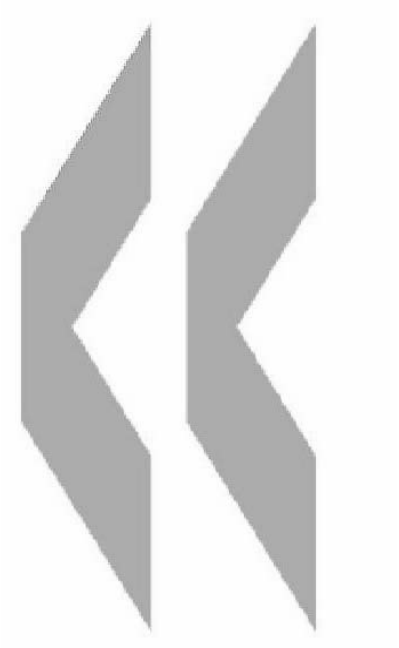

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Identifying Complementary Measures to Ensure the Maximum Realisation of Benefits from the Liberalisation of Trade in Environmental Goods and Services
Case Study: Czech Republic

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IDENTIFYING COMPLEMENTARY MEASURES TO ENSURE THE MAXIMUM REALISATION OF BENEFITS FROM THE LIBERALISATION OF TRADE IN ENVIRONMENTAL GOODS AND SERVICES

CASE STUDY: CZECH REPUBLIC

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ABSTRACT

This study analyses the development of trade in environmental goods and services in Czech Republic and the impact of its liberalization on the country. Demand for environmental goods, mostly end-of-pipe equipment surged as the government introduced emergency environmental regulations in 1991-1992, which triggered significant investment in environmental goods and services in the private sector. The sudden opening of Czech markets through trade liberalization, in the absence of a long-term, integrated strategy, however, has upset the demand-supply equilibrium although it has improved conditions for investment in end-of-pipe technology. Experience with Czech Republic reveals that in order to benefit from trade liberalization of environmental goods and services, an appropriate regulatory framework and policy should be put in place.

Key words: environmental goods and services, trade liberalization, trade and environment, Czech Republic

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The report is available on the OECD website in English and French at the following URL addresses: http://www.oecd.org/trade.

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ACRONYMS

CFC	Chlorofluorocarbons
ČSÚ	Český statistický úřad [Czech Statistical Institute]
EG&S	environmental goods and services
EMAS	Eco-Management and Audit Scheme (EU)
EU	European Union
GDP	Gross domestic product
GEF	Global Environment Facility
GHG	Greenhouse gas
IPPC	Integrated pollution prevention and control
MFN	most-favoured nation
MPO	Ministerstvo průmyslu a obchodu České republiky [Ministry of Industry and Trade of the Czech Republic]
MŽP	Ministerstvo životního prostředí České republiky [Ministry of the Environment of the Czech Republic]
ODA	Official development assistance
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCDD	polychlorinated dibenzo-dioxins/dibenzofurans
SFŽP	Státní fond životního prostředí České republiky [State Environmental Fund of the Czech Republic]
SMEs	Small and medium-sized enterprises
TSP	Total suspended particulates
UNDP	United Nations Development Programme
UNOPS	United Nations Organization for Project Services
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
VOC	Volatile organic compound

IDENTIFYING COMPLEMENTARY MEASURES TO ENSURE THE MAXIMUM REALISATION OF BENEFITS FROM THE LIBERALISATION OF TRADE IN ENVIRONMENTAL GOODS AND SERVICES

CASE STUDY: CZECH REPUBLIC

Executive Summary

A boom in purchases of environmental goods and services (EG&S) in the Czech Republic during the 1990s led to unprecedented improvement in the nation's environmental performance. Three periods can be distinguished in economic and environmental developments in the 1990s: shock therapy (1990-92), environmental restructuring (1993-98) and economic restructuring (from 1999).

Supply and demand of EG&S in the late 1980s, when the economy was centrally planned, was based on outdated environmental legislation. This situation lasted for about two years after unilateral trade liberalisation was announced in 1990. The disappearance of markets and institutions dating from the earlier era led initially to steep declines in industrial production and pollution. This period of structural adjustment was necessary to lay the foundations for the new structures to come.

In 1991-92, the government introduced a flurry of emergency environmental regulations that created a huge demand for environmental goods, mostly end-of-pipe equipment, and a substantial reduction in the most urgent environmental risks. The private sector undertook significant investment as factories, along with municipal works, began to internalise the external costs of pollution. Emissions of some pollutants started to be decoupled from GNP, which began growing again, while emissions of SO_2 and dust declined. Production of waste, however, continued to increase in line with economic growth.

Because investment in pollution control preceded economic restructuring, end-of-pipe technology was widely adopted before preventive measures integrated into production processes could be explored or a strategic view of the affected sectors could be developed.

The sudden opening of Czech markets through extensive trade liberalisation improved conditions for investment in end-of-pipe technology, but the country lacked the time and capacity to devise the longer-term, integrated strategy that could have been achieved if environmental and economic restructuring had proceeded in parallel. Trade liberalisation and the new environmental legislation upset the demand-supply equilibrium that had existed in the late 1980s. The re-establishment of equilibrium was characterised by:

- Short-term environmental policy and extremely short deadlines for significant reductions of environmental risk.

- Market dominance by foreign suppliers of EG&S. These suppliers enjoyed a considerable head start over Czech firms in technical knowledge and inexperience with the western-style environmental legislation on which the new Czech regulations were based. Well-honed marketing skills, and a local bias against Czech-made goods, also worked in their favour.

- A gradual development of the capacities of Czech regulators, clients and suppliers.

During the first two phases the country's environmental performance was brought up to the OECD average. Recent years have seen further environmental improvement and significant economic restructuring, spurred by a sharp economic downturn in the late 1990s. Strong competitive pressures and the saturation of domestic demand have led many Czech suppliers of EG&S to merge with foreign partners. Those that have remained independent are seeking new markets in countries still developing their new environmental legislation.

Purpose and scope of the study

This study analyses the development of trade in environmental goods and services (EG&S) in the Czech Republic.[1] It seeks to explain how environmental policy and significant unilateral liberalisation of trade have affected the country's EG&S trade, with a focus on the win-win potential, encompassing both trade and environmental benefits. The study focuses on the 1990s, when the Czech Republic undertook dramatic economic restructuring, making the transition from centrally planning to a market economy, while addressing the challenge of improving the state of its environment.

Out of a vast array of environmental problems that might be examined, two are reviewed in depth: air-pollution control and waste management. They were selected because the country has both national objectives and multilateral commitments in these areas, and because the sectors consume significant amounts of EG&S.

The starting point of the study is the OECD definition of EG&S (OECD, 2001) along with the OECD/Eurostat classification, which was used in structured interviews to identify certain basic trends in the country's EG&S trade. The classification is consistent with the criteria used by the Czech Statistical Institute (in Czech: Český statistický úřad, ČSÚ) to classify EG&S.

Determinants of demand shifts

This section provides an overview of the major determinants of change in the demand for EG&S in the Czech Republic, including regulatory mechanisms, international environmental agreements, reinforcement of institutional mechanisms and complementary measures.

Drivers on the demand side

Development of environmental policy

In 1990-95, the main factor driving demand was new environmental legislation based on the command-and-control approach and generally involving emergency measures, reflecting the high priority Czech society gave to redressing the environmental results of central planning.

The development of demand for EG&S in the 1990s focused on air protection, wastewater management, waste management, drinking water supply and inherited liabilities.[2] As government recognised the acute need for quick remedies for particular environmental media, a flurry of legislation between 1990 and 1992 stimulated demand for EG&S via a command-and-control approach promoting end-of-pipe solutions.

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1 In 1995 the Czech Republic became the 26th member of the OECD.

2 The order reflects the way demand developed; for example, the introduction of policy instruments to deal with inherited liabilities (e.g. establishment of a financing system in the National Property Fund to support activities in this area in the early 1990s) was followed by a long delay: clean-up (and use of EG&S) started on a broad scale only much later.

In selecting environmental policy instruments, the government looked to those in use in EU countries. For example, German regulations were taken as a main blueprint in air protection and waste management. Thus, from the beginning, its environmental legislation was supported by economic instruments such as charges, subsidies, deposit-refund systems and fines. The effectiveness of charges and taxes increased somewhat with privatization.[3] Subsidies for primary commodities were gradually reduced, and exemptions from taxes and charges were eliminated.

EG&S were purchased and installed under intense time pressure with little or no consideration to the innovation cycle and the need to upgrade outdated technology. Most plants were upgraded only later, generally after they had been privatised. From 1995, more attention began to be paid to the effectiveness and efficiency of environmental policy. Economic instruments were expanded, greater information was provided and some experimentation with voluntary instruments took place. Recent legislation includes the 2002 Act on Clean Air Protection, known as the Clean Air Act.

Since 1996, when the Czech Republic announced its intention to join the European Union, environmental regulations have been developed in accordance with EU law. A growing number of complementary measures reflect the recognition that end-of-pipe solutions are no longer the most effective approach to pollution abatement.

Environmental expenditure

Environmental expenditure, used in this study to estimate Czech trade in EG&S,[4] grew from 1990 to 1997 (Table 1). Overall expenditure (by the public sector and private industry) increased from CZK 6 billion in 1990 to CZK 32.3 billion in 1995, rising from 1% of GDP to 2.4%. Over 1994-97, total expenditure came to around 2.5% of GDP. The share of environmental investment in total investment was about 8%, relatively high in both relative and absolute terms. The level of expenditure fell steeply in 1998 and 1999, to around 1.3% of GDP, mainly because major investment projects in the air, water and waste sectors had to be completed before 1998 based on dead lines introduced in environmental regulations.

Some 85% of investment in air-pollution control was directed at reducing emissions from coal- and oil-fired plants with desulphurisation units, fabric and electrostatic filters and low-NO_x burners. The rest of the investment was directed at replacing coal and oil with natural gas, especially for district heating and household use.

[3] Such fees and penalties as existed before the transition period were not very effective, as state-owned enterprises paid them into the state budget.

[4] Sources of data that would show the volume and structure of EG&S trade in the Czech Republic in the 1990s are very limited (Tošovská, 2001).

Table 1. Environmental investment, 1990-2000

Year	Total environmental investment (billion CZK)	Share of GDP (%)	Share of public finances (%)	Air (%)	Water (%)	Waste (%)	Average exchange rate[1] (CZK/USD)
1990	6.0	1.1	n.a.	25.2	48.8	16.3	
1991	9.4	1.3	n.a.	33.9	49.2	15.2	29.487
1992	17.0	2.1	n.a.	33.9	42.5	18.3	28.256
1993	19.9	2.2	n.a.	39.6	43.4	14.5	29.155
1994	28.3	2.5	n.a.	47.7	38.3	11.1	28.782
1995	32.3	2.4	n.a.	55.4	31.7	8.6	26.545
1996	37.0	2.4	15.3	58.0	29.4	9.3	27.138
1997	40.5	2.5	13.8	55.1	29.4	11.9	31.711
1998	35.2	2.0	9.5	57.1	23.6	13.4	32.274
1999	29.0	1.5	8.8	54.3	30.5	9.0	34.600
2000	21.4	1.1	12.1	39.3	40.0	10.6	38.590
Total	**276**	**-**	**-**	**-**	**-**	**-**	

Note 1. Average exchange rates for the given years: Czech National Bank.

Source: ČSÚ, 2001.

Emissions of the main air pollutants declined significantly over 1990–2001 (Table 2), by up to 91% in the case of total suspended particulates (TSP). The most significant improvements were in dust, SO_2 and lead (as leaded petrol was phased out). Emissions of volatile organic compounds (VOCs) were more than halved, thanks mainly to a shift to acrylic-based paints and more environment-friendly degreasers. Another factor in the dramatic decline in pollution after 1990 was the closure of highly polluting processes and enterprises, largely in the first two years of transition.

Table 2. Emissions of major pollutants in the Czech Republic, 1990-2001

Year	TSP	SO_2	NO_x	CO	VOC	NH_3	Cd	Hg	Pb	PAH	PCB	PCDD
	kt	*kt*	*kt*	*kt*	*kt*	*kt*	*T*	*T*	*t*	*t*	*kg*	*Kg*
1990	565	1 850	551	1 275	441	156	4.3	7.5	269	752	773	1.25
1991	524	1 749	527	1 197	394	134	3.9	7.4	240	747	772	1.22
1992	424	1 495	499	1 141	366	115	3.6	7.3	247	1 131	741	1.22
1993	367	1 366	459	1 055	346	99	3.5	7.5	232	1 115	644	1.14
1994	258	1 205	378	1 036	310	91	3.5	7.2	202	951	630	1.13
1995	211	1 103	370	1 043	292	86	3.6	7.4	180	1 357	623	1.13
1996	178	944	366	1 012	293	81	2.9	5.9	165	971	554	0.92
1997	127	697	349	944	277	81	3.0	5.5	180	657	448	0.83
1998	84	438	321	765	242	80	2.7	5.2	169	657	458	0.77
1999	66	268	313	716	234	75	2.7	3.7	157	557	485	0.64
2000	57	264	326	648	227	74	2.9	3.8	107	488	474	0.74
2001	54	251	332	649	222	74	2.8	3.6	49	470	450	0.73

Source: Czech Hydrometeorological Institute, Czech Environment Inspectorate, Centre for Transport Research, ČSÚ, Agricultural Technique Research Institute (DHV, 2002)

The situation in the waste-management sector at the beginning of the 1990s was characterised by lax control. Thus, the official record of trends for this period is unreliable. Waste treatment facilities, especially landfills, were built during the 1990s. Investment was directed mainly to construction of secure landfills and development of related logistics. Another key focus was recycling, as can be seen from a breakdown of waste management techniques in 2001 (Table 3). The market for recycling and composting technologies seems to be growing.

Table 3. Waste management techniques, by OECD classification, 2001

	Waste management techniques ('000 tonnes)							
Waste source	**Physical and chemical methods**	**Biological methods**	**Inciner-ation**	**Landfilling**	**Use as secondary raw material**	**Storage**	**Export**	
Agriculture and forestry	77	2 809	38	20	1 561	128	0	
Mining	82	49	0	492	3 299	19	0	
Industry	1 780	161	300	1 511	2 432	377	269	
Power generation (except radioactive waste)	141	1	15	3 310	2 905	270	1	
Municipal	169	439	383	2 575	424	53	28	
Other	2 196	714	91	2 597	2 249	763	339	
Unspecified								3 750
Total	4 242	5 225	774	10 629	11 798	1 303	445	3 750

Source: Water Management Institute – Centre for Waste Management.

Multilateral environmental agreements

Multilateral environmental agreements (MEAs) became more important drivers of demand for EG&S after the Czech Republic started negotiations to join the OECD in 1994.[5] Three MEAs of particular significance are discussed below.

Climate change

The Czech Republic has had no problems meeting its commitments under the Kyoto Protocol because its baseline greenhouse gas (GHG) emissions were quite high (Table 4). Hence, the protocol has not been a major stimulus for the EG&S sector in the Czech Republic.[6]

5 Two major issues in the accession negotiations were full implementation of the Basel Convention on transboundary waste movements and new legislation on chemicals and chemical preparations.

6 The Czech Republic signed the protocol in late 1998 (Government Degree 669/98), accepting a target of reducing its GHG emissions by 8% by 2008-12 from a 1990 baseline. By 2000 it had already cut its GHG emissions by nearly 25%.

Table 4. Total GHG emissions, 1990-2000

(Mt of CO2 equivalent)

Gas	1990	1992	1993	1995	1998	1999	2000
CO_2	162.5	134.2	129.2	123.4	124.7	118.2	124.2
CH_4	16.8	14.0	13.3	12.6	11.4	10.7	10.7
N_2O	11.3	7.0	6.6	6.7	8.4	8.1	8.2
F-gases (kt of CO_2 equivalent)	-	-	-	169.4	522.6	525.4	889.6
Total	190.5	155.2	149.1	142.7	145.1	137.6	144.0
% of 1990 level	100.0	82.7	79.5	76.1	76.1	72.2	75.6

Source: Czech Hydrometeorological Institute (DHV, 2002).

The significant reduction of emissions in the early 1990s resulted from structural changes in the energy supply balance (notably a shift from lignite and coal towards gas) and the overall transformation of the economy, due in part to a radical change in energy policy in 1992. Price controls and subsidies for fuels were phased out and stricter limits on emissions of SO_2 and particulates from coal-fired power plants were introduced.

Emissions have been roughly stable since the mid-1990s. Per-capita emissions of CO_2 are still high, however, at 11.5 tonnes, compared with an EU average of less than 9 tonnes. The main reason is continuing dependence on coal, which accounts for more than half the energy supply, and the relatively low energy efficiency of the economy. In 2000, the government adopted a new energy policy based on EU requirements, to promote (among other goals) energy-market liberalisation, and passed a law on energy management that includes a national energy conservation programme. A new energy policy is being drafted.

Montreal Protocol

In line with its commitments under the Montreal Protocol on Substances that Deplete the Ozone Layer,[7] the Czech Republic has been phasing out ozone-depleting substances (ODS) under the 1995 Law on Protection of the Earth's Ozone Layer.[8] Czech companies had been pioneers in developing EG&S for recovering and recycling ODS, contributing to international know-how in the field (Box 1.)

7 The Czech Republic signed the Vienna Convention and Montreal Protocol in 1993, adopting the London and Copenhagen Amendments in 1996 and the Beijing Amendment in 2001.

8 The production and import of halons and CFCs were banned in 1996 and the use of HCFCs in common applications in 1997. (For comparison, 5 500 tonnes of CFCs were consumed in Czechoslovakia in 1986.) The use of small amounts of ODS is allowed in the health and defence sectors, but the Czech Republic does not use its entire quota in either area.

Box 1. Success of the Czech EG&S industry in ozone layer protection

EKOTEZ, a small Czech enterprise, has developed an international service recovering and cleaning refrigerant gases, which helps protect the ozone layer. For recovery operations the company uses an emission-free proprietary technology. The recovered refrigerants are cleaned with technology developed in the United States. EKOTEZ obtains related components, such as measurement equipment, from international (mainly U.S.) suppliers. Its R&D staff is continuing to develop integrated units for recycling refrigerants.

EKOTEZ traces its roots to the late 1980s and a state refrigeration services firm, Kovoslužba. EKOTEZ technicians invented a device for recycling refrigerants, which the company patented in the Czech Republic, United States and Japan. In 1992–93, before the Czech Republic ratified the Montreal Protocol, it was already conducting pilot projects on refrigerant recycling, with help from the World Bank. EKOTEZ found that it was not sufficient to support the transfer of know-how, but that the change agent would be support for the transfer of technologies. In a project in co-operation with the Ministry of the Environment (MŽP) in 1993-95, the World Bank provided grants paying half the cost of installing EKOTEZ equipment and training service providers for refrigerant recovery facilities within the established network of Czech refrigerant service centres. This project helped spread the service quickly.

Thanks to the success of the project, good co-operation with MŽP and active participation in workshops organised by the World Bank, EKOTEZ was included in the databases of international organisations responsible for promoting technologies and processes to help countries meet their Montreal Protocol targets. Since 1997, EKOTEZ has disseminated its products and services through development assistance projects supported by the Global Environment Facility, World Bank, United Nations organisations and the Czech Government.

Despite this success, EKOTEZ faces many challenges in competing with larger international companies. The main trade barriers it has encountered include:

- Tariffs on exports to the United States. They range from 4% to 6%, high enough to discourage Czech firms from competing with local suppliers.
- A preference in the United States for the standards of the Air-Conditioning and Refrigeration Institute over European ones.
- Rules governing the export of small quantities of chemicals. For example, when the U.S. company Honeywell invited EKOTEZ to co-operate in developing a new refrigerant-washing unit, some 10 litres of chemicals had to be imported for necessary experiments. This proved difficult, as Honeywell needed to get a licence to import the material, which took several weeks.
- Technical barriers such as the difference in voltage between countries.

Donor support to the Czech Republic has been instrumental in accelerating the control and phase-out of ODS. The Global Environment Facility provided a USD 2.3 million grant in 1994 in a programme that influenced development of similar projects in other countries and enabled Czech know-how subsequently to be exported. The project succeeded in halving the ozone depletion potential of the Czech refrigeration sector and reducing that of the foam sector by 30%, at a cost of USD 2.15 per ODP kilogramme.

Basel Convention

The Czech Republic became a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal in 1991. Because of the urgency of the situation in 1989, and the lack of an effective monitoring and control system for hazardous waste, the government's first action after becoming a signatory was to place a temporary moratorium on transboundary movements of such waste. The restrictions were phased out as progress in waste management began to be achieved. In 2001 the country reported imports of 68 528 tonnes of hazardous waste (mainly ash from the burning of coal, tyres and batteries) and exports of 10 660 tonnes (chiefly ash, slag and clinker).

The Czech Republic's trade in waste conforms to its commitments under OECD and EU regulations. Waste is divided into three colour-coded categories for the purposes of transboundary movements: green

can move freely while yelow and red require MŽP approval. Some hazardous waste that the country lacks the capacity to treat, such as PCB-contaminated material, receives exceptional approval for export.

The Basel Convention clearly indicates that minimising waste at source is the best form of waste management. The Czech Republic is trying to encourage this approach through improved information and voluntary initiatives.

Complementary measures

This section gives an overview of selected complementary measures that may have driven or hampered demand for better environmental quality and increased the use of EG&S. For example, the Czech Government provides substantial financial assistance to various sectors in the form of subsidies and loan guarantees. The direct costs of this system came to around 2% of GDP as of the late 1990s (WTO, 2001). An independent body for monitoring state aid, the Office for the Protection of Economic Competition, was established by law in 2000, and policies are being developed that could result in a system for evaluating the impact of state aid on the environment.

Subsidies and soft loans

Subsidies have both thwarted and supported efforts to improve the environmental performance of industry. Early in the transition period, subsidies supported polluting facilities such as steelworks and chemical plants, distorting the market and reducing the effectiveness of charges and taxes.[9] Such subsidies, direct and indirect, have since been reduced considerably, and in certain cases eliminated, but some still exist for the energy and industry sectors.

Subsidies that played a positive role, stimulating the adoption of EG&S, were provided during the 1990s in various forms, including soft loans, grants and tax exemptions. The soft loans and grants were financed through the State Environmental Fund (SFŽP), whose income comes primarily from payments for pollution or other harm to the environment (Table 5). They were instrumental in the rapid switch from dirtier fuels to natural gas and in promoting such EG&S as cogeneration units and renewable energy resources.[10] Subsidies also played a decisive role in building capacity for cleaner production and demonstrating the win-win effects of preventive environmental strategies in industrial processes. A National Cleaner Production Programme was launched in 2000.

Several programmes of the Ministry of Industry and Trade (MPO) support the use of EG&S by small and medium-sized enterprises (SMEs). One such programme helps cover SMEs' costs for adoption of environmental management systems, in accordance with ISO 14001 or EMAS, and thus supports the spread of related services.

Table 5a. Income of SFŽP by environmental medium, 1992-2001

Year	Water	Air	Waste	Nature and landscape	Total

[9] Examples include lowered depreciation on fixed assets, expenditure on mine phase-outs, price subsidies, tax allowances (e.g. 5% VAT on energy) and subsidies for environmental investments. In 1995, such support totalled CZK 35-46.5 billion.

[10] The SFŽP provided considerable support, mainly subsidies and soft loans to municipalities, for the shifting the fuel used by district-heating plants from coal to natural gas. This effort, which led to significant reductions in local environmental risks in many parts of the country, promoted standardised solutions and is credited with strongly stimulating the development of domestic supply capacities for EG&S in this area.

			CZK million		
1992	1320.0	845.8	48.1	208.6	2 422.5
1993	1153.2	854.5	358.0	325.8	2 691.5
1994	975.6	2471.2	451.8	514.9	4 413.5
1995	795.2	3057.8	640.0	375.1	4 868.1
1996	782.6	3677.0	323.0	448.3	5 230.9
1997	849.7	3503.7	140.2	469.9	4 963.5
1998	953.0	1804.5	194.6	470.1	3 422.2
1999	1106.0	1604.8	191.5	463.0	3 365.3
2000	1196.9	1393.9	144.0	484.1	3 218.9
2001	510.9	614.4	65.9	336.6	1 332.1

Source: SFŽP (DHV, 2002).

Table 5b. SFŽP expenditure by environmental medium, 1992-2001

Year	Water	Air	Waste	Nature and landscape	Total
			CZK million		
1992	943.1	509.5	12.0	11.4	1 476.0
1993	1 672.4	936.7	214.2	45.3	2 894.5
1994	1 993.7	1 228.0	178.1	144.4	3 584.2
1995	2 163.3	2 379.3	248.7	87.9	4 917.9
1996	1 946.2	2 279.7	145.3	232.1	4 644.7
1997	1 891.6	1 204.3	60.5	139.4	3 364.0
1998	1 083.5	907.7	69.9	167.8	2 228.9
1999	1 073.1	1 061.9	242.6	167.7	2 545.3
2000	1 129.5	1 192.1	290.8	187.9	2 899.8
2001	1 604.3	1 551.8	361.7	180.2	3 619.0

Source: SFŽP (DHV, 2002).

Taxes

Tax exemptions and reductions have been used to stimulate adoption of environment-friendly products and processes. Several products fall under the low VAT regime of 5%, and some production processes are exempt from income tax. Preferential depreciation allowances are applied on selected environmentally sound production sites and buildings. Electric motor vehicles and all public transport are exempt from road taxes. Many recycling facilities and sites, but also landfills, are exempt from certain taxes. In 1998, the VAT rate on solid fuels and heat energy was raised from 5% to the standard 22%.

Eco-labelling

The Czech Government's eco-labelling programme, introduced in 1994, was a pioneer initiative of its kind for central and eastern Europe. MŽP publishes directives setting out criteria for selected product categories. Enterprises can apply for an eco-label by paying a fee of about EUR 600 to cover the costs of testing and application processing. In 2000, 43 enterprises participated and the eco-label was awarded to 256 products, including paints, liquid cleaning agents and water-soluble adhesives. The programme has played an important role in supporting some environmental goods, such as gas-fuelled water heaters, and the government hopes to increase the share of consumer goods that can qualify for the label. The Czech Republic is a member of the Global Ecolabelling Network.

Non-governmental organisations

Some respondents to a survey conducted for this study highlighted the role of non-governmental organisations (NGOs) and other and non-profit enterprises in promoting EG&S. The influence of Czech NGOs has grown in line with their increasing professionalism and efforts to involve a broad range of stakeholders in their activities. Recent legislation gave NGOs more power by enabling them to participate in some planning and other decision-making procedures related to environmental protection. Czech NGOs generally tend to support end-of-pipe solutions, however, as they are tangible and their effectiveness can easily be measured.

Drivers on the supply side

Trade and investment liberalisation

General characteristics

In the 1980s, the trade situation of Czechoslovakia, which split into the Czech Republic and Slovakia in 1992, was heavily influenced by geopolitics and economic isolation. The centrally planned economy was oriented to supplying other eastern bloc countries, with an emphasis on heavy machinery and weapons.

The wide-ranging, unilateral trade and investment liberalisation undertaken in the early 1990s facilitated imports, including those of EG&S.[11] A crucial aspect of this liberalisation was the ending in 1990 of the state monopoly of foreign trade. Enterprises could now initiate their own contacts with foreign suppliers and negotiate contracts.

An economic slump in the late 1990s led to some isolated imposition of import restrictions, but only in the short term. For example, compulsory import deposits were introduced in an effort to reduce the country's balance-of-payments deficit, but after four months were replaced by internal measures. The Czech Republic now adheres to its international trade obligations and its policies fully conform to the agreements it undertook as a member of the World Trade Organization. The system is internationally harmonised and transparent, and promotes a stable trading environment.[12] Box 2 reviews the institutions responsible for the Czech Republic's trade policies.

11 The core legislation concerned was the Commercial Code (Act No. 513/1991 Coll.) and the Customs Act (Act No. 13/1993 Coll.).

12 The WTO (2001) concluded that trade liberalisation had been an important element in the country's reform agenda. The average Czech most favoured nation (MFN) tariff rate had been lowered by two percentage points, to 6%, and both tariff dispersion and the number of rates had decreased since the previous WTO review. The report called the Czech tariff system transparent, noting that it had no specific, composite or other non-ad-valorem rates. The WTO said the fact that all tariff lines were bound (almost all at the applied MFN rates) meant a more predictable trading environment.

Box 2. Czech institutions responsible for trade and related policies

MPO is responsible for formulating, co-ordinating and implementing trade policies, co-ordinating bilateral and multilateral trade negotiations, and meeting related obligations. It oversees the foreign trade licensing regime as well as the Czech Energy Inspection Authority, Czech Trade Inspection Authority, Patent Office and Licensing Office. In 1996, MPO took over some responsibilities of the former Ministry of Economy. It is also responsible for promoting SMEs and exports, and supervises technical standardisation, metrology and testing, industrial research and technical development.

The General Directorate of Customs in the Ministry of Finance is responsible for customs control and enforcement. The Czech Office for Standards, Metrology and Testing co-ordinates standard setting while the Czech Standards Institute prepares, approves and publishes standards. The Economic Competition Protection Office is responsible for regulating competition and monitoring state aid. The Ministry of Regional Development, established in 1996, is responsible for public procurement policy.

Work on balancing the relationship between environmental and trade policies has begun only recently and is co-ordinated by an Interdepartmental Working Group for Trade and Environment, established by MŽP and MPO. The Economics Institute at the Academy of Sciences of the Czech Republic is researching the impact of tariff and non-tariff measures on the environment, including a detailed investigation of the impact of tariffs on EG&S (Tošovská, 2002*b*).

While the effects of extensive trade liberalisation on the national economy and quality of life in the Czech Republic have been largely positive, some negative consequences have been observed. For example, liberalisation weakened a deposit-refund system for glass bottles that had been operating since the 1950 and had resulted in more than 95% of bottles being returned and reused. The system was later restored under the 2001 Packaging Act.

Tariffs

Prior to joining the EU, the Czech Republic restructured its tariff system in accordance with its commitments during the Uruguay Round of trade negotiations, binding all of its applied tariffs and its tariff rates into line with those of the EU.

The impact of the changes in tariffs on EG&S or on the environment has not been systematically evaluated as such. Czech tariff policy does not distinguish EG&S from other goods and services, and for the time being there is no policy to favour them. MPO is aware that developing such a policy would be challenging; it and MŽP co-operate on such issues within the Interdepartmental Working Group for Trade and Environment.

Some bilateral assistance is driven by the goal of supporting the use of certain EG&S from a given donor country. Programmes focusing on development of domestic capacities in EG&S also exist; examples include the Czech-Norwegian Cleaner Production Project (1992–95) and its follow-up, the UNIDO/UNEP Program for National Cleaner Production Centres (1995-1999), both of which focused on building capacity in pollution-prevention approaches for industrial processes in the Czech Republic and thus helped build new supplier capacities in particular environmental services.

Non-tariff barriers

The World Trade Organization's second trade policy review of the Czech Republic (WTO, 2001) noted that the country has relatively few non-tariff import barriers. Such barriers were systematically removed in the 1990s as the Czech Republic became integrated into international trade structures. The country has since harmonised its standards and technical regulations with those of the EU, is simplifying its testing and standardisation process and has concluded mutual recognition agreements for the results of conformity assessments with several countries. Competition rules and intellectual property rights legislation have been strengthened. Legislation related to incentives for foreign investment, including tariff

and non-tariff measures, has attracted such international players as Philips, a Toyota-Peugeot joint venture and the car-parts manufacturer Nemak, a unit of Mexico's ALFA group.

As noted above in the section on the Basel Convention, the Czech Republic regulates waste imports. An agreement from MŽP is needed; in some cases, depending on the colour coding of the waste, notification is necessary or the transaction may be banned. Some limitations on used-car imports, related to pollution concerns, also exist. Environmental impact assessments must be carried out before the import of technologies and products.

International investment

As part of its accession agreement with the OECD in 1995, the Czech Republic met all but a few of the OECD instruments on the establishment of foreign investors in the national market and on national treatment. Foreign investment is restricted or controlled only in a few service industries. With liberalisation of investment, total net foreign investment reached around 9% of GDP in 1999 (WTO, 2001).

Concerning government procurement, the 1994 Public Procurement Law enhanced transparency by requiring all public tenders and awards to be published on the Internet. The WTO report criticised some regulations under this law as possible market distortions that continue to discriminate against foreign firms. For instance, it is possible to restrict a tender to domestic bidders. In open tenders the contracting authority can consider the offer of a local firm, or a foreign company registered in the Czech Republic, equal to the offer of a non-registered foreign firm that bids up to 10% less, a practice mainly affecting public works. The Czech Republic became an observer to the WTO Agreement on Government Procurement in August 2000.

Information provided by authorities and found in the WTO report (WTO, 2001) was confirmed by interviews carried out for this study: foreign suppliers of EG&S seeking to enter the Czech market faced few non-tariff barriers; more important factors were economic concerns and some cultural differences. Problems related to trade policy mostly involved governance and the development of capacity for implementation of new rules, along with the slow functioning of the justice system.

Services

The Czech market for services was highly liberalised in the mid-1990s in accordance with the Schedule of Specific Commitments of the Czech Republic annexed to the General Agreement on Trade and Services (GATS). Subsequent commitments aimed at further opening trade in services, including some environmental ones. The country had already opened its market for certain environmental services, such as those related to sanitation.

Suppliers

Foreign suppliers exerted considerable influence on the Czech market for EG&S early in the transition period when domestic capacity was lacking and the legislative and institutional framework was being built. Their advantages included considerable experience with environmental regulations similar to those that had recently been adopted in the Czech Republic, along with marketing skills that were much stronger than those of domestic suppliers.

A further early disadvantage of domestic suppliers was inadequate information and, in many cases, buyers that lacked the capacity to evaluate alternatives. Some suppliers consequently were able to sell equipment that was not really appropriate for the Czech Republic's needs.

Cultural factors

During the decades when Czechoslovakia was isolated from the global economy and the subject of misleading propaganda, various myths arose. One of the strongest was that everything produced in "the West" was superior in quality to domestic goods. While this myth persisted, it discouraged domestic suppliers from competing with foreign suppliers of EG&S. Similarly, western suppliers often believed that the Czech market lacked competent domestic suppliers, a perception due in part to the fact that before 1989 those representatives of Czech enterprises who were allowed to travel abroad were selected for their political rather than their technical or marketing acumen. In a few years, however, foreign suppliers came to recognise that the technical skills of their Czech counterparts were often comparable to, or in some cases better than, their own.

Another cultural factor that may have benefited foreign suppliers of EG&S was Czech citizens' eagerness to exercise their new freedom to travel to the West. Foreign suppliers thus could play host to potential Czech customers and, in some cases, conclude sales of products or services that were not necessarily superior to those available in the Czech Republic.

Effects of trade in EG&S

Origins of EG&S

The limited statistical evidence available on the market shares of foreign and domestic EG&S in the Czech Republic (Annex 1) suggests that domestic suppliers could expand their share, though foreign suppliers continue to enjoy an advantage in advanced technology.

The first major investments in air-pollution control, driven by the Clean Air Act of 1991, were for imported EG&S (for example, all flue-gas desulphurisation (FGD) units initially came from abroad). To the benefit of consumers and the surprise of officials and customers unused to the workings of the market, competition among foreign suppliers pushed prices down.[13] To better compete by price, foreign firms sought out local subcontractors for such goods and services as were locally available. It has been estimated by the authors that Czech goods and services represented more than half the value of the FGD units installed during the 1990s. A mix of domestic and foreign suppliers was also involved in waste management.

Partly because environmental standards were based on German norms, EG&S suppliers from Germany captured the biggest share of the Czech EG&S market. Over time, however, domestic firms have increased their capacity, often by adopting foreign know-how. And, as Box 1 demonstrated, exceptions exist.

Accessibility and quality of EG&S

Judging by progress towards the goals of the environmental regulations adopted in the early 1990s, the EG&S employed so far have been effective and generally of good quality. No major problems in absorbing new EG&S, such as difficulties in training staff or carrying out maintenance, have been encountered. In general, foreign and domestic EG&S now seem to be comparable in quality. Examples can be found that illustrate efficient and effective transfer of EG&S, but also the reverse.

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[13] For example, it has been estimated that competition reduced the prices for flue-gas desulphurisation equipment by more than 10%.

The urgent need for compliance with the new environmental standards and regulations meant short deadlines, which in turn had some negative results. It was often difficult, for instance, to identify the economically optimal choices. The general focus was on end-of-pipe solutions, as there was not time to introduce new, complex, low-polluting technology.

Moreover, new end-of-pipe technology was often attached to outdated production equipment. For example, all large power stations built from the 1950s to the 1980s were equipped with new desulphurisation units, sometimes with support from donors such as the World Bank and the German Government. In some cases, the new technology was used only for a short time before the plants were shut down for lack of business. New dust filters installed at a large foundry, for instance, were moved to another foundry when the first proved uncompetitive, but their performance was compromised. In another case, a steam generator equipped with a new desulphurisation unit was closed after about two years because there was no market for its heat. Other plants with new pollution-control facilities were shut because of changes in regulations or standards, or, as in the example of some waste incinerators, because other waste-management techniques proved more cost-effective.

The shaky economic viability of some businesses was a major barrier to the efficient transfer of certain environmental goods, as many firms could not undertake feasibility studies or prepare a sound business plan. Changing framework conditions and the unpredictability of some important parameters, namely political, economic and legislative, were also crucial factors.

For example, in the 1990s several projects sought to transfer rubber-waste recycling technology used in OECD countries, but feasibility studies showed that other techniques, including landfilling, would be more economic. Recycling would have also faced serious logistical problems. Now the 2001 Waste Act more actively promotes recycling and other waste-management techniques, favouring a mix of regulatory, economic and information instruments. The Act includes obligations on waste generators to develop waste-management programmes. National and regional waste-management programmes are also being prepared so as to develop a regulatory framework to promote waste minimisation, recycling and improved treatment methods, such as bio treatment.

Box 3 presents a case in which inappropriate technology was used for waste treatment. The example is particularly interesting because the technology was in use before waste-management legislation was adopted. The marketing power of the supplier influenced the choice of technology.

As such problems are overcome, the EG&S market is changing its structure and growing quickly. While the initial growth was spurred by emergency environmental legislation, the new boom in EG&S is driven by the need to adopt EU regulations.[14] Integrated solutions based on preventive, holistic approaches are increasingly being used.

[14] Under the EU's PHARE programme, the Czech project titled "Implementation/Investment Strategies for EC Waste Directives", estimated in 2000 that CZK 50 billion (EUR 1.6 billion) would need to be invested in waste-management by 2020.

Box 3. Example of a supply-driven import of inappropriate technology

In 1991, new legislative requirements for the disposal of hazardous waste obliged the affected enterprises to find solutions quickly. Secure landfills were few and far between, and some producers had to store waste temporarily on site.

Today, an enterprise seeking waste-management goods or services could issue a call for tender and expect to receive responses from several competing suppliers, including those specialising in waste logistics and recycling. At the time, however, the practice of organising competitive tenders was not well developed. Many enterprises turned to particular suppliers in OECD countries that had considerable experience and a long list of references. One of these had established a local market presence and managed to sell small industrial incinerators even before 1989.

Some firms chose these incinerators not so much for their environmental performance as for the usable process heat they produced. The environmental performance standards for waste incinerators established by the 1991 Clean Air Act specified only how long combustion gases should be in the combustion chamber and at what temperature. The imported incinerators did not always meet even these standards.

The units continued to be imported until the mid-1990s. Consequently, many hazardous-waste incinerators do not meet emission standards, which were tightened further with the 2002 Waste Act.

Effects on suppliers

Foreign suppliers

The rapid liberalisation of the market for EG&S enabled foreign suppliers to establish an early presence in the Czech Republic. Most offered extensive experience, impressive references and a broad range of solutions. Their main competitive advantage, however, was their strong marketing skills. Czech suppliers could offer lower prices and often better service, but because they lacked marketing acumen, foreign suppliers were able gradually to develop their service capacities in the Czech Republic, often via Czech companies they acquired.

The Czech Republic is a relatively small market, attracting total foreign investment of around EUR 8 billion a year, of which EG&S account for around EUR 1 billion. Most foreign suppliers have been interested in the country only as part of a broader opening of the regional market after 1989. Czech branch offices of foreign suppliers often serve as a base for expansion within the broader market.[15]

Czech suppliers

The presence of foreign companies has created a highly competitive market for the supply of EG&S. Completely new EG&S supply sub-sectors were established in the Czech Republic during the 1990s. For example, an entire waste-management industry came into existence after legislation was introduced in 1991. New processes — such as technologies for treating discarded fluorescent tubes containing mercury and for recycling of lead and precious metals from lead-acid accumulator batteries — were driven by specific legislative requirements to separate certain waste streams. New industries arose to use the by-products of pollution-control technologies, such as production of construction materials (mainly gypsum) using flue-gas desulphurisation by-products.

EG&S related to expansion of the natural gas network represents another booming industry. Converting coal-fired boilers to cleaner natural gas has been a government priority, supported by grants totalling more than EUR 330 million from 1992 to 2002. This is an example of an area in which domestic

[15] No laws specifically address the situation of foreign investors, but legislation relevant to foreign investment includes Act No. 513/1991 Coll., on the Commercial Code; Act No. 455/19991 on Trade Licensing and Act No. 219/1995 on Foreign Exchange.

suppliers have developed their own capacities and started to export. The government, in addition to encouraging demand through new standards and subsidies, has supported producers of environmentally sound gas boilers by granting eco-labels.

The two basic types of EG&S suppliers are "specialised" firms with business focus in EG&S and "non-specialised" ones providing EG&S alongside a core business in another sphere (Horáček, 2000). Many non-specialised Czech suppliers play important roles in the EG&S sector. For example, Fatra Napajedla, which produces (among other products) PVC foil suitable for lining landfills, originally made the material for other purposes in 1.5-metre widths, which when used in landfills were difficult to install and entailed additional risk. Today, in response to demand from companies building landfills, Fatra also produces the foil in widths of 6-8 metres and sells it abroad as well as in the Czech Republic.

Box 4. The changing fortunes of the Czech Republic's leading exporter of EG&S

ZVVZ is the leading Czech supplier of air-pollution control equipment and services, with a focus on controlling emissions of particulate matter. It produces fabric filters, electrostatic precipitators, ventilators, pneumatic transport systems and similar environmental goods, and provides related services.

ZVVZ was already well known in the late 1980s, its market driven by regulations on dust emissions (it produced, for example, filters and electrostatic precipitators for the cement industry.) With the changes of 1989 and the liberalisation of trade, ZVVZ lost its export markets. Although it had expertise in installing desulphurisation units, it could not compete with suppliers from OECD countries with access to superior technology and impressive client lists. Nevertheless, ZVVZ was able to participate in the market for desulphurisation equipment by delivering components and undertaking assembly work.

For a while, after the new air-pollution legislation was introduced in 1991, domestic demand compensated for the loss in export earnings. ZVVZ's sales grew until the mid-1990s, but slowed as the market became saturated. In anticipation of this development, ZVVZ turned again to foreign markets, and today exports more than half its production, mainly to former east bloc countries, Cuba, Turkey, China, EU countries and the United States.

Despite these domestic and international successes, ZVVZ is gradually downsizing, in response to domestic market saturation and increasing international competition, and may merge with its US partner, Twin City Fan Companies. ZVVZ never fully recovered from the initial loss of export sales, and its service and maintenance work in the Czech Republic represents only a small portion of its profits. As significant trade barriers ZVVZ cites two:

- Czech enterprises exporting to developing countries receive less support (e.g. financing in the form of loans from export-import banks) than competitors from other OECD countries.*
- The Czech Export Guarantee and Insurance Corporation do not provide insurance on loans for exports in central and eastern Europe.

Until the Czech Republic joined the EU, Czech companies providing installation services had problems obtaining work permits for its construction workers.

* Many domestic suppliers claim that support for foreign suppliers, both by the country of origin and by the Czech Government, has been more generous than for domestic ones. Support for Czech EG&S suppliers is provided mainly through general programmes available to all Czech enterprises, such as funding for the Technological Centre of the Czech Academy of Science, technological parks and business innovation centres.

Czech EG&S suppliers recognise that, to compete internationally, they need to develop effective marketing abilities, business strategies and management systems;[16] provide a range of services; protect their knowledge base; and consolidate so as to exploit economies of scale. Strong competition in the field

[16] A major challenge, according to one Czech supplier, is developing "know-how [on] how to gain contracts. The standard contracts in our field are done by foreign suppliers who bought the counterpart Czech firms. We survive on difficult contracts for non-standard solutions. [Our] problems with contracts [do not lie in the] quality of our work nor its price, as we score well in benchmarking against our competitors."

is pushing the Czech industry towards fewer but larger units that can better weather market volatility and problems such as non-payment, which was common early in the transition period and can cripple smaller firms. Several Czech EG&S suppliers have merged either with their international partners or with other Czech suppliers of EG&S (Boxes 4 and 5).

Box 5. History of a Czech waste-management company

Dekont is an example of a successful Czech engineering company engaged in waste management that has upgraded its business through joint ventures with foreign firms. Dekont first tailored an Austrian partner's know-how to Czech conditions, and then transferred this model to other countries.

Dekont covers a large portion of the Czech market for waste-management services, including separation, collection and disposal. The waste-management legislation of the early 1990s left many local companies with insufficient knowledge and technology to meet new legal requirements. Dekont established a joint venture with an Austrian enterprise to build its capacity in this respect. The venture was facilitated by soft loans and tax relief provided by the Austrian Government for investment in central and eastern Europe.

Dekont recognised early on the need to use Czech goods and services to keep down costs. The main barrier it faced was a cultural one; traditional or long-established behaviour patterns can strongly influence the success of waste-management approaches. By tailoring western waste-management technology to Czech conditions, Dekont captured as much as 42% of the Czech market.

The company has started to expand internationally, for example through joint ventures in Belarus (2000) and Latvia (2001). The strategy of tailoring technology to local conditions is working well in both countries. Dekont found its business partners in the two countries with assistance from Omnipol, a leading Czech arms trader that also facilitates international trade contacts in other fields.

According to Dekont, its main barrier in expanding to new markets is strong competition from enterprises based in other OECD countries that can draw upon extensive export assistance from their governments. This means that the support for investments in CEECs, which supported Dekont through facilitation of establishment of its joint venture, become a disadvantage at the time of Dekont's own expansion into new markets.

Exports of Czech EG&S

Export capacities and markets

The Czech EG&S industry is increasing its export capacities and markets. Its main export markets now are other central and eastern European countries, with expansion aimed at large Asian markets, including China, Thailand and Indonesia (Horáček, 2000). Interviews confirmed that this trend was deepening: respondents mainly highlighted the potential of the central and eastern European market, which will continue to grow as these countries strengthen their environmental regulations and enforcement. Among other opportunities, Czech firms are providing technical assistance to companies abroad, especially in the former east bloc.[17]

Barriers to exports of EG&S

No systematic evaluation of tariff and non-tariff barriers to Czech exports of EG&S has yet been undertaken. However, work in this area by the Economics Institute of the Academy of Science of the Czech Republic and the Czech Environmental Management Centre (Tošovská, 2001) found that the main barriers that Czech exporters of EG&S were facing at the time:

[17] The manager of the Czech branch of an international company providing environmental services worldwide said the owners had determined that the Czech office provided technical competence equivalent to that of the parent company abroad at one-third the price, along with knowledge of the languages and local conditions of countries in the region, resulting in greater acceptance.

- Lack of capital.

- Difficulty obtaining export credits (and problems with guarantees when entering higher-risk markets).

- Difficulties related to information transfer, including information on potential partners and on existing rules. (Usually a permanent local presence is needed to overcome this barrier.)

This information was augmented by interviews conducted for this study and by the results of a small research study carried out by the MŽP. Annex 2 presents results of that research and the interviews to show what disadvantages Czech suppliers face in developing countries, where they compete with suppliers from other OECD countries that receive much more export support. Other general problems mentioned by respondents included complicated administrative procedures, insufficiently proactive governmental officials and differences in importing countries' regulations.

Export promotion

Czech export promotion programmes are in line with the country's international commitments, including the OECD Arrangement on Guidelines for Officially Supported Export Credits and the Berne Union rules (WTO, 2001).

Official development assistance

The MŽP's official development assistance (ODA), part of a broader programme co-ordinated by the Ministry of Foreign Affairs, supports exports of Czech EG&S indirectly. The Czech Republic's ODA programme started in 1995 and is regulated by Government Decree No. 175/95. It involves both multilateral and bilateral projects. All projects implemented within the programme involve Czech providers of environmental goods or services.

In 2000, the total budget of the ODA programme was CZK 345 million (EUR 11 million), the equivalent of about 0.017% of GDP. Most of this assistance (CZK 300 million) was provided through bilateral projects. MŽP projects, which accounted for less than 10% (CZK 30.5 million) of the total, were in the area of capacity building for cleaner production, ozone layer protection, sustainable agriculture and geological exploration. Recipient countries were in the former east bloc, the Middle East, Africa and Central America.

Czech Export Bank and Export Guarantee and Insurance Corporation

The Export Guarantee and Insurance Corporation (EGAP) insures export credits against political risk and against a combination of political and non-marketable commercial risk. The government contributes significantly to this insurance system by guaranteeing EGAP obligations arising from such insurance and by allocating money from the central budget to insurance reserve funds; the allocations amounted to CZK 4.3 billion (EUR 0.14 billion) over 1992-99, for instance (WTO, 2001). The system is operated by the Czech Export Bank, which provides support for export loans and some additional instruments, such as non-payment export guarantees (bonds). Usually, guarantees are granted only for part of the export contract (generally 5-10%, depending on the type of guarantee). This system can be used by exporters of EG&S on the terms available to all other exporters.

In accordance with the OECD Export Credit Group recommendation to evaluate the impact that export goods under consideration for credit would have on the environment in the destination country, the Czech Export Bank on 1 May 2002 began requiring applicants for export financing to provide information

allowing the bank to make such evaluation in cases where it provides financing not insured by EGAP. At the same time, EGAP began including environmental impacts among its criteria, since they affect risk and hence the insurability of exports. EGAP requires an environmental impact assessment for state-insured credits of more than two years' duration and for insurance of foreign investment.

CzechTrade

The Czech Trade Promotion Agency (CzechTrade), established in the MPO in 1997, is responsible for export promotion, marketing assistance and training. It has 16 foreign offices supporting Czech enterprises abroad. For SMEs, CzechTrade helps pay marketing costs related to foreign trade. In 2001 it budgeted CZK 230 million (EUR 7.5 million) for export promotion and marketing assistance (WTO, 2001). CzechTrade's Programme Marketing, for example, helped Czech suppliers participate in some 70 trade shows worldwide in 2002. Another organisation helping promote Czech EG&S firms and other exporters is the Export Club, an association of exporters that provides a platform for exchange of experiences, sharing of international capacities and the like.

Future directions

The Czech Republic's EG&S industry has been strongly shaped thus far by the initial need for end-of-pipe technology, and by polluters' concerns in the 1990s not to interfere with production processes and to avoid even temporary outages. End-of-pipe technology does not interfere appreciably with existing technology and can be installed relatively quickly, significantly diminishing certain environmental risks. The problem is that they usually shift pollution from one environmental medium to another, increase the overall material and energy flows needed to achieve a given level of output and are a non-productive investment that increases costs. Regulators recognise that over the long run it is preferable to explore the potential for pollution prevention at source though measures integrated into production technologies (Annex 3).

The Cleaner Production Project attempted to estimate the potential for increased process efficiency and pollution prevention within selected branches of Czech industry in the mid-1990s (CPC, 1996). The estimate was based partly on the results of projects at Czech enterprises and partly on a literature survey. The starting point was rates for pollution charges quantifying specific pollution flows. The minimum potential savings from integrated preventive measures for the branches examined was to be around CZK 50 billion (EUR 1.6 billion) over 1996-2006.

No research has been carried out to explore this potential, which could be even higher than the estimate. Some of the potential has been realised through improvements in process control and the introduction of new technology.

In 1999, Petr Horáček, head of the Czech Business Council for Sustainable Development, observed (Milník, 1999): "Despite the very positive immediate impact of resources used for reduction of pollution [investment in EG&S over 1990-97], this took resources that could [otherwise have been] … used for technological innovations leading to pollution prevention and to a decrease in production costs and an increase in economic effectiveness." In the early 1990s, however, The Czech Republic lacked the time, capacity and drivers for such a development.

It could be argued that balancing the EG&S demand-supply equilibrium in rapidly restructuring economies requires environmental restructuring in parallel with economic restructuring. If environmental and technological improvements were to take place at the same time, companies would be better able to explore the potential for preventive measures integrated into their production processes. As the experience of the Czech Republic shows, once economic, institutional and cultural structures are established with a

bias towards end-of-pipe solutions, reversing the trend is difficult and slow. A study in the Czech Republic in the late 1990s reached the same conclusion: "It is possible that the relative success of the environmental policy based solely on regulatory instruments and end-of-pipe technologies became, paradoxically, a barrier for implementation of the idea of sustainability" (Milník, 1999).

The foregoing suggests some fruitful areas for further research:

- More detailed mapping of the development of EG&S and sector-specific drivers. Using detailed data from ČSÚ it should be possible to trace application of specific EG&S in particular transition years, and MPO's international trade statistics would help in mapping the flows of EG&S in the country. This could lead to a better understanding how particular actions on the demand side promoted specific EG&S.

- A more detailed investigation of possibilities for IPPC in the Czech Republic. Such an analysis would help improve the understanding of complementary measures needed to pursue win-win strategies.

Conclusions

New EG&S were introduced in the Czech Republic on a large scale and within an extremely short period during the 1990s. They were based on end-of-pipe solutions, which quickly and significantly reduced acute environmental risk. Most of these changes were driven by the alarming state of the environment, by the country's participation in MEAs and, later, by the OECD and the EU accession. Environmental policy, based on command-and-control regulations and strengthened institutional mechanisms, was the major demand-side determinant of changes in national demand for EG&S. Complementary measures played an enabling role mostly within general trade policies. On the supply side, extensive unilateral trade liberalisation gave a major boost to EG&S imports.

Foreign suppliers found a ready market for technologies that had already been introduced in their home countries. Indeed, the majority of know-how and supplies related to the new EG&S came from abroad, though foreign suppliers subcontracted with Czech suppliers, who could offer technical skills and low prices. Czech suppliers who survived this period upgraded their supply capabilities, building on the know-how of their foreign competitors, partners and, increasingly, owners. Saturation of the Czech market prompted Czech suppliers to look for international markets, mainly in the former east bloc and Asia, though many exported also to OECD countries. The main barriers to Czech exports were non-tariff in nature.

While the EG&S on offer enabled buyers to comply with new environmental regulations, the focus on end-of-pipe solutions meant companies were spending limited resources mainly on non-productive solutions (apart from certain exceptions, such as cleaner technologies in the shift from coal to gas in heat generation). If consumers had had more time and capacity they could have used part of their resources to upgrade technologies and explore preventive measures integrated into production processes. Quick reduction of environmental risk came at a price: since environmental restructuring preceded economic restructuring, the potential for integrated, preventive approaches was explored only to a very limited extent. Realistically speaking, however, substantial exploration of this potential was probably not possible. The challenge is to support measures increasing efficiency (and integrated into production technologies) first, with added recycling and end-of-pipe technology as a second, less preferred option.

The balance between demand-side factors behind standards for improved environmental protection and supply-side factors determining available EG&S was reached through the following steps, which may provide a more general lessons:

- A new driver introduced on the demand side led to imbalance between demand and supply in a given segment of the EG&S industry.

- Restoring the balance was driven on the supply side by foreign suppliers of EG&S with relevant know-how from experience with this type of demand (the necessary enabling condition being trade liberalisation within the recipient country).

- Competition pushed prices down and successful foreign suppliers had to use the capacities of existing domestic suppliers.

- Domestic suppliers further developed their capacities, often through mergers with foreign partners.

- Their capacities in many cases saturated the domestic market, pushing demand and supply out of equilibrium in the opposite direction.

- This saturation further increased competition and stimulated suppliers to look for new types of EG&S or new markets abroad for existing ones. (Thus the whole process may be repeated in another country.)

The fact that demand was based on command-and-control regulations was the key determinant of these steps. The Czech Republic's new policies, promoting integration of pollution prevention in production processes, are conducive to supply-demand stability because prevention is being achieved through continuous improvement of technological and managerial approaches. As a consequence, non-specialised suppliers of EG&S — many with core businesses in other fields — can be expected increasingly to emerge and compete with specialised suppliers. These suppliers of integrated solutions will become the new drivers of trade in EG&S.

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ANNEX 1

INDICATION OF ORIGIN OF SELECTED EG&S CONSUMED IN THE CZECH REPUBLIC DURING THE 1990S

In this Table, an indication of the ratio between imports and domestic supply of selected EG&S is presented. This indicative estimation is based on interviews[18] with 12 experts.

Table A1. Indication of origin of selected EG&S implemented in the Czech Republic during the 1990s

EG&S *(GATS and CPC classification)*	***International suppliers***	***Domestic suppliers***
AREA I. Air pollution control (GATS 6D, Provisional CPC 94040)		
Desulphurisation units	Suppliers of all major installations and providers of know-how	Subcontractors for providing components and assembly – possibly more than 50%
Boilers and burners	Smaller share	Bigger share
Filters for air protection	Slightly less than 50%	Slightly more than 50%
Pneumatic transport of collected dust	Appr. 50%	Appr. 50%
Recycling of refrigerants within protection of the ozone layer	Cleaning 100% Collection and filling appr. 15%.	Collection and filling appr. 85%.
AREA II. Solid and hazardous waste management – refuse disposal services (GATS 6B or Provisional CPC 9402)	Bigger share at the beginning of nineties was with the growing market shifting in favour of the domestic suppliers.	Bigger share today
Waste incineration plants	More than 50%	Less than 50%
AREA III. Monitoring and regulation (within both previous areas)	Bigger share in providing goods (measuring and regulation equipment)[19], smaller share in providing services.	Smaller share in goods, bigger share in services.

[18] These estimations are based on the opinion of at least two experts for each EG&S. Nonetheless, they have only an indicative value.

[19] For example in the field of the protection of the ozone layer, the import of measuring equipment is 100%.

ANNEX 2

BARRIERS TO CZECH EXPORTS OF EG&S

Information on barriers to the export of Czech EG&S was gathered from interviews of 17 Czech suppliers of EG&S[20] and through processing results of a small questionnaire implemented by MŽP.[21]

Tariff barriers

No respondents mentioned tariff as significant barriers to the export of EG&S. Only one exporter provided a specific example after being asked specifically about these barriers. He referred to tariffs in trade with USA, where tariffs in the range of 4-6% already significantly discourage his EG&S in competition with domestic suppliers. This exporter highlighted that this is not the case in trade with EU countries, which apply no tariffs to his goods. This example underscores the importance of multilateral tariff reduction, as envisioned under the Doha mandate, which would benefits smaller economies like the Czech Republic, and not just large companies (as is popularly perceived).

Non-tariff barriers

Extensive support for exports of EG&S in other OECD countries has disadvantaged Czech suppliers to markets in other CEECs and developing countries, as the Czech suppliers do not obtain comparable financial support from the Czech government.

Different technical standards within WTO countries. Differences between the US-based ARI standards and European ones were mentioned as an example of technical barriers.

For services exported to the EU, problems with work permits for international workers (this problem should be eliminated after joining EU) were mentioned.

For exports to CEECs, problem with insurance provided by EGAP, as these countries fall under the 6^{th} and 7^{th} risk level.

Complicated formal customs arrangements. Formal custom rules as a barrier for import of samples or export of measurement technology etc.

Requirement for low-profile local certifications, even in cases where an internationally recognised certification already exists. Related lack of uniform and slow processing.

Lack of knowledge on EG&S amongst the members of organisations implementing export promotion policies.

Lack of support for export of Czech know-how through international awareness arising and educational programs.

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20 Including interviews with 7 Czech exporters of EG&S.

21 Questionnaire collected by Mr. Becvar from Czech producers of EG&S in 2002.

Difficulty with obtaining formal statements from a Czech certification body that the measurements done in the Czech Republic follow internationally accepted standards.

Czech representatives in international organisations, which support international projects in NIS countries, could increase promotion of Czech suppliers of EG&S in these projects.

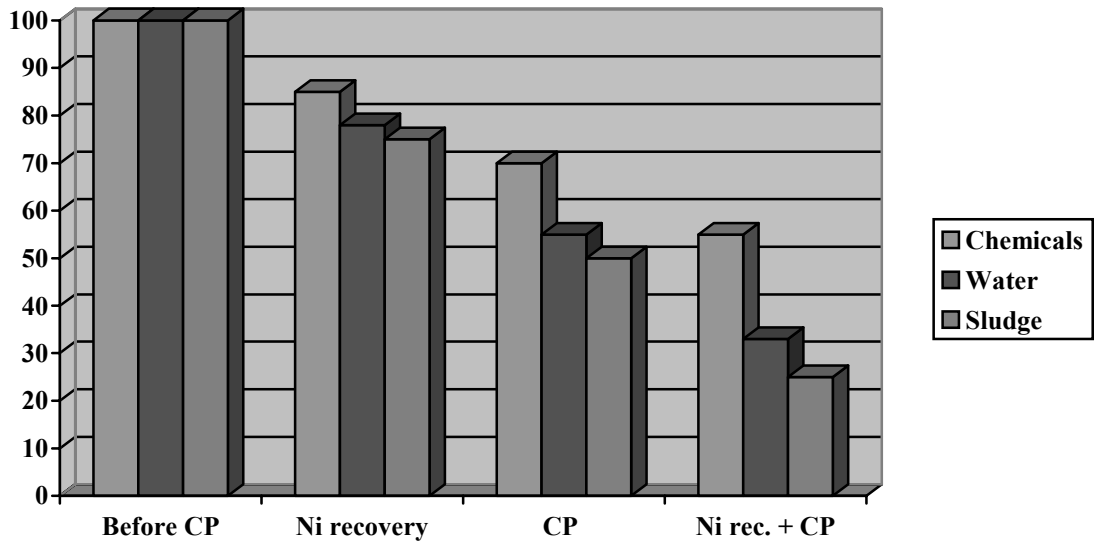
The Czech firms cannot participate in the TACIS program as firms (or only as individuals hired by EU firms). This disadvantage will be eliminated after the Czech Republic will join EU.

ANNEX 3

EXAMPLE ILLUSTRATING UTILISATION OF THE WIN-WIN STRATEGY IN THE CZECH REPUBLIC IN 1990s

Each EG&S is characterised by use of basic production inputs (chemicals and water) and production of pollution (sludge) and presented in a specific graph[22] in the mid 1990s. Figure A1 shows parameters of the same polluting process in a metal finishing enterprise[23] if different EG&S are utilised.

Figure A1. Example of cleaner production (CP) applied to nickel plating — comparison of effects of nickel recovery unit and other cleaner production measures in %



Source: Czech Cleaner Production Centre, 1996.

The situation before the transfer of EG&S is represented by the 100% level of presented indicators shown as the first graph "before CP". This is the base situation in which an enterprise received a strong signal from the demand side to reduce its water pollution. If it would have enough investment funds it would under the time pressure invest into a waste water treatment plant, which would be based on parameters shown in the first graph and which would produce 100% sludge.

Driven by the pressure from authorities to reduce its water pollution and determined by the lack of investment for an expensive end of pipe solution, this enterprise explored in a systemic way the potential for preventive CP measures integrated into its nickel-plating process. This was done within a project lasting almost one year and based on technical assistance and training of enterprise staff in the field of CP. Results of this project are visible in the following graphs showing performance of specific solutions identified (all graphs show reduction of flows related to the same unit of production).

22 This figure includes only three selected indicators. Other flows (for example energy) were also reduced.

23 The metal finishing process was chosen because it has one of the highest potentials for pollution prevention.

The second graph "Ni recovery" presents effects of installation of a nickel recovery unit, which enables on-site recycling of Ni instead of its treating within the waste water treatment plant. This is a cleaner technology, which is added to the production process and can therefore still be distinguished and classified as an environmental good. Also it can be compared relatively easily to the end of pipe solutions.

The third graph "CP" represents effects of set of pollution prevention measures integrated into the production process itself, which were identified within a detail assessment of preventative potential of the process. These were measures representing good management practice and amendments of the existing technology leading to increased efficiency of the process.

The fourth graph "Ni rec. + CP" shows total effects achieved after implementation of cleaner technology and set of pollution prevention measures. Project showed that it is possible to reduce production of sludge to only 25% of the original amount with corresponding reduction of the capacity of needed end of pipe technology and of the needed investment. Minimisation of losses led to additional economic savings on production costs through conservation of chemicals, energy and water.

The levels *(i)* and *(ii)* of implementation of the win-win strategy can be illustrated by this example as follows.

Level *(i)* would represent tender for a waste water treatment plant, which would be based on the 100% values of the showed indicators (amount of water and its pollution without implementation of any preventative measures within the process). This was also the most common approach in implementation of EG&S in the Czech Republic in the 1990s.

In better cases this end of pipe solution would be combined also with some known (predefined) cleaner technology like in the presented example the nickel recovery unit. So the tender would be extended by this cleaner technology and the waste water treatment plant would be smaller (indication of its size is given by production of sludge in the first respective the second graph). This would result in reduction of needed investment costs.

In both cases the trade liberalisation optimises the amount of investment into these solutions added to production process and/or increase their quality exploring potential of the win-win strategy at its first level *(i)*.

Level *(ii)* is represented by the fourth graph, which includes cumulative effects of implementation of preventative measures integrated into the production technology, implementation of the nickel recovery unit and minimised waste water treatment plant (the installed capacity of this environmental good can be much smaller than in the case *(i)* leading to double benefit of further reduced overall pollution flows and conservation of natural resources and corresponding reduction of production costs). Exploration of this level of the win-win strategy is based on a proactive approach from an enterprise and it is time and labour intensive.