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ECOLOGICAL TAX  
REFORM IN GERMANY  
FROM THEORY TO POLICY

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MICHAEL KOHLHAAS

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ECONOMIC STUDIES PROGRAM SERIES  
VOLUME 6

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American Institute for Contemporary German Studies  
The Johns Hopkins University



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# FOREWORD

Ecological tax reform (ETR) ranks among the most significant accomplishments of the Social Democratic-Alliance '90/Green coalition during its first year in office. The logic behind the German ETR is to kill two birds with one stone: raise energy taxes so that prices reflect the true economic cost of energy use (i.e., internalize the externalities) and use the revenue to promote employment by reducing the cost of labor. When fully implemented in 2003, the ecological tax reform will garner over 30 billion DM each year. The bulk of these funds will be used to reduce the payroll tax-rate from 42.3 to 34.6 percent of gross wages. Despite this laudable aim, the ecological tax reform has come under fire from several quarters. Many economists, business leaders and trade unionists have criticized the impact of the ETR on economic efficiency and competitiveness. Some ecologists have questioned the ETR's environmental efficacy. Several labor market experts have doubted the ETR's effectiveness in reducing unemployment. A few politicians and private citizens have challenged the ETR's constitutionality. Consumers have protested higher prices in their electricity bills and at the gasoline pump. Still, if Germany is to meet its self-imposed commitment to reduce greenhouse-gas emissions and its obligations under the 1997 Kyoto Protocol, some form of ecological tax reform is unavoidable.

In this monograph, Michael Kohlhaas, ecological economics expert at the *Deutsches Institut für Wirtschaftsforschung* (DIW), does an excellent job of synthesizing the wide variety of criticisms of the "Red-Green" government's ecological tax reform into a comprehensive assessment of its strengths and weaknesses. Kohlhaas points out that not only interest group politics but also treaty obligations requiring non-discrimination in the treatment of imports forced the German government to embrace "second-best" solutions. The German government consistently endeavored to preserve competitiveness and to prevent dramatic energy cost spikes in any individual sector. The lobbying power of many energy-intensive sectors and coal-mining interests in North Rhine-Westphalia also forced the government to compromise in ways that reduced both ecological and economic efficiency. Consequently, wide variance in the ETR's treatment of individual types and uses of energy conforms neither to an economic nor to an ecological measure of efficiency. It fails, therefore,

both to eliminate market distortions and to reward ecological efficiency consistently.

Kohlhaas challenges the assertions that “carbon leakage” (i.e., the shifting of production across borders in response to pollution control legislation) precludes the implementation of an ETR in one country and that stiff, immediate energy tax increases are the best way to ensure adjustment to a more energy-efficient path of production. Kohlhaas observes that the studies on “carbon leakage” are ambiguous at best. He states that they do not apply to the non-tradable sectors and often fail to take into account the full costs of shifting production from one location to another. Kohlhaas points out that the proponents of ecological “shock therapy” typically neglect to include the heavy devaluation of the existing capital stock and labor shedding that their proposals entail. A gradual implementation of ecological tax reform, which is precisely the approach Chancellor Gerhard Schröder (SPD) is taking, permits a smooth adjustment to changing prices and scarcities that fits well within existing reinvestment cycles.

Kohlhaas concludes that “the imperative not to burden business ‘too much’ clearly shaped the content of the initial steps of Germany’s ecological tax reform.” Still, the ETR is “not as bad as critics claim.” Kohlhaas points out that letting perfection become the enemy of progress would doom any ecological tax at the outset. The biggest flaw in the ecological tax reform as it stands is its uneven treatment of fuels and uses, since this distorts price signals without improving the environment. Kohlhaas proposes resolving this by gradually implementing a lower, but more comprehensive energy tax over the long-run while phasing out a short-run energy tax targeted on those who can afford to pay.

Americans can learn a great deal from Germany’s ecological tax reform. The experience of the United States with ecological tax reform legislation actually predates Germany’s by several years. The Clinton Administration briefly attempted to implement Vice President Albert Gore’s proposal for a British Thermal Unit (BTU) tax in 1993. Anti-tax advocates in the Republican Party as well as both Republicans and Democrats from oil and natural gas-producing states worked vigorously to whittle this proposal down to a five-percent increase in the gasoline tax. After that bitter battle, the Clinton Administration never raised the issue of an ecological tax again.

Still, it is unlikely that ecological tax reform will remain a dead letter in the United States forever. Whether the United States Senate ratifies the Kyoto

Protocol or not, the challenge of controlling climatic change will unavoidably lead U.S. policymakers to revisit the idea of an ecological tax as a means to reduce greenhouse-gas emissions. German ecological tax reform serves as an extremely instructive case study of how the third largest economy in the world accomplished this objective.

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Stephen J. Silvia  
Director, Regulatory Policy Studies  
P.J. Hoenmans Economic Studies Program

Carl Lankowski  
Research Director  
AICGS

February 2000



## ABOUT THE AUTHOR

**Michael Kohlhaas** is a research fellow at the *Deutsches Institut für Wirtschaftsforschung* (German Institute for Economic Research), Berlin, in the department for energy, resource and environmental economics. His training in economics includes studies at the University of Regensburg, the University of Paris I (Pantheon-Sorbonne) and the Kiel Institute of World Economics. His special field of interest is the instruments and strategies of environmental policy, especially environmental taxes, tradable emission permits and voluntary agreements. He is one of Germany's leading experts on ecological taxation and has counseled political parties and participated in studies for federal and regional governments, as well as in hearings of the German *Bundestag*.



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## INTRODUCTION

On April 1, 1999, the “First Step Toward an Ecological Tax Reform Act” came into force in Germany.<sup>1</sup> This law ranks among the most important projects of the center-left governing coalition, which has been in power since October 1998.<sup>2</sup> When the bill passed, a leading member of the government called ecological tax reform (ETR) a “central project of the modern age.” Proponents of ETR both inside and outside of the government expect it to spur a technological, ecological and social modernization of German society that will simultaneously address many environmental, economic and social problems. Curiously, however, not just opponents, but also some supporters of the general concept of an ecological tax reform have strongly criticized the April 1999 law. Critics of the law include labor unions as well as business associations, ecologists as well as economists, and even some prominent figures in the governing parties themselves.

This paper analyzes ecological tax reform in Germany from an economic point of view. Some economists have denounced the Schröder Government’s ETR as inefficient. This judgment, however, neglects the legal and institutional restrictions that in some cases prevent a first-best solution. This paper analyzes the points at which this law departs from ideas that economists have developed about an “ideal” ecological tax reform and identifies where there is room for improvement, especially with regard to further stages of the reform. It first sketches the general concept of an ecological tax reform. Next, it outlines the main features of the actual German economic reform and then focuses on the most controversial issues of the discussion in Germany. The paper concludes with a discussion of future reforms.

## THE CONCEPT OF AN ECOLOGICAL TAX REFORM

The need to attain a sustainable form of economic development that preserves the basis for human existence is now widely recognized. We must now use natural resources more economically and ease the burden on the environment. The traditional instruments of environmental policy—in particular, government reliance on “command and control” regulation, which predominates in Germany—are inadequate for this purpose and induce economic costs that are unnecessarily high. In light of this, the demand for an ecological reform of the taxation system

involving the greater use of environmental charges arises frequently in environmental discussions. Such a reform, it is argued, would enable the realization of environmental objectives more efficiently and allow for the fostering of technological innovation for “environmentally friendly” products and production processes.

The idea of environmental taxes (or charges) originated with A.C. Pigou, who recognized several decades ago that the market mechanism fails if “external costs” are not reflected in market prices.<sup>3</sup> An appropriate tax will help to internalize externalities. Baumol and Oates showed that taxes are an efficient tool to pursue environmental goals, even if the externalities cannot be quantified and the environmental targets are set politically.<sup>4</sup>

A core concept of ecological tax reform is to levy environmental taxes (or charges) and use the subsequent revenue to reduce other existing taxes by an equivalent amount. This “revenue-neutral” approach ensures that the business sector and private households, taken as a whole, will not face a higher overall tax burden. Ideally, this method enables policymakers to reduce economic distortions that the tax system currently causes by reducing taxes that are considered harmful to the economy. Given the persistence of mass unemployment in the Federal Republic, the proposal to reduce social security contributions (and thus labor costs) has gained much support.<sup>5</sup> This option should offer firms an incentive to raise their demand for labor.

Most often, the starting point for an ETR is the environmental objective, but there are also proposals that start with an analysis of the shortcomings of the tax system. The European Commission, for example, in its white paper “Growth, Competitiveness, Employment,”<sup>6</sup> analyzed the causes for unemployment in member states of the EU and identified high social security contributions as one of the causes. It therefore suggested a reduction of these contributions and discussed alternative ways to finance social security systems. One way to do so would be to raise taxes on energy and environmentally harmful activities.

This employment-driven approach does not have to be wrong, but it carries a risk. If revenue-raising becomes the priority, the effectiveness and efficiency of environmental taxation might be neglected or even impaired intentionally in order to guarantee a steady flow of funds. In this case it must be asked if the additional revenue justifies any reduction of the environmental effectiveness

and economic efficiency of a single-purpose ecological tax, and if this is the most efficient way to create employment.

## **KEY FEATURES OF THE GERMAN ECOLOGICAL TAX REFORM**

An ecological tax reform ranked among the most important projects included in the SPD/Green coalition agreement.<sup>7</sup> The government moved quickly to make good on this commitment. The first draft for a law was issued in November 1998.<sup>8</sup> After an intense public debate, two hearings<sup>9</sup> and additional negotiations between the coalition parties, a revised version of the ETR passed in the *Bundestag* on March 3, 1999.<sup>10</sup>

The law contains only one of the two components of an ecological tax reform, the introduction of new taxes on energy. The *Bundestag* passed a separate law containing the compensating reduction of social security contributions in December 1998.<sup>11</sup> This means that there is no formal earmarking of the revenue of the first ecological tax law in the act itself, but lawmakers based the size of the parallel payroll tax cut on the projected revenue stream from the ETR. Both laws came into force on April 1, 1999. Passing the law that reduced payroll taxes before an increase of ecological taxes may have helped to increase the credibility of the promise that the ETR was not meant to raise the overall tax burden.

### **Energy Taxation**

The ecological component of the tax reform in Germany presently consists of a higher taxation of energy products. Taxing energy—or the emissions released through its use—has been an important element in virtually all proposals for an ecologically-oriented reform of the taxation system. A tax on energy is frequently seen as a necessary step towards sustainable development. The current discussion has increasingly come to focus on the threat to the earth's climate posed by energy-related emissions. Yet other environmental damage and risks arising when energy is obtained or used—such as the nuclear risk or land use—are also cited.

Many countries are therefore striving to reduce energy consumption or the emissions related to energy use. For example, the prior government led by Helmut Kohl set a 25 percent reduction of carbon dioxide (CO<sub>2</sub>) emissions from the

1990 level as a target to reach by 2005. Under the framework of the 1997 Kyoto Protocol and EU burden-sharing of a basket of greenhouse-gas emissions, the German government accepted a reduction target of 21 percent for the period 2008 to 2012. The current government, however, explicitly embraced the stricter national target of 25 percent set by the Kohl Government.

Ecological tax reform can help Germany to reach not only the Kyoto targets, but also more demanding goals which are likely to be set in the future. Higher energy prices increase the incentive to use fuels and electricity more efficiently, thereby reducing specific energy requirements. Moreover, energy taxes lower the economic break-even point for technological and organizational measures to reduce energy consumption, accelerating the pace of energy-saving technological progress. Of course, there are complementary and alternative instruments to pursue environmental targets, such as tradable permits, command-and-control measures, subsidies, or voluntary agreements. This paper will focus on the potential contribution of ecological taxes and will not deal with the question of the best policy mix.

### Increase of Energy Taxes

The First Step toward an Ecological Tax Reform Act raises taxes on energy in a complex way. On the one hand, it increases existing taxes on petroleum products (gasoline, diesel fuel, heating oil, and natural gas). On the other hand, it introduces a new tax on electricity.<sup>12</sup>

Ecological taxes are levied on final energy consumption. To avoid double taxation, electricity producers receive a rebate for ecological taxes paid on energy sources purchased to produce electricity, because electricity itself is taxed.<sup>13</sup> It is important to note that the ETR is different from previous taxes on petroleum products, which will coexist with the ecological taxes from now on.<sup>14</sup> The former has been levied on inputs used in power generation, such as natural gas and heavy fuel oil, too.

The increase of the tax rates amounts to 0.06 DM per liter of gasoline and diesel fuel, 0.04 DM per liter of heating oil, 0.0032 DM per kilowatt hour (kWh) of natural gas and 0.02 DM per kWh of electricity.<sup>15</sup> Coal is not taxed. The finance ministry estimates the total additional tax revenue from the first step of the ETR will amount to 11.3 billion DM per year (i.e., 5.95 billion dollars at an exchange rate of 1.90 DM per dollar).<sup>16</sup>

### Provisions for Energy-intensive Sectors

The government considered it necessary to take steps to ensure that the ETR does not impair the ability of German business to compete internationally. Some users are therefore eligible for reduced tax rates:

- The goods and materials sector (i.e., manufacturing industry, energy/water, mining, and construction sectors) as well as the agricultural, forestry and fishery sectors pay only 20 percent of the regular ecological tax<sup>17</sup> described above (except for motor fuels), if their energy consumption exceeds a certain threshold.<sup>18</sup> In other words, mainly private households, retail and road transport, service companies, public institutions, and small enterprises pay the full ecological tax rate.
- Moreover, if the increased ecological tax payments of an enterprise in the goods and materials sector exceed the savings of social security contributions by more than 20 percent, the enterprise can apply for a tax rebate above the 20 percent threshold, as long as the total payment exceeds 1,000 DM for electricity and 1,000 DM for petroleum products (see Figure 1).<sup>19</sup>
- Electricity for trains will be taxed at only half of the regular tax rate.

### Renewable Energy Sources, Cogeneration and Small-scale Power Plants

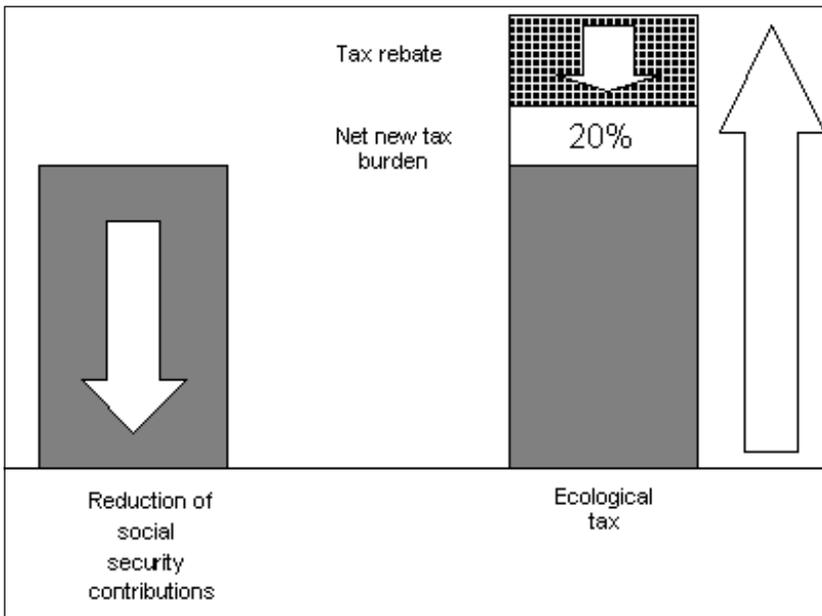
Special provisions are also made in order to promote less environmentally harmful sources of energy:

- Electricity from renewable sources will be exempt from the tax, if the producer uses it, or if it comes from a network or an electric line that is exclusively fed by renewable sources. The law does not, however, exempt all electricity from renewable sources from the electricity tax. This is mainly due to legal and technical reasons that will be discussed below. The government intends to use the tax revenue from renewable energy sources to promote the production of renewable energy.<sup>20</sup>
- Any power station producing both heat and electricity (i.e., a cogeneration plant) receives a full rebate of all energy taxes, **both**

old and new, if its annual efficiency in converting potential into actual energy reaches or exceeds 70 percent. This is in contrast to other forms of power generation, which are only eligible for a rebate of the new energy tax. Thus, the ETR explicitly favors cogeneration.

- Small power plants with less than 0.7 MWh are not subject to the electricity tax.

**Figure 1: Tax Rebates Limit Net Burden**



### **Reduction of Social Security Contributions**

The Schröder Government is using the revenue from the first step of the ETR to reduce social security contributions. Before the reform, the combined employer and employee statutory social security contributions for health, pension and unemployment insurance totaled 42.3 percent of gross wages.<sup>21</sup> The government intends to reduce this sum to below 40 percent of gross wages within the legislative period.<sup>22</sup> The first step cuts both the employer and employee contribution to the state pension program by 0.4 percent (i.e., from 20.3 percent to 19.4 percent). This will reduce the revenue of the statutory pension system by about 12.1 billion DM annually.<sup>23</sup> At the same time, the

government will increase transfers to the pension program in order to compensate for the reduced revenue from payroll taxes, with the bulk of the funds coming from the ecological tax.

## CONTROVERSIAL ISSUES

The following section will discuss the most controversial issues in the debate over an ecological tax reform. It should be considered as a discussion of “stylized” positions and arguments, not a documentation of the debate. It will focus on the debate over the April 1999 first step, but it will include some issues that have been important in earlier phases of the debate and thus influenced the design of the first step.

### **Unilateral Tax Reform**

One of the main issues in the debate over an ecological tax reform in Germany has been whether the German government should undertake it unilaterally. Business representatives and members of the political opposition argued that Germany should only undertake an ETR in tandem with the European Union (EU), if not all OECD countries. Two main reasons have been put forward in support of this position—the potential negative effects on the German economy and the prevention of “carbon leakage.”

First, in an open economy in which enterprises have to face foreign competition (in export as well as domestic markets), an ETR may impair the competitiveness of energy-intensive enterprises by unilaterally increasing their energy costs and thereby driving them out of business. This, in turn, may lead to a devaluation of physical and human capital that enterprises could have otherwise used for a longer time. If this happens very fast, an ETR can destroy more jobs than it creates. Those regions where energy-intensive sectors account for an especially high share of economic production are particularly likely to experience these problems. Moreover, the introduction of an ETR may lead to unacceptable distributive effects for owners and workers in energy-intensive sectors and for consumers of energy-intensive products.

Secondly, from an ecological point of view, the relocation of energy-intensive production across borders impairs the effectiveness of unilateral measures. An increase in greenhouse-gas emissions abroad may partially offset or even exceed the domestic reduction. This effect has been termed “carbon leakage.”

Hence, unilateral measures may not improve the global environment even if domestic emissions are reduced.

The theoretical as well as the empirical evidence concerning carbon leakage is mixed.<sup>24</sup> There is a broad consensus that carbon leakage is likely to mitigate the effectiveness of unilateral measures, but it will not fully offset them. There is, however, some additional justification for “unilateral” measures, even if carbon leakage were to be substantial, which would undercut their direct effectiveness.

At present, the industrial countries, which comprise about one quarter of the world’s population, produce three quarters of the global greenhouse-gas emissions. Most industrialized nations have acknowledged their responsibility within the framework convention on climate change. Most developing countries demand that industrialized countries reduce emissions substantially before they are willing to make an effort of their own. Virtually every developing nation is striving for a level and pattern of economic development broadly similar to that found in today’s affluent countries. The present methods of production and consumption, however, cannot be extended to the rest of the world without overburdening the biosphere’s capacity. Therefore, changes in industrialized countries are a prerequisite to sustainable development in all parts of the world.

Unilateral measures in industrialized countries will foster technological progress that will make renewable energy sources and more efficient use of non-renewable sources available at lower cost. This may help to reduce emissions in the medium to long-run even in those countries that do not themselves undertake climate policy measures.

Undoubtedly, an ecological tax reform would be more effective and the impact on competitiveness would be smaller if more countries participate or take equivalent measures. Therefore, the German government intends to promote a harmonization of energy taxation in the European Union. The chances of agreeing to effective harmonized measures within the EU are slim. The odds of agreement would be slimmer still if the effort were extended beyond the European Union. Unilateral measures, therefore, might be all that can be achieved in the foreseeable future. This does not mean “going it alone,” however. Almost all European countries use or plan to use taxes and charges as an instrument of environmental policy.<sup>25</sup> The more members of the EU that pursue this course, the better are the chances for a Europe-wide tax.

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## Design of the Energy Tax

### Tax Base

The ecological taxes are levied on final energy consumption in relation to the quantity consumed (e.g., gallon of fuel or kWh of natural gas). A tax on final energy does not provide an incentive to increase the efficiency of refining or power generation. Demands have risen to choose a different tax base, preferably carbon dioxide emissions or—if that is not possible—the consumption of primary energy.<sup>26</sup> These alternatives, however, have shortcomings as well.

A tax on primary energy would be more efficient and preferable from an economic point of view. There are, however, legal constraints that preclude adopting a primary energy tax. If secondary energies (such as electricity or petroleum products) remain untaxed domestically, the principle of non-discrimination against imports, which is clearly stated in both the EU's Treaty of Rome and the General Agreement on Tariffs and Trade (GATT), requires that imports of these products remain untaxed, too. This would give a strong incentive to use imported rather than domestically-produced secondary energy sources, which would render the tax ineffective.<sup>27</sup>

If the primary objective is to reduce CO<sub>2</sub> emissions, the most efficient tax base would be the CO<sub>2</sub> emissions or the carbon content of energy sources.<sup>28</sup> Compared to a tax on primary energy, this tax base gives an additional incentive to switch to less emission-intensive sources of energy, however, similar problems the Treaty of Rome and GATT result as described above. This concerns mainly electricity, because in this case emissions occur exclusively during the transformation process instead of during consumption. With a CO<sub>2</sub> tax, electricity would be taxed indirectly via the fossil fuels used for its production. Imported electricity would, therefore, not be touched by domestic emission taxes. If there are no equivalent taxes abroad, imported secondary energies would gain a competitive edge compared to domestically-produced energy. This effect will be the stronger the larger the difference between the total emissions that occur along the energy chain and the emissions related to final consumption.

Hence, proposals have been made to tax secondary energy sources in relation to the CO<sub>2</sub> emissions that are caused along specific energy chains. This would mean taking into account the efficiency of the transformation

process, e.g., of a power plant and of the carbon content of the energy inputs used. Yet here again, trade-related problems occur. Usually, information about primary energy input or CO<sub>2</sub> emissions along the energy chain will not be available for imported energy sources. Therefore, it would be difficult or even impossible to differentiate the tax rates for imported electricity in relation to the primary energy used or CO<sub>2</sub> emissions released along an energy chain. One country, Finland, wanted to avoid this problem by taxing imports of electricity with the average tax rate on domestic electricity. In 1998, however, the Court of Justice of the European Communities ruled that:

the first paragraph of Article 95 of the EC Treaty precludes an excise duty which forms part of a national system of taxation on sources of energy from being levied on electricity of domestic origin at rates which vary according to its method of production while being levied on imported electricity, whatever its method of production, at a flat rate which, although lower than the highest rate applicable to electricity of domestic origin, leads, if only in certain cases, to higher taxation being imposed on imported electricity.<sup>29</sup>

It is not yet clear if it is possible from a technical and administrative standpoint to obtain reliable information on the generation process from the importers of electricity that would allow a differentiated treatment of imported electricity. Since this is a major impediment to the efficient taxation of electricity and since European tax harmonization is not in sight, Germany might have to settle for a “second” or “third-best” solution for some time. The German government should, however, explore possible ways to overcome the trade-related problems.

Even if a CO<sub>2</sub> or primary energy tax cannot be implemented, it would still be desirable and possible to differentiate a tax per unit of final energy according to the average CO<sub>2</sub> emissions or primary energy input along the energy chain. Such a tax would give an incentive to switch from more to less emission-intensive energy sources in final consumption, but would offer no advantage for reducing emissions in power generation or refining. There are no legal or administrative impediments to such “second-best” taxation. Nevertheless, the structure of German tax rates does not reflect such a concept.

**Table 1: Energy Taxes Before and After April 1, 1999**

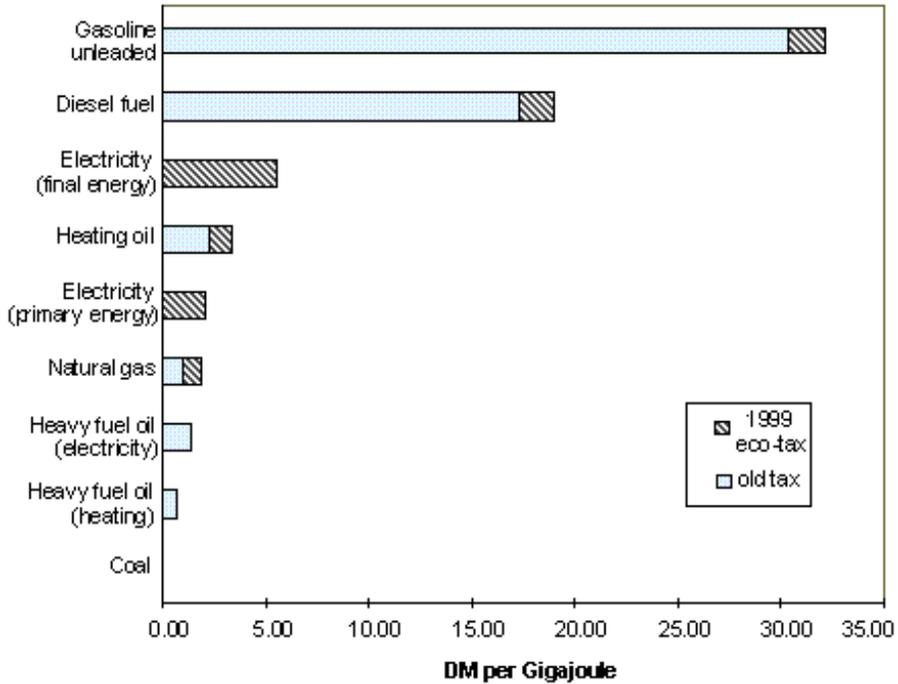
Energy Source	Unit	Tax Rate Before		Tax Increase ("Eco-tax")			New Tax Rates Since April 1999		
		DM per unit April 1999	DM/unit	DM/GJ	DM/ton CO <sub>2</sub>	DM/unit	DM/GJ	DM/ton CO <sub>2</sub>	
Coal	ton	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
Heavy fuel oil (heating)	ton	30.00	0.00	0.00	0.00	30.00	0.73	9.26	
Heavy fuel oil (electricity)	ton	55.00	0.00	0.00	0.00	55.00	1.34	16.97	
Natural gas	MWh	3.60	3.20	0.89	15.87	6.80	1.89	33.73	
Electricity (final energy)	MWh	0.00	20.00	5.56	-	20.00	5.56	-	
Electricity (primary energy) <sup>1</sup>	MWh	0.00	20.00	2.11	35.71	20.00	2.11	35.71	
Heating oil	1000 Liter	80.00	40.00	1.12	15.19	120.00	3.37	45.57	
Diesel fuel	1000 Liter	620.00	60.00	1.68	22.66	680.00	19.00	256.78	
Gasoline, unleaded	1000 Liter	980.00	60.00	1.85	25.75	1040.00	32.13	446.27	

<sup>1</sup>Average efficiency(38%) and CO<sub>2</sub> emissions(0.56 kg per kWh)

Table 1, as well as Figures 2 and 3, shows the tax increase and the new tax rates for the first stage of the ETR, which came into force on April 1, 1999. They reflect substantial differences in the tax increase and of the total tax rates across different sources of energy relative to both the energy content (measured in gigajoules, GJ) and the related CO<sub>2</sub> emissions. The tax rate for electricity is indicated with respect to final energy content as well as with respect to (average) primary energy input. CO<sub>2</sub> emissions for electricity are those which are released from fossil fuels used in power generation.

Several features should be noted:

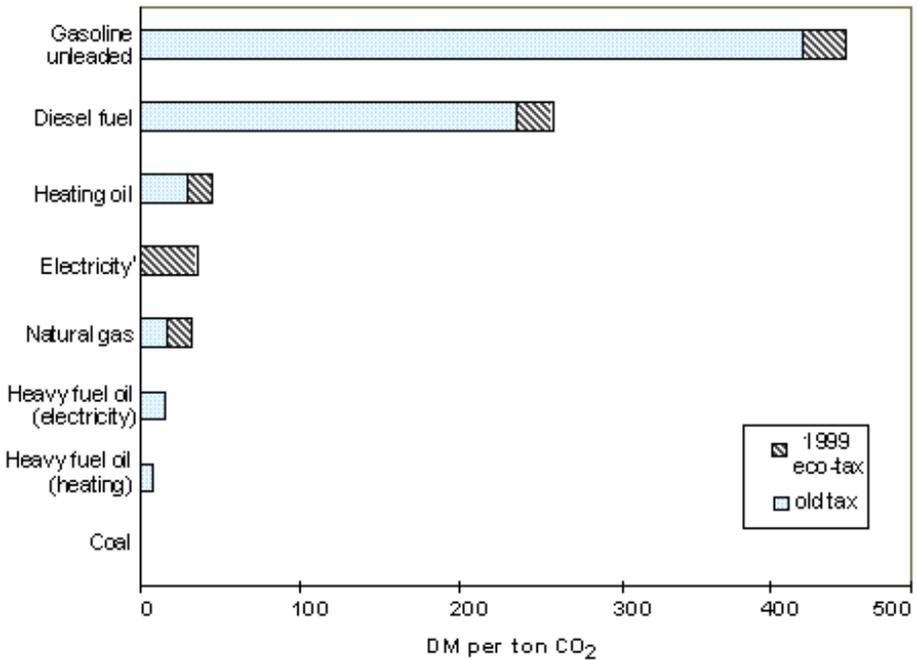
- Motor fuels are subject to very high rates (gasoline is taxed at approximately \$2.07 per gallon and diesel fuel at approximately \$1.35 per gallon at an exchange rate of 1.90 DM to the dollar). Two reasons justify this. Motor fuel taxes also serve to finance the traffic infrastructure and should therefore reflect that expense as well. Moreover, traffic causes many other environmental and non-environmental externalities, such as noise, other emissions, traffic casualties, etc. Some studies estimate that the costs of these externalities run up to 5 DM per liter of gasoline. These values, however, have been challenged and are the subject of a heated debate.
- There are no plans to tax coal at any stage of the ETR.<sup>30</sup> This has been strongly criticized, especially since the CO<sub>2</sub> intensity of coal is very high. It has been argued that the largest share of coal (about 75 percent) is used in power plants and would thus be exempted from the tax in any case. Energy taxes that existed before (e.g., on natural gas), however, are not rebated. Hence, as long as the old taxes are maintained, coal should be taxed to some extent in power generation in order to avoid any discrimination against other less emission-intensive inputs into power generation. At least the remaining part, which is mainly used in energy-intensive industries, should be taxed just like other energy sources. There is, however, strong political pressure to protect energy-intensive industries from a high tax burden and coal mining from increased adjustment pressure.

**Figure 2:** Energy taxes in Germany Per Unit of Energy (DM/GJ)

- Heavy fuel oil is also taxed at relatively low rates. This gives it a competitive edge relative to other inputs in power generation and heating.
- The increase in the tax on electricity has been by far the highest of all energy sources. The tax level is relatively high per gigajoule of final energy. Relative to the primary energy input, the tax rate amounts to 2.11 DM per GJ and is more in line with other tax rates. On the other hand, electricity is additionally taxed indirectly, since the taxes on natural gas and gas oil, which existed before the ecological tax reform, are levied on inputs to power generation as well.

Altogether, the tax increases as well as the tax levels do not follow a consistent pattern, neither with regard to energy content nor CO<sub>2</sub> emissions. This clearly impairs the efficiency of the tax with respect to avoiding environmental damages.

**Figure 3: Energy Taxes in Germany Relative to CO<sub>2</sub> Emissions**



<sup>1</sup> Average efficiency (38%) and CO<sub>2</sub> emissions (0.56 kg per kWh)

It is interesting to note that the debate in Germany has so far almost exclusively focused on the ecological tax, i.e., the tax **increase**. Business has pointed out that the tax level and energy prices were already very high in Germany, but there was no systematic discussion about the structure of existing energy taxes. Politicians may be following the principle “old taxes are good taxes” because they are accepted as a part of the political status quo; they therefore prefer not to consider changing them. Economic analysis should, however, consider the incentive effect of total energy taxes. This has to go beyond the illustrative considerations here and must take into account the different treatment of old and new taxes as far as energy inputs, tax reduction and tax rebates are concerned.

### The Level and Structure of Tax Rates

Some critics have pointed out that the tax rates of the ecological taxes are too low to induce a reduction of CO<sub>2</sub> emissions sufficient to improve the

environment. This argument neglects the advantage of gradually phasing in ecological taxes. Namely, it gives time for individual polluters and the whole economy to adjust to changing prices and scarcities. The capital stock will not be devalued too fast and energy-saving investments can be undertaken within the normal investment cycle. This way, restructuring the economy is to be achieved at lower costs and with less economic and social friction. Therefore, the precise tax rate of the first step is not a decisive feature. It is far more important that energy consumers use the time to adjust to future energy taxes. Whenever an investment is made—e.g., a car is bought, a house built or a production line constructed—the technology should be used that is most economical, taking into account future energy prices. Moreover, suppliers should develop new products and production processes that allow economizing even more on energy in the future. For this to happen it is necessary that future increases of the tax rate be announced as far in advance as possible, in order to send a clear signal for adjustment measures and to help avoid misguided investments.

The German government has announced several more steps of the ecological tax reform. It is appropriate for public officials to specify as many additional steps in the ETR as soon as possible in order to reduce investors' uncertainty about future developments. Yet, since many of the additional steps would take place in the next legislative period and could be reversed by a new German government, announcing plans that extend beyond the fall of 2002 would not substantially reduce uncertainty.

Nevertheless, it is quite likely that further tax increases will be undertaken in the future. The need for further measures in climate policy is unquestionable. Presently, Germany is not on the CO<sub>2</sub> target trajectory that its leaders have set for it.<sup>31</sup> CO<sub>2</sub> emissions have been reduced by 14.5 percent between 1990 and 1998. However, a substantial portion of the reduction of CO<sub>2</sub> emissions in the early 1990s was due to the collapse of industry in eastern Germany. These “wall-fall profits” have been exhausted and further progress has been slow since 1993. Therefore, if the national emission target for 2005 and even the German contribution to the European Kyoto target are to be met, substantial additional efforts will be necessary.

Even if it is not clear which role an ETR should play in achieving this target, it certainly must be part of a comprehensive set of measures. Other steps include:

- Price adjustments, which, next to tax changes,<sup>32</sup> should also include a review of environmentally harmful subsidies. This is necessary to give an overall incentive to use energy more economically. Only if prices reflect the scarcities will climate policy be supported by markets rather than having to work against them.
- Grants for research and development and demonstration projects. There are important positive external effects, especially in basic research, that justify subsidies. Moreover, demonstration effects can facilitate market penetration of new products and help to reduce costs along the learning curve.
- Measures to improve the operation of market forces. If markets fail, market-oriented instruments such as environmental taxes or tradable emission permits will not work properly and are likely to be inefficient at least in those segments of the market, too.
- Measures to supplement or substitute for market forces where market failure cannot be overcome or where market-based instruments are likely to have too strong undesirable side-effects, e.g., on competitiveness or distribution.

Moreover, other objectives of energy policy, such as the liberalization of energy markets or the aim of abandoning nuclear power in Germany, should be taken into account when setting taxes. In the short run, however, these aspects may not be so important, because the issues of competitiveness and structural change will dominate the tax structure. Getting started will help to trigger the adjustment process and to generate experience with this instrument. Future steps, however, should be embedded in a comprehensive energy and climate policy.

### Treatment of Renewable Energy Sources

As discussed above, it was not possible to have an emission tax at this juncture. This has consequences for the treatment of renewable energy sources, as well. With an emission tax, renewable energy sources would be subject to relatively low taxes or would even remain untaxed. As a result, there have been calls to exempt electricity produced with renewable energy sources from

the electricity tax. This would improve the competitiveness of renewable energy and could be justified by the fact that these do not emit greenhouse gases.<sup>33</sup>

The new German law, however, stipulates only a very limited exemption. Electricity from renewable sources will not be subject to the ecological tax if it is used by the producer itself or if it is supplied from a network or an electric line that is exclusively fed by renewable sources. This can be explained by the same reasoning that prevented an emission tax in the first place: if imported electricity cannot be treated in the same way as domestically produced electricity, Treaty of Rome and GATT provisions demand that it must receive the most favorable treatment applied domestically. Therefore, conditions for an exemption of electricity from renewable resources have been set in a way that can be verified with reasonable effort and reliability, even for imported electricity.

This regulation gives only a very limited incentive to produce electricity from renewable energy sources. The German government therefore intends to use the revenue of taxes on electricity from renewable energy sources to promote renewable energy.<sup>34</sup> There are various ways in which this could be done. In Denmark, for example, electricity tax revenue is used to subsidize the domestic production of electricity from renewable sources. Since the subsidy per kWh equals the tax rate, renewable electricity is treated in the same way as if it were exempted from the tax.<sup>35</sup>

In Germany, a different approach was chosen: the tax revenue from renewable energy will be used to create a fund that will support renewable energy projects. In contrast to the Danish model, this reflects a discretionary approach that permits the selection of projects that are to be promoted. Proponents of this approach claim that this may be more efficient because projects that are already economical need not be supported, whereas others need more support to become economical.

Besides market failure, however, one has to take into account government failure, too. Government officials might not be able to pick winners better than the market and bias the development in favor of specific technologies. This could be a problem if the programs have a large volume and are to be operated long-term. Discretionary programs, therefore, should be limited in volume and duration. Since the German government strives for a solution that permits the exemption of renewable energies from taxation, this approach seems acceptable for the first few steps of the ETR.

## Provisions for Energy-intensive Sectors

One of the main ecological tax reform issues is its effect on the competitiveness of the German economy and especially on energy-intensive sectors. Industrialists from most sectors have fiercely opposed an ecological tax reform for a long time and have exerted strong political pressure first to block and then to minimize it. In this campaign, trade union leaders from the sectors most concerned—especially energy, mining and the chemical industry—have supported the rejectionist position of the business associations.

Sectors that are both energy and capital intensive are hit harder by energy taxation and benefit less from cuts in social security taxes than others. Consequently, even a revenue-neutral tax reform that does not place an extra tax burden on the economy as a whole may produce disproportionately high burdens in some sectors. Table 2 illustrates this by calculating the effect of a 2 DM per GJ (and 5.26 DM per kWh for electricity) increase of energy taxes,<sup>36</sup> the revenue of which would be refunded by a reduction of social security contributions.<sup>37</sup> The table shows that the net effect, even with a uniform tax, would be rather low for most sectors, but it still would be substantial for a few energy-intensive sectors. In Germany, the sectors “iron and steel,” “chemical products,” and “non-ferrous metals” are some of the most important sectors that are burdened by the tax reform.

As a consequence, these sectors will have higher production costs and may lose competitiveness. As discussed above, this is problematic for two reasons. First, it places adjustment costs on the domestic economy, especially if structural change takes place rapidly and the existing capital stock is devalued in a short time. Second, if emissions are just relocated, carbon leakage may impair ecological effectiveness.

It is important to distinguish between those two reasons. If the main preoccupation is with the problems of structural change and the distributive effects associated with it, precautions should be taken to manage (but not to eliminate) structural change. If a country aims at a sustained reduction of global emissions with unilateral measures, it must take permanent precautions against “carbon leakage.” A unilateral approach would prove ineffectual, however, if the environmental problem is global, as in the case of the greenhouse effect. Moreover, even within the framework of international agreements, such as the Kyoto Protocol, individual countries usually are obliged to reduce **domestic** emissions.<sup>38</sup> A reduction of emissions due to relocation of production is treated

**Table 2:** Sectoral Price Effects for Manufacturing Branches (in percent)<sup>1</sup>

Manufacturing branches	Energy Tax 2.00 DM/GJ	Compensation (revenue neutral)	Net Effect
Iron and steel	5.1	-0.7	4.4
Chemical products, nuclear and fissile materials	2.1	-0.5	1.6
Non-ferrous metals, non-ferrous semi-finished products	1.7	-0.5	1.2
Quarrying	1.9	-0.7	1.2
Agricultural products	1.4	-0.7	0.6
Cold rolling mills, etc.	1.4	-0.8	0.6
Foodstuffs (excluding beverages)	1.0	-0.6	0.5
Textiles	1.0	-0.6	0.4
Other transport services	1.0	-0.6	0.4
Plastic products	0.9	-0.6	0.3
Market-related services in the catering industry and hotels	0.8	-0.5	0.3
Iron, sheet metal and metal products	0.9	-0.7	0.2
Retail services	0.7	-0.6	0.1
Printing and copying services	0.7	-0.6	0.0
Building and housing services	0.2	-0.2	0.0
Road vehicles	0.6	-0.6	0.0
Wooden goods	0.7	-0.7	0.0
Other market-related services	0.3	-0.3	0.0
Services provided by science, culture and publishing	0.4	-0.5	0.0
Building construction and civil engineering	0.8	-0.8	-0.1
Market-related services provided by the health and veterinary system	0.3	-0.4	-0.1
Development services	0.5	-0.6	-0.1
Electrotechnical products	0.5	-0.7	-0.2
Engineering products	0.6	-0.8	-0.2
Wholesale services and similar, recycling	0.4	-0.6	-0.3
Insurance services	0.3	-0.6	-0.3
Social insurance services	0.5	-0.8	-0.3
Service provided by private organizations, domestic services	0.4	-1.1	-0.7
Postal services and telecommunications	0.2	-0.9	-0.7
Government services	0.5	-1.2	-0.7

<sup>1</sup> Energy tax with compensation by reducing employer's social insurance contributions, assuming unchanged structures from the base year 1988 and that all price changes are passed on to the end consumer. The production sectors are ranked in terms of gross output, with the exception of banking services, which are not included in the standard German input/output tables due to their special accounting treatment.

Source: Federal Statistical Office; DIW input/output analysis; DIW calculations.

in the same way as an increase in energy efficiency or fuel switching. Countries have an incentive to fulfill this obligation in the cheapest way possible, even if this implies carbon leakage. Therefore, managing structural change is the only valid justification for special provisions in the longer run. Most countries that have introduced energy taxation for ecological reasons have made special provisions for energy-intensive sectors. Even if this may not be necessary for economic reasons,<sup>39</sup> it has been unavoidable for political ones.

Various schemes for tax concessions are conceivable. There are several important issues with regard to their design.<sup>40</sup> The most important issues in the German debate were the definition of the enterprise and production processes that are eligible for tax reductions, and the tax rate that should be paid by the beneficiaries of tax relief. The narrower that eligibility is defined, the greater the incentive to reduce emissions and the tax revenue. A precise identification of those enterprises that are not able to cope with higher energy prices, however, requires detailed data (e.g., energy consumption of production processes, available technologies or the competitive situation on the relevant markets). The necessary administrative procedures are likely to be very complicated. Moreover, the process is likely to be the subject of lobbying attempts to safeguard rents and to prevent structural change. In contrast, the wider the group of beneficiaries, the less complicated administrative procedures need to be, but tax revenue and emission reduction will be lower.

There is no single best-practice design for tax allowances within the context of an energy tax. In selecting concrete models, it is necessary to weigh partly conflicting demands against each other: reducing the adjustment pressure for energy-intensive areas, ecological effectiveness, economic efficiency, compatibility with market principles, and issues of administrative feasibility. Such a balance cannot be derived from scientific principles but must be determined politically. In the short run, politicians tend to prefer a narrow delimitation of beneficiaries because it promises a higher incentive effect and tax revenue. The price to pay for that is discretionary interference with market allocation and complicated bureaucratic processes. If sustainable development is to be achieved in a way that is compatible with the market system and the idea of ecological taxes as a market-oriented instrument is taken seriously, discretionary special provisions need to be kept to a minimum.

An earlier draft of the first-step bill<sup>41</sup> proposed that all enterprises in the goods and materials sector should pay only 25 percent of the regular ecological

tax rate. Enterprises that belong to an energy-intensive sector of the German economy<sup>42</sup> were to be totally exempted from the tax. In a hearing of the German *Bundestag*, experts particularly criticized the exemption of energy-intensive sectors.<sup>43</sup> One reason was that the standard international trade classification (SITC) of sectors at a four-digit level was considered too broad to distinguish energy-intensive from less energy-intensive enterprises or production processes. More importantly, however, an exemption would reduce the total tax burden and thus create an absolute competitive advantage for the beneficiaries, since they would not pay higher energy-taxes but would still profit from reduced social security contributions. This would create a “perverse” incentive effect that might increase instead of reduce their energy consumption. Moreover, the Commission of the European Union informed the German government that such an exemption might be considered a contravention of the EU regulation on subsidies granted by member states.<sup>44</sup> It is mainly for this reason that the law does not provide for total exemptions. Instead, the tax rates were reduced to 20 percent of the regular tax rates for all enterprises of the goods and materials sector and the net burden of the tax reform limited to a maximum of 20 percent of the reduction of social security contributions. Most experts considered this regulation from the second reading of the bill to be better but still not satisfactory.<sup>45</sup> The government wants to revisit it during one of the next steps of the ecological tax reform, but no satisfactory solution is in sight so far.

## **Compensatory Reduction of Taxes**

### Reduction of Social Security Contributions

Some denounce the use of general funds to reduce social security contributions as “subsidization,” which runs counter to the principle that participant contributions should cover all benefits. This perspective, however, neglects an important dimension of the current disbursement structure. At present, so-called “non-insurance-related benefits” burden the statutory social security system. These are benefits that either do not originate from the social insurance program or for which insufficient contributions were made. Helmut Kohl’s last two governments made the greater part of the existing commitments to pay non-insurance-related benefits out of the social insurance funds. These were primarily in the form of active labor-market measures and early retirement benefits granted to eastern Germans who would not normally have been eligible

for programs because they had not paid into them the minimum amount necessary to qualify for benefits. Thus, these non-insurance-related benefits are a political solution to a problem that could not be resolved within the confines of the traditional social insurance system. The German Institute for Economic Research (*Deutsches Institut für Wirtschaftsforschung*) estimates that the share of non-insurance-related benefits not covered by government grants amounted to between 68 and 143 billion DM in 1995.<sup>46</sup> This corresponds roughly to between 10 and 20 percent of social security contributions.

In principle, general tax receipts should finance non-insurance-related benefits. Hence, using ecological taxes to replace social security contributions can be justified from the point of view of economic theory and should not be considered an undesirable subsidy. Drawing from revenue sources beyond payroll taxes also includes those segments of the population that German law exempts from paying social security contributions—mainly self-employed persons and civil servants—to cover the costs of a public endeavor that benefits all. Moreover, the reduction of labor costs may help boost employment.

Another objection made against using ecological taxes to reduce payroll taxes stipulates that a reform of the social security system will be necessary in the long-run any way, mainly for demographic reasons. Using the ETR revenue to support the existing system, however, may reduce the pressure for reform.<sup>47</sup> This argument amounts to saying that a more transparent social security system will lead policymakers to make bad decisions. On the contrary, confusion about the real causes of the problem will not help to bring about appropriate solutions. Identifying non-insurance-related benefits and financing them appropriately should help to sort out the real sources of the problems in the pension system and thereby increase the odds that policymakers will come up with an adequate solution.

### Will Ecological Taxes Provide Stable Revenue?

The fear has been expressed that ecological taxes will not provide stable revenue. If they are successful in reducing energy use or emissions, the tax base will continuously shrink. A top representative of a business association phrased it this way: “Either the tax is ecologically useless or it will not provide any revenue.” The conclusion of this line of reasoning is that government officials should not rely on any ecological tax truly worthy of the name as a reliable long-term source of funds.

Obviously, the extreme version of the statement is wrong. Ecological taxes are not intended to and will not reduce energy consumption to zero. Therefore, there will always be some tax revenue. Nevertheless, the question must be asked, if this revenue will ebb over time, will it be sufficient to finance important public spending? In practice, this should not pose a serious problem for a long time. The concept of an ecological tax reform assumes that the tax will be “phased in,” that is, increased steadily over a long period of time. If energy consumption is to be reduced to a sustainable level, a quite substantial increase in tax rates will be necessary within the next few decades. As long as energy consumption declines less than the tax rate increases, total tax revenue will grow.<sup>48</sup>

Problems may occur if no further reduction is necessary or, in the case of emission taxes, if renewable energy sources become competitive on a large scale. This, however, is not likely to happen for several decades. This period will be long enough to profit from the potential benefits of an ecological tax reform. Other reforms may be necessary afterwards, but no tax system is meant to last for an eternity. Reforms have been quite frequent in the past and probably will be in the future.

### **Reducing Ecologically Harmful Subsidies before Increasing Taxes?**

The German tax and transfer system has several elements that cause negative ecological effects. There are, for example, tax reductions or exemptions for various energy uses (e.g., diesel fuel in agriculture, transportation by ship or aviation). Farmers receive subsidies in relation to the quantities produced and thus have an incentive to use intensive methods of cultivation. Taxpayers can deduct higher amounts from their tax bill if they drive to work rather than walk, use public transportation or ride bicycles.

These examples show that tax subsidies may have negative effects on the environment. Often, the objective can be achieved in a different, less environmentally harmful way. Subsidies to agriculture, for example, could be made conditional upon adopting environmentally friendly methods of cultivation. Tax deductions for commuting could be independent of the means of transportation or phased out totally. Several studies have been undertaken to identify the need and possibilities for such reforms.<sup>49</sup> In general, there is wide support for this idea. In some cases, the abolition of tax privileges will increase tax revenue, in others government spending can be reduced. This strategy is in

accordance with the plans of the German government to reduce government interference and subsidies substantially.

It has been suggested that abolishing tax privileges or subsidies would be easier and more efficient than introducing new taxes. The experience of the last two decades does not support this. Often, relatively small, but well-organized groups profit from these privileges and resist change fiercely and quite successfully. It is, however, correct that abolishing these privileges would reduce overall distortions and increase efficiency. The government should therefore pursue both approaches at the same time.

In summary, it is clear that the tax rate and the corresponding reduction of social security contributions of the first step of the ecological tax reform are too low to trigger a substantial reduction of CO<sub>2</sub> emissions or to reduce labor costs enough to create employment. The government always intended to increase ecological taxes gradually, in order to give economic agents time for adjustment measures. It is, however, important to announce further increases as far in advance as possible, in order to set a clear signal for adjustment measures and to help avoid misguided investments.

## **FUTURE REFORM STEPS**

### **Further Steps**

During the fall of 1999, the German government passed a second piece of ETR legislation entitled the “Continuation of Ecological Tax Reform Act.”<sup>50</sup> This act contains four additional steps of the ecological tax reform, which are to be implemented between 2000 and 2003. In most respects, the second act differed little from the first step of ETR. Once again, politics predominated over efficiency in the writing and rewriting of the act. Recognizing political necessity, however, was the only way the Schröder Government could ensure that the Continuation of Ecological Tax Reform Act would pass through both chambers of the German legislature in time for it to take effect on January 1, 2000.

Divisions within the Social Democratic Party made compromise over the second ETR act particularly difficult. The pro-coal faction of the SPD, which has its stronghold in North Rhine-Westphalia, balked at the initial compromise on the second act reached within the governing coalition at the federal level on October 29. The principal objection was to a provision in the bill that granted a tax exemption to highly efficient natural gas power plants that could convert

at least 57 percent of the potential energy consumed into electricity. The pro-coal forces saw this provision, which set an explicit efficiency standard as a prerequisite for favorable tax treatment, as a threat to coal-fired power plants.

During November 1999, two rounds of negotiations, both within the SPD and between the SPD and the Greens, produced a compromise that permitted passage of the Continuation of Ecological Tax Reform Act in the *Bundesrat* on November 26.<sup>51</sup> The compromise retained the tax exemption for highly efficient natural gas power plants, but it raised the efficiency threshold to 57.5 percent and limited eligibility for tax-free status only to plants that begin operations by March 31, 2003. In practice this means that only the Vasa Energy gas power plant, currently under construction in Lubmin, will qualify for the tax exemption. Setting an efficiency threshold at 57.5 percent could have proved beneficial—since it would have served as an additional incentive to research and investment—if it had not been coupled with the time limit on the tax break. This time limit undermines any incentive to invest in highly efficient power plants, since no new project could be completed by March 31, 2003. Indeed, the political success of the pro-coal forces will, if anything, make future investments in highly efficient power plants less likely. For example, Vasa general manager Herbert Aly said that the time limit on the tax exemption would make it more likely that his firm would build highly efficient natural gas power plants in Poland and the Czech Republic.<sup>52</sup>

The November 1999 Continuation of Ecological Tax Reform Act also included the following provisions:

- Four annual tax increases of 0.06 DM per liter on diesel fuel, gasoline and heating oil to be implemented each January 1 from 2000 to 2003. (Since the 16 percent value-added tax (VAT) is calculated on a price that includes all other taxes, each step of the ETR will also lead to a 0.0096 DM increase in the VAT per liter of fuel. This brings the combined annual tax increase to 0.0696 DM per liter.)
- Four annual tax increases of 0.005 DM per kilowatt hour of electricity to be implemented each January 1 from 2000 to 2003. (An additional 0.0008 DM increase of the VAT will be added on top of each annual tax increase.)

- As of January 1, 2000, the ecological tax is extended to include heavy heating oil.
- Fuel used in public transportation, including group taxis, is taxed at only one-half of the standard rate.
- The threshold for small power plants to qualify for tax exemption is raised from 0.7 to 2 megawatt hours.
- Recycled oil is tax exempt.
- The calculation of energy efficiency for cogeneration plants will be done monthly rather than annually. Consequently, more plants can reach the 70 percent threshold to qualify for tax exemption—at least during the winter months.
- Solar energy producers receive a subsidy of slightly more than 1 DM per kilowatt hour of electricity produced.
- Bakeries and work places employing the handicapped also receive the tax rebate granted to industry and agriculture that will limit their maximum tax increase to 20 percent above their former pension-fund contribution.

GATT and Treaty of Rome restrictions again precluded granting tax-free status to renewable energy sources. The government did, however, promise to pass legislation to promote renewable energy by mid-2000.

The Schröder Government calculates that the annual receipts from the ETR will total approximately 30 billion DM (\$15.8 billion) by 2003. The government will use the funds to reduce the payroll tax for retirement in stages from 19.5 to 17.3 percent.

In summary, the Continuation of Ecological Tax Reform Act differed from the First Step toward Ecological Tax Reform only at the margins. The second round of tax increases on fuels and electricity followed the patterns set in the first act. The four additional tax increases will serve as additional disincentive to energy consumption. Investors will find the four-year timetable helpful, but the uneven treatment of different energy sources and users as a result of the ETR will widen as each additional step is implemented. The compromise on highly efficient natural-gas power plants may actually do more damage than good from economic and environmental perspectives. Although it does use efficiency as a criterion to determine tax status, the March 31, 2003, deadline

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for qualifying for tax-free status increases rather than reduces uncertainty for investors.

### **Structural Adjustment, Political Bargaining and Differentiated Tax Rates**

The imperative not to burden business “too much” clearly shaped the content of the first two steps of Germany’s ecological tax reform. This restriction resulted from a political debate in which all groups that feared negative consequences were quite active—ranging from business representatives to private households, employers to labor unions, and including all political parties. The line between proponents and opponents went right through most social groups.

The resulting limitations have left their mark on the tax reform. Tax rates are differentiated by energy sources and by user groups in a way which reflects concerns about “reasonableness” (i.e., effects on competitiveness and social distribution). The tax increases as well as the new tax rates per unit of energy or emissions differ substantially. According to mainstream economic reasoning, this is clearly inefficient. This analysis, however, usually neglects problems of structural change and a fixed capital stock and often assumes that distributive issues can be handled by a costless transfer mechanism. If these assumptions are relaxed, the judgment is more complicated and there is less clear theoretical support for policy design in this setting. Nevertheless, the mainstream analysis should serve as a guide for the tax structure in the medium- to long-run. Otherwise, efforts to attain a sustainable economy will be dominated by political bargaining, rendering it too arbitrary and inefficient.

Some of the deviations from an “ideal” tax structure can be justified by legal and technical restrictions. For example, it was not possible to have an emission tax or primary energy tax due to legal reasons. Therefore, the law should have looked for second- or third-best solutions, such as a tax on final energy that is differentiated according to the average primary energy input or CO<sub>2</sub> emissions along the production chain. The fundamentals of the next phases of the ETR do not correct this failure, but rather reinforce it. The difference between the tax rates (per unit of CO<sub>2</sub> emissions or energy content) for the various energy sources will continue to grow. The failure to establish an efficient tax structure is mainly due to the political reasons described above. It is therefore important to find a way to bridge the gap between the recommendation of

economists and the politicians' need for maneuvering room to assemble majorities for the next steps in the *Bundestag* and *Bundesrat*.

### **CONCLUSION: BETWEEN IVORY TOWER AND POLITICAL “MUDDLING THROUGH”**

The current situation reflects two conflicting sets of targets. On the one hand, the government wants to induce emission reductions and raise revenue. On the other hand, it wants to avoid energy-intensive sectors of the economy losing competitiveness and relocating their production to other countries. It can achieve these objectives by differentiating tax rates and making special provisions so that private households and small business that are unlikely to relocate have to pay high rates, whereas energy-intensive sectors profit from a lower tax burden.

This approach may be justified by the adjustment costs that would otherwise occur, but is inefficient in the long-run. Even energy-intensive sectors have a substantial potential for energy-saving measures, especially if technological innovation is taken into account. If those branches expect to profit from special provisions in the long run, the adjustment process will not be started and the government will face a similar situation in the future. Moreover, if taxes are set arbitrarily and under pressure from political groups, ecological taxes will not display the qualities of a market-based policy instrument that gives an economic incentive and serves as a filter to undertake energy-saving measures at the least cost. It is therefore necessary to overcome the dilemma between the short-term and long-term objectives. The following proposal could help to do that. It consists of two components.

First, a **long-term component** that gives a uniform incentive to avoid emissions by taxing every unit of emissions by the same tax rate for all uses and users of energy. In order to prevent energy-intensive sectors from having to bear too high a burden, the tax rates have to be very low and to be increased very slowly over the long-term. The tax level must be so low that the speed of structural change does not exceed a politically-acceptable level. This component will induce neither substantial emission reductions in the short-term nor sizable tax revenue. It will, however, give an incentive to undertake long-term adjustment measures. For this to take place, no exemptions or special provisions are allowed and the tax path has to be specified for the long-term.

Second, a **short-term component** that induces emission reduction in the short term and raises revenue. This component would be targeted primarily at those users of energy where fewer economic or social problems are to be expected. The larger the long-term component has grown, the less important will the short-term component be. In the very long-run, the short-term discretionary component should disappear and environmental policy should be predominantly market-based.

### **Final Remarks**

The ecological tax reform is an innovative approach to environmental policy in Germany that has been dominated by command-and-control measures for decades. Expectations of its advocates had been very high in the beginning, leading to deep disappointment when the law actually emerged from the political process.

The reform is far from satisfactory, but it is not as bad as critics claim. Some of the shortcomings are due to legal or technical restrictions that could not be overcome in the short-run. Others are due to political bargaining and reflect the political power of social groups and the problems of German society in coping with structural change. It is important to be aware of this, because often the discussion about means just disguises a conflict about the ends. As long as economic concerns and vested interests dominate environmental policy, it is unlikely that more stringent environmental measures will be undertaken. Any redistribution of property rights would cause similar problems, independent of the environmental instruments. Therefore, the current debate concerns not only taxes as an instrument of environmental policy, but also any reallocation of property rights, which is necessary to achieve more sustainable development.

## ENDNOTES

- <sup>1</sup> Gesetz zum Einstieg in die ökologische Steuerreform, Bundesgesetzblatt I, pp. 378. (1999).
- <sup>2</sup> The Social Democratic Party of Germany (*Sozialdemokratische Partei Deutschlands*, SPD) is the senior partner in the coalition and the Alliance '90/The Greens (*Bündnis '90/DIE GRÜNEN*) is the junior partner. Their coalition agreement is entitled: Sozialdemokratische Partei Deutschlands und Bündnis '90/DIE GRÜNEN, "Aufbruch und Erneuerung—Deutschlands Weg ins 21. Jahrhundert—Koalitionsvereinbarung zwischen der Sozialdemokratischen Partei Deutschlands und Bündnis 90/Die GRÜNEN vom 20. Oktober 1998," Bonn.
- <sup>3</sup> A.C. Pigou, *The Economics of Welfare*. London, 1920.
- <sup>4</sup> W.J. Baumol and W.E. Oates, "The Use of Standards and Prices for Protection of the Environment." *Swedish Journal of Economics* 73 (1971).
- <sup>5</sup> This proposal was first made by H.C. Binswanger, H. Frisch, H.G. Nutzinger, B. Schefold, G. Scherhorn, U.E. Simonis and B. Strümpel, *Arbeit ohne Umweltzerstörung—Strategien einer neuen Wirtschaftspolitik* (Frankfurt, 1983).
- <sup>6</sup> European Commission, "Growth, Competitiveness, Employment—The Challenges and Ways Forward into the 21<sup>st</sup> Century." White Paper. Brussels, Luxembourg, 1994.
- <sup>7</sup> SPD and Bündnis '90/DIE GRÜNEN, "Aufbruch und Erneuerung—Deutschlands Weg ins 21. Jahrhundert—Koalitionsvereinbarung zwischen der Sozialdemokratischen Partei Deutschlands und Bündnis '90/Die GRÜNEN vom 20. Oktober 1998, Bonn."
- <sup>8</sup> Bündnis '90/DIE GRÜNEN, "Gesetzentwurf der Fraktionen SPD und Bündnis 90/DIE GRÜNEN—Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform." Bundestagsdrucksache 14/40 vom 17. November 1998.
- <sup>9</sup> Deutscher Bundestag, "Öffentliche Anhörung am 18. Januar 1999 zum Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform—Drucksache 14/40. Zusammenstellung der Stellungnahmen;" and "Öffentliche Anhörung des Finanzausschusses zum Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform—Gesetzentwurf der Fraktionen SPD und Bündnis '90/DIE GRÜNEN—Drucksache 14/40—am Donnerstag, dem 18. Februar 1999. Wortprotokoll."
- <sup>10</sup> Gesetz zum Einstieg in die ökologische Steuerreform, Bundesgesetzblatt I, p. 378. (1999).
- <sup>11</sup> Gesetz zu Korrekturen in der Sozialversicherung und zur Sicherung der Arbeitnehmerrechte, vom 19. Dezember 1998, Bundesgesetzblatt I, S. 3843. Artikel 5: Gesetz zur Bestimmung der Beitragssätze in der gesetzlichen Rentenversicherung für 1999 und zur Bestimmung weiterer Rechengrößen der Sozialversicherung für 1999.
- <sup>12</sup> There had been an 8 percent surcharge on electric bills in Germany to subsidize coalmining. A 1996 German Federal Constitutional Court abolished it.
- <sup>13</sup> Gesetz zum Einstieg in die ökologische Steuerreform, Article 2, Section 6b) Sentence 1.3, 4.3 and 5.3, Bundesgesetzblatt I, p. 382, 1999.
- <sup>14</sup> Ecological taxes on petroleum products have been introduced as an amendment to current German tax law, raising the rates. It is therefore somewhat arbitrary to call them

- “ecological taxes” as opposed to traditional taxes. This distinction, however, is helpful, because some rules only apply to the tax increase under the ETR.
- <sup>15</sup> On top of energy taxes, the value added tax (VAT) of 16 percent will be raised, so that the total price increase will be larger than indicated by these tax rates.
- <sup>16</sup> Since the ETR came into force in April, the amount will be proportionately lower in 1999.
- <sup>17</sup> Gesetz zum Einstieg in die ökologische Steuerreform, Article 1, §9, Section 3 and Article 2, Section 6b), Sentence 1.3, 4.3 and 5.3, Bundesgesetzblatt I, pp. 379 and 382.
- <sup>18</sup> The threshold is 50 megawatt hours (MWh) for electricity (which corresponds to a tax payment of 1000 DM) and a tax payment of 1000 DM for petroleum products per enterprise and year. Therefore, only 60,000 of 200,000 to 250,000 enterprises in manufacturing will profit from reduced tax rates (B. Meyer, “Der Gesetzentwurf zum Einstieg in die ökologische Steuerreform—Eckpunkte und Beurteilung,” Kiel, April 1999). The unpublished paper is available from the author <bettina.meyer@umin.landsh.de>.
- <sup>19</sup> Gesetz zum Einstieg in die ökologische Steuerreform, Article 1, §10, Section 2 and Article 2, Section 7, Bundesgesetzblatt I, pp. 380 and 383.
- <sup>20</sup> The tax revenue from renewable sources will be about 180 million DM in 1999 (from April to December) and about 240 million DM in 2000 with the tax rates of the first phase. About 200 million DM are to be used for the promotion of renewable energy and energy saving measures. The exact amount is still disputed (“200 Millionen DM für Öko-Strom,” *Süddeutsche Zeitung*, 16. August 1999).
- <sup>21</sup> There is an income ceiling that limits the absolute maximum contribution, so for high incomes the share is lower.
- <sup>22</sup> “Aufbruch und Erneuerung—Deutschlands Weg ins 21. Jahrhundert—Koalitionsvereinbarung zwischen der Sozialdemokratischen Partei Deutschlands und Bündnis ‘90/Die GRÜNEN vom 20. Oktober 1998, Bonn.”
- <sup>23</sup> Since the reform came into force in April rather than January, the amount will be proportionately lower in 1999.
- <sup>24</sup> Intergovernmental Panel on Climatic Change, “Climate Change 1995: Impacts, Adaptations, and Mitigation of Climate Change: Scientific-Technical Analyses,” in R.T. Watson, M.C. Zinyowera and R.H. Moss, eds., *Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge University Press, 1996), section 11.6.4.1.
- <sup>25</sup> Recently, several of them explicitly referred to the idea of an ecological tax reform and expressed interest in a shift from traditional to environmental taxes (e.g., Austria, Belgium, Denmark, Italy and the Netherlands).
- <sup>26</sup> E.g., Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung: Vor weitreichenden Entscheidungen. Jahresgutachten 1998/99, TZ 495.
- <sup>27</sup> Since Germany has embarked on the liberalization of energy markets, energy users will increasingly be free to profit from price differences for imported energy.
- <sup>28</sup> It should be noted that a CO<sub>2</sub> tax focuses exclusively on CO<sub>2</sub> emissions. There are, however, more greenhouse gases and other externalities which should be taken into account in environmental policy. Since it is difficult to quantify and monetarize all

externalities, an “agnostic” point of view would be to choose the energy content as tax base.

- <sup>29</sup> Court of Justice of the European Communities, Excise duty on electricity, C-213/96, 2 April 1998.
- <sup>30</sup> There are even high subsidies for coal mining in Germany. These are, however, subsidies for domestic production that do not have an impact on consumer prices of coal.
- <sup>31</sup> H.-J. Ziesing, “CO<sub>2</sub> Emissions in Germany: Still Not on the Target Trajectory,” German Institute for Economic Research, *Economic Bulletin* 36 (1999): 13-20.
- <sup>32</sup> Alternatively, tradable permits could be used to adjust market prices. In Germany this instrument has not been seriously taken into consideration so far.
- <sup>33</sup> It should be noted that renewable energy usually causes some kinds of externalities, e.g., land use, injury to birds or sound emitted by wind energy mills. Those externalities, however, are estimated to be substantially lower than those of fossil fuels, so that renewable energies should still be promoted vis-à-vis fossil fuels.
- <sup>34</sup> This program is not part of the law on an ecological tax reform and is still subject to negotiation in the government.
- <sup>35</sup> It is questionable if this regulation is in accordance with European law, but it has not been challenged so far.
- <sup>36</sup> The tax rate for electricity is calculated by dividing the general tax rate by the average efficiency of power transformation of 38 percent.
- <sup>37</sup> This is an illustrative calculation with a similar tax level, but a uniform taxation for all sources of energy and without special provisions for energy-intensive sectors.
- <sup>38</sup> Additionally, there are mechanisms which allow them to acquire emission reduction units from other countries.
- <sup>39</sup> A study of the German Institute for Economic Research (DIW) suggests that important economic variables, such as growth or employment, do not vary significantly if special provisions for energy-intensive sectors are introduced to an ecological tax reform (Stefan Bach, Michael Kohlhaas and Bernhard Seidel, “The Use of Tax Allowances to Reduce Competitive Disadvantages Resulting from Ecological Tax Reform,” German Institute for Economic Research, *Economic Bulletin* 34, no. 7 [1997]: 17-28).
- <sup>40</sup> Stefan Bach, Michael Kohlhaas and Bernhard Seidel, “The Use of Tax Allowances to Reduce Competitive Disadvantages Resulting from Ecological Tax Reform,” German Institute for Economic Research, *Economic Bulletin* 34, no. 7 (1997): 17-28.
- <sup>41</sup> Bündnis ‘90/DIE GRÜNEN, “Gesetzentwurf der Fraktionen SPD und Bündnis ‘90/DIE GRÜNEN—Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform.” Bundestagsdrucksache 14/40 vom 17. November 1998.
- <sup>42</sup> A sector (as defined by Standard International Trade Classification (SITC) of economic activities in the European Community at a four-digit level) was defined as “energy-intensive” if the share of energy-cost in total production cost of a sector exceeds 6.4 percent.
- <sup>43</sup> “Öffentliche Anhörung am 18. Januar 1999 zum Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform—Drucksache 14/40. Zusammenstellung der Stellungnahmen.”

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- <sup>44</sup> Treaty establishing the European Community (signed in Rome on March 25, 1957), Article 92: “Save as otherwise provided in this Treaty, any aid granted by a Member State ... which distorts or threatens to distort competition by favouring certain undertakings or the production of certain goods shall ... be incompatible with the common market.”
- <sup>45</sup> “Öffentliche Anhörung des Finanzausschusses zum Entwurf eines Gesetzes zum Einstieg in die ökologische Steuerreform—Gesetzentwurf der Fraktionen SPD und BÜNDNIS 90/DIE GRÜNEN—Drucksache 14/40—am Donnerstag, dem 18. Februar 1999,” Protocol.
- <sup>46</sup> Volker Meinhardt and Rudolf Zwiener, “Steuerfinanzierung von versicherungsfremden Leistungen in der Sozialversicherung,” *Vierteljahrshefte zur Wirtschaftsforschung* 66 (1997): 352-361.
- <sup>47</sup> E.g., Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung: Vor weitreichenden Entscheidungen. Jahresgutachten 1998/99, TZ 494.
- <sup>48</sup> This presumption is supported by empirical estimates of the price elasticity of energy demand far below unity.
- <sup>49</sup> Angela Franke and Ursula Triebswetter, “Steuern und Umweltschutz - Umweltpolitisch kontraproduktive Einzelregelungen innerhalb des deutschen Steuerrechts.” *IFO Schnelldienst* Nr. 36, 1994, and B. Linscheid and A. Truger, “Beurteilung ökologischer Steuerreformvorschläge vor dem Hintergrund des bestehenden Steuersystems,” *Finanzwissenschaftliche Forschungsarbeiten*, N.F., Bd. 62. Berlin 1995.
- <sup>50</sup> Gesetz zur Fortführung der ökologischen Steuerreform, Bundesrat, Drucksache 638/1/99, November 26, 1999.
- <sup>51</sup> Since it was too late to amend the bill to include the contents of the final compromise and then send it back through the *Bundestag* and *Bundesrat* in time to become law on January 1, 2000, the pro-coal forces led by North Rhine-Westphalian prime minister Wolfgang Clement agreed to support passage of the unaltered bill in the *Bundesrat* on November 26, 1999, in exchange for a commitment from the Schröder Government to enact the missing pieces of the final compromise in a so-called “article act” by mid-2000 (*tageszeitung*, November 24, 1999).
- <sup>52</sup> *tageszeitung*, November 24, 1999.



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