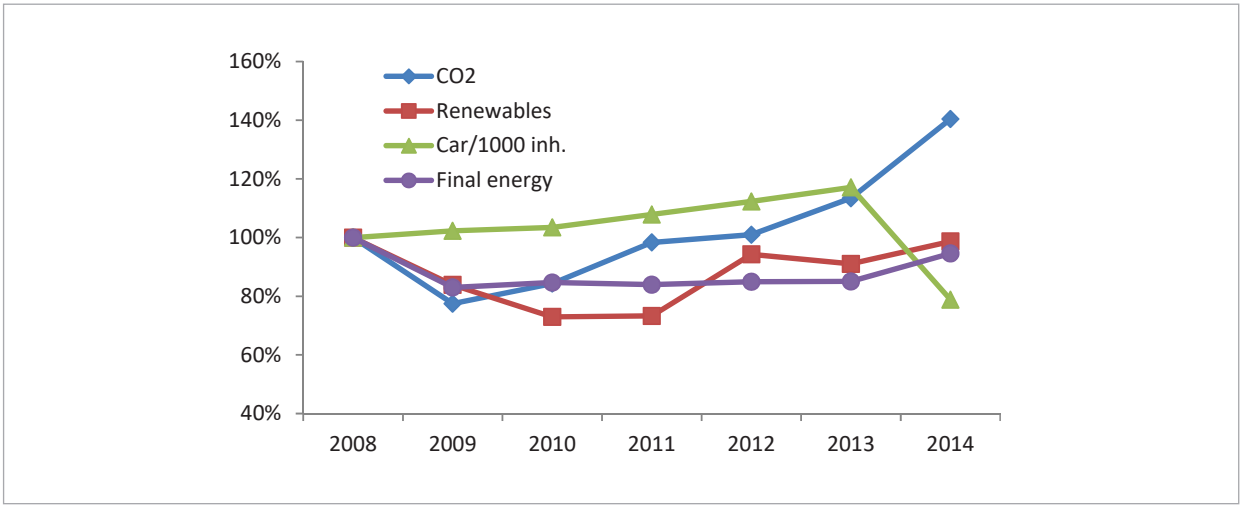
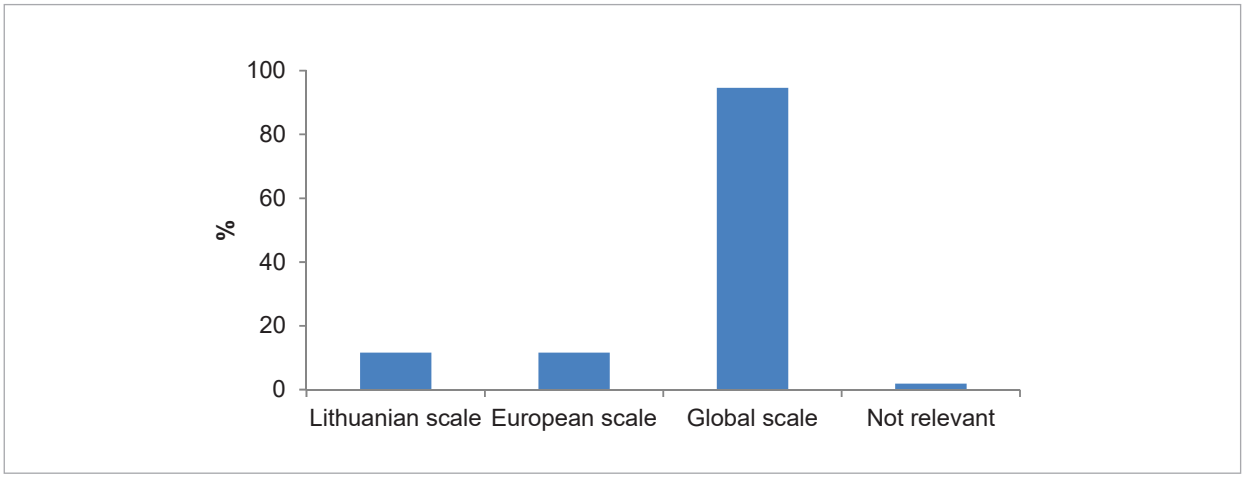


Fig. 2

Relevance of climate change as a problem (survey results, multiple answers possible)



Perceptions and behavior regarding low-carbon transport

The respondents indicated that the main measures for low-carbon economy realization in the transport sector in Lithuania could be increasing length and quality of bike roads (53%), tax incentives (return of value added tax) for hybrid or electric car purchase (69%), and increasing attractiveness of public transport (62%).

Although the respondents expressed personal responsibility for the environment, only some 58% of them said that they were trying to walk more, 48% cooperated while going by car, 27% were more likely to use a bicycle, 39% used public transport. Some 4% admitted doing nothing that could help to mitigate climate change. Walking was more often preferred by woman, younger respondents (up to 25 years old) and employed respondents (Table 2). This might be related to the fact that usually men more often possess a car and use it more frequently than women. Older respondents usually have higher incomes, which allows them to possess a car more often compared to the younger ones (under 25).

Table 2

Determinants for alternative walking (survey results)

	x^2	p
1	2	3
Age	**6.621**	**0.036**
Gender	**12.665**	**0.000**
Social status	**6.878**	**0.032**
Education	0.396	0.820
Income	1.033	0.597
Responsibility for climate change	0.623	0.430
Perfunctory attitude to the environment	0.024	0.878

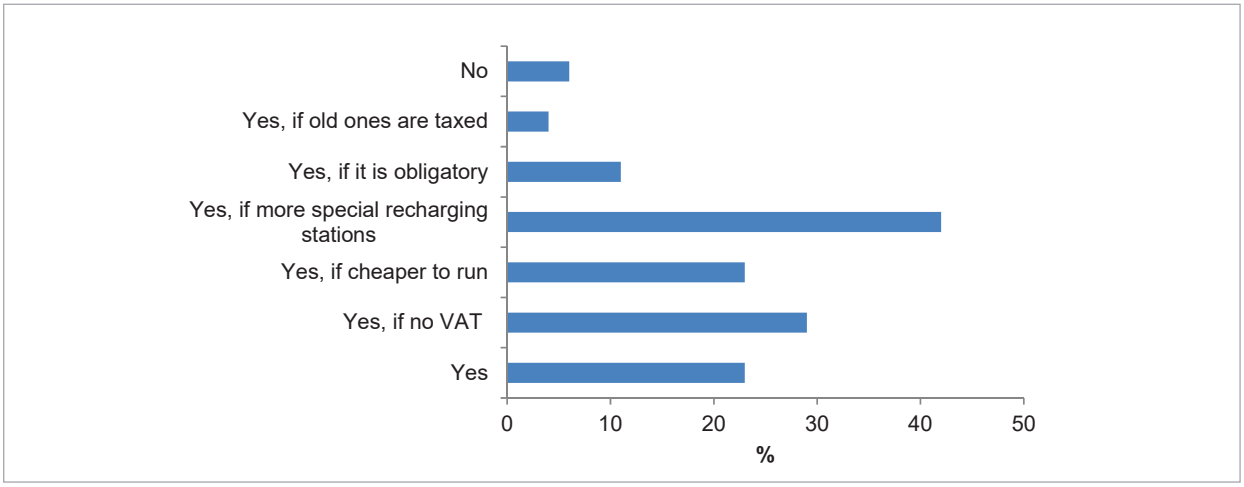
Regarding car use, 44% of the respondents would choose a hybrid or electric car, if there were a proliferation of special electricity stations for hybrid and electric cars, and 23% would choose it if it was cheaper to run it. Some 29% of the respondents would choose such a car if value added tax (VAT) was returned. Only 23% of the respondents would like to switch to a hybrid or electric car without any additional conditions (Fig. 3).

Willingness to pay a car tax

A car tax is one of the taxes that is quite often referred to by local politicians as well as by EU and international organizations for fiscal policy improvements in Lithuania. A previously suggested car tax ranges from 70 to 100 EUR.

Fig. 3

Willingness to switch to a hybrid/electric car (survey results, multiple answers possible)



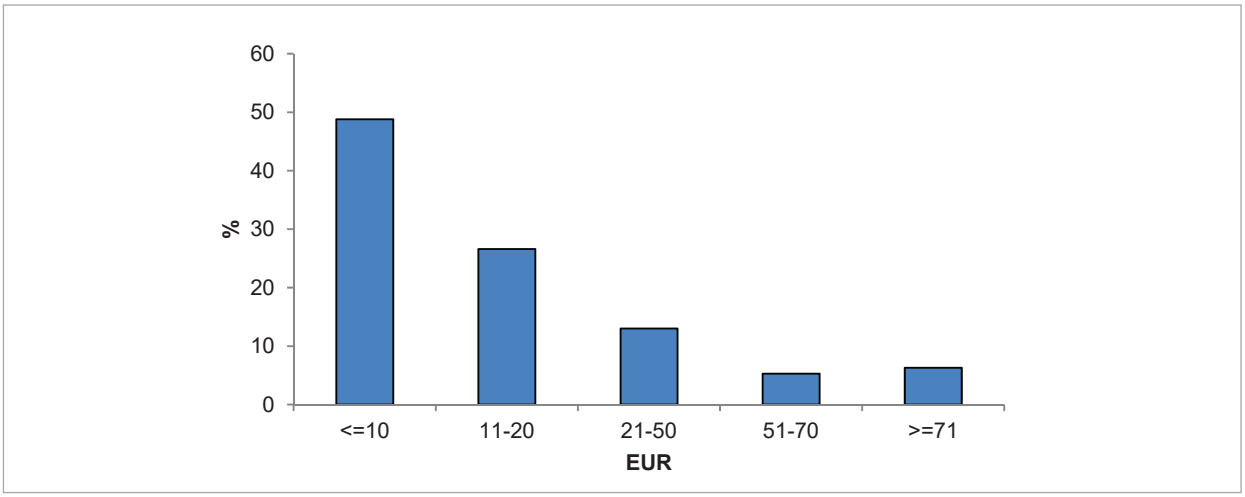
In-between measures for transport pollution mitigation, respondents also agreed on car taxes, sharing initiatives, and information provision. However, the respondents were more for informational campaigns (40%) and other initiatives than for a car tax (15%) as a measure for climate mitigation in the transport system. Still, at the personal level as many as 42% of the respondents agreed on car tax. Conditions behind often include statements like if "the tax is applied for the second and more cars", if "tax revenue is used for road improvement" or "public transport development".

Some 49% of the respondents say that an annual vehicle tax of less than 10 EUR would be optimal. Only 27% of the respondents would agree to pay a higher tax (11–20 EUR). Only some 6% of the respondents would be ready to pay more than 71 EUR (Fig. 4).

The respondents who expressed willingness to pay a lower amount received lower income, contrary to the ones willing to pay a higher car tax ($x^2 = 18.64$, $p < 0.05$). The study also found that the intended

Fig. 4

Willingness to pay a car tax (survey results)



70–100 EUR annual car tax was rejected by almost 85% of the respondents. The main factors behind this include income, WTP and age (Table 3). The respondents with lower income, lower WTP and younger ones more often were against car tax introduction.

Table 3

Determinants for acceptance of the intended (70–100 EUR) car tax (survey results)

	x^2	p
1	2	3
Age	**4.834**	**0.089***
Gender	1.692	0.193
Social status	1.979	0.372
Education	3.221	0.200
Incomes	**4.697**	**0.095**
Willingness to pay car tax	**1.115**	**0.000**
Responsibility for the climate change	2.261	0.133
Perfunctory attitude to the environment	0.03	0.862

*$p < 0.1$

This also suggests that environmental consciousness has no impact on decisions made by citizens. Hence, the role of income is in line with current debates that the main reason for postponing the car tax is relatively low income in Lithuania, although car dependence is very high. In general, people are against any new taxation and strong political will is needed to introduce measures like that, and awareness rising could be an option here, too.

Discussion and conclusions

The study shows that transport energy needs are growing and in turn fostering CO_2 emissions. This growth is mainly led by an increasing motorization rate (although due to changed accounting rules the number of cars per one thousand inhabitants officially decreased in 2014). Ongoing car fleet renewal is rather slow and the average age of a car is rather big (reaching 15 years). Hence, car fleet renewal should be much more pronounced to see significant reductions in air emissions (Dagiliute at al., 2017). The discussed car tax could be an option to foster car fleet changes and transportation modes as such. Some good examples applying incentive taxes for cars could be seen in the case of Sweden (Mannberg et al., 2014) and the Netherlands (Kok et al., 2015). However, the tax approach should be selected carefully as it might give only a shift from petrol to diesel cars and a modest CO_2 emissions drop (Hennessy and Tol, 2011). Greatest CO_2 reductions are achieved through combined policy: fuel tax, registration tax and annual motor tax charges (Fu and Kelly, 2012).

The amount that the majority of the respondents were willing to pay was rather low (10 EUR) compared with the intended annual tax (70–100 EUR). Still it is not clear which base would be chosen for the car tax; therefore, analysis like this could be only as a starting point. The respondents expressed preference for differentiated car taxes for alternatively fueled cars. In addition, WTP a car tax is income dependent, suggesting that economic situation is a rather strong factor, and for the initial stage possibly not all but luxury and very powerful cars could be taxed (the so-called "luxury tax"). Some other factors like refueling possibilities are also important for promoting "green" cars. Some other studies also suggest that factors like the ability to charge close to their home might give different preferences even among alternative cars (Hoen and Koetse,a 2014). Some 29% would choose a hybrid or electric car without any additional conditions or tax incentives in our case.

In addition, the majority of the respondents still feel a lack of knowledge on climate change and other related environmental issues. Introducing a reasonable car tax and awareness rising together could be a start for tax incentives in the transport sector. As the study of Agrawal et al. (2010) shows, environmental knowledge and attitudes tend to increase willingness to pay green taxes for transportation. Furthermore, political will remains one of the factors that can lead to low-carbon economy feasibility in the transport sector in Lithuania

(and countries with similar experiences). In 2018, a prepared project of the national air pollution reduction plan renewed the idea of a car tax and some incentives for the use of alternative cars and restricted diesel cars. Hence, public discussions and scientific studies should be considered as measures for sound decisions.

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Mažai anglies dioksido išmetantis transportas: ar pasiruošę mokėti automobilio mokestį? Lietuvos atvejis

Gauta:
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Priimta spaudai:
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Straipsnyje analizuojami Lietuvos kelių transporto sektoriaus rodikliai ir gyventojų nuostatos bei pasiryžimas mokėti automobilio mokestį. Nors naudojama daugiau kuro iš atsinaujinančių energijos išteklių, augantis automobilių skaičius ir santykinai senas automobilių parkas lemia didėjančias kelių transporto anglies dioksido emisijas šalyje. Kaip viena iš priemonių automobilių parko atsinaujinimui ir biudžeto pajamų padidinimui gali būti taikomas automobilių mokestis. Apklausti respondentai išreiškė pasiryžimą mokėti automobilio mokestį, tačiau pastarasis buvo daug mažesnis nei valstybės planuojamas automobilio mokestis. Respondento pajamos, amžius darė įtaką deklaruotam pasiryžimui mokėti automobilio mokestį. Gaunantys didesnes pajamas buvo pasiryžę mokėti didesnį mokestį. Tyrimas rodo, kad prieš įvedant tokį mokestį, reiktų šviesti visuomenę aplinkosauginiais klausimais; taip pat reiktų atlikti detalesnę analizę siekiant parinkti tinkamiausią automobilio mokesčio bazę.

Raktiniai žodžiai: mažo anglies kiekio ekonomika, transportas, automobilio mokestis, mokestinės paskatos, apklausa.