Achieving Environmental and Fiscal Goals in Lithuania Using Environmental Taxes

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The main aim of this article is to analyse and compare the former and revised system of environmental taxes in Lithuania. Conceptual, analytical and methodological issues associated with the use of these instruments in the Lithuanian context are thoroughly discussed. Comparative and system analysis allows revealing deficiencies of the previous system of taxes and positive features of the new system. Comparison of pollution taxes available in Lithuania with the damage costs related to these pollutants emissions as well as comparison of environmental taxes with those of EU and accession countries allows to evaluate the efficiency of existing tax system in Lithuania and provide recommendations for strategic actions with respect of increasing effectiveness of existing environmental taxation system.

Introduction

Origin of the idea of applying economic instruments as a suitable mean for equating private and social costs of economic activities traces back to the earlier work of Arthur C. Pigou [1] who suggested to impose taxes on a particular activity that would be equal to the marginal social damage it generates. It took a long time until the idea of Pigou found its wide application in environmental protection. Since late 1980's economic instruments are becoming a major tools of environmental regulation in a number of countries.

The principal argument in favour of economic instruments has been that they lead to devolution decisions to numerous individual

private sector actors where the market leads to the automatic concentration of environmental improvement efforts at those sites and activities where the greatest environmental benefit per unit of expenditure can be achieved. Thus, market provides mechanisms, which are believed to be more rational and objective than attempts to regulate thousands of individual polluters.

One type of economic instruments used for the purpose of reducing environmental impacts of energy consumption through internalising its external costs is energy-related environmental taxes / charges. The energy-related environmental taxes / charges are widely applied both in developed market economy countries and countries in transition to market economy (Eastern and Central European and NIS countries). However approaches in the design, institutional involvement, purpose and effectiveness of the instruments differs significantly between these two groups of countries.

Environmental pollution taxes, including taxes for air emissions from combustion processes (air emission taxes) have been in use in Lithuania since the beginning of 1990-ies. **The aim of this paper** is to address design and implementation issues of these taxes, compare damage costs with the tax rate set for the main pollutants, assess their effectiveness in terms of providing incentive to polluter for pollution reduction, and provide recommendations for strategic actions with respect of increasing effectiveness of existing environmental taxation system.

The main tasks can be defined as following:

- To define the main goals of the environmental taxes;
- To review the former and the new systems of environmental taxes in Lithuania seeking to reveal deficiencies of the former system and positive features of the new one;
- To compare the rate of pollution taxes available in Lithuania with the damage costs related to these pollutants emissions;
- To review and compare environmental tax systems of EU and accession countries with Lithuanian environmental tax system seeking to provide with recommendations for the increase of effectiveness of existing environmental tax system.

The methods of the scientific research, employed in the article are the comparative and system analysis and synthesis, comparison and evaluation.

The main goals of the environmental taxes

In attaining environmental strategy goals economic instruments are necessary to encourage pollution minimization and prevention, waste minimisation and preservation of natural resources. Economic instruments encompass taxes on state natural resources, pollution charges, user charges, tax waivers, tax differentiation: subsidies, loans and funds. The action programme of Lithuanian environmental strategy [2] foresees the following criteria, which should be met by developing and improving of economic instruments:

- Effectiveness: the instrument should be directed at pollution reduction at source;
- Easiness: instruments should be easy to implement and administer, their implementation cost and benefits should be well balanced;
- Acceptability: instruments are more likely to be effective if they are acceptable to the society and if they can be incorporated into the existing market and institutional system;
- Transparency: instruments should provide a continuous incentive for seeking least-cost solutions;
- Equity considerations: the instruments should not confer a disproportionate burden

on the poorest members of society and those who are indirect users of nature resources causing no environmental pollution.

The long-term Lithuanian economy development strategy [3] witch encompass the Strategy of economic factors of environmental protection up to year 2015 sets the ambitious targets for the implementation of *Green Budget Reform* in Lithuania which aims at introduction of new, or the increase in existing, environment-related taxes and reduction in other taxes, preferably distortionary taxes (e. g. taxes on labour). This can yield additional non-environmental benefits, such as greater economic efficiency and – possibly – higher employment.

In the Law on Taxes of Environmental Pollution (1991) it was stated that the goal of imposing pollution taxes is to "... serve as an economic element of environmental protection which stimulates pollution abatement and reduces the harmful impact on the environment." Therefore, the goal of the legislation was to influence the level of emissions by polluters. In fact, pollution charges can contribute to achieving the three alternative goals:

1) *financing environmental investments* (pollution charges can be used to raise targeted levels of revenue which then may be earmarked for pollution abatement or cleanup activities);

2) *"greening" of the tax system* (pollution charges, which have the attractive property of creating incentive to reduce pollution and therefore improve the environment, can be used to substitute for taxes on wage income and profits which hurt the economy);

3) achieve a target level of emission reduction (because polluters may be expected to respond to the incentive for abatement provided by an appropriately designed system of pollution charges, it is possible to use charges to target an aggregate level of reduction in emissions. The advantage of using environmental taxes as an economic instrument is that total pollution reductions are achieved much more cheaply).

Of course, revenue and pollution reduction goals are not independent and aspects of both goals can be achieved at the same time. (The potential question of how much revenue is desired and "what to do with the revenues from pollution charges" is absolutely central to any discussion of revising charge rates and enforcement producers / levels).

And though the information requirements are quite high, basing charges on damages is certainly the most theoretically sound basis for setting charges. In particular, a careful calculation of the *benefits of pollution abatement* combined with information about the costs of compliance (which in any case will be needed) can be used to choose the charge level, which maximizes social benefits from the charge system.

The former system of environmental taxes in Lithuania

There are few two types of environmental taxes available in Lithuania: royalties and pollution taxes. The Law on Taxes on State Natural Resources adopted on March 21 1991 serves to increase the responsibility of users of natural resources for effective and economic utilization of the national wealth at their disposal. Revenue accumulated from such tax serves to offset state expenditures required to monitor the use and state of the supply of natural resources. The Law on Pollution Taxes adopted in the same year imposes mandatory fees on all persons, business or organizations whose activities contribute to the pollution of environment, thereby implementing the "polluter pays" principle.

The Governmental Resolution of 10 October 1995 on implementing the Law on Taxes on State Natural Resources sets the tax rate and prescribes the methodology for calculating the taxes. It links the tax directly to the resources quantity extracted. The formula reduces the tax if exploration has been carried out with little or no State funding. The tax includes royalties too. If the landowner uses mineral resources and water exclusively for his own needs, he is exempted from the tax. The taxes are paid into State budget. The fines for resource use over established limits are paid into the State Nature Protection Fund. The penalty is ten times the regular tax on the resource use. The revenues from taxes on natural resources recently amounted for 0,5 % of the State budget's total revenues. However those taxes are 61–75 % of all environmental taxes accruing to the State budget. Taxes on Natural Resources are included into the costs of production and penalties are paid from the producer's profits.

The natural resource tax system adopted in 1991 was not related to evaluation of natural resource as national property, i. e. royalties. In this law only one part of this tax was included – state expenditures for the natural resource finding, exploration, assimilation and enlargement. However only covering these state expenditures do not stimulate rational use of natural resources. Therefore this Law was amended by supplementing the former taxes by royalties. In this part of the tax the quantitative characteristics of natural resources, the nature conditions and the real price of natural resources are reflected. It is evaluated that the share of Lithuanian deep earth resources makes up to 27 % of national property or 8.8 bill. USD.

The aim of the Law on Taxes on Natural Resources is to stimulate efficient use of natural resources. Introducing the tax on non renewable natural resources we are somehow trying to shift the scarcity of these limited resources into the present time by imposing the additional price (utilization costs) to their current price. These taxes for the future generations are the extension of polluters pays principle. In this case resource user has to pay [4].

Since natural resources are Lithuanian national property the state has to receive revenues from the user of these resources equal to the price of these resources in the mine. The estimation technique for royalties is quite complicated and it was developed later than the Law was passed. Establishing this tax rate for royalties first of all mineral and water resources should be set into the comparative basis by comparing their energy potential with the oil potential.

Since 1993 the market sets oil prices in Lithuania. The different energy potential of natural resources determine the value and tax rate for royalties. But royalties should not be confined to energy potential of natural resources. Besides that establishment of the tax rate for royalties based on the price of oil is not theoretically well grounded because oil price is determined by its supply and demand on the world markets whereas the price of our inland natural resources are determined by the inland demand. In the future this complicated and economically not well grounded tax system should be replaced by introducing tax rate depending on the price of sold natural resources. Besides that it is very important considering royalties to take into account the statistical aspect of their evaluation. In the evaluation of national property it was usual not to include estimated and involved into economic turnover landed property, mineral resources and other natural resources as they wouldn't be a national property [5].

The technique for the evaluation of tax rate was amended in 1997 by simplifying it and supplementing with the information about market price of natural resources for the new tax rate development. The rate of 5 % of natural resources market price was established.

In the former Lithuanian system of pollution charges adopted in the middle of 1991 by the Law on Taxes for Environmental Pollution the Ministry of Environmental Protection (LMEP) had set up a very difficult regulatory job for itself by assessing charges on 100 air pollutants and 51 water pollutants. These was many more pollutants than are regulated by the use of pollution charges in any Western European or other OECD countries, but was rather typical of most Central and eastern European countries. For example in the Czech Republic pollution taxes were applied to 90 air pollutants and 5 water pollutants, in Estonia – 139 air and 8 water pollutants, in Hungary – 150 air and 32 water pollutants, in Poland – 62 air and 6 water, in Russia – more than 100 air and water pollutants. It is worth to mention that in some Western Europe countries, USA and Japan taxes for air pollution do not play important role because of the complexity of the tax system, difficulties related with the monitoring, marginal damage costs assessment and high rates of administration costs and a environmental [6].

In any case, it was not useful to focus of the charge system on so many pollutants in the light of the enforcement capability of the LMEP. It was obvious need to focus only on the main emissions. It should be noted too, that charge levels in the former Lithuanian environmental taxes system were specified in the legislation in Lithuania rather than as a regulatory measure outside the law. This feature essentially eliminated opportunities for regulatory flexibility and somewhat called into question the rationale for formulating the goal in relatively vague terms.

Other problem that the pollution charge system structure certainly seems was designed to keep pollution below the maximum allowable pollution level (MAP). It also made not only the setting of charge rates, but also the firm-level standards, of critical importance. To the extent that an individual MAP level was intended to be a "ceiling" on source-level pollution, it must therefore be a realistic one which is not only ecologically meaningful, but also actually attainable by all but the dirtiest firms. It is also worth to mention that it is not good to set too strict norms because enterprises have to pay a huge penalties and at the same time will not be able to use these means for the implementation of pollution abatement measures [7].

Because a very high marginal charge rate (so much higher than T_b – basic charge rate for each pollutant) was set up, there were strong incentives for polluters to keep their emissions below the MAP, as long as enforcement was effective and the charge rates were high enough. But once the MAP emission point has been crossed, incentives to reduce pollution drastically declined. As it was pointed out in an example of how the Lithuanian pollution charge system operated, crossing in the MAP level increased the marginal pollution charge by 137 times compared with the basic rate. For emissions past the MAP level, the marginal charge rate dropped to 3,2 times the basic rate. (So, in fact Lithuanian charge system had the very peculiar feature of applying penalty rates not only to emissions above the MAP level, but to all emissions below it as well. This feature created a huge spike in the marginal penalty rate at the MAP level, and also means that it is not continually increased or constant).

Really, this structural feature of former pollution charge system was important because

to the extent base charge rates for most pollutants are too low to influence behavior, the system operated like a pure standard regime in that emissions are kept below the MAP level, but no other incentives or opportunities for adjustment were provided by the system.

The tariffs were only proportional to the harmfulness of these pollutants but did not reflect the damage caused by emission of pollutants. Tariffs are divided into basic, increased and preferential according to the pollution level applied. The basic tariff was applied for the pollution emissions below established maximal allowable norms. In the case of overdrawing of allowable norms increased tariff is being applied. There are separate formulas for the increased tariff calculations for energy and industrial enterprises. For energy enterprises the increased tariff is higher by factor 4. When pollution is lower than 50 % of established norm the charges are not being applied.

There are two main reasons, which predetermined the failure of this environmental tax system: methodological and objective. The main methodological reasons for the inefficient functioning of these environmental taxes are following:

• The basis for the basic tariff establishment was evaluation of damage to environment calculated according the Soviet approach prepared in 1983. It is difficult to evaluate methodological weakness of this approach, but it was applied to all regions of the Soviet Union regardless specific features of different localities;

• The basis for the definition of the increased tariff was calculations of the necessary costs of pollution abatement. This indicator was selected empirically on the ground of available information at this time. All evaluations of these costs in the transitional to market economy countries are not reliable.

The main objective reasons of inactivity of the current environmental tax system are:

• Inflation – initial tariffs were adjusted to inflation rate applying price index starting from the last quarter of 1992 only and the reduced index (multiplied by 0.7) was applied. Only from the second quarter of 1995 this reduction was abolished.

• Privatisation, which caused the splitting of large enterprises into small one. In many cases the amounts of pollutants emitted from the small enterprises are less than the limits for pollution emissions are being issued and charges being applied.

• The problem of reliability of environmental information.

The environmental taxes did not influence any positive structural changes in the Lithuanian industry. The average enterprise paid from 15 to 117 LTL for separate pollutant per year. About 70 % of all taxes were collected from the biggest enterprises (most of them were from energy sector) in Lithuania. The share of environmental taxes in the production costs made up to less then 1 %. The share of environmental taxes collected to the state budget in year 1994 made up to 0.2 % of the state budget and the same time State investments into environmental improvement measures reached more than 2.5 % from the state budget in that year.

So, the former pollution charge system as it was designed was not effective in reducing pollution and was revised, including revised goals of the pollution charge system to include the political goal of EU integration. The goal of joining the EU eventually required that charge rates and standards were harmonized with the EU ones. So, this harmonization process will have important practical implications because of the need to develop appropriate charge rates to support those goals. In the extreme, if EU

conventions are the strictest set of requirements, which Lithuania attempts to achieve, they will determine the appropriate charge rates. But it was also recognized that the period of economic transition makes immediate harmonization with the EU standards difficult. And a gradually increasing schedule of charges, that can be used, both can give some incentives for exploiting very low-cost measures during the period of transition and then later provide incentives for making state-of-the-art investments, also can allow enterprises an opportunity to adjust to the coming harmonization with the EU.

The new system of environmental taxes in Lithuania

Because it was not useful to focus the charge system on so many pollutants in the light of the enforcement capability of the LMEP, charge rates for all pollutants to be regulated using pollution charges were carefully re-calculated. As this process required substantial time and effort, focusing only on the main emissions therefore conserved scarce analytical capability.

The new improved system of pollution charges was elaborated during 1993–1996 year period with the help of experts from the Harvard Institute for International Development and supported by the USAID. The new Law on Environmental Pollution Taxes was adopted in 1999.The new tariffs came into force from the 1st of January 2000. The new amended and improved version of the Law on Environmental Pollution Taxes was approved by the Parliament in January 2002, it will come into power from January 1st, 2003. This new version does not change the principles of the taxation and approved the same tariffs.

The new system is considerably simplified and pollution taxes should be applied for the significantly reduced quantity of pollutants (from 151 to 18). The individual tariffs would be established only for principal pollutants (in the case of air pollutants for SO_2, NO_x and Dust), which are not so far dangerous, but which easier to control. The tariffs are established in order to achieve determined pollution reduction aims.

The rest of pollutants were grouped according to the level of toxicity into the classes (in the case of air pollutants into the IV classes and water pollutants into V classes) and the same tariff for the class was defined. Another important feature of the tax system reform is that the tariffs would not be a linear function of emissions and norms. Only two tariffs would be applied for the each pollutant and pollution source: basic (for the emissions lower than established norms) and penalty tariff (for the emissions exceeding norms). The size of fine would be defined using the constant multiplier for the basic tariff, but these coefficients would depend on the toxicity of pollutant. Air pollution taxes and coefficients applied for the penalty tariff calculation is shown in Table 1.

The main aim of the improved environmental tax system was related with the national goals for the pollution reduction into the air and water. Tariffs were defined according to the separate scenarios seeking to achieve the set level of emissions reduction. Basic tax rates per ton of pollutant emitted were determined by projected industrial growth and emission reduction goals set by the former Ministry of Environmental Protection.

Enterprises introducing emission abatement measures allowing to reduce emissions more than 10 % from the established MAP do not pay pollution taxes for pollutants which emissions are reduced by more than 10 % for 3 years. Tariffs should be determined for the 5 years period; they are adjusted to inflation

Table 1: Air pollution taxes in Lithuania

	Tariffs, LTL/t					*Coefficient*
	2000	2001	2002	2003	2004	
Principal pollutants						
SO_2	206	225	268	288	311	1.5
NO_x	386	386	405	479	587	1.5
Dust	184	184	184	184	184	1.5
Vanadium pentoxide	11 485	11 485	11 485	11 485	11 485	300
The classes of pollutants						
I	1210	1210	1210	1210	1210	300
II	570	570	570	570	570	50
III	74	74	74	74	74	30
IV	13	13	13	13	13	1.5

using the price index. The new tariffs for the consequent 5 years period should be set by the Law two years before these rates should come into force.

30 % of the environmental taxes are paid to the state budget, they are used to finance environmental projects approved by the Lithuanian environmental investments fund programme. 70 % of the taxes are paid to the municipalities, where the polluter is located, environmental protection fund. Fines are paid to the state budget and used to finance the above mentioned investments.

Tariffs are uniform throughout all locations though the negative impact can vary along different locations. Another important feature that these tariffs do not reflect the damage caused by these pollutants and are also only proportional to the harmfulness of these pollutants.

Damage estimates

Growing worldwide concern about the environment has led to several studies, which have estimated some of the externalities associated with electric power production and fuel cycles. In this section we look at some methods of valuation that are different from the approach we have taken. The most prominent examples of alternative approaches are studies by Hohmeyer [8] and Bernow et al. [9] of the Tellus Institute.

Hohmeyer's study is certainly one of the first important attempts to estimate externalities. He used a "top-down" approach. First, he identified other studies' estimates of the total damages (health costs for example) attributed to air pollution. Next he estimated the fraction of the total emissions that are from electric power generation with fossil fuels (e. g., 28 percent). Then, he multiplied this fraction by the health costs attributed to air pollution. The result is an 'estimate' of the health damages from fossil fuels. Hohmeyer's methodology enables him to assess "the big picture", but the methodology relies heavily on approximations and previous estimates of total damages. Furthermore it does not take account of the different stages of the fuel cycles, thus ignoring some important sources of external effects. Finally it cannot provide a tool for assessing site-specific effects, which may be very important. In contrast, the EC / US approach is a bottom-up, full fuel cycle approach, with site-specific primary data.

An alternative approach to the impact pathway / externality approach is that adopted by Bernow et al. of the Tellus Institute. They point out that, since it is difficult to estimate social costs based on damages, abatement costs may be a reasonable surrogate for damages. In this approach, existing and proposed environmental regulations are analysed to estimate the value that society implicitly places on different environmental impacts. According to Bernow, the marginal cost of abating emissions, when they are at the limit imposed by regulation, reflects the preference of regulators to require that particular level of abatement and the corresponding incremental cost, rather than allow emissions to exceed that limit and subsequently to have adverse impact on the public. The reasoning used by Bernow is that since these regulators represent the public, their views represent the costs placed on those emissions by the public.

We take the view that such reasoning is flawed. The premise that marginal control costs represent the costs of air emissions to society implies that regulators know what individual environmental damages are and always decide on the optimal policy where the marginal costs of control equal the marginal damages. In fact it is quite clear that they do not know these costs, and the political processes by which policy decisions are made do not generally have the property that they equate social damages to costs of abatement.

Earlier studies used a "top-down" approach to evaluate externalities in an aggregated way, typically on a regional or national level. Although useful because of its simplicity, this methodology has several drawbacks, notably it relies on previous estimates to compute the average costs and consequently it can assess neither the site-specific effects nor estimate the effects of additional or marginal impacts. The latest, well established among international scientific community, methodology for the detailed analysis of health and environmental impacts of electricity generation systems is the Impact Pathway Assessment (IPA) approach developed within the ExternE ('External Costs of Energy') Project of the European Commission [10]. IPA is a 'bottom-up" procedure, being a step by step tracing of the impact pathways from the activity that creates it to the damage it produces. It allows accounting for site specific conditions, like receptor distribution or background concentrations affecting chemical conversion in atmosphere, which might strongly influence the results.

The IAEA simplified approach used for the damage costs evaluation seeking to obtain realistic tax rates is nothing but a simplified IPA approach [11] and second, we can compare some estimates obtained by simplified models with the results of ExternE's EcoSense model that employs full IPA procedure.

The "Classical" airborne pollutants from fossil power plants are the main pollutants for which tax rates are being applied in Lithuania, i. e. (particulate matter – PM, SO_2, NO_x,).

This approach used for damage estimates is designed to quantify marginal external costs of an electric power plant at a particular location, involves the analysis of a set of priority impact pathways from the source to the affected receptors (population, crops, buildings, etc.) and includes the following steps [12]:

1. EMISSIONS – Characterising the energy technology and atmospheric emissions of all relevant pollutants.

2. DISPERSION – Modeling dispersion and chemical transformation of pollutants and assessment of effects of these emissions on local and regional air concentrations (including secondary pollutants formed).

3. IMPACTS – Quantification of the health and environmental impacts associated with the additional concentrations of pollutants using dose-response functions and data on the population or stock exposed at both local and regional level.

4. COST – Translating these health and environmental impacts into monetary values.

Results are summed across all impacts and receptors to give total damage. Dividing the damage cost due to a pollutant by the associated emission one obtains external cost per unit of pollutant (e. g. USD/t_SO_2).

The simplified methodology developed within the IAEA CRP on externalities [11] follows largely the full Impact Pathways approach – a gradual progression through emissions, change in pollutant concentrations (exposure), quantification of impacts using exposure-response functions and finally monetary valuation of damages based on the individual willingness to pay. The major difference is that full IPA involves complex computer models to calculate the dispersion of pollutants to different locations, while simplified methods approximate changes in concentrations with a simple calculation that does not realy on dispersion modeling at all or if it does, then only to a quite limited extent. Not only that none of them involves regional or long range dispersion simulation (the most data-hungry and time-consuming part of any externality computation), but also the short distance (local) dispersion is mostly treated in a simplified way.

Lithuanian average values obtained for SO_2 NO_x and (PM_{10}) using the simplified Impact Pathway approach within IAEA CRP on externalities are the following [13]:

SO_2 – 300 USD/t
NO_x – 600 USD/t
(PM_{10}) – 1000 USD/t.

One may compare these average values with pollution tax rates available in Lithuania. In 2002 the tax rates for these pollutants were more than 4 times lower except particulates (22 times higher):

SO_2 – 78 USD/t
NO_x – 147 USD/t
(PM_{10}) – 46 USD/t.

One can make conclusion that pollution taxes available in Lithuania are significantly lower the damage costs related to these pollutants emissions and in the future should be gradually increased seeking to base charges on damages.

Environmental taxes in EU and accession countries

CEE Countries have previous experience with emission charges, as pollution charges and penalty rate non-compliance fines were introduced in many countries as early as the 1970s [14]. While serving no economic function, per se, during this period, these charges were modified during the transition to a market-based economy in many countries. As subsidies for operating costs were reduced and enterprises faced real budget constraints, pollution charges emerged as real costs to producers and consumers. The value of environmental charges was also apparent to environmental policymakers who recognized the need for investment revenues in the environmental sector.

The development and implementation of air pollution charges, the primary pollutants being SO_2, NO_x, and solid particles, varies both in comprehensiveness and success throughout the region. On a regional basis, more attention has been given to the revenue rising function of economic instruments rather than their ability to provide incentives to polluters to reduce

environmental pollution. This can be attributed to budgetary pressures in most countries, which have severely restricted the public financing of environmental investments. Moreover, much experience had been accrued within environmental ministries regarding these types of charges, and, as industry and municipalities recognize the potential environment-related financial support from earmarked funds, these charges are often more politically attractive. For this reason, economic instruments have now become the main revenue source for state / municipal environmental funds, which exist in most countries in the region.

SO_2 and NO_x charges have been introduced in conjunction with a permit system: a base charge rate is applied to all pollution within the permitted level and a penalty rate is added for pollution above that level (the so-called non-compliance fee). Large point source polluters (combustion plants, heavy industry) are the primary subjects of these instruments. The charges are intended to raise revenues and encourage cost-effective abatement below the permitted level. The fines, non-compliance fees, are intended to provide incentive to reduce pollution to permitted levels and therefore play a compliance function. Such a system is in place in Poland, Czech Republic, Estonia, Latvia, Lithuania, and Slovakia. Romania and Croatia have introduced no taxes on SO_2, NO_x, or CO_2. The Hungarian fuel product charge and the Slovenian CO_2 tax, which do not work in conjunction with permits, are discussed below.

The revenues from these charges and fines are largely earmarked for expenditure through national and regional / local environmental funds. Because of the direct link between pollution charges and the environmental financing system in these countries, pollution charges play a fundamental role in environmental policy and implementing the Polluter Pays Principle (Table 2).

*Table 2: **Emission Taxes (1999)***

Country	*EUR per ton SO_2*	*EUR per ton NOx*	*EUR per ton CO_2*
Accession Country			
Czech Republic	27 (ET) 40.5 (NC)	22 (ET) 33 (NC)	
Estonia	2.9 (ET) 29 (NC)	6.7 (ET) 67 (NC)	
Lithuania	34.3 (ET) 51.8 (NC)	96.5 (ET) 144.8 (NC)	
Poland	80 (ET) 800 (NC)	80 (ET) 800 (NC)	
Slovakia	22.7 (ET)	18.2 (ET)	
Slovenia			14 (PT)
EU Member State			
Denmark	2700 EUR / ton S (PT) 1340 (ET)	0	13.4 (PT)
Finland			17.1 (PT)
France	27.4 (ET)	22.9 (ET)	
Italy	53.2 (ET)	105 (ET)	
Sweden	3470 EUR / ton S	4630	42.8 (PT)

Notes: (ET) Emission Tax; (NC) Non-compliance fine per unit emissions above permitted levels; (PT) Product Tax.

Revenues from emission charges and fines in Czech Republic, Poland, and Slovakia are earmarked for environmental expenditure via national or regional environmental funds. Estonia earmarks revenues within the central budget. Slovenia imposed liquid fuel tax based on carbon content of fuel. In Denmark SO_2 tax is levied either on energy products (product tax based on sulphur content of the fuel) or emission tax (ET) (levied on actual SO_2 emissions). In Sweden sulphur tax is imposed for coal and other solid fuels.

It is noticeable that emission taxes and charges are implemented in 7 of the 11 countries covered in this analysis and in addition in the other four countries non-compliance fees are already implemented. This situation attracts some attention when compared with the development in EU Member States where emission taxes are only introduced in a small number of countries. However, the assessment of the effectiveness and efficiency of these economic instruments in the region is complex because the administration of them is less optimal in certain cases; for example the large numbers of pollutants chargeable, and exemptions schemes available for polluters cause problems.

In 1997, Slovenia introduced the first CO_2 tax in the region. The tax is applied to all liquid fuels based on their carbon content, and it is planned to be extended for coal used for electricity production in 2004. The current tax rate is equivalent to about 14 EUR / ton CO_2 and the tax raised 77.9 mln EUR in 1999 representing an additional 30% of the revenue generated by excise taxes which are in accordance with EU minimum [14].

Conclusions

1. It is becoming increasingly difficult to calibrate environmental taxes and charges. In Scandinavian countries "Green Commissions" were created for this purpose. They develop compromise solutions, frequently raising environmental taxes and charges and lowering the tax on labor.

2. Pollution taxes available in Lithuania are significantly lower than the damage costs related to these pollutants emissions and in the future should be gradually increased seeking to base charges on damages. Pollution charges ought to be increased to induce polluters to internalize external costs. The polluter-pays principle should be applied and the precautionary principle promoted.

3. There is necessary to analyse efficiency of the existing economic instruments in Lithuania. This analysis should in particular shed light on the pace at which taxes can be raised without threatening business activity as such. The analysis should also be used to design feedback mechanisms for business reactions to the applied economic instruments.

4. In Central and Eastern Europe, many countries including Lithuania have used the revenues from environmental charges to capitalize environmental funds. Current low level of revenues generated by most air emission charges and the existing environmental financing systems based on the revenue from these charges do not create incentives to reduce pollution. Such a system of recycling payments from polluters in general to subsidize environmental improvements through specific projects is generally regarded as an effective "second-best" policy to overcome environmental challenges during economic transition but in the future as economy recovers experience of Scandinavian and EU countries should be implemented in these countries.

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APLINKOSAUGOS IR FISKALINIŲ TIKSLŲ UŽTIKRINIMAS, TAIKANT APLINKOSAUGOS MOKESČIUS LIETUVOJE

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Santrauka

Straipsnyje nagrinėjami pagrindiniai tikslai, kurių siekiama taikant aplinkosaugos mokesčius Lietuvoje. Remiantis detalia ankstesnės ir dabartinės naujos Lietuvos aplinkosaugos mokesčių sistemos, kuri susideda iš mokesčių už gamtos išteklius ir taršos mokesčių sistemų, analize, nagrinėjami pagrindiniai koncepciniai, analitiniai ir metodologiniai aplinkosaugos mokesčių taikymo Lietuvoje aspektai.

Pirmiausiai apibrėžiami pagrindiniai tikslai, kurių siekiama Lietuvos įstatymais, įtvirtinančiais aplinkosaugos mokesčių taikymą Lietuvoje. Toliau pateikiama ankstesnės, Lietuvoje galiojusios nuo 1991 m. iki 1999 m., sistemos analizė, išryškinant jos trūkumus, siekiant parodyti, kodėl ši sistema buvo neefektyvi ir jai nepavyko pasiekti užsibrėžtų aplinkosaugos ir fiskalinių tikslų, numatytų įstatymuose, bei pagrindžiant naujos sistemos įvedimo būtinybę. Daroma išvada, kad 1991 m. nustatyti mokesčiai už aplinkos teršimą praktiškai neatliko savo pagrindinių – skatinamosios ir fiskalinių – funkcijų.

Mokesčių sistemos efektyvumo analizė, kurios tikslas – nustatyti, ar mokesčiai už aplinkos teršimą skatina mažinti teršalų emisijas į aplinką, parodė, kad teršalų emisijos į aplinką apimtis ir mokesčių dydis remiantis Lietuvoje galiojusia mokesčių sistema buvo nedaug susiję.

Straipsnyje išanalizuoti naujos mokesčių sistemos, įsigaliojusios nuo 1999 m., pranašumai, palyginti su ankstesniąja sistema, išnagrinėti pakeitimai, kurie supaprastina mokesčių mokėjimą ir pateikia realesnius taršalų tarifus, taip pat įvertintos naujosios sistemos efektyvumas siekiant užsibrėžtų aplinkosaugos tikslų.

Daugiausia dėmesio yra skiriama atmosferos taršos mokesčių tarifų nustatymo klausimams, tarifai lyginami su atmosferos taršos žala dėl atskirų taršalų emisijų, taip pat išnagrinėtos Rytų ir Vakarų Europos šalyse taikomos mokesčių už atmosferos taršą sistemos bei palyginti tose šalyse taikomi tarifai už atskirų taršalų emisijas į atmosferą.

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