MONITORING OF THE ECOLOGICAL TAX REFORM IN ESTONIA, PRESENT STATE AND WAY FORWARD

Document for the 23nd Meeting of the London Group on Environmental Accounting

San Jose, 17-20 October 2017

Kaia Oras, Statistics Estonia

Key issue: framework for the evaluation of the implementation of green tax reform in Estonia

Outline

Introduction

In Estonia, e.g. country where the share of environmental taxes in GDP is already above the average of the EU level and the environmental pressure is rather high in several dimensions, environmental taxes account in combination with other accounts could be of help for the optimization of the environmental taxes. We propose that this kind of monitoring framework could be useful for the evaluation if environmental taxes have been effective in reaching environmental but also relevant socio economic goals. Document discusses the framework for the evaluation of the effectiveness of green fiscal policy in Estonia on the bases of the principles of Estonian Ecological Tax reform and additional aspects proposed by OECD. National context is discussed in a main part of the document but more detailed and explained tables and graphs are outlined in annex. Seven years long series of environmental taxes accounts is available for now and harmonized economic and environmental monetary and physical

data could be assembled in a comprehensive framework. However the potential of these assembled accounts has not fully discovered and made use of yet.

National context:

The principles of the ecological tax reform have been formulated by government more than a decade ago now in Estonia. The taxation of environmental pressure has raised steadily: fuel excise duty rates have increased considerably and the rates of environmental charges have increased every year. Have environmental taxes really caused a shift towards more environmentally friendlier behaviour of consumers and producers and improved environmental-economic effectiveness in terms of resource use and environmental pollution?

Ecological tax reform goals:

1. Make consumption and production more environmentally friendly and efficient.
2. Follow the principles of revenue neutrality

Dimensions and measures for the monitoring of the implementation of the green fiscal reform

In addition to the need to improve environmental performance and to maintain the neutrality of the impact of overall taxes pointed out in Estonian ecological tax reform (2005 [1]), the Organization for Economic Co-operation and Development brings out wider circle of important aspects to consider while monitoring the green fiscal reforms. OECD has suggested that open and transparent communication of all elements of the green fiscal reforms – including the use of revenues, distributional and competitiveness impacts and how the governments intend to deal with them – are a key to successful implementation (OECD, 2011 [2]). What could statistical system offer for the monitoring of these substantial aspects?

Compilation of environmental taxes account has created a bridge between several economic and environmental data domains. In Estonia the work has started in order to map the feasible dimensions for the creation of the harmonized environmental and economic data hub which would allow to carry out analyses relevant to ecological tax reform and support green fiscal policy ten years ago. Statistical Office has worked with the data and the concepts with researchers[3],[4],[5]. The first analyses have been also published after the environmental taxes account became available in 2013. Published data and

[1] - Environmental tax reform base document. Estonian Ministry of Finance, 2005
[2] - Environmental Taxation A Guide for Policy Makers, OECD, 2011
[3] - "Environmental taxes — economic instruments for environmental protection", Eda Grüner, Kersti Salu, Kaia Oras Tea Nõmmann(Stockholm Environment Institute Tallinn Center, Estonian Institute for Sustainable Development) Statistics Estonia, 3/09, 2009 Quarterly Bulletin of Statistics Estonia", http://www.stat.ee/dokumendid/37734
[4] - Keskkonna majandushoobade raamistik X Eesti ökoloogiakonverents. Framework to Analyze the Impact of Environmental Economic Instruments; Tea Nõmmann, Eda Grüner, Kaia Oras www.stat.ee/dokumendid/37734

[5] - Use of environmental tax statistics for monitoring of environmental tax reform in Estonia,Kaia Oras, Eda Grüner, Kersti Salu, Tea Nõmman, Tallinn, 2009.

analyses[6], [7] are adding solid data to the ongoing debates. Dimensions presently covered are outlined in the text box below and will be discussed in next chapters.

Dimensions to be covered

Dimension/aspect	Bases for the evaluation/ content
Environmental effectiveness	Changes in the absolute values of tax base e g environmental pressures or resource use (indicators: changes of waste landfill, emissions, relevant driving forces, resource use, etc.). Alternative: changes in the productivity, e g emissions or resource use per unit of value added.
Principle of revenue neutrality of an overall taxes	Balance between following components: 1. Sectoral level: changes in the share of the payments of social taxes in total expenses and changes of the share of environmental taxes in total expenses **2.** State level: share of the environmental taxes in GDP compared to the share of the accrual from labour taxes in GDP (indicators: share of taxes in total expenses, share of labour taxes in total expenses; monetary)
Competitiveness impacts	Sectoral competitiveness: comparison of profit with environmental taxes paid. (indicators: surplus compared with paid environmental taxes, monetary)
Equity of environmental taxes who is carrying the burden of environmental taxes	Sectoral equity: sectors relative shares of paid taxes in comparison with the sectors relative shares in respective tax base (consumption, emissions etc.). Indicators: tax base in physical quantities, tax in monetary values)
Use of revenues	Public sector expenditures on environmental protection relative to the receipts of environmental taxes
Combined impact with other instruments (investments, prices)	If the change occurs in tax base it can also be a result (or the combined impact of) of the other instruments (investments, changes in technology, ohter price changes etc; monetary).

Relevant national trends and analyses which are the bases for following discussions are presented in a form of explained figures and the tables in the annex.

Environmental effectiveness, effect of the tax on the tax base

Environmental effectiveness is a basic goal of environmental tax reform as the main objective of the taxes on environmental pollution and resource use is to achieve a curbing impact on the tax base (e g object of the tax). Evaluation of the environmental effectiveness should allow tracking if there are improvements in the environmental issues of concern. Changes in the tax base should be mostly easy to quantity as usually there is a direct link with absolute values of environmental pressures or resource use (waste landfill tax and landfilled waste amounts, air pollution tax and air emissions, fuel excise duty and fuel consumption).

[6] Environmental taxes account enables analyzing the taxes macroeconomically, Kaia Oras, Kersti Salu, Statistics Estonia, 3/09, 2013 Quarterly Bulletin of Statistics Estonia", https://www.stat.ee/dokumendid/75152

[7] Environment overview 2016, Quarterly Bulletin of Statistics Estonia, 2/2017, p 37-39, ISSN 1736-7921,

Simple trends in environmental pressure are unavoidable measures of environmental effectiveness and these measures indeed do not need environmental accounts to be produced. However these are main figures which always need to be monitored. In Estonian national context these trends show that majority of environmental taxes have not had a significant observable curbing effect on the tax bases. Figure 1 displays ten year positive and negative trends in the problematic areas of resource use and environmental pressures. In order to portray if developed taxes for several major environmental issues have (or have not) provided a signal, figure 2 displays in a table format side by side environmental performance of the problematic environmental pressures and resource use trends in one hand and contribution of respective taxes to total environmental tax revenues in another hand. This kind of setting allows to evaluate if the environmental issues of concern have been taxed and if there are improvements or further decline in the taxed and not taxed problematic environmental trends.

Independent study has indicated that environmental tax rates are too low to provide the signal in case of air emissions and resource use[8]. In case of transport fuels (which are quite highly taxed) there seems to be no real alternatives and the suppressive effect of taxes on the tax base is not observed.

Environmental taxes account adds value to the environmental effectiveness analyses as it allows to carry out sectorial level evaluations. Positive example of environmental effectiveness of electricity excise duty is displayed on figure 3 where changes in tax rate, tax revenues and decrease of tax base are displayed as index changes for households.

Several positive trends in environmental pressures could be observed as well. For example in the areas of water use, acid air emissions and wastewater management emissions have decreased significantly (figure 2). In these spheres lot of environmental investments and expenditure have incurred (61.4% based on 2010) and the environmental taxes paid in this case are and have been quite negligible. The tax base has been influenced by other measures more.

Revenue neutrality and distributional impacts

The principle of revenue neutrality is a second important goal of the Estonian ecological tax reform. According to the principle of revenue neutrality the taxation of environmental burden (environmental pollution and use of environmental resources) should increase and the taxation of labour should decrease so that an overall tax burden would not increase. Share of labour taxes and environmental taxes relative to the GDP (displayed on a Figure 4) have been used to analyze the revenue neutrality and distributional impacts on a total industries level.

When comparing the receipts from environmental and labour taxes in the gross domestic product, it can be said that while moving towards the ecological tax reform, the principle of revenue neutrality has not been fully followed as the higher taxation of the use of the environment and lowering the taxation of labor did not in the end balance the changes in tax burden. Since 2005 when the principles of the ecological tax reform were formulated and the application of these principles started, the receipts from environmental taxes have grown (also as a ratio of the GDP). The share of the receipts from labour taxes has not decreased. On the contrary, the share of labour taxes in the GDP have also slightly increased during the period 2005–2015.

[8] OECD Environmental Performance Reviews: Estonia 2017; highlights. OECD,Paris 2017. ISBN:9789264268319; http://www.oecd.org/environment/country-reviews/OECD_EPR_Estonia_Highlights.pdf

Environmental taxes account provides a good bases for the monitoring of the maintenance of the neutrality of taxes impact on sectoral level. The changes in burden of social contributions and environmental taxes in total taxes on a sectorial level could provide additional aspects for analyses. On a sectoral level the increase of environmental taxes and the decrease of social taxes should balance each other out as well, so that the total tax burden of the sectors would not increase. The scatterplot analyses of a sectors on a figure 5 provides an insight into the revenue neutrality and distributional impacts. Vertical axes displays the shares of environmental taxes in total expenditures and horizontal axes displays the shares of labor taxes in total expenditures. In this graph the size of the bubbles reflects the sectors environmental impact using air emissions as proxy. In this analyses the principle of the revenue neutrality appears to be followed for the sectors which are allocated in a upper left corner: as the share of in environmental taxes in total expenditures have grown and the shares of social taxes in total expenditures have decreased. On the upper right corner are the sectors for which both the shares of social taxes and environmental taxes have been increased. In land transport as well as, for example, in the area of public administration and education, the share of both labor taxes and environmental taxes have increased in total costs. However in most of the sectors the share of environmental taxes in total expenditures has increased and the share of labor taxes in the total costs has decreased.

Influence of taxes on a sectoral competitiveness

Influence of taxes on a sectoral competitiveness is a third important dimension to be monitored. The evaluation of the possible influence of taxes on a sectoral competitiveness helps to answer the question if there is still space to increase “safely” environmental taxes. The data provided by the environmental taxes account in combination with available data (revenue) in national accounts allows to evaluate if the profits of the target sectors could be critically affected by higher taxes. On a figure 6 the influence of taxes on a sectoral competitiveness is displayed on a simple bar diagram: the environmental taxes (and charges) are displayed in comparison to operating surplus. In Estonia’s case some sectors have relatively high environmental tax burden (land transport, households) while others may favor lower taxes on resource use and pollution. In some sectors environmental taxes exceed the operating surplus in relative terms (land transport) but in some others even with high environmental impact the surplus could exceed the environmental charges they pay (mining and energy production).

Environmental effectiveness and equity

Bringing into the same framework environmental taxes paid in one hand and environmental pressures in another hand allows to draw out the equity aspect of environmental tax burden e.g. to analyses if sectors which generate the biggest share of the emissions or use most of the resources are those who also pay the proportional amount of taxes.

Environmental taxes account allows to analyze if the sectors with highest environmental pressure pay the highest environmental taxes: 80% of the paid environmental taxes are fuel excise duty (diesel and gasoline) in Estonia. Figure 7 in annex displays on the right side the distribution of all paid environmental taxes among the selected main activities and on the left the proxy for environmental

pollution. Due to diverse units it is not possible to assemble the environmental pressures of different kinds on the same chart, so the distribution the air emissions has been used as a proxy for the environmental pollution. However even this kind of rather simplified presentation brings out that bigger environmental tax payers (households and land transport paying fuel tax) are responsible only for 10% of the emissions (and the emissions are the predominant environmental pressure in case of transport fuels). In Estonia transport fuels contribute to a relatively minor portion of the fossils use and air emissions. 80% of the emissions comes from the mining and energy sector. Their share in taxes however remains below 20%. Mining and energy sector have other environmental impacts in addition to air emissions as well. Distribution of environmental taxes among selected main activities shows that big part of the pollution and resource use is taxed still rather moderately whereas certain part of fossil fuels (diesel and gasoline) are taxed rather heavily.

Relative sectorial distributions of the payments of excise duty on transport fuels and consumption of transport fuels by economic activities allows to bring out the aspect of the equity of environmental taxes on a more detailed sectoral level. Figure 8 in annex portrays and explains environmental effectiveness and equity just for the diesel and gasoline fuels consumption, the payed taxes of which count up to 80% of the environmental taxes. It could be easily seen that there are three big users of diesel and gasoline fuels: land transport, water transport (incl. air) and households. However just economic activity of transport and households pay the most of the fuel excise duty.

The use of revenues

From the fiscal viewpoint, the increased use of natural resources and also the rising environmental tax rates cause an increase in the receipts of environmental taxes in the state budget. In the monitoring of the green fiscal reforms OECD considers important to monitor the use of these recipes from environmental view point. The use of the revenues raised from environmental taxes could be set alongside with the financing of the countries environmental protection (environmental expenditure account) in absolute terms in order to bring out the government's efforts in covering environmental costs. However in practice there are at least two obstacles. Rather big amount of expenses made by environmental authorities are not classified as environmental protection expenditures (EPEA) but as the expenditures of resource management (RUMEA) and these are not yet well accounted for. In another hand resource charges are classified as resource rent in national accounts and are not classified as environmental taxes. Part of the resource use charges are however air marked environmental taxes in Estonia's national context. These inconsistencies need to be settled before the monetary flow analyses would become operational in the analyses of the use of tax revenues.

In Estonia's national context it could be said that as the receipts from environmental taxes have been increasing in the state budget, state also has more possibilities for bigger investments and environmental protection expenditures. In one hand accruals from environmental taxes amounted to 432 million. In another hand general government contributed relatively lower amount: 110 million euros to environmental protection (based on environmental expenditure account). Final consumption of environmental services by the general government made 75% of this sum and environmental investments just 10%.

Bring together different dimensions

Analytical and visual solutions need to be further developed in order to effectively communicate the complex results of the monitoring of the fiscal reforms. Harmonized accounts provide more possibilities for communication of the taxes related issues in visual form. Scatterplot analyses allows displaying simultaneously status in one and the trends of two observed linked parameters in another hand and hence to bring together more information. As an example for combining the equity of environmental taxes and environmental effectiveness on the same chart, the transport fuels consumption and the respective trends in consumption and paid excise duty by sectors are displayed on figure 9. Each sector features four parameters: the amounts of the fuel used, the taxes paid (latest available year) and the trends in fuel use and taxes paid (2008-2014). In this scatterplot for each sector there are green (share in fuel excise) and red circle (share in fuel use). So, the size of the red circles indicates the biggest fuel users: land transport, households and water transport. The biggest fuel excise payers are the big green circles: land transport and households. Comparison of the sizes of the red and green circles for each sector shows that that water transport but also agriculture and energy (mining sector) pay proportionally less taxes than is their fuel consumption (green circles are much smaller). The positioning of the sector in scatterplot indicates if it has moved towards using more or less fuels and paying more or less taxes compare to 2008. There are almost no sectors using now more fuels and paying less excise duty (upper left corner is empty) than in 2008. In line with the principles of ecological tax reform there are lot of sectors who now use more fuels and also pay more fuel taxes. Regarding equity there are some sectors to whom the changes may have been unfair: their increase in excise duty payments is relatively higher than is their increase in used fuel amounts. This kind of analyses could be carried out for several taxes and tax bases. Sectoral level database used for present analyses is not currently available on-line yet. Files, enclosing relevant dimensions should be made available for the users outside statistical system in order to bring in more expertize and find the users.

Way forward:

Communicate the main findings, visualize the outcomes and refresh a statistic-policy-science *trialogue* in the refining and reaching of the agreement on the monitoring framework of the ecological tax reform

Collaborate with statistical community in order to learn from the best practices

Develop a technical solution (on line database) for a framework for monitoring of the efficiency of environmental taxes and the implementation of ecological tax reform in Estonia.

Conclusions:

Environmental taxes account in combination of other accounts are quite valuable for the evaluation of the environmental efficiency competitiveness, equity and revenue neutrality aspects of green fiscal reform.

Analyses have brought out interesting findings in most of the dimensions: environmental efficiency of implementing the pollution charges and environmental taxes has been quite low in case of some taxes. The distribution of taxes among industries is not fair in some cases and the impact on the competitiveness of enterprises could provide useful signals. The principle of the revenue neutrality was not due for some sectors. The revenues from environmental taxes seem to be higher than spending on environment (however the classification issues do not allow in some cases straightforward analyses).

Statistical agencies have a quite unique role in the evaluation and monitoring of the taxes related policies due to the access to the macroeconomic, microeconomic and environmental accounts basic data and a knowledgeable staff working with accounts.

The fact that environmental taxes accounts would be produced on a routine bases and would be available on a certain known quality level, would make them a valuable resource.

Questions to the London Group

Should a framework for the assessment of the efficiency of the green fiscal reforms cover additional aspects/dimensions?

Are there other assessments of the efficiency of the green fiscal reforms based on environmental accounts data available?

What kind of additional research is needed in order to develop the assessments? What could be the data needs for these possibly more developed assessments?

Should the consistency between the domains of environmental accounts be further developed?

Should statistical agencies carry out and disseminate these kind of analyses or is this a task for other dedicated agencies?

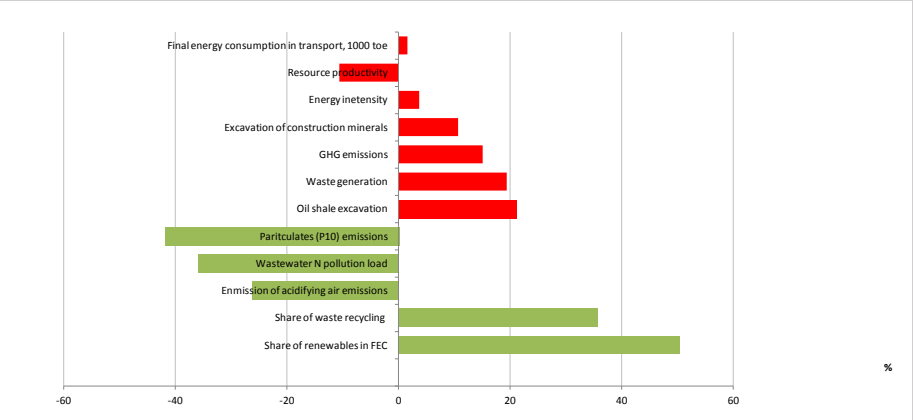
Is there a need for specific subgroup dealing with the monitoring issues of green fiscal reforms?

Is there a need to develop a general indicator framework for reflecting the effectiveness of green taxes?

Please send the suggestions to: kaia.oras@stat.ee

Annex: National context in figures [9]

Figure 1. Environmental effectiveness: changes in the resource use and relevant environmental pressures

In Estonia the increased taxation of the use of the environmental resources and pollution has not brought along an overall transition to a more resource efficient and less polluting economy. Compare to 2005, the year than the principles of the ecological tax reform were formulated, energy intensity of the economy and finale energy consumption in transport have increased and resource productivity has even further decreased 10.6%. Waste generation, excavation of mineral and fossil resources have and greenhouse gas emissions increased as well. However, there are lot of quite positive trends as well: in the areas of air emissions and wastewater management environmental pressure has decreased significantly, recycling rates and the use of the renewables have increased as well.	
Red columns (upper seven) refer for the selected negative trends and green columns for some of the positive trends	Selected trends, 2015, 2005=100% 

[9] *Statistics Estonia, database, Sept 2017; https://www.stat.ee/environment*

Figure 2. Environmental effectiveness: environmental performance and contribution of relevant taxes to total environmental taxes

Environmental issues	Performance 2005-2015, 2005=100%	Taxes developed	Contribution to total environmental taxes
Decline:			
Low resource productivity	Decline 5,5 %	Resource use charges	8,6% *
Oil shale use issues	Use increases 21%	Oil shale use charge	4,9% *
Use of fossils: diesel and gasoline:	No major change	Fuel excise duty	76%
Waste generation	Increase by 34%		
High energy intensity	No major change		
Improvement			
Emissions of N and P with WW	42% and 62% resp	Pollution tax	N: 2,2 %; P: 0,1%
Emission of acidifying gases	37,4%	Pollution tax	SOx 1,1 %; NOx 0,4%
Implementation of renewables	Improvement ca 50 %	Subsidies	
Waste recycling	Improvement ca 35%	Waste landfill tax	5,4%

**- resource use charges are included here to the sum of taxes*

Figure 3. Environmental effectiveness: changes in the tax rate, tax revenues and tax base

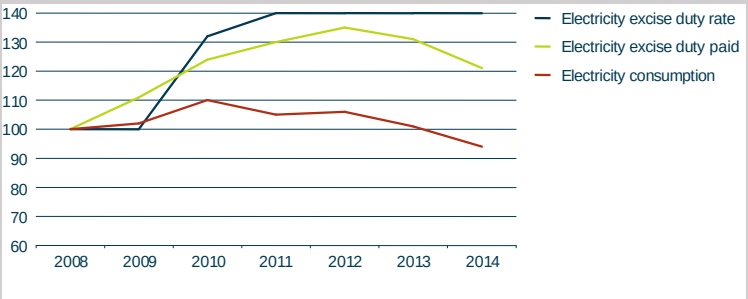
Impact of environmental taxes appears more specifically at the sectorial level: it is likely that rising electricity excise duty rates (blue line) have caused a reduction in electricity consumption of households (red line, 3.7% decrease by 2014, compared to 2008) and eventually also the decrease in paid duty (green line).	
The upper line: excise rate, remained stable after 2011 Green line: decrease in paid duty since 2012 Falling red line: electricity consumption	Electricity consumption and payments of excise duty on electricity (2008=100%), 2008-2014. 

Figure 4. Revenue neutrality and distributional impacts: share of labour taxes and environmental taxes in GDP

Increase of the taxation of environmental pressures and resource use in combination of the decrease of the taxation of labour were the main instruments foreseen to implement ecological tax reform. In 2005, Estonia started the increase of environmental and decrease of labour taxes. The plan was to reduce the individual income tax rate by 1% a year – from 26% in 2005 to 18% in 2011 (reduction of the tax rate stopped at 20% during the years of the economic crisis).

Both the receipts from environmental taxes (colums) and labour taxes (red line) as a ratio to the GDP have grown (from 15,7% to 17,2 and 2,2% to 2,8%).

Share of labour taxes and environmental taxes in GDP

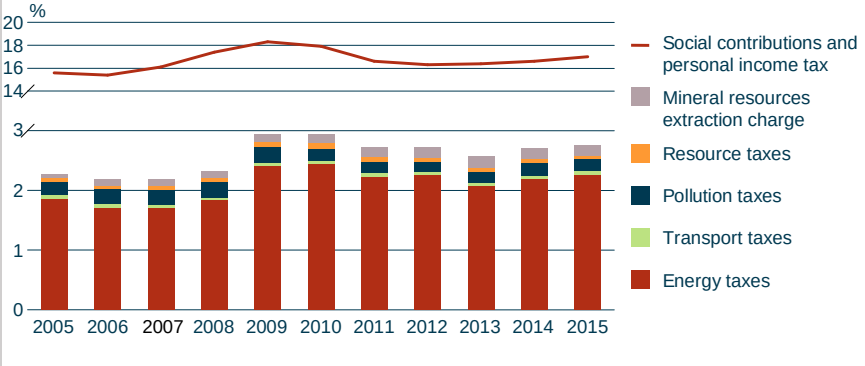


Figure 5. Revenue neutrality and distributional impacts: changes in burden of social contributions and environmental taxes

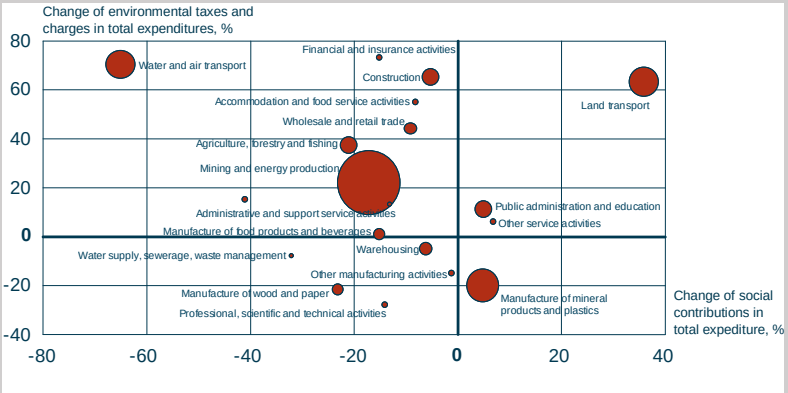
Is there a zero impact on total tax burden? During the reference period (2008–2014) the share of environmental taxes in total expenditures of most economic activities in Estonia (incl. the economic activities with a higher environmental burden – mining and quarrying and energy supply, and water and air transport) has increased (by 22.2% and 70.4%, respectively) and the share of labor taxes in the total costs has decreased (by 17.5% and 65.0%, respectively). In land transport as well as, for example, in the area of public administration and education, the share of both labor taxes (by 36.0% and 4.6%, respectively) and environmental taxes (by 62.6% and 10.8%, respectively) has increased in total costs. As in these sectors both the shares of environmental and labor taxes have increased, these sectors could be more sensitive to similar tax changes in the future.

Sectors in upper left corner are in line with the principle of revenue neutrality: environmental taxes have grown and social taxes have decreased.

On the upper right corner are the sectors for which both shares environmental and social taxes have grown: land transport, public administration.

On the lower right corner is th sector whose social contributions have increased but environmental taxes shares have decreased

Changes in burden of social contributions and environmental taxes, 2008-2014. *



* - Size of the bubble reflects the environmental impact (air emissions proxy).

Figure 6. Influence of taxes on a sectoral competitiveness: environmental taxes (and charges) in comparison to operating surplus, 2014

Is there a zero impact on sectoral competitiveness? Land transports, which is the largest payer of environmental charges among the sectors, amount of the profit (86.9 million euros) was smaller than what was paid as environmental taxes (146.9 million euros). Fuel excise duty is the main component of the environmental taxes of land transport. As fossil fuels do not yet have a serious alternative in road transport, the paid excise duty has increased along with transportation volumes and increased fuel consumption (by 2014 an increase of 73.3% and 108.5%, respectively, compared to 2008).

Land transport's environmental taxes exceed their operating surplus in relative terms.

Mining and energy sector has 4 times higher surplus compare to environmental charges they pay

Environmental taxes (and charges) in comparison to operating surplus

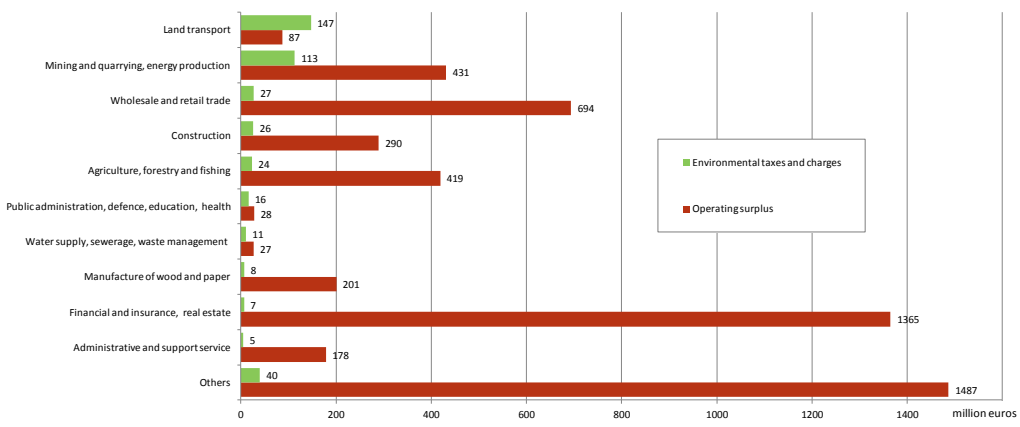


Figure 7. Environmental effectiveness and equity: distribution of environmental taxes and emissions between selected main activities.

Around 80 % of the taxes are energy taxes which are relevant for the use of the transport fuels (red). However in Estonia transport fuels contribute to a relatively minor portion of air emissions (on the left). Big part of the pollution and resource use is taxed still rather moderately (mining and energy sectors). Unfortunately it is not possible to display the environmental pressures of different dimensions on the same chart, so total air emissions (as a proxy for environmental pollution) are displayed on the left.

Distribution of environmental taxes (on the right) and emissions (left) among selected main activities, 2015

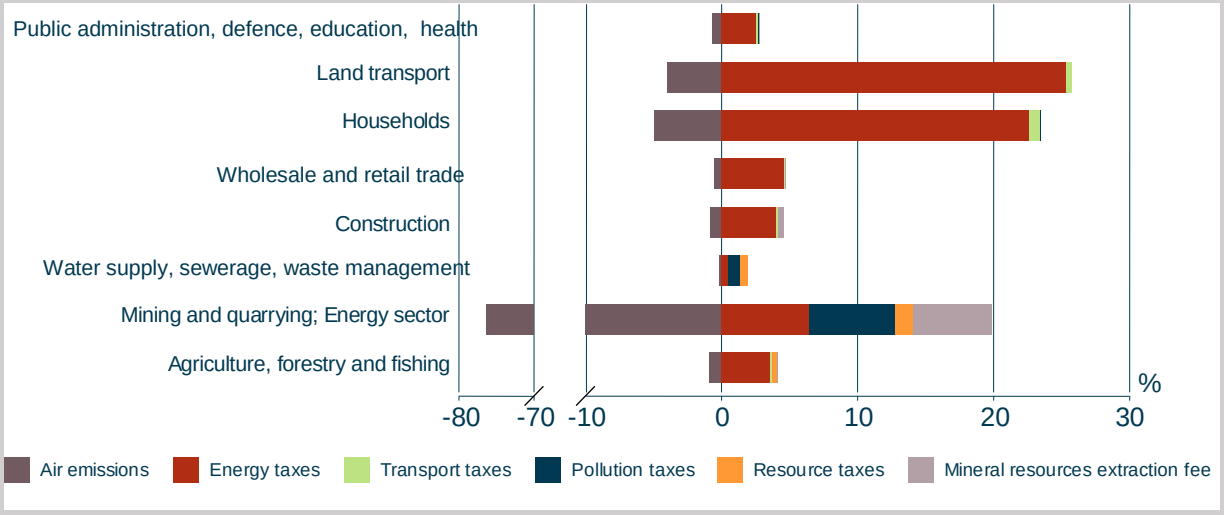


Figure 8. Environmental effectiveness and equity: relative distribution of the payments of excise duty on transport fuels and transport fuels consumption by economic activities

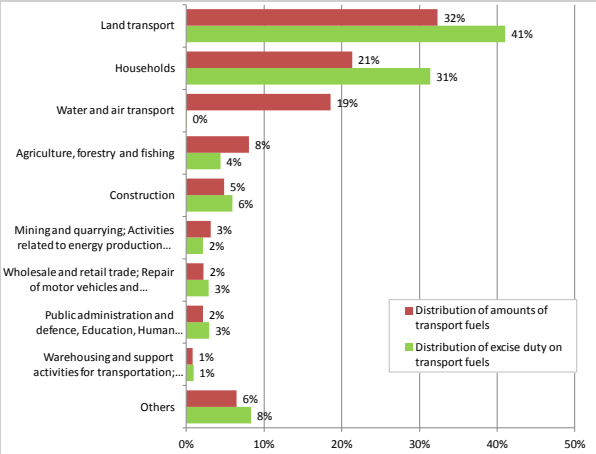
Relative sectorial distributions of the payments of excise duty on transport fuels and consumption of transport fuels by economic activities shed light on the aspect of the equity of environmental taxes.	
The economic activity of transport (41.0%) and households (31.4% in) pay the most of the fuel excise duty. However if to look at the biggest fuel consumers, there is also a third consumer water and air transport (19%). Water and air transport share in fuel excise duty is around zero.	Equity of environmental taxes: relative distribution of the payments of excise duty on transport fuels and transport fuels consumption by economic activity, 2014 

Figure 9. Bringing together different dimensions: transport fuels consumption and excise duty revenues in combination with the respective trends

Each sector features four parameters: the amounts of the fuel used, the taxes paid (in a latest available year) and the trends in fuel use and taxes paid (2008-2014). In this scatterplot for each sector there are green (share in fuel excise) and red circle (share in fuel use). So, the size of the red circles indicates the biggest fuel users: land transport, households and water transport. Size of the green bubbles reflect the biggest fuel excise payers. The positioning of the sectors in scatterplot indicates if sector has moved towards using more or less fuels and paying more or less taxes.