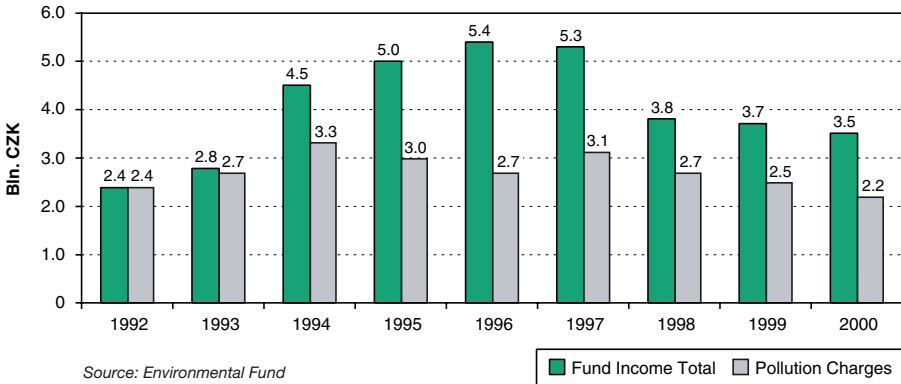


## VI. ECOLOGY

## VI.1 International Comparison

## Environmental Fund Income



### Environmental Legislation and the EU

The provisional conclusion of Chapter 22 - Environment was realized on June 1, 2001 at the intergovernmental conference of the EU. The Czech Republic is prepared to implement all the EU legislative provisions apart from directives where the Czech Republic asked for a transitional period:

- Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment. The Czech Republic will have to

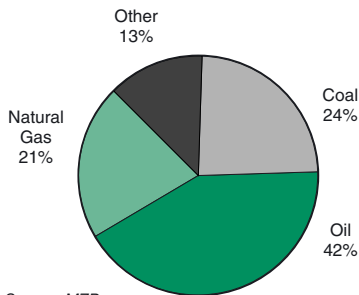
create sewage systems and waste water treatment plants for between 2000 and 10,000 inhabitants;

- European Parliament and Council Directive 94/62/EC of 20 December 1994 on packaging and packaging waste. The Czech Republic is not able to fulfill the percentage set for the recycling of waste – 25 % and for the re-using of waste – 50 %. The percentages will gradually grow on the basis of the voluntary agreement and the new Act on Waste and Act on Packaging.

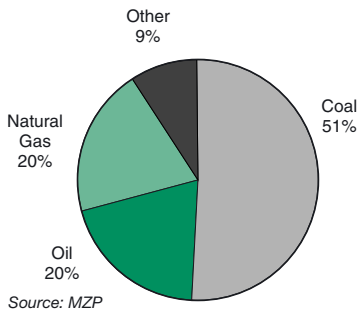
	Acts	Decrees		
		Governmental	Ministry of Environment	Other
Approved in 2000	10	7	15	7
Approved in 2001(Fall)	9	2	4	8

Source: MZP

## Composition of Primary Energy Resources OECD



## Composition of Primary Energy Resources in the Czech Republic

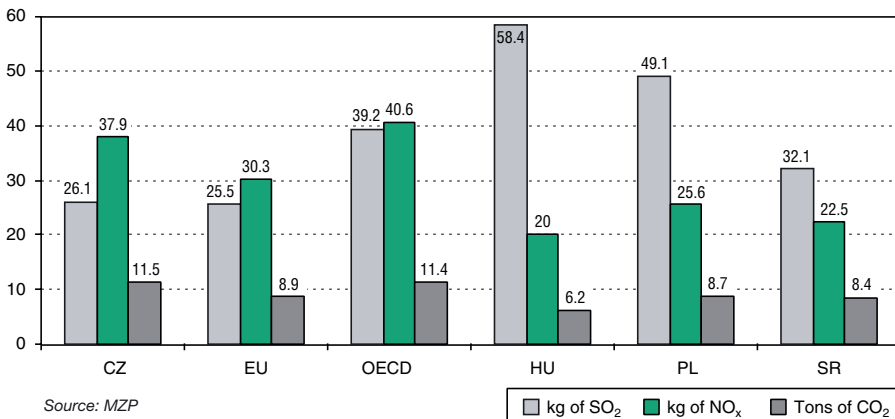


## Major Achievements during 10 Years of Transition

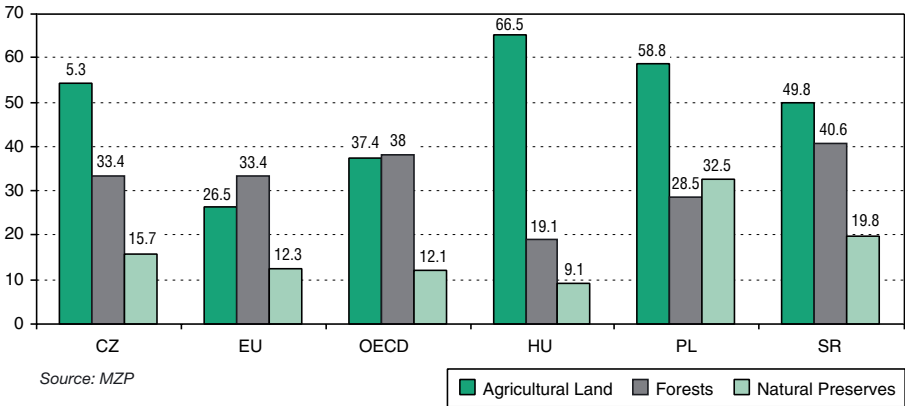
From 1990 the usage of hard fuels fell almost exactly half. In 2000, consumption was 51 % of its 1990 level. The unleaded fuel share in gas consumption rose from a mere 1 % in 1990 to 81 % in 2000. From 2001, the import and sale of leaded gas has been prohibited. In addition, due to new regulations the total share of cars with catalytic converters increased from 1 % in 1990 to 32 % in 2000.

The Czech Republic is a signatory of both the Vienna and Montreal treaties on the protection of the ozonosphere. Although there was a sharp decline in the emissions of sulphur dioxide and carbon oxides during the last ten years and the current emissions per inhabitant are similar to OECD and EU averages, the emissions per square kilometer are still two times higher than the EU average and three times higher than the OECD average. In addition, the relative emissions of carbon dioxide are higher than

## Emissions per Inhabitant



Areas (% of Total Area of the State)

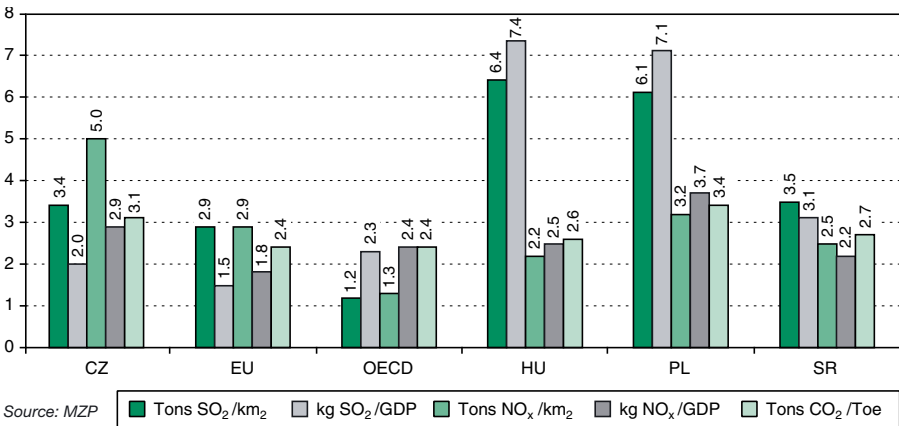


the EU and OECD averages. We should also note the high portion of coal as a primary energy resource. However, these figures give a more mixed result in comparison with the original Visegrad countries. The Czech Republic has a favorable position especially in the case of relative emissions of sulphur dioxide; its figures are about half of those of Hungary and Poland. Slovakia's level of emissions are between those of the Czech

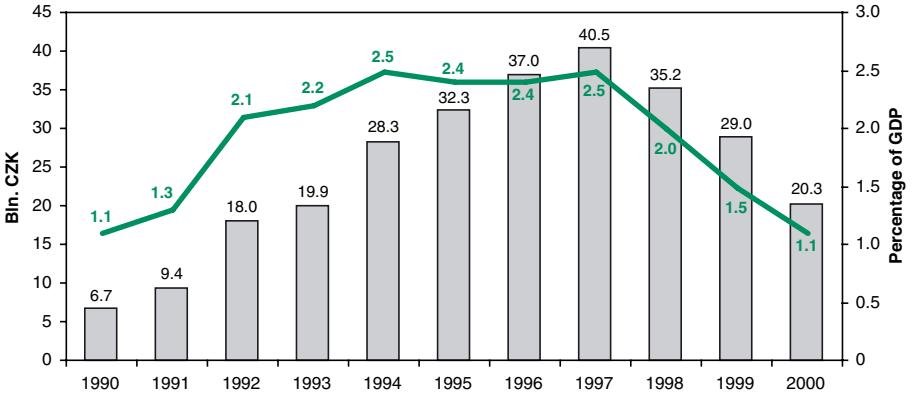
Republic on the one side, and Poland and Hungary on the other.

Just the opposite is the case with nitride oxides. The Czech Republic produces more of these pollutants because of the number of registered passenger cars is 36 per 100 inhabitants—much closer to the EU and OECD average of 50. In the remaining Visegrad countries, meanwhile, the average is only around 23 per 100 inhabitants.

Relative Emissions



**Investment in Environmental Protection**

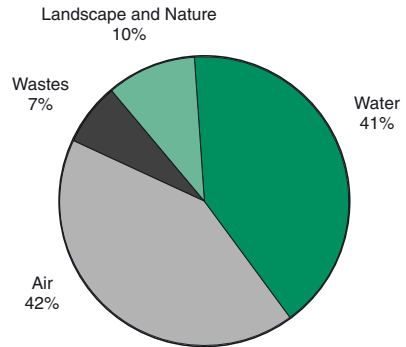


Sources: CSO, MZPCR, 2000 preliminary

Unlike Poland and the Czech Republic, Slovakia and Hungary rely much less on coal energy.

Note the high portion of agricultural land in all the Visegrad countries in comparison to the EU and OECD. In 1999, a new national park, České Švýcarsko (Czech Switzerland), was established. Investment in environmental protection peaked in the mid-nineties when firms were facing new environmental standards and had to modify their technologies. New standards were enforced and the temporarily granted exceptions expired.

**Environmental Subsidies and Loans  
(Total Expenses of Environmental Fund)**



Source: Environmental Fund

### Temelín Case

*In 1980 the Czechoslovak government finalized its decision to build a new nuclear power plant by selecting a site near the town of Temelín. Two years later, in 1982, a contract was signed with the Soviet Union to provide the necessary technology. The final construction permit was issued in late 1986; however, the site preparation had already started in 1983. The total planned output of four 1000 MW units was obviously too large to be finished and justified under the new economic conditions which followed the 1989 events, so in 1990, the Czechoslovak government decided to cut the capacity by one half and to reduce the originally planned four units to only two. Due to economic and political changes after 1989, the dates for completion were adjusted several times.*

*Later the original Soviet-controlled technology was replaced with more modern Western technology to meet the highest safety standards. In 2000, after 20 years and 100 bln. CZK in costs, the first unit was finished and ready for testing prior to normal operation. By this time, pressure groups had finally succeeded in involving a good part of the general public in Austria in protests against the power plant and its proximity to the border. This has subsequently widened the political gap between the two countries. Although the Czech Republic and Austria agreed in Melk on a way to solve the problem, certain parties continue to exert political pressure to make the issue of Temelín part of the accession talks. (see also the privatization of energy sector, Section IV. 1)*

#### The nuclear power plant Temelín

Estimated Temelín Yearly Electricity Production	Consumption of Brown Coal in Coal Powerplants Reduced by	Resulting Reduction of Labor Input in the Coal Mining industry
10–12 TWh	10–12 M tons	5,800 employees

Source: MPO and MPSV

## VI.2 Wastes and Pollution

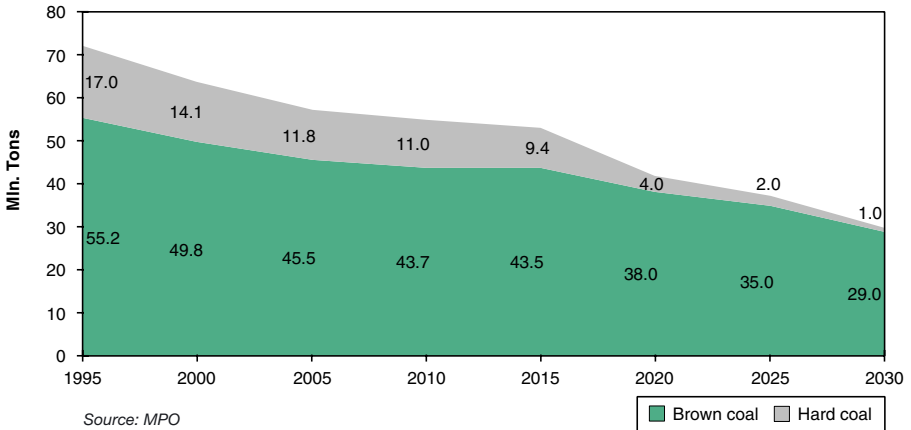
Ten years after the fall of the socialist bloc, significant improvements in environmental protection can be observed. Not only are the new legal standards comparable to those in the EU being implemented, but huge reductions in emissions and

significant improvements in environmental quality can be noticed in everyday life.

Major air pollutants of sulfur and carbon dioxides (e.g., power plants) had a temporary exemption from the emission limits until January 1999. From that time on, all

## VI. ECOLOGY

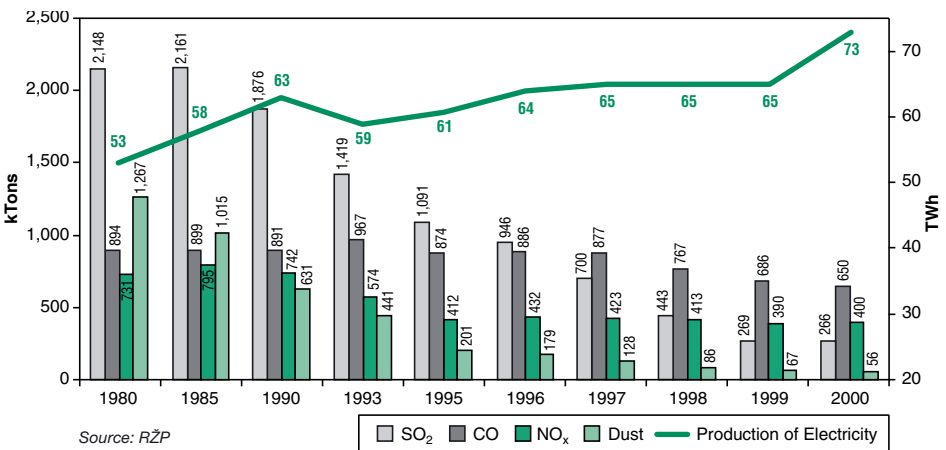
### Coal Mining Prediction



major polluters have been expected to utilize new technologies. Indeed, sulfur dioxide emissions dropped to one eighth of the level of the 1980s and even dust emissions were reduced by nineteen times. Moreover, a further reduction is predicted by the MPO once the newly finished nuclear plant near

Temelín is in full operation. The other nuclear power plant in Dukovany currently produces about 20 % of the country's total electricity supply. The MPO estimates that both nuclear plants would reduce the emission of carbon dioxide to 17 % of the total emissions. The future share of nuclear energy

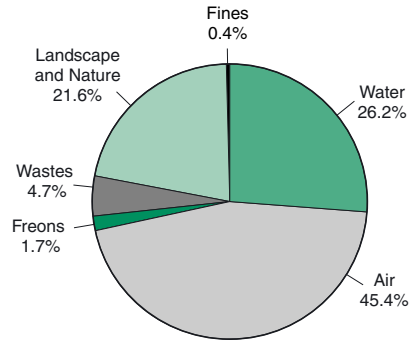
### Waste and Electricity Production



consumption is estimated to be about 38%. According to these predictions, coal mining should decline as outlined in the graph.

The mentioned improvement is also reflected in the declining income to the Environmental Fund that started in 1998, when most companies had to cope with the end of temporary environmental protection relief. It is also expected that a reduction in nitrogen oxide emissions will occur since all new automobiles are required to be equipped with catalytic converters.

**Pollution Charges Composition in 1999**



### **Environmental Protection and Firms' Finance**

*(Based on Earnhart D., and Lizal L., mimeo, CERGE-EI, 2001)*

*This article examines the link between corporate financial performance and corporate environmental performance and explores the effects of ownership structure on environmental performance. The effect of lagged financial performance is negative or insignificant, indicating that strong financial performance leads to better future environmental performance (i.e., lower emissions) or does not affect emissions at all. Therefore, financial success either begets or does not undermine better environmental performance. This finding is quite different from those already cited in the literature.*

*Production significantly affects emissions; as expected, greater production generates more emissions. Oddly, greater relative production also generates more emissions. Thus, we can safely conclude that the technology employed has increasing returns to scale with respect to generated pollution.*

*Ceteris paribus, the major differences are in the effect of the financial status among firms on average, where the link between financial status and pollution is significantly negative. On the other hand, within a firm the effect of financial performance is marginally significant, indicating that higher profits lead to employment of better technology, and therefore a firm produces relatively lower emissions.*

*Moreover, our analysis finds that state owned firms have lower environmental performance relative to all other investor types; however, the state does hold less environmentally friendly firms. Indeed, during privatization in the early nineties the Czech state kept a significant portion of assets in so-called "strategic" firms, which also included large SOEs from heavy industry. Our analysis also finds that concentrated ownership is positively correlated with environmental performance, contrary to our expectations that the concentration should not play a role.*

### **The Benefits of Compliance with the Environmental Acquis for the Czech Republic and Candidate Countries**

*(Source: ECOTEC in association with EFTEC, IEEP, Metroeconomica, TME & Candidate Country Experts, final report, July 2001)*

*The monetary assessment of the effects of compliance provides a measure of the benefits that follow from the implementation of the environmental directives as described in the environmental chapter of the acquis communautaire. This measure, however, does not include the full range of benefits and provides only a partial indicator of the consequences. The true benefits value is not fully in line with GDP or real costs.*

*Benefits from reduced air pollution account for around half of the total benefits for both the lower and upper estimate. However, it should be kept in mind that the benefits from water and waste directives are not exhaustively captured by the monetary valuation and that the benefits from nature protection are not covered.*

*The monetarization is based on three approaches:*

*1. The application of unit pollution damage costs to estimated reductions in given pollutants – this is the approach applied to the estimation of benefits from waste directives;*

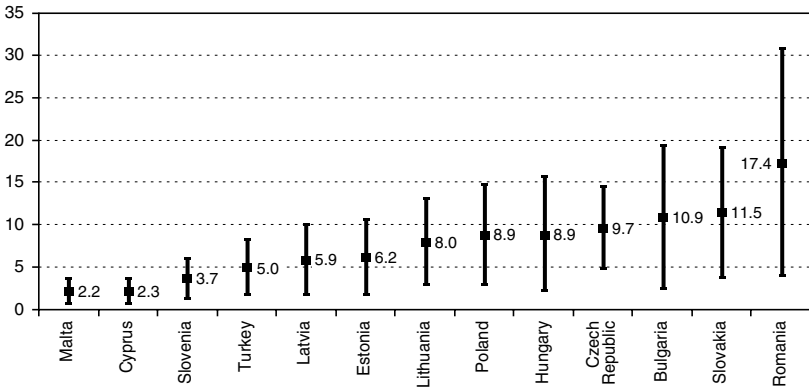
#### **Annual Benefits of Full Compliance, by Media, by Candidate Country**

Country	Air		Water		Waste		Total	
	Low	High	Low	High	Low	High	Low	High
Bulgaria	110	1,130	160	435	20	680	290	2,240
Cyprus	30	140	25	100	8	75	65	310
Czech Republic	730	3,600	1,560	2,475	95	1,150	2,390	7,220
Estonia	40	210	27	100	10	180	75	490
Hungary	590	4,100	280	1,080	115	1,900	985	7,080
Latvia	50	320	40	140	5	110	95	570
Lithuania	160	820	125	280	6	205	290	1,300
Malta	8	40	13	47	3	40	24	130
Poland	2,650	15,400	1,400	3,280	165	2,750	4,210	21,400
Romania	780	5,850	405	1,250	85	2,650	1,270	9,800
Slovakia	350	2,250	305	680	30	440	690	3,370
Slovenia	70	475	150	350	25	290	240	1,120
Turkey	2,180	9,700	880	3,400	77	1,850	3,140	14,950
<b>Total</b>	<b>7,700</b>	<b>44,000</b>	<b>5,380</b>	<b>13,600</b>	<b>650</b>	<b>12,300</b>	<b>12,500</b>	<b>69,300</b>

*Source: ECOTEC in association with EFTEC, IEEP, Metroeconomica, TME & Candidate Country Experts, final report, July 2001.*



### Ratios of Annual Benefits of Full Compliance, Benefits as % of GDP



Source: ECOTEC in association with EFTEC, IEEP, Metroeconomica, TME & Candidate Country Experts, final report, July 2001.

2. The application of unit receptor damage costs to estimated reduction in damage to given receptors or receptors valuation of damage using willingness to pay analysis;  
 3. The calculation of completed dose-response function, relating pollution changes to effect for particular receptors capable of valuation in monetary terms – this is the approach applied to the estimation of health benefits from air directives.

The benefits from reducing air pollution relate mainly to improved public health through fewer respiratory diseases and, most importantly, fewer cases of premature deaths. There are also significant benefits from a reduced burden on agricultural crops and avoided damage to buildings. The benefits from implementing the EU's water related directives include improved access to clean drinking water, bathing water, and rivers. The benefits of implementing EU waste directives included reduced methane emissions, which benefit public health and global warming, and a reduced impact on the environment through increased recycling and the lower use of primary materials.

The Czech Republic is one of those countries which benefits from full implementation the most.

The benefits as a proportion of GDP and per capita are based on benefits given in purchasing price parities (PPP). The range of values across countries reflects several factors – the difference in actual benefits, variations in data availability allowing benefits estimation, variations in the meaning of the data across the candidate countries, and differences in purchasing price parities across countries. The high result in the Czech Republic is strongly influenced by the significant benefits from improvements in river water quality.

In terms of GDP, the benefits from EU directives are quite high for the Czech Republic.