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COMPETITIVENESS AND ENVIRONMENT PROTECTION

This paper was produced as part of the research project entitled 'Economic competitiveness: recent trends and options for state intervention'

December 2003

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Summary

International competitiveness and environment

Theoretical and practical debates of economic policy turned towards the concepts of 'ecological tax reform' or 'green budget reform' as well as the relationship referred to as 'competitiveness and environment' in the last decade of the 20th century, from a variety of novel aspects. The relevant statements and arguments of economic theories as well as practical economic policy measures resulted in intense discussions and have lead to the revaluation of the previously dominant views and standpoints.

In the framework of a dynamic Porterian perspective (in the Schumpeterian economy) international competitiveness lies in adaptability and renewability enabling enterprises and - on a global scale - national economies to more fully satisfy the ever-changing demands of consumers. Our study explores the relationship between an environmentally aware economic policy and international competitiveness. Sustainable competitive advantage relies on innovativeness enforced by the very conditions of relative scarcity. Accordingly, an efficient environmental policy - reflecting the scarcity of natural resources - prompts enterprises focus efforts on innovation. The dynamic efficiency gains originating from (technology and product level) innovation may balance the static costs of meeting the regulations of environmental policy.

Some elements and possibilities of an economic policy based on environmental awareness

Ecological tax reform

An ecological tax reform is a transformation of the tax system whereby the tax burden is shifted from the economic 'good' (employment, income, investment), towards economic 'bad' (pollution, waste output, depletion of resources). An ecological tax reform is an economic policy package including the introduction and/or steady increase of taxes on energy, environmental taxes, raw material taxes, the phasing out of ecologically detrimental subsidies and tax allowances as well as the reduction of the taxes on labour, employment, incomes and/or investment. The goal of an ecological tax reform is to alter the economic structure in a way as will prompt a substantial shift from an energy- and natural resource-intensive economic structure towards a labour intensive structure. The extent of the reform and the content of the economic policy instruments applied may vary from country to country, for besides the variety of the ecological taxes the economic and social position and status of the countries concerned are also different.

One argument in favour of environmental taxes is that their introduction generates double dividends for the society, if the utilisation of the revenues originating from the increasing pollution taxes is accompanied by reductions of other distortive taxes (e.g. on labour, income), in a revenue-neutral way. The first benefit is the improvement of the quality of the environment through the reduction of operations generating pollution, while the second benefit is realised in the

improvement of the labour market thorough the re-investment of revenues, i.e. the cost of labour may be reduced which will then lead to increasing employment.

The two main practical obstacles to the introduction of an ecological tax reform are the differentiation of the international competitiveness effects, and the regressive nature of the distribution effects. The gradual introduction of the necessary measures enables enterprises of the most adversely affected sectors as well to get prepared and to exploit the benefits of innovation making it possible to offset negative impacts. Another lesson drawn from practical examples is that the way of the re-investment of revenues is a crucial factor.

Subsidy policy

A review and transformation of the existing subsidy system is a fundamental part of the 'green budget reform'. Potential changes that are not only acceptable from each of the three (economic, social, ecological) perspectives, but that can mutually strengthen and justify one another, need to be sought for. The promotion of products, services, technologies and developments offering positive environmental externalities is a step of internalisation that is justified from an economic point of view as well. The termination of subsidising environmentally harmful operations/investments and entities pursuing wasteful management of resources, is yet another important step from the aspect of the adaptability and renewability of the national economy.

Public procurement

Public procurement based on environmental awareness enables the development of a harmonised public procurement policy that can significantly influence the whole of the economy and its structural processes. A public procurement policy dominated by environmental awareness may aim at enhancing the market of specific environment-friendly products and services, it may prescribe less specific but still clearly defined environmental expectations to be met by certain groups of products and it may also impose guarantee type requirements (e.g. publication of environmental reports) on market actors intending to participate in public procurement procedures.

The risk of path-dependence of technological development - along with all of its disadvantages - may be reduced through provision of targeted assistance to the strengthening of competing alternatives, prior to the appearance of the closing effect through the positive feedback mechanisms. In essence, public technology development and subsidy policies should be aimed at preserving the competing alternatives.

Nature conservation, agriculture and competitiveness

The multifunctional agriculture concept adopted by the European Union assigns at least three different functions to the agriculture sector: (i) production, (ii) nature conservation, landscape maintenance and (iii) rural development. These

functions may be regarded as so-called 'collective products' of agriculture. Accordingly, agriculture generates positive externalities and public goods as well, without compensation by the market: consequently these have to be financed from public funds.

The common agricultural and rural policy of the EU is, in a long run, based on two pillars. The first one is the so-called production pillar which is a payment attached to quotas and quantities. The second one is the so-called eco-social pillar, a form of assistance related to the environmental, social, regional and employment functions of agriculture. The EU is planning to phase out payments directly relating to quotas, quantities, production and exports and at the same time payments under the second pillar will be increased. The candidate countries may receive assistance from the new and progressively increasing funds of the eco-social pillar in proportion to the degree of their preparedness.

Agricultural subsidies directly related to production distort competition, consequently they entail a substantial social dead weight loss. Under the conditions of international economic relations shifting towards liberalisation they cannot and should not be maintained in a long run. The functions of agriculture generating positive externalities and public goods, however, should be compensated by society for the very purposes of the enhancement of social welfare and the offsetting of market failures. In addition, such functions contribute to the preservation of the very biological and cultural diversity that constitute the foundations of long term adaptiveness and renewability, in other words: competitiveness.

1. International competitiveness and environment

Theoretical and practical debates of economic policy turned towards the concepts of 'ecological tax reform' or 'green budget reform' as well as the relationship referred to as 'competitiveness and environment' in the last decade of the 20th century, from a variety of novel aspects. The relevant statements and arguments of economic theories as well as practical economic policy measures resulted in intense discussions and have lead to the revaluation of the previously dominant views and standpoints. The most important message of these and of the following relatively brief review is that the traditional economic policy considerations and priority variables (competitiveness, employment, productivity, national income), as well as environment protection and nature conservation are not necessarily incompatible and there are so-called win - win situations as well.

The problem of environment pollution found its way into economic theories through studies written by Arthur Pigou, successor to professor Alfred Marshall, a leading figure of the Cambridge school. Pigou introduced the concept and analysis of 'externality' in his work entitled The economics of welfare (1920) which is discussed today in books on macroeconomics as one of the phenomena of market failure. The pollution of the environment - as a negative external impact - causes losses in terms of welfare for the society, which may be eliminated or offset by governmental intervention. The imposing of pollution tax in line with the principles established by Pigou is aimed at phasing out inefficient utilisation of resources - in the form of excessive production or consumption resulting in pollution - and at enabling economic policy to lead the society to a higher level of welfare, through the accomplishment of the so-called Pareto-efficient improvement. In this way the failure of the market can be eliminated, the efficiency of the utilisation of resources (allocation efficiency) may be improved, the level of production or consumption causing pollution can be reduced to a level considered as 'optimum' from the aspect of the society as a whole, and the level of environment pollution is also reduced to a socially optimal level.

EXTERNALITY

The phenomenon of externality is a failure of the market. External effects are defined as a situation where the (positive or negative) effect of the regular operations of an economic actor appears - unintended - in the production or consumption function of another economic actor without such effect being covered by a business transaction.

In the wake of the introduction of the Pigou tax the production and consumption of products and services resulting in environment pollution will undoubtedly grow more expensive and the costs of the producer will increase, for the external costs that used to be passed on to the society as a whole will be paid by the producer under the new circumstances, on the basis of each unit of pollution. In the framework of analysis of a static partial equilibrium this will result in a reduction of production resulting in pollution and in the weakening of its profitability. From a macroeconomic aspect the imposing of the tax on pollution (environmental tax) will, on the one hand, result in a welfare gain through the improvement of the quality of

the environment, in contrast to the welfare cost resulting from the drop of the production and consumption of the product or service entailing environment pollution. According to formerly predominant views the latter loss outweighs the gains and the participants of the economy - producers and consumers - have to face increasing costs and prices. In this static framework of partial equilibrium the introduction of the tax on pollution results - through the growth of comparative prices - in a weakening of the competitiveness of enterprises and of the economy as a whole. Up to the nineties it was widely held that environment policy regulation will always deteriorate international competitiveness. Accordingly, competitiveness may be explained by comparative cost advantages and disadvantages.

PIGOU TAX ON POLLUTION

An optimum tax imposed on each unit of pollution emitted by the taxpayer. The optimum rate of the tax equals the external marginal cost relating to the optimum level. The aim of the Pigou tax is to internalise negative externalities thereby ensuring the maximum social welfare.

By the nineties, however, the interpretation of the concept of competitiveness had changed, and this process was brought to completion by a book written by Michael Porter - senior professor of Harvard Business School - entitled Competitive advantage of nations (1990). In the Porterian framework based on a dynamic approach (in the 'Schumpeterian economy') international competitiveness - of enterprises and national economies alike - lies in adaptability and renewability whereby enterprises and the national economy on a global scale are capable of increasingly satisfying the constantly and more and more rapidly changing demands of consumers. In contrast to the conventional approach of comparative advantages Porter argues that instead of an ample supply of factors of production, sustainable competitive advantage relies on the innovative capacities enforced by the very conditions of relative scarcity. Accordingly - as argued by Porter in his essay entitled America's green strategy (1991) - an efficient environment policy regulation - communicating the scarcity of natural resources by means of pollution taxes - stimulates enterprises to innovate. The dynamic efficiency gains originating from (technological and product level) innovation may offset the static costs of environment policy regulation. The enterprises and national economies that manage to develop an internal capability of rapid adaptation and renewal will acquire a competitive advantage over others, which will be sustainable in a long run. This capability of renewal and innovation - and consequently competitiveness - will inevitably and increasingly dominantly include adaptation to ecological limits as well.

COMPETITIVENESS

In brief: competitiveness equals adaptability. The capability of an economic unit - national economy or enterprise - of relatively quickly and flexibly adapting itself to changing circumstances whilst ensuring maximum possible satisfaction of the demands of society or consumers. Sustainable competitive advantage lies in the renewal - innovation and learning - capability of an economic unit.

In his subsequent works (Porter - van der Linde 1995a and 1995b) Porter lays detailed arguments against the conventional approach which considers pollution taxes and other effective environmental policy instruments simply as cost increasing items. Pollution is inefficient and wasteful use of resources, involving failure to increase the added value component. The avoidance of pollution will increase productivity and improve the efficiency of production, thereby it results in cost benefits (through the reduction of material and energy costs). The most essential competitive advantage, however, lies in the learning process taking place during the development and utilisation of this type of ecological efficiency (see the results accomplished by the advanced economies in the productivity of labour, since the World War Two). An enterprise or a national economy is given yet another impetus in terms of innovation and acquires types of knowledge and learning capabilities, providing for the competitive advantage of today's 'knowledge based' competitive economies and 'learning organisations' which may then be sustained in a long run.

ECO-EFFICIENCY

Eco-efficiency is accomplished through the provision of services and products at market prices, satisfying human demand, improving the quality of life, whilst gradually reducing the environmental impacts and the exploitation of resources - in terms of input per unit of output - throughout the entire lifecycle, at least to the limit of the estimated sustaining capability of the planet Earth. In other words eco-efficiency means maximising value whilst minimising environmental impact. Eco-effectiveness may be expressed in terms of the environment load per unit value of the product or service.

Source: World Business Council on Sustainable Development

This approach to the 'competitiveness and environment' debate was introduced in the literature on economic theories as 'Porter hypothesis'. Although the impacts of environment policy regulation on international competitiveness had already been analysed by previous studies, the testing of the Porter hypothesis triggered a new wave of empirical analyses. On the whole, macroeconomic analyses revealed no or minor - practically negligible - effects (on economic growth, investments) indeed, they also identified modest positive consequences (e.g. on employment). Nor did the possibility that companies operating in relevant industries would start 'moving' from national economies introducing tightened environment policy regulations to national economies applying no such regulations or applying much more lenient rules, prove to be a major threat. Nevertheless, the different economic sectors are not bearing equal burdens under the environmental policy regulations: sectors demanding more natural resources are obviously more exposed to such requirements. However, sectors using no or little natural resources - as well as the industries providing environment protection services - will benefit in relative terms from the tightening of the environmental regulations. At the same time, a variety of empirical research projects have proven that, within any given sector, enterprises of different capabilities and applying different strategies in competition will respond to the environment policy regulations in different ways and so some of them will build up competitive advantage over their international competitors within their respective

sectors covered by such regulations. The international comparative advantage of the so-called first-mover may be exploited in some cases, as has been proven by empirical data.

THE PORTER HYPOTHESIS

Gradually tightening, though efficient, environment policy regulation may improve the competitiveness of economic sectors and companies concerned - by forcing them to increase their efforts in the field of innovation - in a long run, promoting thereby the improvement of the international comparative advantage of the national economy as a whole.

To some extent apart from the discussion surrounding the Porter hypothesis a number of governments - including those of the EU Member States - along with the EU Commission have been paying increasing attention to environmental taxation as one of the political steps taken towards the accomplishment of sustainable development. The growth of the attractiveness of environmental taxes is driven partly by the fact that they enable more cost-efficient environmental policy regulation in comparison to the technological and emission standards and regulations that used to be applied almost exclusively. These, however, also originate from a theoretical assumption offering benefits in addition to the environmental ones, as a consequence of environmental taxation. Such additional benefits are based on the theoretical features of the Pigou taxes and they have made a substantial contribution to the increasing interest in - and to the actual measures triggered by - the concept of 'ecological' or 'environmental' tax reform, on the part of economic and financial policy makers of numerous countries. This approach has also appeared in a variety of official standpoints of the EU (see the 5th Environmental Action Programme, the 1993 White Book on Growth, competitiveness and employment). The White Paper - by Jacques Delors, former Chairman of the EU Committee - declares that 'if an answer is to be given to the double challenge of unemployment and pollution the possible trade-off between the reduction of labour costs and the increasing of pollution charges should be recognised'.

In the following sections the theoretical and practical aspects of the ecological tax reform will be discussed first, to be followed by a review of the example of agriculture which is, perhaps, the most important economic sector of Hungary (from the aspect of her natural conditions and resources). While the main question of an ecological tax reform is focused primarily on the relationship between the internalisation of negative externalities and competitiveness, we will discuss - as a second aspect - the relationships between the positive external impacts of the agriculture sector and international competitiveness. The fundamental principles of an economic policy based on environmental awareness will be dealt with in brief closing sections; along with some key recommendations for the Hungarian economic policy; as well as the necessary directions of further analyses. This paper is closed by the annotated bibliography of the main pieces of work in technical literature, a detailed list of literature used as well as the annexes attached hereto.

2. Some elements and possibilities of an economic policy based on environmental awareness

2.1 Ecological tax reform

2.1.1 Theoretical issues

From the aspect of economic theory the Pigou environmental taxes are fundamentally different from other taxation forms. Theoretically (in a first-best world) environmental taxes enable optimum taxation without distortions. By contrast, the taxes on labour and incomes lead to efficiency losses in the economy by having a direct impact on the incentives driving the actors of the economy, distorting thereby their economic behaviour. In addition to the avoidance of such effects, optimised environmental taxes lead to economic efficiency improvements by forcing economic actors to face the whole of the social costs of their activities (including external costs as well). Accordingly, environmental taxes may enable the avoidance of the disadvantage of other forms of taxation where the raising of public/governmental revenues is accompanied by the net dead weight loss suffered by social welfare. (See Annex 1 for the areas of practical application of environmental taxes).

STRENGTHS AND WEAKNESSES OF THE ENVIRONMENTAL TAX

Strengths:

- *It is a market conform regulatory instrument for it does not interfere with market mechanisms and does not impede the operation of the pricing system;*
- *Since tax is to be paid on each unit of pollution it stimulates complete avoidance of pollution;*
- *Such taxes are capable of minimising the costs of the controlling and reduction of pollution in a given economy (static efficiency);*
- *It is economically effective at the level of enterprises for the decision concerning environmental loads - i.e. how to minimise costs - is up to the polluting companies;*
- *It stimulates innovation aimed at reducing or avoiding pollution, thereby improving the long term adaptability and renewability of enterprises and ultimately their competitiveness (dynamic efficiency and favourable ripple effect);*
- *They generate revenues which may be used for a variety of purposes.*

Weaknesses:

- *The optimum rate of the tax cannot be calculated in advance;*
- *Too low tax rates will not accomplish their environmental policy goals;*
- *Undesirable distorted incentives may be created if the tax is not imposed directly on the pollutant concerned;*
- *The incentive of environmental taxes in the way of influencing behaviour may be in conflict with the maintenance of the level of central revenues (an efficient environmental tax will reduce or even eliminate the tax base);*
- *The tax system and administration will be made more complicated;*
- *Since taxes are imposed in a harmonised uniform system the accomplishment of region-specific goals is not guaranteed (some sources of pollution may not be eliminated);*
- *Particularly during an economic downturn groups of economic actors with contrary interests may grow increasingly capable of enforcing the cancelling of environmental taxes.*

The ecological tax reform is a complex economic policy package wherein the introduction and raising of the environmental taxes and the withdrawal of environmentally harmful tax allowances and subsidies are accompanied by revenue-neutral alleviation of the rates of distortive taxes (on labour, income, investment) as well as by the provision of financial assistance to ecologically favourable activities (technological innovation). In this way the ecological tax reform comprises the transformation of existing taxes based on environmental considerations, along with the introduction of new environmental taxes. This reform includes each of the four possible goals of the imposition of environmental taxes, namely: (i) influencing of economic behaviour (stimulating of operations entailing reduced environmental burdens); (ii) internalisation of external costs (in the interest of social welfare); (iii) the general revenue generating demand of the budget; and (iv) tax revenues collected for specific expenditure objectives (earmarked revenues to be used for environmental subsidies). The above elements of an ecological tax reform are aimed primarily and most importantly at transforming the structure of the economy, at shifting the economic structure from energy and natural resource intensive sectors towards

labour intensive ones. According to the simple logic underlying the reform package tax burdens should be shifted from factors that are considered as desirable in respect of economic development, such as employment and investment, to undesirable aspects of growth, such as pollution, waste generation and the depletion of natural resources. This provides a clear message to economic actors concerning the desired forms of behaviour and development directions and the changing conditions of competition, to which they can respond in an innovative way, in time, whilst relying on their own resources. The objective of an ecological tax reform is a long term one, focusing on the dynamic effectiveness of the economy and the creation of a new dimension of competition in the market.

ECOLOGICAL TAX REFORM

An ecological tax reform is a transformation of the tax system shifting the tax burden from the economic 'good' (employment, income, investment), towards economic 'bad' (pollution, waste output, depletion of resources). An ecological tax reform is an economic policy package - of contents varying in accordance with the different social and economic features of countries - including the introduction and/or steady increase energy taxes, environmental taxes and raw material taxes, the phasing out of ecologically detrimental subsidies and tax allowances as well as the reduction of the taxes on labour, employment, incomes and/or investment. The goal of ecological tax reform is to alter the economic structure in a way as will prompt a substantial shift from an energy- and natural resource-intensive economic structure towards a labour intensive structure.

Theoretical technical literature and practical economic policies have equally been focusing primarily to the question whether the so-called 'double dividend' is really provided by an ecological tax reform. According to the double dividend hypothesis the first benefit of environmental taxes lies in the improvement of the quality of the environment (reduced pollution) while the second benefit is the possibility to reduce the burdens of taxes distorting economic efficiency, by reinvesting the revenues from the environmental taxes. In fact the losses resulting from the introduction of environmental taxes are compensated by the gains resulting from the rates of distortive taxes. Such benefits are expected to be yielded primarily by the growth of employment (decline of unemployment), the enhancement of economic performance (GDP growth) and ultimately from the improvement of competitiveness.

DOUBLE DIVIDEND

The double dividend of environmental taxes is realised when the revenues from the growing taxes on pollution are used for the reduction of other distortive taxes (e.g. on labour and income), in a revenue-neutral way. The first benefit is the improvement of the quality of the environment through the reduction of environment polluting operations (Pigou effect), while the second benefit is realised by the improvement of the labour market thorough the re-investment of revenues, i.e. the cost of labour may be reduced which will then lead to increasing employment ('revenue re-investment effect').

The so-called weak and strong versions of the double dividend are distinguished in theoretical technical literature. According to the weak requirement of double dividend a variety of efficiency gains may be realised through the re-investment of revenues originating from the environmental taxes in contrast to payment of other - typically lump sum - benefits to households. Experts generally agree with this argument, but the concept of the strong version of the double dividend is disputed by many. According to the strong version the benefits of the reinvestment of the revenues collected from environmental taxes exceed the welfare cost of environmental taxes. Such costs stem from the interaction between various taxes. The key pre-requisite for the validity of the strong version is inefficiency and flexibility of the labour market; i.e. that the market should be capable of responding to the real wage decline caused by the introduction of an environmental tax by increasing the labour input.

The double dividend of an ecological tax system may be realised most likely if the following conditions are met:

- large differences between the efficiency costs of the various existing taxation forms;
- the burden of the environmental tax is borne by a tax base with a low efficiency cost;
- a broad environmental tax base.

The revenues raised from environmental taxes may be used for the reduction of various taxation forms characterised by high efficiency costs.

Researchers apply two basic approaches in the testing of the existence of the double dividend, i.e. the economic effects of the ecological tax reform: on the one hand, by applying general equilibrium models (for partial analyses may not always reveal all facts and circumstances); on the other hand through econometric models. In the general equilibrium models the 'environmental benefit' originates from the introduction of social (external) costs built into prices, while the 'economic benefit' comes from the reduction of distortive taxes. This double dividend is compared to the theoretical optimum created and assumed by the model. By contrast, the majority of econometric models based on time series do not have such an optimum. Environmental benefit typically comes from the diminishing of the emission of some pollutant while the economic benefit originates form the growth of employment resulting from the shifting of the tax burden.

The DRI study (DRI 1994) - one of the most often quoted analysis - modelled the carbon emission tax in the case of the six largest EU Member States. The reference scenario was 'business as usual'.

Another scenario was offered by the carbon-dioxide tax under discussion within the EU at the time.

A third scenario took into account - besides the energy tax - the taxation of traffic congestion (jam charge), the tradable emission licences to be introduced on emissions from point sources and the introduction or raising of certain other environmental taxes, along with the utilisation of 80 % of the revenues for the cutting of the personal income tax rates.

Under the fourth scenario the revenues were reinvested into the cutting of non-wage type labour costs.

The simulation exercises showed that the third and fourth scenario yielded substantially larger environmental benefits than did the other two scenarios. Both the third and the fourth scenario resulted in larger economic benefits than did the second one. In terms of the employment benefit the fourth scenario significantly surpassed even that of the third one. It was also revealed by the simulation exercises that certain economic sectors and certain regions would suffer losses in consequence of such a tax reform.

RESULTS AND FINDINGS OF MODELS AND SIMULATIONS

The following summary conclusions may be drawn from a review of a total of 139 different general equilibrium and econometric models and simulations of 56 scientific analyses:

1) *There is a 'first benefit', i.e. the environmental gains:*
2) *73 % of the simulations revealed the existence of a second benefit, in the form of increased employment. The most favourable results in respect of a positive change of employment may be expected in the case of a reduction of the social security contribution.*
3) *In terms of economic performance (GDP) 49% of the econometric models and 58 % of the general equilibrium models forecast beneficial effects.*
4) *A total of 77% of the models used predicted a drop of investment.*
5) *94% of the models used indicated an increase of the consumer price index.*
6) *If modelled at the level of the EU the effects on competitiveness are modest; with energy-intensive industries suffering losses and labour-intensive sectors enjoying gains.*
7) *As a result of the introduction of energy taxes households with relatively higher energy expenditure structures will be among the losers of the change, i.e. the distribution effect of the CO_2 tax is regressive (though not as strongly as expected). At the same time the taxation of fuels shows a more progressive impact. On the whole, the impacts of energy taxes may vary from country to country for the models showed regressive impacts for instance in the case of Ireland, Denmark and the United Kingdom, and they revealed progressive effects in the case of Italy and Spain.*

Two of the benefits of an ecological tax reform are not disputed. One of them is the environmental benefit in the form of improved environmental quality and diminishing emission of pollutants. The other is the 'eco-efficiency benefit' reaped in the form of improved production efficiency enabled by the increased efficiency of the use of resources (materials and energy). In technical literature these are referred to as 'low-hanging fruits' where real win-win situations may be exploited by businesses through savings on material and energy costs. Furthermore, this eco-efficiency will also appear in a long term in the form of dynamic efficiency gains as well, in the sense that the persistent stimulus to cut pollution leads to innovative product and technology developments. This is considered by many authors as the way to what is known as 'ecological modernisation' which is developing into one of the relevant

factors of the preservation and increasing of the international competitiveness of countries.

The economic gain that may result from the reinvestment of the revenues - in our world which is definitely not better than a 'second best' - may theoretically be put at risk by the interactions between tax types: a negative tax interaction effect may offset the positive impact of the reinvestment of the revenues. At the same time the theoretical debate continues for it may also be argued that the tax interaction effect may perhaps be less significant than expected by some. For in the models the role of the quality of the environment should also be taken into account as a factor of production. In this way the environmental tax reduces the cost of production to some extent, which may even fully offset the negative tax interaction effect. This theoretical argument has been confirmed by the simulations carried out using models thus modified. Moreover, the dynamic efficiency consequences or the innovative responses of enterprises cannot be taken into account by the currently applied models, despite the possibility of it being the key benefit of an ecological tax reform in respect of competitiveness. As has been proven, the existence and availability of the benefit of increased competitiveness is confirmed by the majority of simulations and highly promising findings have been yielded in respect of the productivity benefit as well.

It should be emphasised that the possibility of structural changes - that may be triggered in a national economy by an ecological tax reform at the lowest possible cost - carrying dynamic efficiency benefits and making substantial contributions to the tackling of competitiveness challenges faced by the economy in the 21st century as well as to the development of the necessary capability of permanent adaptation and renewal, seems even more important than the existence of the double dividend. Accordingly, an ecological tax reform creates a capability for the influencing of the structure of the economy which should be taken into account by economic policy. In addition to meeting the requirement of fiscal neutrality this may enable the maintenance of the tax burden imposed on the economy unchanged, consequently, the tax revenues of the government need not diminish either.

2.1.2 Practical questions

Although environmental taxes and charges have been spreading increasingly rapidly since the seventies in OECD countries, the first complex ecological tax reform attempts had to be waited for until the nineties. Accordingly, the available wealth of experience relating to ecological tax reforms has accumulated during the past 10 years or so. Ecological tax reforms per se have been launched by eight countries: Denmark, the United Kingdom, Finland, the Netherlands, Germany, Norway, Italy and Sweden. Each of them launched its multistage reform package on the basis of the recommendations developed by their ecological tax reform expert committees, along with thorough social coordination and awareness raising efforts. Such ecological tax reforms have, in the majority of cases, involved and they still involve a gradual and predictable increase of the taxes on energy, along with the introduction of additional taxes on pollution (environmental load charges, product fees). Nevertheless, the practical examples of ecological tax reforms - in their current rates and scopes of application - are still regarded as the initial steps of the process.

THE ROLE OF ENVIRONMENTAL TAXES IN THE EU

Until recently no EU level environmental taxation had been in effect, though the mandatory minimum taxation of mineral oil has been prescribed since 1993. Numerous attempts have been made concerning the introduction of a uniform CO_2 tax but for lack of consensus such attempts have not succeeded as yet. A number of Member States (Denmark, Finland, the Netherlands, Germany, Italy and Sweden) have unilaterally introduced such taxes at national level. Most recently, on 20 March 2003 the ECOFIN (EU Council of Ministers for Economic and Financial Affairs) made a decision concerning the long delayed introduction of a standardised European energy tax. From next year on each EU Member State - including Hungary - such minimum tax will be imposed on each energy product, whilst actual tax increases should be expected in the case of certain energy products only.

Data on revenues originating in the EU from national level environmental taxes have been collected by Eurostat since 1997. Based on the time series data on energy, transport and environmental taxes the following main features have been established:

- Out of the total tax revenue of the EU15 environmental taxes accounted for 5.8% in 1980, 6.8% in 1994 and 6.7% in 1997. The individual percentages varied between 5.3% and 9.2%.
- Energy taxes account for the largest - over 75 % - part within the total revenue from environmental taxes. Taxes on transport and those on pollution account for 20% and 5%, respectively. The latter item has been growing most dynamically within the total tax revenue: between 1990 and 1997 it increased by 51%, while energy taxes grew by only 10% and the share of taxes on transports actually dropped by 2 %.
- In total, environmental taxes increased at a higher rate in comparison to the total GDP of the EU15, than did taxes on labour (28% and 7%, respectively) between 1980 and 1997.
- A highly variable and broad range of tax differentiation in the area of value added taxes is applied in the EU15 countries for environmental purposes.

Source: EEA (2000); Sterner (1999)

The two main practical obstacles hindering the introduction of an ecological tax reform are the differentiated nature of the international competitiveness effects and the regressive features of distribution effects. Although no general deterioration of competitiveness at the level of the national economy is confirmed by theoretical models or empirical research, there is no doubt about the fact that the adaptation and the economic restructuring process has different impacts on the various sectors of the economy. The competitiveness of energy and transport intensive sectors is expected to deteriorate in a short run. Since such sectors have substantial capabilities to enforce their interests, in the majority of cases they have managed to secure exemption from the energy taxes imposed by regulations. The way of the establishment of such exemptions and the composition of the 'packages' they are introduced in, however, do make a difference. In order to avoid losing the social benefits of an ecological tax reform for good - as a result of the influence exerted by

various particular interest groups - the communication of the objectives of the reform and its potential double dividends has proven to be useful, along with the involvement of the interested parties in the compilation of the final packages, without giving up the original objectives. The gradual introduction of the measures provides opportunities for the enterprises operating in the most adversely influenced sectors to get prepared in time and to exploit advantages and compensations offered by innovation.

Another lesson drawn from the practical examples is that the way of the reinvestment of the revenues is also crucial. One method applied in a number of tax reform packages is the utilisation of part of the revenues in a way as will generate funds for successful adaptation of the sectors hardest hit by such taxes. The criteria of access to the resources, however, have to contribute to the accomplishment of the goals (e.g. in return for the tax allowances enterprises undertake to reduce their emission of pollutants or to apply the best available technologies, under voluntary agreements). Negative sectoral impacts on competitiveness may be mitigated in this way. It should be noted, however, that the very aim of an ecological tax reform is to transform the structure of the economy. Quite naturally, therefore, it is the group of the most closely involved sectors that will have to go through the most substantial adaptation and renewal process, partly in order to improve their competitiveness in a long run.

Impacts on distribution are not less sensitive in political terms. On the one hand, mention has to be made again of the inevitability of social discussion and the necessity of awareness raising and information campaigns. On the other hand, however, the targeted utilisation of part of the revenues will also enable effective improvement of the circumstances of especially disadvantaged groups of the society (e.g. pensioners and other groups outside the labour market for whom the gain in employment will not generate direct benefits). In practice, a variety of solutions are applied in this area as well: e.g. the environmental taxi is not even levied below a certain level of consumption (which is regarded as the minimum required for sustenance) or lower tax rates are imposed on lower income groups of the society or members of such groups are provided with ex-post compensation. It is also possible to set up funds (in the case of energy taxes for instance) to provide financial assistance for investment projects (e.g. energy efficiency), to be used for the reduction of or compensation for the burdens of the most adversely affected groups of society (whereby both the environmental benefit is retained and the social disadvantages can be avoided). It should also be noted, however, that research has shown that the general improvement of the quality of the environment (realisation of the environmental benefits) is, in general, a regressive process, i.e. the lower income and more disadvantaged groups of the society draw larger benefits from the improvements (for they tend to live in more heavily polluted areas and they are more exposed to the majority of the forms of pollution).

Table 1. Ecological tax reform measures introduced or proposed to be introduced in the EU countries

Country	*Shifting of tax burden*		*Revenues originating from the shifting of the tax burden*
	from	to	As % of the total tax revenue
Sweden 1990	Personal incomes (4.3 % cut)	Environmental and energy taxes, including CO_2 and SO_2 taxes	1.9 % (environmental and energy taxes EUR 2 billion)
Spain 1995	Personal incomes	Fuel	0.2 %
Denmark 1993, 1995, 1998	Personal incomes Social security, investment	Environmental and energy taxes (power, water, waste, cars, CO_2 and SO_2)	2.5 % (EUR 340 billion in 2000)
the Netherlands 1996	Personal and corporate incomes, social security	Energy and CO_2	0.8 % (EUR 1 billion in 1998)
United Kingdom 1996, 2001	Social security	Landfills, CO_2	0.2 % (EUR 640 million in 1996)
Finland 1997	Personal incomes and social security	CO_2 and landfills	0.5 %
Italy 1999	Fees payable on employees	CO_2	0.2 % (approx. EUR 600 million)
Germany	Social security	Energy (mineral oil, natural gas and power)	0.6 % (estimated)/0.8 % (EUR 4.3 billion in 1999)
France 1999	Plan to reduce taxes on employment	Pollution tax	no data
Austria 1999 proposal	social security	Energy and traffic-related taxes (vehicle taxes)	up to 4.8 % (EUR 3.6 billion)

Source: ECOTEC (2001): 27-28

Table 2. Ecological tax reform in Denmark

Tax base	Beneficiary/collecting authority	Payment period	Income (USD million)	
			in 1994	in 2000
Mineral oils	National government/territorial tax and customs authority	Monthly	752.8	821.0
Retail crates (e.g. bottle crates)	National government/territorial tax and customs authority	Monthly	67.7	95.4
CO_2	National government/central and territorial tax and customs authority	Monthly	485.7	595.7
Carbon	National government/territorial tax and customs authority	Monthly	90.1	162.8
Light bulbs and fuses	National government/territorial tax and customs authority	Monthly	23.3	21.3
Power	National government/territorial tax and customs authority	Monthly	625.8	966.6
MTPL insurance	National government/territorial tax and customs authority	Monthly	137.4	179.3
Natural gas	National government/territorial tax and customs authority	Monthly	0	327.1
Chemicals (crop protection)	National government/territorial tax and customs authority	Monthly	6.8	46.4
Petrol	National government/territorial tax and customs authority	Monthly	956.2	1245.2
Raw materials	National government/territorial tax and customs authority	Quarterly	18.8	22.5
Sulphur	National government/territorial tax and customs authority	Monthly	0	24.5
Solid waste	National government/territorial tax and customs authority	Quarterly	88.1	123.5
Waste water	National government/territorial tax and customs authority	Quarterly	0	4.1
Motor vehicle registration fee	National government/territorial tax and customs authority	Monthly	2114.1	1745.6
Motor vehicle weight tax	National government/territorial tax and customs authority	Annual, semi-annual, quarterly	501.4	856.6
Road use tax	National government/police and territorial tax and customs authority	Daily, weekly, monthly, annual	34.3	38.0

Source: ECOTEC (2001); http://www.1.oecd/Taxrates.asp< MAKK (2000)

Although even the North European countries - the pioneers of ecological tax reforms - have been making slow progress, they have an increasing number of followers. Denmark is one of the first countries to have embarked on reforms, where the ecological tax reform plays a dominant role both in terms of extent and depth. Germany - where third phase of reform has already been launched - has had very favourable experience in terms of the improvement of the environment and the growth of employment. Poland took its first steps in 2001 - 2002 by the transformation of its environmental product and deposit charge system and by the establishment of a working group for the exploration of environmental taxes and the wealth of experience built up in Germany.

Hungary has introduced and is applying a wide variety of environmental taxes but most of these are either taxes on energy or product charges (see Annex 2). Only sporadic steps have been taken in the area of the application of the Pigou taxes on pollution or a comprehensive ecological tax reform. The concept of environmental load charges has been on the table for years (see Annex 3) but no Pigou type taxes have been introduced as yet.

Denmark is rich in traditions relating to environmental taxes and has a rich complex environmental tax system including a wide variety of tax bases. The Danish environmental tax reform was launched in 1993 and has been implemented in three phases, where the budgetary revenues originating from the increase of the rates of the already existing green taxes and the introduction of new taxes have been used for the reduction of the taxes on labour and capital. The reform introduced in 1993 affected households primarily, the reforms of 1995 targeted industry while the reforms of 1998 equally covered households and industry. The total environmental and energy tax revenue amounted to EUR 340 in 1995, equalling 4.4 % of GDP and 8.6 % of the total tax revenue.

Table 3. Ecological tax reform in the United Kingdom

Tax base	Beneficiary/collecting authority	Payment period	Income (USD million)	
			in 1994	in 2000
Quarrying tax	National government	-	0	0
Flight passenger tax	National government	-	50.5	1422.1
Climate change charge in the case of coal, power, natural gas and fuel consumption	National government	-	0	0
Hydrocarbon tax (including fuel consumption)	National government	-	2123.9	34836.6
Waste disposal tax	National Government/HM Customs	Quarterly	0	697.4
Mandatory tax on non-fossil fuels in the course of power generation	National government - power regulation authority	Monthly	2075	127.1
Motor vehicle excise tax	National government - Driver and Vehicle Licensing Agency	-	5893	7077.2

Source: ECOTEC (2001); http://www.1.oecd/Taxrates.asp MAKK (2000)

In 1993 an annual 5 % escalator factor was integrated in the excise tax payable on fuels, which was increased to 6 % in 1997. In year 1996 the tax levied on landfills marked the first major step of the environmental tax reform. The social security contribution paid by employers was reduced by an amount equalling 80 % of the tax revenues while the remaining 20 % was used for the financing of environmental rehabilitation programmes. The reinvestment of the extra revenues - in real terms - from the fuel taxes in the development of public transport and the improvement of the road network should be mentioned as the second step of the process. The third - also highly significant - step was the introduction of the climate change tax introduced in 2001, the revenues of which are used for the continued reduction of the social security contribution of employees and for energy efficiency investments. The total tax revenue from environmental and energy taxes amounted to EUR 640 million in 1995, which equalled 2.8 % of GDP and 8 % of the total tax revenue.

2.1.3 Subsidy policy

Besides the introduction of a green tax system a review of the subsidy policy from the aspect of the environment is also an important part of the 'green fiscal reform'. The effectiveness of a green tax system and its environmental and economic efficiency depends, to a large extent, on the way of the redistribution of the revenues of the budget. The challenge lies in finding the balance between day-to-day decisions on economy and ecology.

One requirement to be met by any form of financial assistance is that it should have no detrimental effects from economic, social or environmental aspects. A subsidy is to improve economic efficiency, help resolve market imperfections and

promote activities entailing positive externalities, if it is to be acceptable from an economic aspect. A subsidy should be regarded as environmentally detrimental if it results in any deterioration of the quality of any element of the environment (e.g. soil, surface water, subsoil water, air) or in a decline of the condition of the eco-system. Furthermore, it is to be considered detrimental if it reduces biodiversity, deteriorates the quality of the management of resources or if it hinders the operation of the principle of the prevention of pollution. In some circumstances it is possible to reconcile these three types of interests. In many cases, however, the economic, social and environmental interests may turn out to be irreconcilable in the current social/economic systems. For these reasons due attention is to be paid to the reviewing and assessment of the existing system of subsidies in the course of the elaboration of a tax reform package and efforts have to be made to find possibilities for changes that will be not only be acceptable from each of the relevant aspects (economic, social and ecological) but that will mutually confirm and justify one another. (One example for such transformation of subsidies is the transformation of the system of agricultural subsidies as described below.)

Transfers, state subsidy, loans and liability insurance:

- Subsidies, financial transfer payments;
- Credit instruments (interest subsidy, soft loans, loan guarantees);
- Payment guarantees, payments of deficits (environmental liability, accident insurance, inherited liability);
- Transfers to producers of input for energy producers;
- Research and development subsidies.

Taxation instruments:

- Energy taxes and other tax type levies on energy products;
- Excise taxes, contributions levied on natural resources;
- Emission charges;
- Tax exemptions (tax allowances, tax credits, tax deferral, reduced VAT rate and corporate income tax rate);
- Accelerated depreciation write-off.

Trade instruments:

- Tariffs, quotas, import restrictions.

We have also shown, however, that the effectiveness of the reinvestment of revenues generated by an ecological tax reform may be improved by adequately tightly controlled and targeted subsidy forms. It is generally true that the provision of financial support to products, services, technologies and developments providing positive environmental externalities may be an economically justified step of internalisation. The success of a green taxation system and its environmental and economic effectiveness depends, to a large extent, on the way of the re-distribution of the budgetary revenues. For this reason, a subsidy policy based on environmental awareness is an integral part of an efficient green fiscal reform.

The various forms of financial assistance may be categorised from a variety of aspects, however, from the perspective of their efficiency and effectiveness there are two main factors that need to be taken into account:

- the goal of the subsidy
- the source of the funds used.

Table 4.Categories of financial assistance

		Source	
		Central budget	Environmental revenues
	Environmental R&D	1	2
Objective	To reduce pollution	3	4

Two types of subsidies are distinguished from the aspect of the objectives of their application. The first type includes the R&D subsidies enabling environment-friendly product and technology change (1-2). These forms of subsidies are effective over a longer period of time, aiming at complete and final elimination of pollution. They play a major role in the preparation of the change of production technology, because by enabling scientific work and by focusing it on the resolving of environmental problems these subsidies will offer ready-to-use technologies for the alleviation of the environmental problems of the economy.

The second category is that of subsidies having a direct influence on the participants of the economy, the accessibility of which is subject to the reduction of pollution as a pre-requisite. Depending on the formulation of the subsidy criteria a variety of possible forms of subsidies are available. The goal of the allocation of a subsidy may be restricted to the reduction of pollution, where the relevant environmental policy objective is to have polluters reduce their emissions for which they are granted financial subsidy. In this case it is up to the economic actors to decide on the solutions they apply and on the extent to which they will reduce their emissions. In this way the various polluters may freely establish their techniques to apply in avoiding pollution, they may optimise their environmental expenditures and this is the way in which the emission of pollutants may be reduced most efficiently from the aspect of the national economy. Subsidies may be made available subject to the application of a certain technology or to the production or distribution of a certain range of products. Although in this case the decision making options of polluters are reduced, yet the economic structure or technology is much more likely to change than in the previous case. Such types of subsidies are intended to reward the positive externalities of environmentally friendly products and technologies and they enable the removal of market barriers to increase the profitability and promote the wider introduction of cleaner products and technologies. In this way they channel market processes towards politically preferred directions of development, resulting in positive discrimination for the beneficiaries and negative discrimination for the rest of the market actors.

Subsidies may also be supplemented by direct legal regulation. In this case limit values are imposed on emissions where the costs of keeping below the limits are covered by the state in the form of subsidies. This is another arrangement based on the principle of public burden sharing.

The subsidy policy preserves, indeed, it promotes the process of the development of the market, in that it facilitates the abandonment of the old path of development with its environmental loads and it encourages the evolution of a new, dynamic and environment friendly development trend. In the application of subsidies their incentives influence processes in numerous directions. On the one hand, they encourage polluters to reduce pollution whereby they impose an indirect economic disadvantage on polluters not willing to take measures to reduce pollution. On the other hand, this is an indication to the market and the rest of the society concerning the importance of the reduction of pollution and the introduction of new technologies. In this way it is possible to indirectly promote the adoption of new attitudes and behaviour patterns, along with the stimulation of research and development in this field. Such effects are summarised in the following table:

Table 5. The impacts of subsidies

		Subsidy	Information
Impact	Direct	Rewarding of participants	
	Indirect	Penalising of those refusing to participate	Influencing R&D, Formulation of public opinion

The effectiveness of environmental subsidies - i.e. the expense of the accomplishment of an environmental objective - is substantially influenced by the source of the amount used for such purpose. If it originates from the general budget revenues the subsidy may only have a direct effect on the recipient, it is based on the principle of public burden sharing, with all of its disadvantages (Table 1, types 1-3). If, however, financing is provided from a separate fund made up of environmental fines, marketable licences and environmental taxes, the subsidy will also have an indirect effect - through the collection of resources - on the transformation of the economy and in this case it operates on the basis of the polluter pays principle (Table 2, 2-4). This is the basic concept of the green fiscal reform.

The effectiveness of subsidies is also influenced by the questions of who and under what conditions will receive subsidies. The following expectations should be met in this respect:

- Subsidies should be allocated through a fair competitive scheme instead of a discriminative process, i.e. financial assistance should be provided for those who can use it in the most effective way, accomplishing the greatest improvement in the quality of the environment. Competitive bidding (tendering) seems to be the most suitable solution for this.
- Subsidies should not be made available in a long run, i.e. they should stimulate polluters to make prompt actions to develop their eventual environment protection solutions avoiding thereby a situation where the environmental funds play a mere income-top-up role (*rent seeking* activities). This is indicated by the so-called 'evolution criterion' of subsidies: in other words, the subsidised technologies and products should be viable in the economy after the termination of the subsidy.

The most frequent disadvantages of subsidies are as follows:

- Emission limit values need to be identified for the specification of the environmental policy objective (for it may not be necessary to subsidise the avoidance of each specific emission) above which subsidies become effective. Precise and reliable establishment of limit values, however, imposes an excessive task on politics, and their formulation in a polluter-specific way is beyond the capacities of authorities.
- Inadequate conditions applied to subsidies may result in distortions to the mechanisms of the market for sectors generating the heaviest pollutions will receive most of the subsidies whereas these are the areas where there is the largest need for the adoption of more environment-friendly procedures and yet the subsidies enable the maintenance of the polluting technologies.
- It is not possible to provide subsidies for all polluters which will result in discrimination and irregularities of various sorts.
- Long term subsidies have little incentive concerning the introduction of new, more effective procedures and technologies for in this way the costs of polluters are reimbursed even without the introduction of innovations (Cansier, 1993).

2.1.4 Public procurement policy

Besides influencing the structure and competitiveness of the economy through the formulation and modification of the rules governing the market, state and governmental organs also appear on the demand side of the market, as buyers. This is the field of public procurements. Public institutions generate substantial demand in various markets for various industries. The whole of the market, the supply side as well as competition itself will be influenced by the behaviour of and such a large customer in the market and the public procurement criteria applied by such a customer (see the role of the bargaining power of buyers in Porter's model).

Public procurements based on environmental awareness enable the formulation of a coordinated public procurement policy that can have a very significant impact on the whole of the economy and its structural processes. Besides its own demand for more environment-friendly products and services a public procurement policy guided by environmental awareness sends important signals to all participants of the market concerning the spirit and direction of competition. For a variety of industries imposing particularly heavy burdens on the environment in their current state - which are major partners of the public sector on the supply side - the expectations of environmentally oriented public procurement may materialise in the improvement of the environmental performance of the enterprises concerned ('going greener') and in the re-consideration and transformation of embedded behaviour patterns, routines and procedures, rather than in the form of specific requirements (e.g. certain technologies or products).

Accordingly, a public procurement policy based on environmental awareness may aim at increasing the market of specific environmentally friendly products and services (e.g. 'recycled paper', or bio-degradable detergents, water-based paints); it may also impose less specific but definitely outlined environmental expectations on various product categories (e.g. purchasing of 'zero emission' cars, of a number of

possible technical solutions, ranging from electrical to hydrogen fuelled etc.); and it may also introduce general, guarantee type requirement (e.g. operation of a certified ISO 14001 environment management system, publication of annual environmental reports), for market actors intending to participate in public procurement procedures.

From the perspective of the dynamic definition of competitiveness (adaptability and renewability), one of the most challenging aspects - and one of the most promising opportunities - of subsidy and public procurement policies in terms of economic theory, lies in the so-called 'path-dependent' nature of technical development. Technical development and the economics of innovation draws attention to the fact that not necessarily the most efficient technological or technical solutions will be widely adopted by the economy (numerous examples are offered by the history of technical development, from the QWERTY keyboard through the VHS video system to the Windows operating systems). Owing to the positive feedback mechanisms operating in the economy and technical development it is very easy to get locked in a given technological path which will be very difficult to leave upon recognition of its inferiority of quality or detrimental (e.g. polluting) characteristics in comparison to other technologies. Accordingly, technical development is dangerously path-dependent and quitting a wrong path is complicated by immense historical social costs, embedded cognitive schemata (engineering, managerial and consumer expectations), institutional and organisational inertias as well as economic and political counter-interests. In fact we are facing a so-called 'technological regime', whose cognitive and institutional pillars mutually strengthen each other and try to exclude competing alternatives (exclusion effect).

The most effective instrument that may be applied by economic policy against this phenomenon may be aiming at the preservation of diversity. The risk of the path-dependence of technical development - together with all of its disadvantages - may be alleviated by providing deliberate and carefully planned support to the strengthening of competing technological alternatives before the exclusion effect can appear through the positive feedback mechanisms. This is the so-called 'strategic niche management' concept. Its key point is that the technical development and subsidy policies applied by the state should promote the preservation of competing alternatives. It has to assist the avoidance of having one or another technological solution excluding competing solutions (e.g. ones developed later), in order to enable several technology market niches to co-exist, for that is the real guarantee for the long term adaptability and renewability of the economy, in other words, for innovation. The concept of strategic niche management aims to promote precisely targeted temporary subsidies (to be compared to the infant industry argument) and the evolution of a network of and cooperation between actors interested in the development of one or another technological alternative.

The creation and maintenance of diversity is one of the key criteria and fundamental principles, as well as the basic logic of functioning, of the evolutionary stability and resistance of ecological systems. In an evolutionary perspective the economy may preserve its competitiveness only through the maintenance of the diversity of its technological foundations (and this is not restricted to the diversity of products and services). The state - both as a subsidy provider and as a customer - plays an enormous role in the maintenance of such diversity.

2.2 Nature conservation, agriculture and competitiveness

The quality of the environment and of natural resources as well as their sustainable utilisation in a long run, are essential requirements for farming and agriculture as a whole. The depletion of natural resources (e.g. soil, water bases, genetic bases) and their over-exploitation disregarding the limitations of renewability may result in catastrophic effects on the competitiveness of the agriculture sector both in a medium term and in the long run.

Furthermore, agriculture is a sector within the national economy with a number of unique features that are highly different from those of industrial sectors. This is clearly indicated by the so-called multifunctional agriculture concept adopted by the European Union, which assigns at least three different functions to agriculture: (i) production, (ii) nature conservation, landscape maintenance and (iii) rural development. These functions may in fact be regarded as common outputs (joint production) of agriculture, which cannot be separated from one another and whose generation and maintenance cannot be assigned to any specific activity within the agriculture sector. For agriculture is more than merely a productive sector (business), because agricultural production is, at the same time, the basis of landscape and environment management and of rural culture (agri-culture). Consequently, agriculture generates positive externalities and public goods as well, which, however, are not compensated for by the market. And this has a number of substantial impacts on the economy and competitiveness as well.

The main thrust of the reform of the Common Agricultural Policy of the European Union (CAP) is declared to be pointing in this direction, towards the concept and practice of multifunctional agriculture: that is, a common agricultural and rural development policy (CARPE). Accordingly, the long term common agriculture and rural development policy of the EU is based on two pillars. The first one is the so-called production pillar, i.e. the pillar of subsidies and payments related to quotas and quantities. The second one is the so-called eco-social pillar, comprising the environmental, social and regional employment functions of agriculture. Accordingly, the EU intends to develop an agriculture system and is following a new agricultural strategy in which subsidies are provided to farming and management systems which - besides producing high quality healthy and safe foodstuffs that are free from chemical residues - will preserve landscape, flora and fauna as well as the environment, create rural environments where people like to live, and at the same time provide work, tasks and goals for rural populations, for people living from agriculture. In addition to commercial (productive) efficiency this concept accommodates two more dimensions of efficiency: environmental efficiency and social-regional-employment efficiency as well. All these necessitate special farming systems adjusted to the features and resources of the landscape, the natural environment and society alike. The EU is gradually adopting a scheme of supporting such farming systems, planning to phase out direct payments and subsidies relating to quotas, quantities, production and exports while the payments from the other pillar are increasing. Candidate countries - including Hungary - may access these

new and increasing funds in proportion to their preparedness, along the second - eco-social - pillar.

Figure 1: The elements of the CAP and of CARPE

CAP		CARPE	
1990	1996	2002	2008
Direct subsidies	Compensation subsidies	Transitional transformation subsidies	Transitional transformation subsidies
Market subsidies (Common market organisations, CMO's)	Market subsidies (Common market organisations, CMO's)	Market stabilisation subsidies	Market stabilisation subsidies
Agro-environmental subsidies	Agro-environmental subsidies	Environmental and Landscape management subsidies	Agro-environmental subsidies
Structural subsidies	Structural subsidies	Rural development subsidies	Rural development subsidies

Source: Buckwell report, 1998

The transformation of the agriculture policy should ensure that instead of market price subsidies an increasing amount is allocated to the completion of cultural, social, employment, environmental and spatial development tasks. It is aimed at enabling an economically efficient and environmentally sustainable agriculture, whilst stimulating the integrated development of the rural areas of the Union and reducing conflicts between agriculture and rural areas. This is made up of four main elements: market stabilisation; environmental, social and cultural - landscape related - payments; rural development initiatives and the promotion of transformation required for transition.

Considering that Hungary has very good conditions and resources for agricultural production, with a degree of biodiversity that is higher than that of EU Member States both in terms of quasi natural as well as agricultural eco-systems, while the livelihood and perspectives of rural populations have been steadily declining ever since the system change, it is highly important for Hungary to develop a forward-looking agricultural policy built on win-win strategies, rewarding the generation of positive externalities and public goods. From this perspective an increase of the subsidies provided to agricultural environment protection and rural development the conditions of Hungary's EU accession may indeed be improved. The state subsidies assigned to (i.e. the internalisation of) environmentally friendly agricultural production and other rural development objectives (i.e. positive

externalities) should at least be increased at the expense of subsidies stimulating the production of the largest possible quantities whilst distorting the market conditions. For it is possible to apply for four-five times as much in community (EU) funding in relation to funds spent on such objectives, in contrast to quantity oriented subsidies where the EU may provide but a fourth or fifth of the amounts spent from domestic sources. The EU offers assistance primarily for landscape management, farming practices ensuring the protection of the soil, integrated crop production, organic farming, extensive grassland management and grazing practices as well as wetland habitat utilisation and regional management systems. During the seven year budget period beginning in 2007 the EU is expected to curb direct agricultural subsidies linked to quantities of production - in view of over-production, employment-related and environmental problems as well as human health risks - re-allocating such funds to agricultural environment management and rural development. The development of agriculture will be facilitated by the increasing support of farming systems that are not limited to the provision of masses of produce but that will also offer environmental, rural employment and social services as well. Productive type funds and rural development funds are not mutually exclusive, rather, they supplement one another in a complex subsidy system as a result of which they ensure the sustenance of agricultural production in all regions, securing fair incomes for families living from this sector.

Agricultural subsidies directly linked to production tend to distort competition in the market, entailing significant social deadweight loss. Their maintenance under the increasingly liberalised conditions of international economic relations (see WTO, Uruguay round), is not possible and it is not desirable in a long run. By contrast, the functions of agriculture generating positive externalities and public goods need to be compensated by society, for the very purpose of increasing public welfare and compensating for market failure. Moreover, these functions enable the preservation of diversity in biological terms (agro-biodiversity) as well as in cultural terms (that of farming modes and methods) which is the basis of long term adaptability and renewability. The knowledge and potential source if information represented for instance by the genetical level of biodiversity (e.g. local varieties of crops) and the farming methods adapted to various local environments, constitute the largest economic value - in terms of evolutionary perspectives - of a country. And in this sense Hungary is still in a favourable position in comparison to other European countries (with a higher degree of diversity in the genetic bases of cultivated crops, less intensive/industrialised farming methods).

Moreover, ecosystems of higher degrees of biodiversity, that have not yet been very heavily damaged, or that have been preserved or indeed created by agriculture, are also of outstanding importance from the aspect of the competitiveness of other economic sectors. Such sectors include - inter alia - tourism, as well as forestry and game management.

Eco-systems provide so-called ecological services of economic value: these are public goods generating positive externalities. Such ecological services may be global, regional and local public goods. Any given eco-system may offer public goods of a variety of levels. Forests, for instance, play a major role in the regulation of global climate just as they do in the maintenance of the local micro-climate; in the regulation

of the water balance of the soil and the prevention of erosion; and the economic benefits of such ecological services are directly harnessed by agriculture. In addition to the direct economic benefits enjoyed by the local population (e.g. firewood, timber for construction, picking edible mushrooms), other economic sectors also enjoy direct or indirect benefits (in the form of lower costs or higher revenues) from the ecological services provided by forests (to keep to the above example), including tourism, game management, wood and pulp industry etc. Wetlands could have just as well been mentioned as an example: their main ecological services include flood prevention, the protection of the quality of water, their birdlife is a target for eco-tourism, which is one of the most rapidly developing branches of tourism today. Furthermore, wetlands are sources of other benefits of the local population in terms of fishing or floodplain farming (e.g. animal husbandry, orchards etc.). The maintenance and the preservation of the unimpaired functioning of these ecological services depend largely on the local rural - and not the urban - population and on the farming techniques adopted by local farmers. Rural population - as has been highlighted by the European Charter of Rural Areas - provide substantial public goods type services for all residents (including rural populations) of a given country or region. The population retaining capacity of rural areas depends directly on the preservation of such eco-systems and their services, for these constitute the basis of farming and livelihood. The sustainable international competitiveness and welfare of a country is in a positive relationship with the regionally balanced development of a country and with the balance between rural and urban possibilities for making a livelihood. This will enable the avoidance of a large number of social costs reducing welfare (e. g. the costs of commuting: productive time lost, pollution through transport, diminishing of human capital etc.) on the one hand. On the other hand, however, ecological services may be maintained and preserved in terms of their economic value through rural economic activities in cooperation with nature (e.g. select-cutting techniques in forestry, flood plain farming etc.). The social and the ecological aspects are inseparably integrated with one another and with the sustainable international competitiveness of the economic sectors concerned.

The Carpathian Basin is an especially important area from the aspect of bio-diversity, for no other such region so completely encircled by mountain ranges may be found in Europe. The Carpathian Basin, as such a region, is characterised by a mosaic-like diversity of unique sub-regions. The mountain ranges around the Basin transmit impacts and at the same time isolate the region to some extent. For this reason, some separated populations have been developing their own separate evolutionary paths. There is a high degree of diversity in terms of the number of species in border areas of the Carpathian Basin that are subject to different contrasting effects. The most precious value of the flora and fauna of the Carpathian Basin lies in the endemic species. Some of our endemic species may now be found only in this region of our planet (so-called relic endemic species) and are therefore uniquely valuable. The Carpathians represent outstanding evolutionary values in respect of a number of groups of species.

Such biological riches should be regarded as a potential economic resource and a foundation for comparative advantage from the aspect of the national economy. In economic terms, we are discussing here the value of Hungary's natural capital. In

this sense - even by applying the standard rules of economics (see the Hicksian concept of income) - this capital has to be managed in a sustainable way in order to avoid the consumption this economic foundation and thereby reducing the riches of Hungary from a variety of perspectives. To this end, it is essential for us to follow the comprehensive double goal which is a declared objective of European nature conservation:

Preservation of the compositional and operational integrity of the natural and quasi-natural ecological systems,

Integrated protection of biodiversity on a variety of planes, from genetic diversity to landscape diversity.

The above objectives are definitely in line with the principles and programmes of the National Agro-environment Protection Programme (NAPP), whose preservation and continued development - in this direction and spirit - is socially desirable and preferable. Industrial agriculture will never lead to the preservation of the heterogeneity of landscapes, its intensive land use eliminates mosaic-elements, the soil improvement programmes and the elimination of wetland habitats (for the declared purposes of flood prevention) upset the water balance of large areas and besides the annihilation of our natural capital the efforts made to increase crop production have also lead to a substantial decline in the population retaining capacity of the rural areas. Agricultural practices and an agro-strategy formulated in line with the features of the landscape, 'in cooperation with nature' - based on a kind of a 'differentiation' - may guarantee in the future the international competitiveness of the Hungarian 'agri-culture'.

3. The fundamental principles of an economic policy based on environmental awareness

- Ecological considerations appear in an integrated form in all sectoral policies of economic and social policy (the sectoral policies are re-considered in this sense);
- The various functional (sectoral) policies rely on ecological foundations coordinated both at strategic and programme levels;
- The rules governing competition in the market promote eco-efficiency;
- Economic growth is accompanied by relative and absolute dematerialisation (i.e. along with diminishing material and energy consumption an increasing economic value is generated)
- The evolution of natural capital is followed by economic policy (intervening if necessary, to preserve a critical level of the natural capital);
- Economic incentives are formulated in a way as will ensue the replacement of linear production systems by cyclical production systems that are 'closed' from the aspect of materials (i.e. based on recycling and reuse);
- Infrastructure development promotes the reduction of the quantity of resources used;

- Subsidies are re-channelled from industrial type agriculture production to multifunctional agriculture;
- The principle of prudent precaution grows into one of the dominant elements of economic policy;
- Key strategic directions and programmes are elaborated through participation, the involvement of all relevant stakeholders, seeking for consensus;
- Sustainable international comparative advantage materialises in the preservation of ecological, cultural, technological and economic diversity.

4. Recommendations for Hungarian economic policy

- An Ecological Tax Reform Committee should be set up, to outline the domestic directions of ecological tax reform; forecast its impacts and elaborate its details, through a broad range of consultations (in which ministries should also be represented;
- International exchange of experience in respect of ecological tax reform;
- In view of the well-foundedness of the concept the introduction of an environmental load charge is recommended in a short run, to be followed by a gradual and predictable increase of the fees and/or eliminating any exemptions, announcing their introduction as part of a more comprehensive tax reform (i.e. this should be accompanied by a reduction of the social security contribution rates borne by employers);
- A landfill tax should also be introduced in a shorter run (following the British model);
- Application of macroeconomic indicators enabling the monitoring of any change in the value of the natural capital, to be applied as a standard for the measurement of growth along with the per capita national income;
- Incorporation of environmental expectations in the regulation of public procurements;
- Paying special attention in land use to the protection of land, to nature conservation, the preservation of green areas in urban areas and agglomerations - by coordinated application of economic instruments and regulations;
- The preservation of the competitiveness of the agricultural sector necessitates a major increase of the domestic funding sources made available for the National Agro-environment Protection Programme in order to have increased access to the growing subsidies provided by the European Union.

5. Possible and necessary areas for further analyses

- Assessment of the possibilities of the application of an ecological tax reform in Hungary using simulation models.
- Impact assessment of the domestic subsidy system from an ecological aspect.

- Review and adaptation to the Hungarian circumstances of welfare measures and macro-economic ratios.

6. Annotated technical literature

Ángyán J., Tardy J., Vajnáné M. A. (szerk.) (2002): Védett és érzékeny természeti területek mezőgazdálkodásának alapjai. Mezőgazda Kiadó, Budapest
This book provides an excellent overview of the principles on the basis of which agriculture should be operating without destroying natural values. Natural areas under protection and those categorised as vulnerable are also characterised from the aspect of land use and environment.

Ángyán J.,, Balázs K.,, Podmaniczky L. (199): A nitrogénadózás lehetőségei a magyar mezőgazdaságban. MTA - Magyarország az ezredfordulón kutatási program, Budapest
The study provides a detailed overview of the economic instruments promoting the reduction of the quantity of nitrogen, laying special emphasis on the taxation of nitrogen use. Instruments applied in the European Union and their impacts are also described.

Bela Gy., Fucskó F., Kajner P., Marossy Z. (2001): Környezetterhelési díjak bevezetésének vizsgálata. MTA - Magyarország az ezredfordulón sorozat 7.
The study reviews the concept of environmental load charges and it provides an analysis of the expected efficiency of the system of charges, along with the economic burdens of the introduction of the prospective system of charges. Alternative solution proposals that may be applied instead of the environmental load charges are also outlined.

Cansier D. (1993): Umweltökonomie. Gustav Fischer Verlag., Stuttgart, 384 p.
By applying the analytical methods of neo-classic environmental economics the book probes the basic problems and system of instruments of environmental policy. The in-depth analyses illustrated with examples taken from German environmental policy present useful conclusions for proponents of the so-called 'mainstream' economic orientation.

ECOTEC (2001): Study on the Economic and Environmental Implications of the use of Environmental Taxes and Charges in the European Union and its Member States. ECOTEC Research and Consulting.
The study reviews the various types of environmental taxes applied in the Member States of the European Union and some of the candidate countries. It presents an in-depth description of the experience relating to the application of the various taxes, analysing their impacts on the environment, competitiveness, business, employment and economic efficiency. This is a highly useful piece of work for those interested in this topic.

Fucskó J., Kelemen Á., Bela Gy. (2003): A forgalmazható zöld bizonyítvány és alternatívái: A megújuló energiahordozókból történő villamos energia-termelés támogatására szolgáló szabályozó eszközök bemutatása. MTA - BKÁE, Környezetgazdaságtani és Technológiai Tanszék, Budapest
The paper describes the various forms of financial assistance provided for the introduction and use of renewable energy sources, the mechanisms of the operation of the tradable green certificate, the guaranteed mandatory acceptance system and the tendering scheme. The understanding of the theme is assisted by foreign case studies: the systems applied in Denmark, Holland, Great Britain, Germany and Spain in the promotion of the use of renewable energy are described.

Heady, C.J. - Markandya A (2000): Study on the relationship between energy taxation and employment creation. University of Bath - The European Commission: Directorate General XI.
The introduction to the study describes the various interpretations of double dividend and on the basis of an empirical model it reviews the relationship between the introduction of environmental and energy taxes and the impacts on employment. This is also a useful source because it gives a proper description of the environmental taxes introduced in various European countries.

MAKK (2000): Ökológiai adóreform II Tanulmány a Környezetvédelmi Minisztérium részére - Magyar Közgazdaságtani Központ Alapítvány, Budapest
The study provides an exhaustive review of the domestic environmental taxes along with those applied in other countries of Europe. The authors make proposals concerning the introduction of specific environmental taxes (e.g. waste taxation) and the impacts of varieties of taxes on the national economy are also assessed.

Sterner, T. (ed.) (1999): The market and the Environment. Edward Elgar, Cheltenham, 520 p.
This book is a structured collection of international studies relating to environmental taxes, written by scientists of world-wide renown. The first group of the studies deals with issues of environmental taxation in general, the other part is comprised of country reviews sharing experience relating to environmental taxes applied by developing and developed as well as eastern and western countries.

7. References

Andrews-Speed, Philip - Rogers, Christopher D. [1999]: Mining taxation issues for the future. *Resources Policy*, 25:221-227

Bach, Stefan - Kohlhaas, Michael - Meyer, Bernd - Praetorius, Barbara - Welsch, Heinz [2002]: The effects of environmental fiscal reform in Germany: a simulation study. *Energy Policy*, 30:803-811

Baranzini, Andrea - Goldemberg, José - Speck, Stefan [2000] A future for carbon taxes. *Ecological Economics*, 32:395-412

Barker, Terry [1997] Taxing pollution instead of jobs. In O'Riordan, T., ed. *Ecotaxation*. Earthscan, London, 162-200

Bohm, Peter [1997]: Environmental taxation and the double dividend: fact or fallacy? In O'Riordan, T., ed. *Ecotaxation*. Earthscan, London, 106-124

Bosquet, Benoit [2000]: Environmental tax reform: does it work? A survey of the empirical evidence. *Ecological Economics*, 34: 19-32

Bossier, Francis - Bréchet, Thierry [1995]: A fiscal reform for increasing employment and mitigating CO_2 emissions in Europe. *Energy policy*, 23[9]: 789-798

Bruvoll, Annegrete [1998]: Taxing virgin materials: an approach to waste problems. *Resources*, *Conservation and Recycling*, 22: 15-29

Dellingk, Rob B - Kandelaars, Patricia P. A. A. H. [2000]: An empirical analysis of dematerialisation: application to metal policies in The Netherlands. *Ecological Economics*, 33:205-218

EEA [2000]: Recent developments in the use of environmental taxes in the European Union. European Environmental Agency, Copenhagen

Ekins, Paul [1997]: On the dividends from environmental taxation. In O'Riordan, T., ed. *Ecotaxation*. Earthscan, London, 125-162

Ekins, Paul [1999]: European environmental taxes and charges: recent experience, issues and trends. *Ecological Economics*, 31:39-62

Elek Péter [2003]: Energiaadók hatékonyságának néhány magyarországi vonatkozása *TDK Dolgozat*, BKÁE, Környezetgazdaságtani és technológiai tanszék, Budapest

Felder, Stefan - Schleiniger, Reto [1999]: Environmental tax reform: efficiency and political feasibility. *Working Paper No. 13*, Institute for Empirical Research in Economics, University of Zurich

Gee, David [1997] Economic tax reform in Europe: opportunities and obstacles. In O'Riordan, T., ed. *Ecotaxation*. Earthscan, London, 81-105

Godal, Odd - Holtsmark, Bjart [2001]: Greenhouse gas taxation and the distribution of costs and benefits: the case of Norway. *Energy Policy*, 29: 653-662

Grigg, Sacha V. L. - Read, Adam D. [2001]: A discussion on the various methods of application for landfill tax credit funding for environmental and community projects. *Resources*, *Conservation and Recycling*, 32:389-409

Jackson, Tony [2000]: The employment and productivity effects of environmental taxation: additional dividends or added distortions? *Journal of Environmental Planning and Management*, 43(3): 389-406.

Johnstone, Nick - Alavalapati, Janaki [é. n.]: The distributional effects of environmental tax reform.

Kahn, James R. - Farmer, Amy [1999]: The double dividend, second best world, and real-world environmental policy. *Ecological Economics*, 30:433-439

Kiss Károly [2002]: Energiaadók az Európai Unióban [környezetgazdasági elemzés]. A BKÁE Környezettudományi Intézetének tanulmányai, 13. szám, Budapest

McCoy, Daniel [1997]: Reflections on the double dividend debate. In O'Riordan, T., ed. *Ecotaxation*. Earthscan, London, 201-214

Morris, John R. - Phillips, Paul S. - Read, Adam D. [1998]: The UK Landfill Tax: an analysis of its contribution to sustainable waste management. *Resources*, *Conservation and Recycling*, 23: 259-270

O'Riordan, Timothy [1997] [ed.]: *Ecotaxation*. Earthscan, London

Porter, M. E. [1991] America's Green Strategy. *Scientific American*, April

Porter, M. E. - van der Linde, C. [1995a] Toward a new Conception of the Environment-Competitiveness Relationship. *Journal of Economic Perspectives*, Vol. 9, No. 4, 97-118.

Porter, M. E. van der Linde, C. [1995b] Green and Competitive: Ending the Stalemate. *Harvard Business Review*, Vol 73, No. 5 September-October, 120-134.

Sipes, Kristin N. - Mendelsohn, Robert [2001]: The Effectiveness of gasoline taxation to manage air pollution. *Ecological Economics*, 36:299-309

Speck, Stefan [1999]: Energy and carbon taxes and their distributional implications. *Energy Policy*, 27:659-667

Speck, Stefan - Ekins, Paul [2000]: Recent trends in the application of economic instruments in EU Member States plus Norway, Switzerland and an overview of economic instruments in Central and Eastern Europe. *Report to DG ENVIRONMENT*

Sterner, Thomas [ed.] [1990]: *The Market and the Environment: The Effectiveness of Market-Based Policy Instruments for Environmental Reform*. Edward Elgar, Cheltenham - Northampton, MA

Varma, Adarsh [2003]: UK's climate change levy: cost effectiveness, competitiveness and environmental impacts. *Energy Policy*, 31:51-61

Vehmas, Jarmo - Kaivo-oja, Jari - Luukkanen, Jyrki - Malaska, Pentti [1999]: Environmental taxes on fuels and electricity - some experiences from the Nordic countries. *Energy Policy*, 27:343-355.

8. Annexes

8.1 Areas of practical application of environmental taxes

The following is a description of various types of taxes elaborated for the resolving of certain environmental problem areas. This brief summary is not aimed at giving a comprehensive presentation of all proposed or already introduced types of taxes and charges, it is focusing on a brief description of the most characteristic ones. For a more detailed discussion of the issue see: MAKK [2000]; ECOTEC [2001]; Hoerner - Bosquet [2001].

Energy taxes

Taxes related to the production and consumption of energy belong to the group of 'energy taxes':

- Energy tax: consumption taxes on energy (not on fuel) with the energy contents of the various sources of energy as tax base, along with specific production tax relating to the generation of hydropower or nuclear energy;
- Carbon tax: based on the carbon contents of the fuels or the quantity of CO2 emitted through the burning of such fuels;
- Sulphur-dioxide tax: based on the sulphur contents of the fuels or the quantity of SO2 emitted through the burning of such fuels;
- Nitrogen tax: based on the quantity of NOx emitted by burning;
- Electricity tax: taxation of power consumption.

(See the air load tax below, which is a form of emission taxes in which tax rates are established on CO_2, SO_x and NO_x emissions to be paid by point source polluters, the majority of which are heating facilities.)

Taxation of road transport

There are three types of taxation on road transport:

- Taxes and charges on road use: Road use taxes have been introduced in a number of EU Member States to make road users pay for the negative externalities they cause and to provide funding for road maintenance. Another important purpose of the application of this tax is rerouting of traffic. Such instruments include flat rate charges payable for road use, tolls, mileage charge, electronic road charge system;
- Taxes relating to the ownership of vehicles: Taxes may be levied on the purchasing, the ownership or operation of motor vehicles. Differentiation of taxes on the ownership of vehicles may stimulate the use of types of vehicles imposing smaller burdens on the environment;
- Fuel taxes: These include taxes imposed in the phase of fuel production or taxes imposed on import. Differentiation of fuel taxes may promote the use of cleaner fuels.

Contributions on use/raw material taxes

Contributions on use are paid by users on the utilisation of a given resource. The use of resources that are in for depletion or those that can be depleted (including slowly renewable resources) prevents their future availability for other purposes for they are not going to be regenerated (opportunity cost). For this purpose states impose a *royalty* payment obligation on users with the aim of having users to face the opportunity costs and of increasing the revenues of the state.

The type of the use contributions and raw material taxes:

- Mining royalty;
- Raw material taxes;
- Forest maintenance contribution;
- Water use contribution.

Agricultural input taxes

- Taxes on pesticides;
- Other charges relating to pesticides:
- Nitrogen taxes: three possible types of taxes may be imposed on nitrogen:
    a) Fertiliser tax
    b) Taxation of fertilisers and fodder on the basis of nitrogen content
    c) Taxation of nitrogen/phosphorous surplus, established for individual farms, on the basis of the nitrogen balance.

Landfills

- Fees paid to cover costs of waste collection and treatment: user or public utility fees, the waste is paid for by the manufacturer, producer
- Taxes levied on landfills: Paid by those carrying out waste treatment, the quantity of waste to be landfilled constituting the basis of the tax;
- Tax on waste: Paid by those generating waste, the quantity of waste stored at the plant or the waste offered for treatment constituting the basis of taxation.

Product charges

Product charges may be imposed on numerous products entailing environment pollution or waste 'generation'. The range of products subject to product charge payment obligation varies by country; product charges may be levied for instance on:

- Tyres;
- Refrigerating equipment;
- Batteries;
- Packaging materials;
- Paint, warmish, other household chemicals etc.

One of the declared objectives of the application of product charges (fees) is to facilitate the reduction of products entailing environmental damage, as the increased prices may result in a decline of demand and if there are substitute products that do not entail pollution, consumption will be oriented towards those. The revenues from product charges are normally used for the resolving of the given problem instead of

being integrated in the central budget. Product taxes may also be imposed on polluting/waste generating products. A product tax differs from a product charge in that the revenue collected in the form of product taxes is a central tax revenue and its objective is - instead of reducing the consumption of the products constituting the tax base - to generate revenues. Differentiation of the tax rates, however, makes it possible to influence behaviour, e.g. applying lower rate taxes on passenger cars with lower emission rates will encourage consumers to opt for such cars.

Taxation of land use

Real estate type taxes are not normally regarded as environmental taxes, however, it is possible to work out tax differentiation (e.g. lower tax rates on brown field sites) which makes it possible to promote environmental objectives. The use of free land - as a scarce resource - i.e. the re-classification of a piece of natural land into land devoted to development may also be taxed. In general, taxes relating to land use generate local revenues, instead of central funds.

Other taxes/charges related to emissions

- Water load charges: Taxes collected on the quantity of pollutants discharged into surface waters directly or indirectly.
- Waste water charges: Charges collected to cover the costs of collection and treatment of waste water.
- Air load charges: Taxes collected on the quantity of pollutants emitted into the atmosphere directly or indirectly usually by point sources.
- Soil load charges: Taxes collected on the quantity of certain pollutants into the soil or subsoil waters directly or indirectly.

8.2 Environmental taxes applied in Hungary

A. Product charges:

Such charges are imposed on products whose production, importation, distribution or consumption entail environmental loads, or impose hazards on the environment. No. LVI Act of 1995 'On environmental product charge and the product charges on certain products' identifies the group of products entailing direct pollution or waste generation on which environmental product charges are payable:

Table 7

a) fuels and other products made from mineral oil

Product subject to product charge	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Lubricant oil	88	92.4	97

Table 8

b) tyres,

Category	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
1. New tyres and tyres imported for re-treading under specific conditions and in quantities specified in a separate piece of legislation, bearing approved (UN EEC) 'E' mark	55.7	70.6	86
2. Imported re-treaded tyres, bearing approved (UN EEC) 'E' mark	70	90	110
3. Used tyres imported for re-treading (under conditions specified in a separate piece of legislation)	222.9	282.9	344
4. In the case of imported used tyres	1300	1700	2100

Table 9

c) refrigerators, coolants,

I. Product charge categories on new refrigerators Nominal refrigerating space	Amount of product charge from 15 February 2003 (HUF/unit)	Amount of product charge in 2004 (HUF/unit)	Amount of product charge in 2005 (HUF/unit)
up to 120 litres	1470	1866	2262
120.01 - 250.00 litres	2647	3360	4072
over 250.01 litres	6828	8667	10504
	k(HUF/unit)	k(HUF/unit)	k(HUF/unit)
up to 0.50 kg	366	476	564
0.51 - 2.00 kg	655	832	1010
over 2.01 kg	1717	2180	2642
II. Product charge categories on new coolants subject to product charge	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Coolants subject to product charge			
HCFC and HCFC mix	546	693	840

For a more detailed list: see No. LVI Act of 1995

Table 10

d) packaging,

Material of packaging	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Plastic	25.5	29	30.4
Combined	30.4	35	36.8
Aluminium	11.1	13	13.7
Metal (except Al)	8.6	10	10.5
Paper, wood, organic textile	11.1	13	13.7
Glass	4.1	5	5.3
Other	30.4	35	36.8

Table 11

e) batteries,

Product subject to product charge	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Batteries filled with electrolytes	89.1	100.3	112
Batteries not filled with electrolytes	124.3	140	156

Table 12

f) thinners and solvents of paints and solvents,

Product subject to product charge [1]	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Thinners and other solvents	200	210	221

[1] II. Establishment of the tax (T) payable:

T=t x p x s, where t = 200 HUF /kg
p = the quantity of the thinner/solvent to be sold/cleared through customs (kg)
s = correction factor depending on environmental features of the product, of the following values:
a) s = 1, if the aromatic content of the solvent is over 30 %
b) s = 0.8 if the aromatic content of the solvent is between 20 and 30 %
c) s = 0.6 if the aromatic content of the solvent is between 0.5 and 19.99 % or if its aliphatic content is over 40 %
d) s = 0.4 if the aliphatic content of the solvent is between 15 and 40 %
e) s = 0.1 if the aliphatic content of the solvent is below 15 %

Table 13

g) product charge on advertisement carrier paper products

Product subject to product charge	Amount of product charge from 15 February 2003 (HUF/kg)	Amount of product charge in 2004 (HUF/kg)	Amount of product charge in 2005 (HUF/kg)
Advertisement carrier paper products	13	19.5	26

B. Product taxes

Product taxes differ from product charges in that these generate central revenues that are not used for the resolving of environmental problems caused by the products. The following types of product taxes may be regarded as of important from an environmental aspect as well:

- Mineral oil excise taxes;
- Vehicle consumption taxes;

The rate of the tax, however, does not reflect the social external damage/loss caused by the given goods, consequently, instead of reducing consumption of the product to the socially optimum level, the primary goal of the tax is to generate revenues.

Table 14

Rates of excise taxes on mineral oil products in 2003[2]

Unleaded petrol, except for lower quality No. 98 petrol	103.50 HUF/litre
Leaded petrol, lower quality No. 98 petrol, other petrol	111.80 HUF/litre
Gasoline, fuel oil, certain heating oils	85.00 HUF/litre
Petroleum	111.80 HUF/litre
LPG gas	47.90 HUF/litre
Liquefied natural gas	24.50 HUF/litre
Benzol and homologues	111.80 HUF/litre
Additives, basic oils	76.50 HUF/litre
Bio-diesel	0.00 (85 HUF/litre)

[2] For more details, see No. CIII Act of 1997 on Excise Duties and Specific Rules of Commercial Circulation of Products Subject to Excise Duty

Table 15

Consumption tax on passenger cars

Name of product	Tax rate
2/a. Passenger car - except for those with catalytic converters and electrical cars - up to 1600 cm3	22%
2/a. Passenger car - except for those with catalytic converters and electrical cars - from 1601 cm3	32%
2/c. Passenger cars with catalytic converters and electrical cars	10%
2/d. Passenger cars with catalytic converters, from 1601 cm3	20%

Source: No. LXXVIII Act of 1991 on Consumption tax and consumer price top-up

C. Mining royalty

The following rates of mining royalty are applied in Hungary on the basis of the quantity of mineral raw materials produced:

a) on mineral oil and natural gas (including CO_2) 12 %

b) (with the exception of energy carriers) in the case of non-metal mineral raw materials produced by open cast mining 5 %

c) in the case of other solid mineral raw materials 2 %

d) in the case of geothermic energy, 2 % of the geothermic energy produced.

D. Water reserve royalty:

Water reserve royalty is payable on the quantity of water used, by water users or industrial consumers3. The rates are established in Annex 9 to No. CXXV Act of 1999 as follows:

18. (3) The water reserve royalty payable by a *water user*

a) shall be 1.70 HUF/m^3 basic royalty with the exception of water uses as per *b) - c)*;

b) if it exceeds the quantity of water specified in the licence issued by the water management authority - with a view to the specifically identified periods as well - by more than 10 %, 3.40 HUF /m3 basic royalty on the whole excess quantity;

c) shall be calculated, if the operations subject to the obligation to obtain licence from the water management authority are carried out without licence, taking into account a 10.90 HUF/m^3 basic royalty, applying the multiplying factors - determining the amounts payable - as prescribed by law (depending on the mode of the determination of the quantity of water used, the nature of water use and of the water reserve and the water balance position of the given region) on the basis of the quantity of water actually used. The quantity of

[3] Water user is a person subject to the obligation of obtaining licence from the water management authority, industrial consumer is one satisfying its water demand (which does not need to meet drinking water standards) from the drinking water supply system (over 10,000 m^3 per annum).

water shall be established in the case of unauthorised water use as specified in a separate piece of legislation.

8.3 Concept of the Hungarian system of environmental load charges

The concept of the taxation of environmental load (which does not necessarily mean emission in excess of the limit value - i.e. environment pollution) emerged in the early nineties. The latest version of the concept on environmental load charges was elaborated in 2000 but this draft did not pass the phase of inter-ministerial and social coordination.

The concept identified three types of environmental load charges: (1.) air load charge, (2.) water load charge and (3) soil load charge. The concept regulates the emission of pollutants into air, water and subsoil waters, in a standardised system. The objective of the introduction of the charges is to prompt consumers and businesses to reduce loads. The charges are planned to be introduced gradually so as to enable payers to get prepared for technology change where appropriate. In the case of the undertaking of an investment aimed at reducing the environmental loads an allowance off the charge is available to the extent of the completed investment.

According to the concept the state would separate the revenues from the environmental charge for purposes of environment protection, for use at central or local level.

Air load charge:

This is paid by fixed point sources of air pollution, i.e. it does not extend to mobile sources (e.g. transport). Its rate is specified as follows:

Annual air load charge payable = $\Sigma M_i * P_i$
where M_i = the annual quantity of the given (i) pollutant emitted (kg/year)
P_i = unit charge payable on the given (i) pollutant (HUF /kg)

Table 16

Air pollutant	Unit charge under version A (P_i)	Unit charge under version B (P_i)
SO_2	15 (HUF/kg)	30 (HUF/kg)
NO_x	30 (HUF/kg)	60 (HUF/kg)
CO	15 (HUF/kg)	15 (HUF/kg)
Solid non-toxic substances	15 (HUF/kg)	15 (HUF/kg)
CO_2	0 (HUF/kg)	0 (HUF/kg)

Water load charge:

The taxpayer is the natural or legal person or economic association without legal personality subject to licensing by the water management authority, discharging waste water into surface water. Its rate is established as follows:
Annual water load charge payable = $\Sigma (M_i * P_i) * T * I$,

where P_i = unit charge payable on the given (i) pollutant depending on degree of hazard (HUF /kg)

M_i = the annual quantity of the given (i) pollutant discharged (kg/year)

T = multiplying factor showing vulnerability of recipient

I = multiplying factor corresponding to method of sludge treatment.

Table 17

Component	*Unit charge under version A (P)*	*Unit charge under version B (P)*
1.a. KOI	30 (HUF/kg)	44 (HUF/kg)
1.b. BOI	50 (HUF/kg)	73.3 (HUF/kg)
2. Organic solvent extract	600 (HUF/kg)	880 (HUF/kg)
3. Phosphorous	500 (HUF/kg)	733.3 (HUF/kg)
4. Nitrogen	60 (HUF/kg)	88 (HUF/kg)
5.a. Mercury	75000 (HUF/kg)	110000 (HUF/kg)
5.b. Cadmium	15000 (HUF/kg)	22000 (HUF/kg)
5.c. Chromium	3000 (HUF/kg)	4400 (HUF/kg)
5.d. Nickel	3000 (HUF/kg)	4400 (HUF/kg)
5.e. Lead	3000 (HUF/kg)	4400 (HUF/kg)
5.f. Copper	1500 (HUF/kg)	2200 (HUF/kg)
6. Total salts	1.5 (HUF/kg)	2.2 (HUF/kg)
7. Toxicity	0.5 HUF*m^3 dilution	0.7 HUF*m^3 dilution
8. Heat pollution	0	0

Soil load charge:

Those discharging pollutants resulting in soil load are subject to the obligation to pay soil load charges under the concept. The desiccation of waste water from a residential building not exceeding 500 m3/ year and the desiccation of used water and precipitation and its storage qualifies as discharge resulting in soil load.

The annual amount of soil load charge payable = E * A * T * V,

where E unit charge (HUF/m^3)

A basis of charge (m^3)

T territorial multiplying factor

V hazard factor.

The unit charge reflecting the extent of the load is 30 HUF/m3 in the case of version A and it is 60 HUF/m3 in the case of version B.

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