4 Industry

Facts and figures

- The industry sector contributes between 20 % and 45 % of GDP in the SEE and EECCA countries. Even though industry's share in GDP has generally been declining, in absolute figures industrial output has been increasing in recent years.
- In several countries, especially in the EECCA region, industry is now dominated by a few industrial sub-sectors. These dominating sub-sectors (such as extractive industries, metallurgy or food processing) tend to be pollution and resource-intensive.
- Data on industrial pollution and resource use are scarce in all SEE and EECCA countries. Available information suggests that some degree of decoupling has taken place between industrial growth and emissions.
- Progress in implementing environmental management in enterprises in EECCA and SEE countries has been limited. With very few exceptions, compliance with environmental regulations does not currently represent a strong driving force for companies to improve significantly their environmental management.
- SEE and EECCA countries account for a very small share of ISO 14001 certifications issued worldwide, and there are very few examples of corporate social responsibility (CSR) projects in the region.
- Among the various services supporting environmental management in enterprises, only environmental management system (EMS) services seem to be provided on a commercial basis. All other relevant services continue to be supported mainly through donor-funded programmes.

4.1 Introduction

Industry and international environmental policy

Environmental management in industry was one of the leading themes in the global Agenda 21 adopted in Rio de Janeiro in 1992. The 'Environment for Europe' process, initiated shortly after the Rio conference, also included a strong component on environmental management in enterprises (EME). Numerous EME- and cleaner production (CP)-related projects and programs were already initiated in the 1990s. More recently, in the Plan of Implementation adopted at the World Summit on Sustainable Development (WSSD) in 2002 in Johannesburg, the call for more sustainable consumption and production was renewed. The Plan of Implementation includes numerous references to eco-efficient production, pollution prevention, resource/energy efficiency, and the transfer and diffusion of environmentally sound technologies.

Within the framework of the 'Environment for Europe' process, cleaner production and environmental management in enterprises have been supported in all ministerial declarations issued to date. The Task Force for the Implementation of the Environmental Action Programme for Eastern Europe, Caucasus and Central Asia countries

(EAP Task Force) included a work programme on environmental management in enterprises, building on the statement made at the 1998 Aarhus Ministerial Conference (Box 4.1) ([1]). This work programme was discontinued in 2003, and since then, there has been no specific EME-related work programme within the framework of the 'Environment for Europe' process. However, various initiatives continued to be implemented in SEE and EECCA with support from multilateral and bi-lateral donors.

Scope and methodology

This chapter first provides an overview of the structural changes in the industrial sector in the SEE and EECCA regions. In the absence of reliable and internationally-comparable data on emissions and resource use in industry, general trends in industrial emissions are presented for a few selected countries. The analysis then turns to the implementation of environmental management in enterprises, reviewing existing policies and analysing those factors which determine success in implementation. In addition to information on the EECCA and SEE countries, Bulgaria, Czech Republic and Romania are used throughout the text for comparison purposes.

The broad term 'environmental management in enterprises' used throughout this chapter encompasses various specific approaches such as cleaner production (CP), energy efficiency (EE), environmentally sound technologies (EST), financing services related to EST and EE, Environmental Management Systems (EMS), and corporate social responsibility (CSR — especially as regards the application of the SA 8000 standard) ([2]).

The information in this chapter is based on the existing literature on the subject, as well as on individual inquiries and interviews with experts from the SEE and EECCA countries. Additional information was collected through the UNEP Questionnaire on SCP sent to the governments, and the survey carried out by the author among Cleaner Production Centres (CPC) operational in EECCA and SEE countries.

Box 4.1 Call for support to EME of Environment Ministers at the 1998 Aarhus Environment for Europe conference

'We undertake to catalyse, facilitate and strongly support the implementation of effective environmental management in enterprises including cleaner production in CEE countries and NIS based on the recommendations in the Policy Statement on Environmental Management in Enterprises in CEEC/NIS (…). We will give increased priority to environmental management in enterprises within bilateral and multilateral cooperation. (…) We urge donors, IFIs, and CEE and NIS countries to create a business climate that will encourage the establishment of local private sector environmental goods and services companies in CEE countries and the NIS'.

4.2 Trends and current situation

4.2.1 Recent developments in the industry sector

The industry sector accounts for 20 % to 45 % of GDP in individual SEE and EECCA countries. Although the deep recession throughout most of the 1990s and the severe economic crisis of 1998 in EECCA strongly affected the industrial sector, in recent years the situation has improved considerably. Since 2000, annual growth in industrial output has been steady (Table 4.1).

As already noted in Section 2.3, in several countries, especially in the EECCA region, the industry sector is now dominated by one or a few industrial sub-sectors. Typically, these dominating sub-sectors are pollution and resource-use intensive. Examples include extractive industries in Azerbaijan (oil), Kazakhstan (oil and metals), the Kyrgyzstan (gold), the Russian Federation (oil, gas, and metals), Ukraine (metals and oil), Tajikistan (aluminium) and Turkmenistan (gas and oil). In Moldova the food processing and drinks industry is the dominating sector. In SEE, in addition to metals and petroleum, food and agriculture as well and textiles and clothing are important sectors.

Since the fall of the central planning system and the break-up of Yugoslavia and the Soviet Union, the industrial sectors of EECCA and SEE countries have gone through profound changes and restructuring. This is illustrated in Box 4.2 by the example of

([1]) www.unece.org.

([2]) The SA 8000 Standard is an auditable certification standard based on international workplace norms of the International Labour Organization (ILO), the Universal Declaration of Human Rights and the UN Convention on the Rights of the Child. The SA 8000 Standard addresses issues such as: child labour, forced labour, workplace health and safety, discrimination, discipline, and working hours and compensation.

Table 4.1 Industry share in GDP and industrial growth in recent years in the SEE and EECCA regions

	Share of industry in GDP (in %)				Industrial gross output (% change in real terms)					
	1991	1995	2000	2005*	2000	2001	2002	2003	2004	2005*
Albania	43	22	8	7	0.5	7.1	– 7.9	2.7	3.1	4.0
Bosnia and Herzegovina	na	26	29	28	9.4	– 2.0	11.5	3.8	12.0	9.8
Croatia	33	34	21	20	1.7	6.0	5.4	4.1	3.7	6.5
FYR of Macedonia	36	30	18	17	9.4	– 4.6	– 0.8	5.1	– 2.1	6.9
Serbia and Montenegro	n.a.	n.a.	26	n.a.	11.1	0.0	1.7	– 2.7	7.5	0.0
Belarus	50	37	31	32	7.8	5.9	4.5	7.1	15.9	10.5
Republic of Moldova	33	32	19	17	7.7	13.7	10.8	15.6	6.9	6.3
Russian Federation	48	37	39	35	11.9	4.9	3.7	7.0	8.3	4.0
Ukraine	50	43	27	30	13.2	14.2	7.0	15.8	12.5	3.1
Armenia	49	32	22	20	6.5	3.8	14.4	15.3	2.1	7.5
Azerbaijan	31	34	36	43	6.9	5.1	3.6	6.1	5.7	33.5
Goergia	37	16	17	16	5.3	– 4.5	7.8	14.0	12.2	13.0
Kazakhstan	45	32	25	24	15.5	13.8	10.5	9.1	10.1	4.6
Kyrgyzstan	35	20	27	19	6.0	5.4	– 10.9	17.0	3.7	– 12.1
Tajikistan	37	39	24	21	10.3	14.4	6.3	9.9	13.8	8.5
Turkmenistan	31	64	46	39	21.0	16.8	12.8	13.5	16.4	8.5
Uzbekistan	37	28	14	21	1.3	2.7	3.4	2.8	5.4	4.2
Bulgaria	44	35	26	26	12.0	– 4.8	4.0	18.3	21.5	5.8
Czech Republic	n.a.	33	36	40	1.5	6.7	1.9	5.5	9.6	6.7
Romania	45	43	27	24	8.2	8.3	4.3	3.1	5.3	2.1

Note: * 2005 data estimates.

Sources: EBRD (2002 and 2006b).

the mining sector in Kyrgyzstan, a country where mining products are the largest export commodity.

As shown in Figure 4.1, almost all countries experienced a strong growth in exports over the period 2000–2005.

When comparing export figures on a per capita basis with the levels in new EU Member States (for example, the Czech Republic, or Bulgaria and Romania), it is obvious that there is a large potential for additional increases of exports in all SEE and EECCA countries.

Table 4.2 shows the five largest export commodities of SEE and EECCA countries, in terms of their share in total exports. Products from extractive industries still remain important export commodities in the region. Food processing and textile industries also account for a significant share of the exports in several countries. Typically, these industries put heavy pressure on the environment and are characterised by substantial consumption of natural resources.

Concerning exports, experience shows that environmental improvements in suppliers' operations are often driven by the requirements of the buyers, especially those with a strong environmental policy. Consequently, the demand for environment-friendly practices in these priority sub-sectors could be high, provided that foreign buyers of products require a demonstrated compliance with environmental and social criteria. This is for example the case for clothing and accessories which, together with related products, are major export commodities in several countries. In recent years awareness about environmental and social issues in textile and clothing production has increased, and many importers now require producers to guarantee minimum production standards or compliance with specific textile label requirements. Nevertheless, environmental requirements for imported products can be expected to be an issue mainly for trade with EU Member States and the US.

Over the last decade, industry in EECCA and SEE countries has undergone profound changes in the ownership structure. In many countries this process is likely to continue for several years, as (or if) these countries further progress in the transition to a market economy. According to the latest EBRD Transition Report (2006b), in most countries (except

Box 4.2 Mining sector in Kyrgyzstan: selected factors affecting the sector before and after the breakup of the Soviet Union

Situation during the Soviet era

- Centralised supply solved the problem of purchasing materials and equipment
- There was no need to find markets (state-run distribution system)
- Many towns and villages emerged and developed due to the operation of mining plants. Companies were responsible for the maintenance of the whole social infrastructure of the industrial communities, which negatively affected the basic cost of products
- Raw materials and commodities had fixed purchase prices
- Prices for energy resources and electricity were the lowest in the world. Non-profitable companies (e.g. Khaidarkan Mercury Plant, Kyrgyz Mining and Metallurgical Plant) received state subsidies
- Special funds estimated at USD 40–55 million were allocated from the state budget to maintain the mineral raw material base
- A continuous staff retraining programme was available.

Situation after the break-up of the Soviet Union

After the collapse of the USSR, financial and industrial conditions deteriorated sharply because of:

- The break-up of industrial ties and supply channels
- Electricity prices increased four times, fuel prices 2–3 times and railroad transportation costs 4–6 times
- Social costs increased massively
- The access to raw material of antimony and uranium was lost (previously delivered from Russia and Kazakhstan)
- The legislative system, particularly taxation, hinders industrial development by its high custom fees and royalties
- Most raw materials, equipment and other materials necessary for functioning of the plants need to be imported. The company staff has little or no experience with purchasing abroad
- Most of the production needs to be exported. As a result, companies are now exposed to changing world market prices
- Insolvency of some domestic clients and fuel suppliers has caused additional problems
- Companies which were subsidised in the Soviet era went immediately bankrupt after political independence
- Despite higher salaries in the mining industry compared to other Kyrgyz industries, several thousands of highly skilled technicians and engineers emigrated
- Companies virtually had no trained employees for new economic, financial and management tasks. Also, no staff were familiar with of the requirements of world markets
- Companies now need to address the issue of staff training.

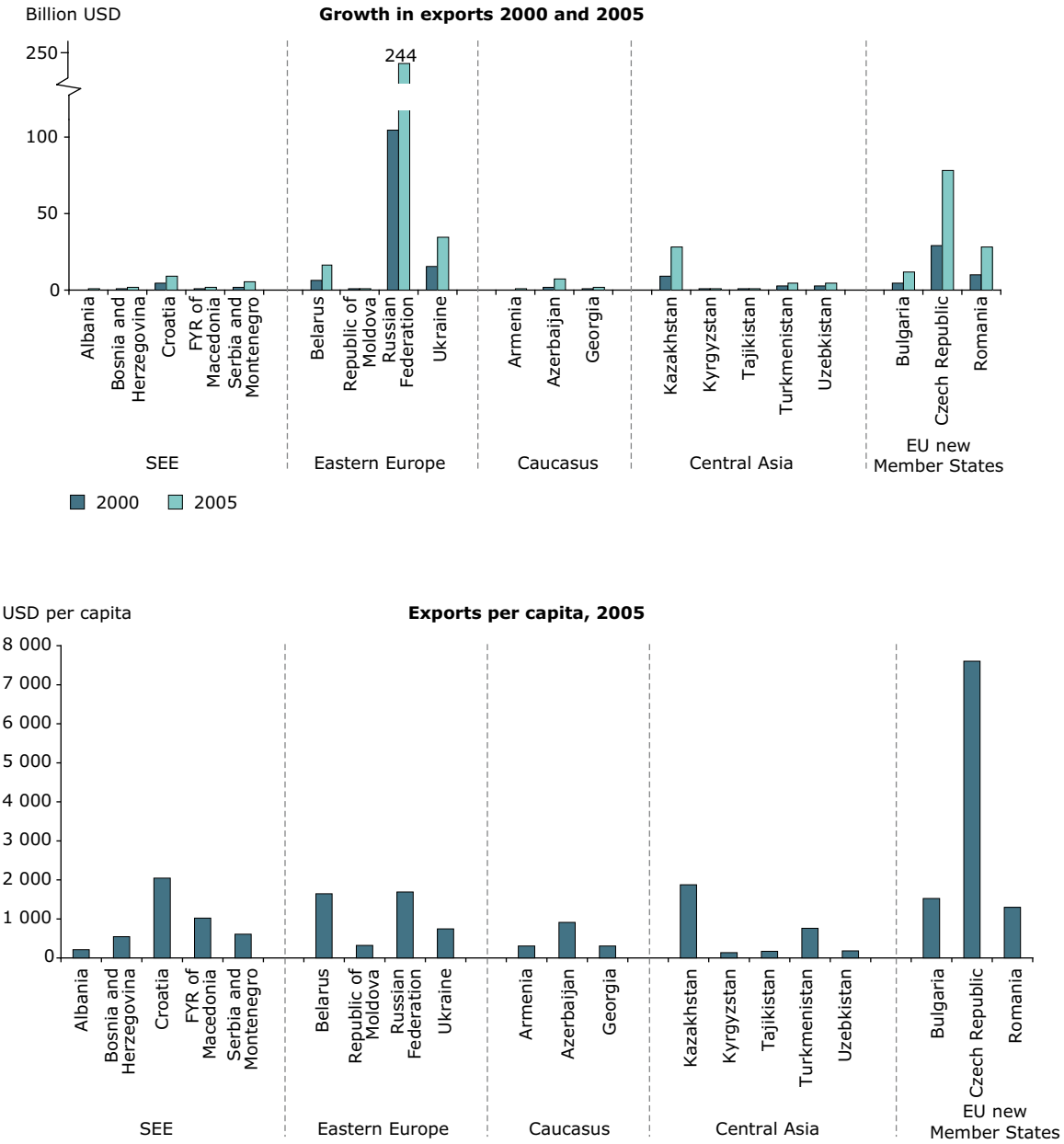
Source: Adapted from Bogdetsky *et al.*, 2002.

for Bosnia and Herzegovina, Belarus, Serbia, Tajikistan, Turkmenistan and Uzbekistan) the share of the private sector in GDP exceeds 60 %.

Experience from new EU Member States shows that the number of small and medium-sized industrial enterprises (SMEs) is likely to increase over time; in contrast, the number and size of large companies usually stagnate or even decrease. The strong growth in industrial SMEs can also be expected in the SEE and EECCA countries. This is partly driven by Foreign Direct Investment (FDI) which has increased substantially in several countries in recent years, even if at present it remains significantly below the levels in new EU Member States. It is expected that increased FDI and the stronger presence of international companies will lead to improved competitiveness of local companies and increase investments in production technology and efficiency.

Affordability and access to investment finance remain a serious problem in most countries in the region, affecting the demand for environmentally

Figure 4.1 Exports in SEE and EECCA countries (2000 and 2005)



sound technologies and other environment-related investments. Both inflation and interest rates for short-term commercial lending have declined gradually since 2000. In 2005 inflation was around or below 10 % in most countries of the region. However, interest rates for short term commercial credit remained in double digits, with rates close to or above 20 % in Armenia, Azerbaijan, Georgia, Kyrgyz Republic, Moldova, Tajikistan, Turkmenistan, Ukraine and Uzbekistan. In addition, even when a company decides to seek a bank loan, it may not succeed because of often stringent conditions set up by the banks, such as 200 % or more collateral, short loan duration, very high premiums for business risk, etc. This is especially the case for small and medium enterprises (SMEs).

In general, when companies use commercial lending at all, they make investments which bring immediate benefits in terms of production and profit. Therefore, at the present time the implementation of environment-related industrial investments in most SEE and EECCA countries largely depends on the availability of preferential

Table 4.2 Five largest export commodities of SEE and EECCA countries (% of total exports; 2003 or latest year available)

	Year	Commodity	%	Commodity	%	Commodity	%	Commodity	%	Commodity	%	Commodity	%
Albania	2003	Clothing and accessories	34.3	Footwear	29.8	Metal manufactures	4.3	Iron and steel	4.1	Metalliferrous ore and metal scrap	3.3	Other	24.2
Bosnia and Herzegovina	2003	Non-ferrous metals	16.3	Cork and wood	10.7	Furniture and bedding	8.5	Power generating machines	6.5	Clothing and accessories	6.3	Other	51.7
Croatia	2003	Transport equipment	12.2	Clothing and accessories	9.6	Electrical machinery and appliances, and electrical parts	7.5	Petroleum, petrol. product	6.8	Non-metallic mineral manufactures	3.8	Other	60.1
FYR of Macedonia	2003	Clothing and accessories	30.0	Iron and steel	18.4	Tobacco and tobacco manufactures	6.0	Petroleum and petroleum products	5.2	Beverages	4.1	Other	36.3
Serbia and Montenegro	2002	Non-ferrous metals	11.1	Vegetables and fruit	8.2	Clothing and accessories	7.0	Iron and steel	5.4	Cereals and cereal preparations	5.2	Other	63.1
Belarus	2003	Petroleum and petroleum products	21.5	Road vehicles	8.7	Fertiliser	6.5	Electrical machinery and appliances, and electrical parts	5.0	Textile yarn, fabric	4.5	Other	53.8
Moldova	2003	Beverages	30.6	Clothing and accessories	15.0	Vegetables and fruit	11.9	Hides, skins, furskins, raw	4.4	Fixed vegetable fats and oils	3.6	Other	34.5
Russian Federation	2003	Petroleum and petroleum products	38.1	Special transactions and commodities not classified	13.8	Natural gas, manufactured	13.1	Iron and steel	6.1	Non-ferrous metals	5.6	Other	23.3
Ukraine	2002	Iron and steel	30.5	Petroleum and petroleum products	7.0	Cereals, cereal preparations	5.8	Metalliferrous ore	5.2	Metals, manufactures	4.7	Other	46.8
Armenia	2003	Non-metallic mineral manufactures	25.2	Non-ferrous metals	5.3	Beverages	5.2	Gold, non-monetary excluding ores	3.0	Miscellaneous manufactured goods	2.6	Other	58.7
Azerbaijan	2003	Petroleum and petroleum products	85.5	Vegetables and fruit	2.4	Textile fibres	1.3	Metalliferrous ore	1.3	Plastics in primary form	1.2	Other	8.3
Georgia	2003	Metalliferrous ore and metal scrap	23.7	Beverages	18.4	Other transport equipment	9.4	Sugar, sugar preparations, honey	7.2	Iron and steel	6.3	Other	35.0
Kazakhstan	2001	Petroleum and petroleum products	51.1	Non-ferrous metals	13.7	Iron and steel	10.8	Metalliferrous ore	5.9	Cereals and cereal preparations	4.3	Other	14.2
Kyrgyzstan	2002	Gold, non-monetary, excluding ores	35.4	Textile fibres	10.5	Petroleum and petroleum products	7.7	Electric current	4.8	Tobacco and tobacco manufactures	4.5	Other	37.1
Tajikistan	2000	Alumunium	53.8	Electric current	13.3	Cotton	12.0	Aircraft and spacecraft	5.3	Gold, non-monetary, excluding ores	3.5	Other	12.1
Turkmenistan	2002	Natural gas	49.7	Heavy petrol and oils from bituminous minerals	20.5	Petroleum oils and oils from bituminous minerals, crude	9.7	Cotton	9.3	Textile yarn	2.2	Other	8.6
Uzbekistan	2000	Cotton	40.4	Gold	8.6	Cotton yarn	6.1	Radioactive chemical elements and isotopes	4.0	Passenger cars	3.6	Other	37.3
Bulgaria	2003	Clothing and accessories	19.9	Non-ferrous metals	7.9	Iron and steel	7.4	Petroleum and petroleum products	5.8	Special transactions and commodities not classified	5.7	Other	53.3
Romania	2003	Clothing and accessories	23.1	Footwear	8.1	Iron and steel	7.4	Electrical machinery and appliances, and parts	7.0	Petroleum and petroleum products	5.9	Other	48.5

Source: UN Statistics Division (Comtrade database) as cited in the Statistical Yearbook of UNECE 2005.

finance. This is in contrast to those countries where enforcement is stricter, such as in Croatia, where the drive to join the European Union has led to increased efforts for environmental compliance and created more stable commercial lending conditions.

4.2.2 Resource use and pollution from industry

The initial objective of this section was to provide a detailed picture of pollution and resource use in industry. However, reasearch conducted for this chapter has not uncovered comprehensive and internationally comparable data on industrial pollution and resource use in SEE and EECCA countries. Available data cover only air emissions, including greenhouse gases, as shown in Figure 4.2.

Environmental issues in the industry sector include a whole spectrum of concerns, from control of air emissions and wastewater discharges, improving efficiency in the use of natural resources and energy, a switch to less polluting fuels, proper management and prevention of waste, to management and control of hazardous and toxic substances. The topic is all the more important in view of the significant role of industry in the SEE and EECCA economies and the fact that pollution and resource use intensities are typically much higher in the industry sector than in the agriculture and service sectors. Notable exceptions are transport and municipal services.

Detailed data and information on emissions, waste generation and resource use by industrial sources are a necessary precondition for designing and implementing effective industry-related environmental policies. However, as noted above, such data and information are not readily available in SEE and EECCA countries. This is in spite of the fact that many countries in the region apply charges and fines systems on air and water emissions, as well as on waste generation and disposal. These charges and fines are based on measured (although in practice mostly estimated) emissions, waste production and amounts of resources used.

Environmental inspectorates, typically the body responsible for enforcing related legislation, collect actual or estimated data on emissions from industrial companies. It appears, however, that such data are not systematically compiled at nationwide level (data on emissions to different media provided by industrial enterprises are channelled to different inspectorates responsible for soil/air/water emissions) and apparently there are no efforts to use this information for policy making. As regards energy consumption and hazardous waste generation, the availability of data is generally better. This is because these data are systematically collected by fewer providers (e.g. energy) or because data collection is part of implementation of international legally binding instruments (e.g. hazardous waste).

Given the poor data situation, it was not possible to prepare a comprehensive review of trends in industrial pollution and resource use since 1990 in all SEE and EECCA countries. Available limited information is presented in Figure 4.2.

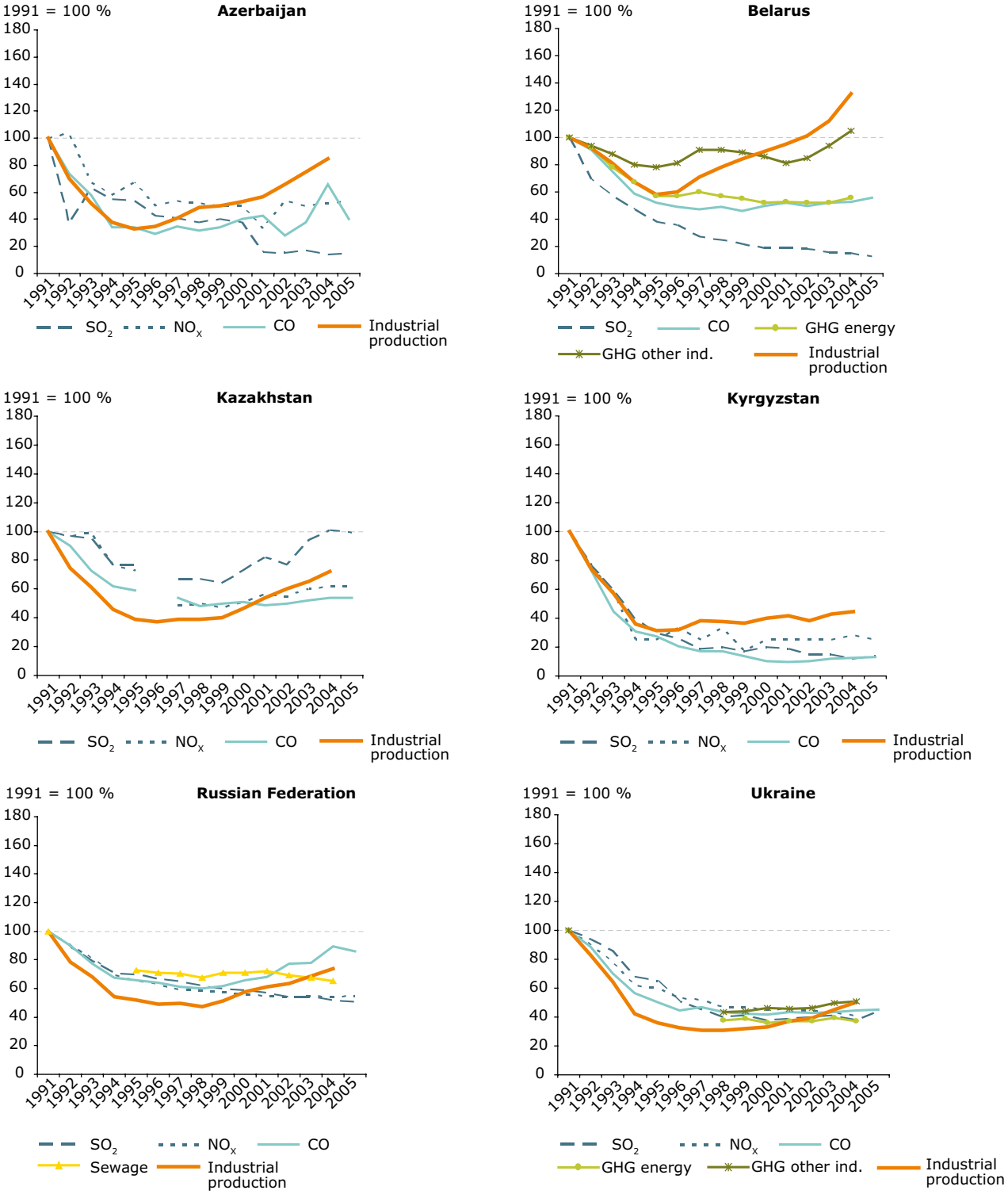
In the case of some pollutants, a de-coupling has taken place between the growth of industrial output and emissions. Some examples include emissions of SO_2 in Azerbaijan, Belarus, Kyrgyzstan and Russia; CO in Belarus, Kazakhstan and Kyrgyzstan; NO_X in Belarus, Kyrgyzstan and Russia; greenhouse gases from fuel extraction and energy production industries in Belarus and Ukraine; and sewage discharges in Russia.

There can be many underlying reasons for such a de-coupling, including changes in production technology and installation of pollution control equipment, shifts in input and raw materials, improvements in environmental regulations and enforcement, or issues related to data collection. Unfortunately, available information does not allow us to make any firm conclusions regarding this subject. Since some lessons could be transferrable across many SEE and EECCA countries, it might be worthwhile conducting specific studies and assessments to analyse industrial de-coupling trends in EECCA and SEE.

As shown in Section 2.4, energy intensities (defined as energy used per unit of GDP) in SEE and EECCA economies continue to be much higher in comparison with Western European countries. If energy intensity is adjusted for differences in purchasing power parity, the gap is narrower, but it is still several times higher in SEE and EECCA than in the EU. Box 4.3 includes a summary of EBRD's latest assessment of progress in energy efficiency — and of prospects for renewable energy markets — in EECCA and SEE.

EBRD emphasises that transition countries' energy needs are projected to rise by 60–80 % over the next 20 years. EBRD noted that 'industry in transition countries is characterised by obsolete, inefficient processes and technologies'. For example, in Russia, 22 % of steel output in 2004 was by inefficient open-hearth furnaces versus 3.9 % in India and 0 % in the EU (EBRD, 2006a). In most countries

Figure 4.2 Industrial growth vs. emissions in selected EECCA and SEE countries (1991–2005)



Note: Greenhouse gases (GHG) energy includes 'emissions from fuels combusted by fuel extraction or energy producing industries'. GHG other ind. includes 'emissions from fuels combusted by manufacturing industries plus GHG emissions from industrial processes'. Ukraine GHG and Russia industrial sewage discharges data: base year is 1990, therefore 1990 = 100 for these two data series (1991 data not available).

Sources: Industrial production: authors' calculations based on the World Bank World Development Indicator 'industry value added in mlns of constant 2000 USD'. SO_2, NO_x and CO data: CIS. Industrial GHG emission data: authors' calculations based on absolute GHG emission data published by www.unfccc.int. Industrial sewage discharges: authors' calculations based on absolute values in billion m^3 as published in 'Statistical Year Book of Russia, official publication, Moscow, 2006'.

Box 4.3 Current energy efficiency and renewable energy market trends as assessed by EBRD

Situation in SEE and EECCA countries (except Russia)

Energy efficiency:

Progress in improving energy efficiency has been slow. Low tariffs, the slow pace of industrial restructuring and more limited access to debt finance undermine the incentives for energy efficiency and push it down the priority list of investment options. Policy support is generally positive but this is rarely backed up with resources and targeted financial support.

Most activity to date has been in smaller companies which have set their sights on international competitiveness. Many initiatives have been implemented in the food sector and in energy intensive processes such as glass manufacture — largely driven by booming demand for food and drink products.

Renewable energy:

Regulatory reforms to support renewables are largely absent or inadequate in SEE and EECCA countries — many of which are still grappling with basic sector reforms. Together with low energy prices the commercial environment for developers remains unfavourable. Some exceptions do, however, demonstrate that progress can be made: Kazakhstan is working to improve the regulatory framework, Bosnia and Herzegovina is seeking developers for wind and hydro resources, and Armenia has already developed targeted policies for renewable energy. As in more advanced transition countries, the biomass sector has received little structured support.

Situation in the Russian Federation

Energy efficiency:

As a country endowed with vast natural resources which have traditionally been made available to all consumers at very low prices, Russia has historically had little awareness of or inclination towards energy efficiency. With recent increases in domestic gas and electricity prices, this situation is slowly beginning to change. Government policy supports energy efficiency but provides very limited resources of either a financial or institutional nature. With the energy sector still largely dominated by RAO, UES and Gazprom and price liberalisation still some way off, the prospects for a significant shift in attitude from consumption to conservation still seem remote. One significant opportunity that is achievable in the short term is the availability of finance from carbon credits. Russia is expected to become one of the biggest suppliers of carbon credits in the emerging carbon markets. However, the legal and financial framework to take advantage of these opportunities is not yet in place.

Renewable energy:

Russia has vast technical potential for renewable energy, particularly hydro, biomass and wind. However, there is little support for renewables at present and with still low basic energy prices, few technologies can compete commercially in the current environment. Activity to date has been limited to occasional projects or small-scale early stage technology development such as tidal power. Significant activity in the renewable sector will be unlikely without targeted policy and regulatory support.

Source: EBRD, 2006a.

improvements in energy efficiency offer a big potential in addressing the question of energy supply. According to the Russian Ministry of Industry and Energy, Russia could save up to 40 % of its current annual energy consumption through improved efficiency. Ukraine, if it implemented all currently viable energy efficiency improvements, could reduce by half the 70 % of the gas supply it now imports, greatly increasing the country's energy supply security.

4.3 Policies and implementation

Policies addressing environmental management in enterprises need to take into account what

motivates industrial companies to deal with this issue. One of the most important driving forces is — or should be — compliance with environmental regulations on pollution. Essential preconditions for achieving such compliance are the existence of realistic environmental policies and targets, and adequate enforcement of enacted legislation. Economic incentives to reduce pollution and waste treatment costs are another crucial motivating factor for companies. An overview of driving forces and motivations for industrial companies to continuously improve environmental management is presented in Box 4.4.

In addition to the driving forces in Box 4.4, various supply-related factors influence the feasibility of improving environmental management in enterprises. These include:

- *Economic incentives* provided by the existing legal and policy environment, including: prices for raw materials and infrastructure, fees and fines on emissions, tax allowances, subsidies, etc.

- *Availability and affordability of alternative technologies* (including production technology, water and wastewater treatment, waste management, energy efficiency). When such technologies are not available nationally, the transaction costs involved in their import can be significant. Transaction costs are higher if a technology has not yet been used or tested in a country.

- *Availability of and access to affordable external finance* (both, commercial finance and/or subsidised finance). Typically, better production technology brings about significant environmental gains, even if the motivation for buying new technology is not related to environmental concerns.

- *Availability of experienced experts and consultants*, who are able and qualified to provide required services to a company at an acceptable price.

Depending on the specific country and environmental problem, all these factors will play a variety of roles in stimulating better environmental management in industry. For example, while air pollution usually is closely related to energy use or specific production processes, pre-treatment of industrial wastewater before release to public sewer networks is a very different case. Air pollution can often be addressed in an economically efficient way, for example, by switching fuels, improving energy efficiency or using better input or process materials. In contrast, wastewater pre-treatment is mainly compliance-driven, and considered a burden for an industry manager. Introducing wastewater pre-treatment could offer economic gains if it were to save companies a significant amount of money in wastewater charges and fines. But, with few exceptions, such charges and fines today do not represent a significant cost factor for industrial companies in SEE and EECCA, as pressure to comply with environmental laws is rather low.

Box 4.4 Main driving forces for industrial companies in EECCA and SEE countries to address environmental management

- Need to ensure compliance with environmental laws and regulations — and enforcement by relevant enforcement agencies.
- Existing economic instruments stimulating companies to address environmental management.
- Potential to decrease operating costs by implementing environmental management.
- Perceived need of a company to have a quality or environmental management certification (e.g. ISO 9001, ISO 14001) in order to increase sales and profits or to gain market share and new clients.
- In case of goods and services in a supply chain (including exports): requirements of the buyer with respect to environmental or social aspects in production, product quality or the environmental management system.
- Availability of affordable finance for environmentally sound technologies or for better production technology.
- Opportunity to improve a company's 'environmental image', as well as possible related gains in public relations and new clients.
- Need to switch to cleaner input materials and technology in production to remain competitive.
- Opportunity to replace obsolete technology when repair costs are close to the costs for new technology, or when a company is relocating.
- Pressure from consumers, consumer associations, media, environmental NGOs, citizens or employees to decrease pollution.

4.3.1 Overview of regulatory framework for environmental management in industry

Since the break-up of the Soviet Union and Yugoslavia, many efforts have been made in the EECCA and SEE countries to revise and improve the environmental legal and policy framework. Much has been achieved to meet requirements stemming from international or regional environmental agreements. However, while regulatory framework has improved in all countries of the region, significant problems remain. In 2003 the European Commission published a study assessing barriers and opportunities for convergence of EECCA environmental legislation with EU environmental law (EC 2003). Although environmental legal systems have further developed since 2003, a number of basic points made in the study concerning legislation relevant for industry remain valid today (Box 4.5).

A wide range of books and manuals to help improve environmental legislation and increase the capacity of institutions responsible for enforcement in EECCA countries was developed under the auspices of the Regulatory Environmental Programme Implementation Network, REPIN ([3]). The various studies and papers provide a detailed and country-specific picture of achievements and challenges in the field of environmental legislation, as well as offering guidance on environmental permitting, compliance, and enforcement practice.

The situation in many SEE countries is similar to that in EECCA in so far as compliance with environmental law and policy does not currently represent a strong driving force for companies to deal seriously with environmental management. However, not all the weaknesses mentioned in Box 4.5 apply equally in SEE. Croatia is a notable example of a country whose environmental legal framework is strongly influenced by EU environmental legislation. Adopting EU environmental regulations and improved enforcement will likely result in an increasing demand for EME services. It is conceivable that a similar trend may occur in other SEE countries in the future.

4.3.2 Support services for environmental management in enterprises

Regulations and command and control approach can be effective in stimulating industry to improve their environmental management. In the long term, however, more effective way to address industrial pollution and inefficient use of resources will be through creating economic incentives to improve performance. Achieving this will, among other things, require the existence of functioning national markets that provide the necessary services on a commercial basis.

The only such market to emerge to date is related to the implementation of environmental management systems (EMS), and in particular ISO 14001 certification. Based on the experience of other transition countries, in the future service markets can be expected to appear in the following areas: technology modernization and energy efficiency improvements, environmentally sound technologies including the use of renewables; waste prevention and reuse and recycling, pollution prevention and control solutions, on-site wastewater pre-treatment; and consultancy services for addressing specific problems such as compliance with environmental law.

The remainder of this section examines the current situation for selected factors involved in the implementation of environmental management in enterprises.

Environmental Management Systems

According to the International Organization for Standardisation (ISO), by the end of 2005 at least 111 162 ISO 14001 certificates had been issued in 138 countries, a 24 % increase over 2004. Figure 4.3 presents data on ISO 9001 and ISO 14001 certification in the SEE and EECCA countries.

SEE and EECCA countries account for only a very small share of ISO 14001 certifications issued worldwide. However, a number of countries have experienced a steady increase in certification in recent years. A notable growth took place in Azerbaijan, Belarus, Bosnia and Herzegovina, Croatia, Russian Federation, Serbia and Montenegro and Ukraine, largely driven by export requirements and the desire of companies to expand in European markets. In other countries, including Albania, the former Yugoslav Republic of Macedonia and countries in the Caucasus and Central Asian areas, very little activity has been recorded as regards ISO 14001.

For comparison, figures are also given for Bulgaria and Romania, where the growth in certifications

([3]) For more details, visit the REPIN — Policy and Enforcement Network section on the OECD website.

Box 4.5 Environmental legislation on industrial pollution control in EECCA countries

Main weaknesses in environmental policy instruments and legislation in EECCA countries

- Environmental quality standards are unrealistic, often set so high that they cannot be enforced.
- High number of regulated substances. Only a small number of regulated substances can realistically be enforced.
- Legislation is often merely declarative and poorly designed.
- Lack of implementing regulations, procedures and guidance.
- Policy instruments often do not provide incentives to the regulated companies to achieve better targets.
- Insufficient awareness resulting from limited outreach and dissemination.
- Overlap between laws, decrees and regulations, as well as responsibilities of government agencies.
- Weak institutional structures of environmental authorities and lack of qualified staff.
- Low political priority, as environmental expenditure is not considered to add to economic growth.

Main weaknesses in enforcement of environmental law

The unrealistic scope and thresholds in environmental standards, together with the complexity of environmental regulations, means that the regulated community is almost always in breach of the law and enforcement agencies face an impossible task in attempting to bring them into compliance. These difficulties are further compounded by the enforcement agencies' lack of resources to carry out their functions: they lose qualified personnel due to low salaries, and a lack of basic facilities and equipment prevents them from fulfilling their duties. In addition, sometimes they lack the skills and capacity to function effectively: staff receive no or inadequate training, and often have a poor knowledge of the regulated community. Enforcement mechanisms are further weakened by enforcement agencies' lack of recourse to economic incentives to reward compliance, or to legal and financial sanctions to penalise non-compliance. Environmental enforcement agencies tend to have a weak standing in relation to local governments and industry, and receive little support from the court system which is ill equipped to address environmental cases. The levels of fees and fines are usually too low to act as a deterrent. Collection of imposed environmental charges and fines is a problem — collection rates range from negligible to around 80 %. The effectiveness of enforcement efforts is not measured in terms of their impact on environmental conditions; instead, emphasis is placed on activity indicators (numbers of inspections, etc.), which gives inspectors no incentive to engage in compliance promotion.

Main weaknesses in permitting and pollution control procedures

- Same permitting system for all enterprises without regard to their size or polluting potential.
- Permitting focused on end-of-pipe solutions.
- Emission limits set up on the basis of complicated and rigid calculations and, geared towards payments, therefore not creating economic incentives.
- Separate permits for each environmental medium.
- Often unclear and/or duplicating responsibilities of authorities responsible for issuing different permits.
- Poor communication and coordination between the permitting authorities.
- Limited requirements for self-monitoring.
- In practice, aspects other than air emission, wastewater discharge and waste disposal are not covered.
- Very limited public information and participation, which reduces the transparency of the regulatory process and facilitates corruption.
- Overall low level of enforcement.

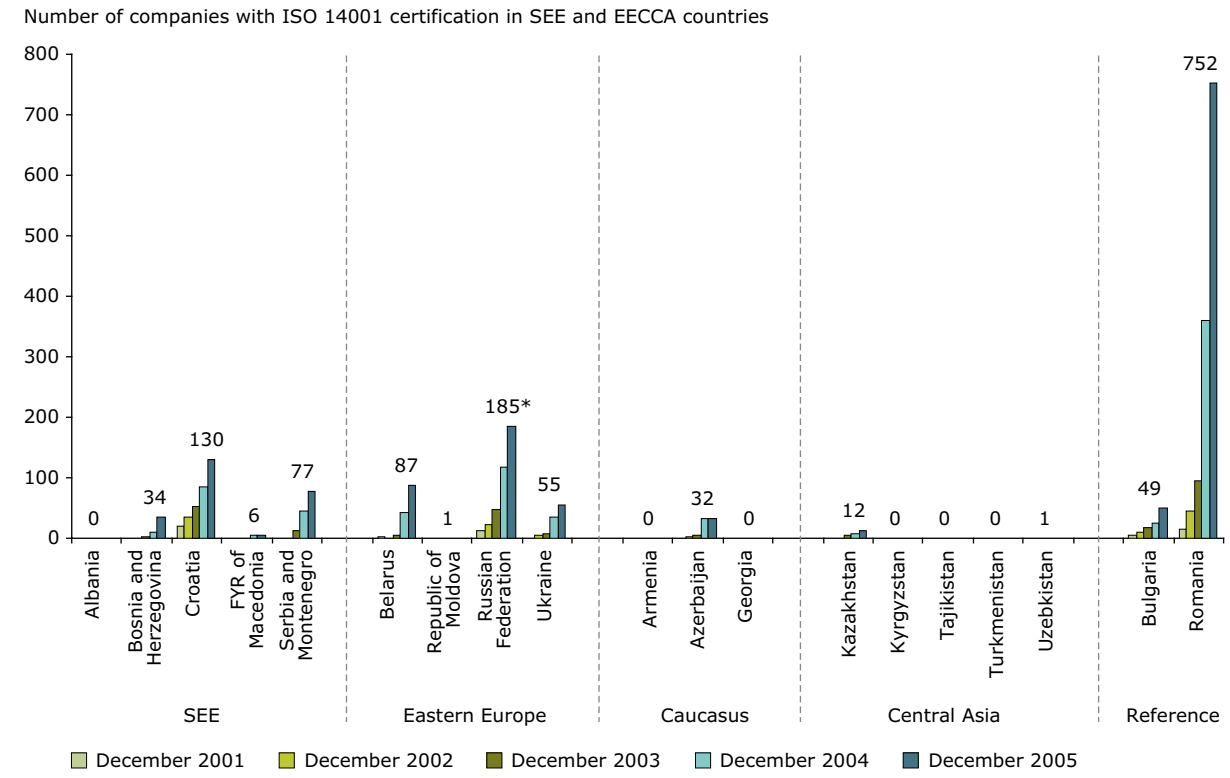
Challenges to possible convergence with EU IPPC Directive

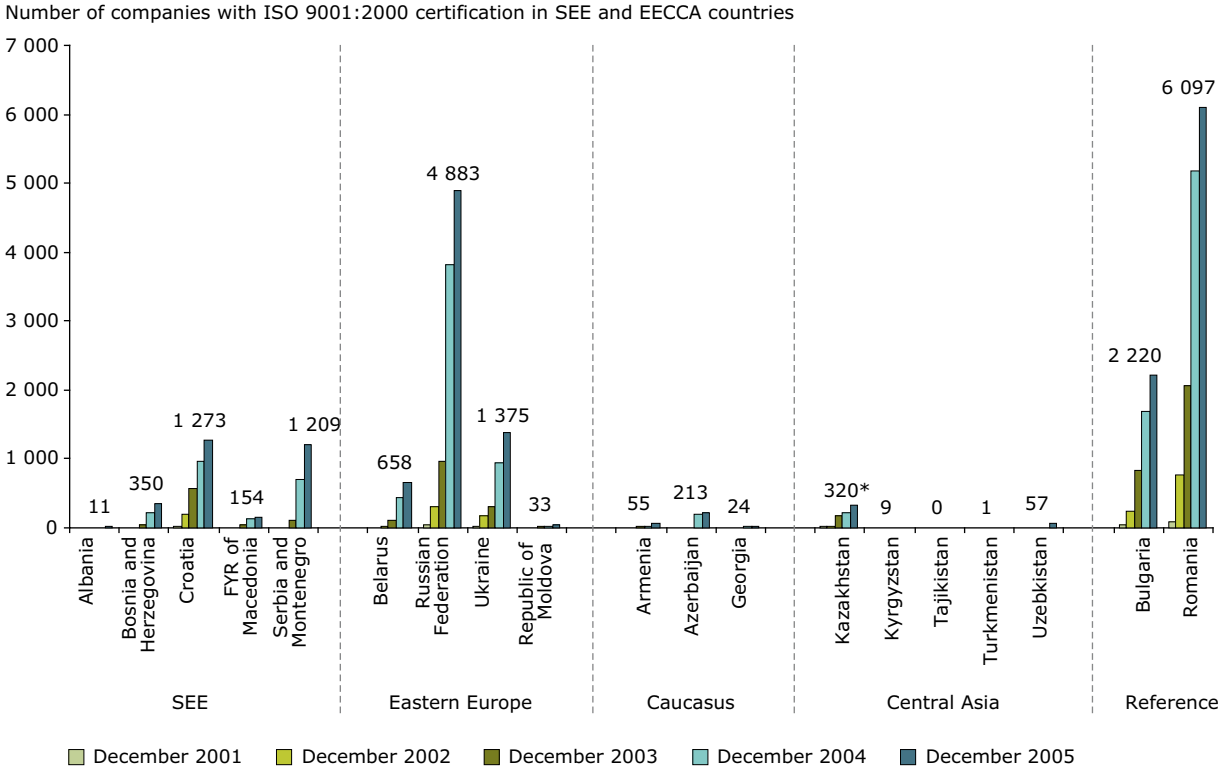
Main barriers to a possible convergence with the EU IPPC Directive in EECCA countries include:

- major change in permitting philosophy required;
- a major reform of standards would be necessary;
- BATs are generally not defined in EECCA country legislation, although some countries have started to use the term in their legislation or policy documents without really defining it or implementing the relevant provisions;
- large costs associated with BAT implementation — significant input of technical resources and a high degree of support for both the regulator(s) and industry will be required;
- availability of comprehensive advice and guidance notes will be essential for effective implementation of the integrated pollution control regime, but this is costly, and capacities will take a long time to develop;
- scope for political tension where bodies currently charged with regulating particular installations or media fear loss of power as a result of new arrangements for IPPC.

Source: Adapted from European Commission, 2003.

Figure 4.3 Number of companies with ISO 14001 and ISO 9001:2000 certification in SEE and EECCA countries (2001–2005)





Note: * = Number of certified companies in December 2005.

Source: www.iso.org.

was driven by the upcoming EU membership, and the need of companies to improve the competitiveness of their exports in EU markets. The expectation that environmental regulations will be more rigorously enforced may also have been a motivation there.

National markets for providing EMS services (in particular for ISO 14001 certifications) continue to develop. Demand comes primarily from export-oriented companies, and especially large exporters. SMEs may also become more interested in ISO 14001, as the example of Romania shows. Many companies opt to implement ISO 14001 simply because their competitors have done so. One facilitating factor for ISO 14001 certification can be previous ISO 9001 certification (see the relatively strong correlation in the two graphs above).

It should be noted, however, that implementation of ISO 14001 does not in itself guarantee comprehensive progress in environmental management in enterprises. Companies sometimes perceive EMS only as a certificate that has to be obtained to overcome a trade barrier, rather than as a tool to increase their efficiency and improve environmental performance.

EME expertise and consultants

Availability of ready-to-use information on EME tailored to the context of EECCA and SEE countries is currently limited. The only publicly available sources of such information include existing cleaner production centres ([4]) as well as other donor-supported programs. Much of what they tend to provide is general information which is not useful for environmental managers in industrial companies. The situation is especially poor concerning information on environmentally sound technologies, where little effort has been made to facilitate access to relevant information.

Little is known and published about the size and operations of eco-industry in SEE and EECCA countries (see EC, 2006 for an EU eco-industry review). In general, EME-related expertise on national and local levels in EECCA and SEE can be found primarily at the company level (environmental management departments in larger companies) and at Cleaner Production Centres (CPC staff and individuals trained by CPCs). Some EME-related expertise is usually also available in governmental agencies, although government experts are not directly involved in the provision of commercial EME services to companies.

No detailed information is readily available about the work of environmental managers in industrial companies in EECCA and SEE, and about existing capacities, problems and challenges.

The following discussion focuses on the role of CPCs and other similar organizations, based on the survey carried out by the author among CPCs operating in the region (Table 4.3).

Albania, Belarus and Turkmenistan are the only countries in SEE and EECCA without an operational or planned CPC. Setting up CPCs is already planned in Armenia, Serbia, and Tajikistan.

By far the most common services delivered by existing CPCs are those related to cleaner production, energy efficiency, EMS, and training and capacity building. However, even though CPCs report that they have trained several hundred individuals in EME services, they also estimate that only a small number of qualified CP, EST and EMS consultants is available in their country. Involvement of CPCs in financial engineering projects is much more limited, and only two CPCs have carried out CSR services.

Table 4.3 shows that most CPCs depend heavily on donor financing for their operation and project implementation. Overall, only a small percentage of the EME consulting services (CP, EE, EMS, CSR, financial engineering) delivered by the CPCs to companies are fully paid for by the beneficiaries.

To illustrate implementation, an overview of recent work carried out by the Russian CPSD Centre is presented in Box 4.6.

An example of implementation of EME at company level in Turkmenistan is presented in Box 4.7.

Access to environmentally sound technologies

It appears that no EST information platforms exist tailored to the context and needs of SEE and EECCA countries. Large industrial companies in the region can easily obtain the information

([4]) Note that the term cleaner production centre is used broadly here to include pollution prevention centres, energy efficiency institutes, clean technology centres, etc.

Table 4.3 Overview of CPCs and other EME-related organisations in the EECCA and SEE regions

Country	Name of CPC	Main service areas	Number of employees (end 2006)	2005 turnover (EUR)	Share of intl. sources in 2005 turnover	Websites and email addresses
Azerbaijan	Cleaner Production and Energy Efficiency Centre, CPEE	CP, EE, EMS, FIN, CPT, EMST, EIA, industrial audits	6	115 000	70 %	www.cpee.az; nariman@cpee.az
Bosnia and Herzegovina	Centre for Environmentally Sustainable Development, CESD	CP, EMS, CPT, EMST, awareness raising activities	0	170 236	83 %	www.coor.ba; coorsa@bih.net.ba
Bulgaria	EnEffect	Did not reply to survey				www.eneffect.bg
Bulgaria	Technical University of Sofia	Did not reply to survey				www.tu-sofia.bg
Croatia	Croatian Cleaner Production Centre	Did not reply to survey				www.cro-cpc.hr
Georgia	Energy Efficiency Centre Georgia (EEC Georgia)	CP, EE, FIN, CPT, EMST, FINT, policy advice, market studies, etc.	11	Ca. 200 000	97 %	www.eecgeo.org; g_abul@eecgeo.org
Kazakhstan	Energy Efficiency & CP Centre	Did not reply to survey				www.cpee.kz
Kyrgyzstan	Demonstration Zone of Energy and Water Efficiency Ltd., DZEWE	CP, EE, EMS, FIN, CPT, FINT	9	63 000	75 %	www.dzb.in.kg; dzb@elcat.kg
Moldova	Cleaner Production and Energy Efficiency Centre, CPEE	CP, EE, EMS, FIN, CPT, EMST, FINT, preparation for ISO 9001	6	58 000	87 %	www.cpee.md; cpee@cpee.md
Romania	Pollution Prevention Centre, CPP	CP, EE, EMS, FIN, CPT, EMST, EIA, industrial audits, monitoring	3	106 000	19 %	www.cpp.org.ro; office@cpp.org.ro
Romania	National R&D Institute for Industrial Ecology, ECOIND	CP, EE, EMS, CSR, FIN, CPT, EMST, research, EIA, risk ass. etc.	n.a.	n.a.	3 %	www.incdecoind.ro; pi@incdecoind.ro
Russian Federation	Cleaner Production and Sustainable Development Centre (CPSD)	CP, EMS, CSR, FIN, CPT, EMST, FINT, policy advice	7	173 000	92 %	www.ruscp.ru; edcentcp@deol.ru
Russian Federation	North-West Intl. CP Centre	Did not reply to survey				www.nwicpc.ru
Russian Federation	CP Centre for Oil & Gas Industries	Did not reply to survey				www.ncpc.ru
Russian Federation	Kola Energy Efficiency Centre	Did not reply to survey				www.keec.com
Russian Federation	Murmansk Oblast Energy Efficiency Centre, MOEEC	EE, FIN	6	70 000	40 %	www.moeec.com; moeec@online.ru
Russian Federation	Arkhangelsk Energy Efficiency Centre	Did not reply to survey				www.aoeec.com
Russian Federation	Karelia Energy Efficiency Centre	Did not reply to survey				www.kaeec.com
Ukraine	Cleaner Technologies Centre	Did not reply to survey				www.ctc-ua.org
Ukraine	Pridneprovie (Dnepropetrovsk) Cleaner Production Centre, PCPC	CP, EE, EMS, CSR, FIN, CPT, EMST, FINT, policy related issues	5	50 000	0 %	www.arwsd.com/pcpc; ecofond@a-teleport.com
Uzbekistan	Uzbek Cleaner Production Centre	CP, EE, EMS, FIN, CPT, EMST, FINT, ISO 9001 related services	4	n.a.	60 %	www.ncpc.uz; uzbekncpc@ars.uz

Note: For reference, the table also presents situation in Bulgaria and Romania.
EE = energy efficiency services; CSR = Corporate Social Responsibility related services; FIN = services related to 'financial engineering' of CP/EST investment projects; CPT = CP training services; EMST = EMS training services; FINT = training services in 'financial engineering'. EIA = Environmental Impact Assessment.

Source: All information provided by the featured CPCs.

Box 4.6 An overview of recent CP work of the Russian CPSD Centre

In 2005, the Russian Cleaner Production and Sustainable Development Centre (CPSD) implemented a CP programme at the TransPolar Branch of JSC 'Norilsk nickel' in the polar city of Norilsk. The results achieved are shown in three tables.

Low cost investment projects		
	Developed	**Implemented**
Number of projects	38	25
Estimated economic gains	USD 668 100	USD 313 000
Projected environmental effects p.a.:		
• reduction of fresh water consumption	0.99 million m^3	0.74 in m^3
• decrease in waste water discharge	0.99 million m^3	0.74 million m^3
• economy of electric power	2.11 million kWh	1.10 million kWh
• reduction of solid waste formation	3 000 tonnes	2 200 tonnes
• reduction of emissions into air	105 600 tonnes	105 600 tonnes
• reduction in SO_2 emissions	2.93 million m^3	—
• economy of diesel oil	174 000 litres	26 650 litres
• economy of thermal energy	5 684 000 kWh	5 684 000 kWh

Medium size investment projects		**Large size investment projects**	
Number of projects	32	Number of projects	20
Estimated economic effect per year	USD 2.97 mln	Estimated economic effect p.a. (total)	USSD 3.8 mln
Investments needed (total)	USD 1.32 mln	Investments needed (total)	USD 16 mln
Average payback period	0.44 year	Average payback period	4.2 year
Projected environmental effects p.a.:		Projected environmental effects p.a.:	
• reduction of fresh water consumption	10.00 million m^3	• decrease in waste waters discharge	3.7 million m^3
• decrease in waste waters discharge	3.52 million m^3	• economy of electric power	1.5 million kWh
• economy of electric power	2.42 million kWh	• reduction of solid waste formation	23 400 tonnes
• reduction of solid waste formation	2 600 tonnes	• reduction of Ni emissions	1 tonne (Ni)
• reduction in use of compressed air	57.00 million m^3	• economy of thermal energy	130 million kWh
• economy of thermal energy	130 mln kWh	• economy of natural gas	6.07 million m^3
• reduction of SO_2 emissions	64 800 tonnes	• economy of raw materials	12 000 tonnes
• reduction of Ni emissions	2 tonnes (Ni)	• economy of diesel oil	264 000 litres

An example of the Russian CPSD's activities in the field of eco-technology implementation is the work carried out with the company 'JSC Solombala PPM', located in the city of Archangelsk. During the CP training programme, a project aimed at the reduction of mercaptan emissions was developed. A loan from NEFCO in the amount of USD 200 000 was received. The project was implemented in 2006 and all mercaptan emissions were eliminated.

Source: Information provided by the Russian CPSD Centre to the author.

and advice they need on EST, as technology suppliers promote their products directly to them and because they generally have specialised staff. Large companies also have easier access to funding, including resources provided by international financial institutions.

For SMEs, however, the situation is more difficult — they usually do not have specialised staff, do not know where to get advice, have little or no experience in preparing EST projects, and have limited ability to prepare bankable project proposals.

Box 4.7 Environmental management in oil production in Turkmenistan

One of the major players in the lucrative Turkmen oil industry is the Turkmenbashi complex of refineries, located in Saymonov Bay in the west of Turkmenistan. After more than 60 years of exploitation the environmental situation causes concern. Before construction of the Turkmenbashi Oil Refinery in 1943 the Saymonov Bay presented a rich reserve for flora and fauna, including rare species of birds and fishes. Until 1961, the refinery used to discharge its industrial wastes into the bay without cleaning, which led to significant pollution of the water sources as well as of the coastal areas of both the Saymonov and the Turkmenbashi bays. Oil products from production used to infiltrate into ground waters, contributing to the pollution of the Caspian Sea. At the same time a lowering of the sea level occurred. Additional factors contributed to further environmental degradation of the bay: in 1962, the Turkmenbashi Power Station was put into operation, which for its technical process required the division of incoming and outgoing water flows of/to the bay. The construction of the dam transformed the Saymonov bay into a sedimentation waterbed and increased its pollution levels. Moreover, water supply, sewerage (including sewage leakages into the bay) and transport infrastructure of Turkmenbashi town have had strong environmental impacts. Discharges coming from desalination equipment operated by some tourist facilities heavily contributed to increasing water salinity. In the early 1970s, the ecological situation of the bay was critical.

Due to a combination of factors, the environmental condition of the bay has recently started to improve: Firstly, repair and modernization work in the refinery improved the quality of discharged wastewater and reduced the spills of oil products. Secondly, due to environmental concerns, the Krasnovodsk State Reserve was created already in 1968. The site was then recognised by the Ramsar Convention as a wetland of international importance. Environmental monitoring and management were strengthened. The Turkmen government contracted an Irish company to remove oil products from ground water in the vicinity of the refinery. According to estimates, between 1995 and 2006, more than 3 million tonnes of oil wastes have been processed and more than 600 000 tonnes of cleaned, reconditioned oil could be returned to the production cycle. Thirdly, the rise in the sea level decreased pollution concentrations. The discharges of municipal sewage gradually diminished the salinity of the bay and contributed to a partial biological recovery.

A number of remediation projects have been initiated based on the Presidential decree no 5548 of March 2002. They include environmental impact assessment at the bay, a project on revising pollution standards, a project for delivering two technological lines to clean industrial drainage wastes of the refinery, a project focused on ground water cleaning, and a project related to solid waste disposal.

Source: Adopted from De Martino *et al.,* 2007 (in press).

Overall, EST markets in the region are still very small and are mostly limited to large exporting companies. There might be additional demand from companies which participated in donor-funded CP programs, or from those which cooperate with CPCs. Concerning future trends, it can be expected that the market for EST will increase along with economic growth and progress in transitioning.

Availability of finance for EME

Domestic sources of financing for EME investments are largely limited to commercial finance from domestic banks. However, experience in most countries shows that commercial credit is not very viable for CP and EST investments. Instead, companies are more likely to opt for credit for investments in production technology and processes, as those types of investment promise more immediate economic and financial results.

In a handful of cases, there are CP- and EST-related programs at National Environmental Funds, such as the Croatian Fund for Environmental Protection and Energy Efficiency. Usually, though, only small subsidies can be obtained as the budgets of environmental funds in EECCA and SEE countries are generally small. Moreover, subsidies or co-financing from environmental funds can be difficult to acquire due to their bureaucratic procedures. Companies often choose not to apply for subsidies offered by environmental funds, because they consider administrative procedures of the funds too complicated and insufficiently transparent.

Box 4.8. IFI activities in SEE and EECCA

Several international financing institutions have opened energy efficiency and EST credit lines in EECCA and SEE countries. EBRD and the World Bank, among others, offer soft loans for large-scale energy efficiency investments. Examples of recently completed EBRD projects include:

- Ukrainian Energy Services Company which initiated 19 energy-saving projects, most with payback time of less than 18 months.
- In Bosnia and Herzegovina, investments in energy-efficiency improvements in a steel mill, with annual energy savings equal to the energy consumed by ca. 70 000 Bosnian homes.
- In Bulgaria, support for the renewable energy sector. Ultra-efficient burners, fuelled by wood, sunflower seed pods and other biomass were introduced, with a payback of less than three years, and the additional benefit that locally-produced fuel is half the price of imported natural gas.

The World Bank has financed numerous energy- efficiency and EME- related projects in SEE and EECCA. Apart from the Bank's activities related to the Joint Implementation and CDM mechanisms under the Kyoto Protocol, it has also supported Energy Efficiency Funds in Bulgaria and Romania, the 'Danube River Enterprise Pollution Reduction Project' in Serbia, and an Energy Efficiency Project in Croatia. In addition, the World Bank has initiated and supported the National Pollution Abatement Facility (NPAF) in the Russian Federation ([5]).

The NPAF is a not-for-profit institution which has been operational now for more than 10 years. The NPAF manages a USD 60 million revolving fund, which co-finances investment projects in Russian industrial enterprises by providing soft loans at interest rates lower than those offered by the commercial market, and loan durations and grace periods longer than those offered by the private sector. The NPAF also manages the Russian Renewable Energy Program (RREP) and a GEF/UNDP project, 'Russian Federation — removing barriers for extraction and utilization of coal mine methane'.

The Nordic Environmental Finance Corporation (NEFCO) and Nordic Investment Bank (NIB) also finance CP and energy efficiency investments in Russia, Ukraine, and recently also in Belarus. NEFCO and NIB programs have been linked primarily to Norwegian CP and EE projects. An important feature of the Norwegian programme is that specific credit lines (providing soft loans) for identified CP, EST and energy efficiency projects are made available via NEFCO and NIB. In Moldova a small revolving fund (USD 40 000 capital for soft loans) for CP/EST investments was created using Norwegian support.

A number of international financing institutions which operate EECCA and SEE do have specialised financing lines for EME-related projects (Box 4.8). These mechanisms usually target large-scale investments which are viable only in large companies, or in a few cases, through existing local financial intermediaries.

Overall, financing for CP/EST investments is very limited in EECCA countries as in most SEEs, especially for SMEs. Exceptions to this are to some extent Croatia and Russia where subsidised finance is more readily available through various channels. Whatever financing is available, it is easy to secure for energy efficiency projects.

4.3.3 Role of donor-funded EME programs

Donor-funded demonstration projects have played a significant role in initiating and promoting environmental management in enterprises in SEE and EECA countries since the mid-1990s. The following overview focuses on the main donor programs in operation in the period since the 2003 Ministerial Conference in Kiev ([6]).

UNIDO activities

Traditionally UNIDO has had a large CP project portfolio, including related EME services. A central component of these activities is the

([5]) www.npaf.ru
([6]) For an overview of EME activities before 2003, check the publication of the EAP Task Force (OECD, 2003a).

UNIDO/UNEP worldwide network of Cleaner Production Centres. Selected UNIDO projects in EECCA and SEE countries during the period 2003–2006 include:

- The Transfer of Environmentally Sound Technology in the Danube River Basin project, financed by GEF, UNIDO and the Hungarian and Czech Governments (total budget: USD 1.25 million, see UNIDO 2005a and UNIDO 2005b for more details). Among the countries covered in this report the project included only Croatia, but in the wider SEE region it also involved Romania and Bulgaria.

- In Uzbekistan UNIDO facilitated the establishment of a new CPC. The Uzbek CPC provided training, CP assessments and advice on implementing EMS in industry and information on EST.

- In the Russian Federation UNIDO continued support to its two national CPCs (North West International Cleaner Production and Environmental Management Centre in St. Petersburg and the National Environmental Management and Cleaner Production Centre for the Oil and Gas Industries in Moscow).

- The Croatian CPC was involved in various UNIDO activities. One of these aimed at promoting the concept of CSR in Croatian industry. The project developed a conceptual framework for a Croatian CSR policy and disseminated a practical methodology with supporting tools that SMEs in Croatia can use.

- UNIDO is planning to establish a new CPC in Armenia and in Serbia and/or Montenegro. The proposed Armenian CPC would focus on provision of CP and EST services (and related capacity building), primarily in the food and chemical sectors. Future UNIDO assistance to Armenia would also focus on CP and waste management, including hazardous waste management, energy efficiency and renewable energy development.

Norwegian government EME programme

One of the most comprehensive EME programmes implemented in the EECCA and SEE regions in recent years has been financed by the Norwegian government ([7]). A wide range of activities and projects has been implemented, including:

- CP, energy efficiency and energy audit services in industry and buildings;

- financing services related to CP, EST (including energy efficiency) and greenhouse gas abatement projects;

- energy efficiency market studies;

- EMS services;

- capacity building and training related to CP, energy efficiency and financing services;

- information exchange and development of websites.

During the years 2003 to 2006 such work was carried out in Azerbaijan (see Box 4.9), Bulgaria, Croatia, Georgia, Kazakhstan, Kyrgyzstan, Moldova, Romania and the Russian Federation.

The Norwegian programme also established and supported many Cleaner Production and Energy Efficiency Centres in the EECCA and SEE regions. Interestingly, the Norwegian programme has worked on cleaner production and energy efficiency not only in large companies but also with a strong focus on SMEs.

EU initiatives

The EU has supported several EME-related projects in the EECCA and SEE countries. Within the TACIS framework, EU provided EUR 1.5 million between 2003 and 2005 for a CP programme in Georgia, Kazakhstan and Moldova ([8]). The work included CP demonstration projects in selected industrial companies, creating basic CP capacity in CP Centres in the three target countries, and raising the awareness of governmental decision-makers. A sizeable part of the project budget was used to implement environmental improvements in the participating companies.

At the end of 2005 it was agreed to launch an EU-Russia Environmental Dialogue to implement the environmental priorities of the EU-Russia Common Economic Space road map. At a first meeting of the Permanent Partnership Council on Environment in October 2006, it was agreed that an EU-Russia Dialogue should be launched on Cleaner Production and Pollution Control. Several other environmental issues were chosen in addition to CP. The EU-Russia Dialogue on Cleaner

([7]) Norwegian EME programme: www.ensi.no; www.tekna.no; www.energy-links.com, www.barentsenergy.org. Related financing activities and credit lines: www.nib.int and www.nefco.fi.
([8]) www.cpnis.karec.kz/eng.

Box 4.9 Developing production efficiency in old oil wells of the Absheron Peninsula in Azerbaijan

The project was initiated by a group of engineers who participated in the CP programme organised by the CPEE Centre of Azerbaijan and TEKNA in 2006. It aims to improve ecological and economical aspects of oil production by switching from gas-lift technology to more modern down-hole pumping equipment. The equipment is intended to be installed in 20 offshore oil wells at the Absheron Bank oil field, with an annual production capacity of 17 000 tonnes/year. The initiative is taking place in the state-owned oil-gas production company ABSHERONNEFT, which currently has 2400 employees and a production capacity of 450 tonnes of petrol and 100 000 m^3 of gas per day. The annual capacity is 160 000 tonnes/year of oil and 36 000 000 m^3/year of gas.

Consumption and cost structure of the existing gas-lift technology	Consumption and cost structure of a new down-hole pumping equipment technology
• Gas: 6 000 000 m^3/year; USD 95 700 (all gas is lost in the technological cycle) • Diesel fuel: 220 tonnes/year; USD 79 570 • Lubricants: 4 tonnes/year; USD 1 608	The use of the gas-diesel equipment 'Kubota' (KNG 3200) would allow for the following savings: • Savings from gas not used: 4 600 000 m^3/year; equivalent to USD 74 000 • Increased oil production: 5 110 tonnes/year, equivalent to USD 751 170 • Savings from diesel fuel not used: 220 tonnes/year, equivalent to USD 86 900 Total savings: USD 912 070 for all 20 wells.

The total cost for implementing this investment has been estimated at USD 418 280, with an estimated payback period of six months. Currently, a detailed technical and financial proposal is being prepared to implement the project.

Source: Information provided by the CPEE Centre of Azerbaijan to the author.

Production and Pollution Control will be led by DG Environment and the Russian Ministry for Natural Resources.

The EU and Russia also co-operate on the environment in the context of the Northern Dimension which addresses the specific challenges and opportunities arising in north western Russia, the Baltic Sea and the Arctic Sea region. The Northern Dimension Environmental Partnership (NDEP) is a partnership of the European Commission, several EU Member States, Russia, Norway and IFIs (EBRD, EIB, NIB, World Bank), to leverage environmental investments with a focus on north western Russia. The TACIS programme has contributed EUR 30 million towards non-nuclear projects under the NDEP Support Fund.

Other donor activities

Selected additional donor-funded projects include:

- The Barcelona-based Regional Activity Centre for Cleaner Production (an institution established under the Barcelona Convention) has held training seminars on pollution prevention in the food sector (2005) and on prevention of toxic and hazardous industrial waste (2006). Both seminars involved experts from Albania, Bosnia and Herzegovina and Serbia and Montenegro. RAC CP, in cooperation with the Center for Environmentally Sustainable Development in Bosnia and Herzegovina, has also organised CP assessments in various industrial firms in Bosnia and Herzegovina.

- The Austrian Development Agency has financed an EcoProfit project in Timisoara, Romania (2005–2006). A special feature of the EcoProfit approach is the project's focus on one city and close links with the city authorities. Apart from CP and EMS, the project included on-the-job training for local CP service providers (consultants).

- CP activities were carried out under the umbrella of the Basel Convention, including training on waste minimization for experts

from SEE countries and from Belarus, Russia and Ukraine.

- In Kazakhstan the project known as the 'Use of preventive methods in selected companies dealing with transfer of Czech technology and know-how' was implemented 2003–2005, funded by the Czech Republic.
- Until 2006 when the programme was finalised, the USAID sponsored the EcoLinks project (see www.ecolinks.org) which facilitated technology transfer of US technology to Bulgaria, Croatia, Kazakhstan and Romania.
- Sweden, Switzerland and the United Kingdom have bilaterally supported a number of EME-related projects in SEE and EECCA countries, focusing on energy efficiency, training and capacity building, and policy development.

4.4 Conclusions

Despite continued efforts to reform the regulatory framework, progress in implementing environmental management in enterprises in EECCA and SEE countries has been limited. However, the macroeconomic situation of industry has been improving in recent years, and there have been a few local efforts to improve environmental performance (Box 4.10)

This concluding section provides an overview of barriers and opportunities for environmental management in enterprises in EECCA and SEE. There is much room for mutual learning and regional

Box 4.10 Recent EME-related initiatives of the Ukrainian government

1) As part of the 'Industrial and Consumption Waste Use Program 2005', later extended until 2006, the Ministry of Industrial Policy provided waste treatment technology for ferrous and non-ferrous metallurgy, chemical industry, machinery, and households. In 1998–2005, more than 40 projects were implemented, 37 of which received state budget funding equal to 6.97 million grivna (approximately USD 1.4 million).

2) The Ministry of Nature Protection is currently developing draft amendments to the law on State Task Programmes with the objective to develop a state policy on cleaner production and include CP considerations into task programmes across all sectors of the economy.

3) Following the objective of minimizing environmental pollution, state-owned companies under the Ministry of Industrial Policy are implementing activities for the modernization of technological processes. These activities are either self-financed or financed by investors. Examples include:
   - The Alchevsk Metallurgical Plant and Alchevsk 'Koksohim' are participating in a pilot project supported by EBRD initiated in 2003 by their strategic investor the Industrial Union of Donbass in collaboration with the companies Duferco (Switzerland) and Voest-Alpine Industrieanlagenbau (Austria). The project with a budget of USD 360 million is to be completed in 2009, and activities include installations for burning waste-gases instead of natural gases.
   - The Alumina Refinery of Nikolaevsk introduced environmental monitoring and was ISO 14001 certified.

4) The Ministry of Industrial Policy backed the World Bank's offer to provide financial support to projects on the modernization of technological processes in various sectors of the economy through the Policy and Human Resource Development (PHRD) Fund and Industrial Development Fund (IDF) grants. As part of these activities, the Government of Ukraine agreed to sell excessive greenhouse gas emission quotas in accordance with the Kyoto Protocol. These initiatives are expected to improve energy-efficiency and environmental performance of mining, metallurgical, chemical and other industries.

5) The Ministry of Industrial Policy prepared a Programme on Developing Bio-diesel Production until 2010, which was adopted by the Cabinet of Ministries on 21 December 2006 with a view to enhancing the environmental aspects of agricultural production.

Source: Reply of the Ministry of Nature Protection to the UNEP SCP questionnaire.

experience transfer, in spite of the contrasts among the countries. The problems they face are often similar, and so there may also be common solutions.

Barriers

- The environmental policies and regulatory framework remain inadequate to address environmental issues in industry. The principal weaknesses include ineffective permit and charge/fine systems, gaps and inconsistencies in regulations, unrealistic standards, weak enforcement, and little compliance promotion.

- Data about pollution and resource use in industrial companies are not systematically collected or compiled, even though environmental inspectorates in most countries already collect such data as part of the permit/charge/fine systems. Better availability of data on emissions and resource use is essential for the adoption of more realistic and effective environmental policies in industry.

- Improving environmental performance is usually not considered a priority by company managements, and general awareness about environmental issues remains fairly low. There are few examples of corporate social responsibility initiatives in the region. In addition, there is little pressure from consumers and public opinion.

- Investment in environmentally sound technologies is generally limited to large and export-oriented companies. Access to and affordability of commercial finance for EST investments remains problematic in most countries of the region, especially in the case of SMEs. There is very little preferential finance available for EME implementation, with the exception of financing for energy efficiency improvements, and those few financing sources supported by donors and some national environmental funds.

- Among the various services to support EME, only environmental management system (EMS) services are provided on a commercial basis. All other types of EME services (including cleaner production, environmentally sound technologies, capacity building) tend to be offered through donor-funded programs.

- At present, national markets to provide EME services on a commercial basis still do not exist in most countries of the region. This gap is partially filled by donor-funded initiatives, although some of those projects have been 'donor driven', where projects tended to convince companies that EME methods are more beneficial for them rather than focus on companies' priorities or demands.

- Although there have been a significant number of EME projects with a training and capacity building component (especially in cleaner production, energy efficiency, and EMS), there is still a shortage of qualified experts and consultants in most countries. Additional capacity building is necessary to help create a strong domestic market.

- Many categories of environmentally sound technologies have not yet been tested in the SEE and EECCA regions, and are not easily available via local markets.

Opportunities

- Based on the incomplete data available, there are signs of emerging decoupling between industrial emissions and the growth of industrial output in several EECCA countries. This could be the result of changes in production technology, installation of pollution control equipment, shifts in input and raw materials, or improvements in environmental regulations and enforcement. In reality, the reasons behind this trend are not clear and deserve further scrutiny.

- Steady growth has been experienced in recent years in most industrial sectors in SEE and EECCA, and industrial restructuring continues. Restructuring and ownership changes offer a window of opportunity for environmental management in enterprises, for instance, when company management changes, new investors emerge, companies are re-located or when technology needs to be modernised.

- International political support continues for sustainable consumption and production in general, and for environmental management in enterprises. In addition to donor-funded EME activities (e.g. in cleaner production or energy efficiency), there are also emerging examples of

projects funded under the Joint Implementation scheme within the Kyoto agreement.

- The continued reform of industrial pollution control legislation and related administrative and institutional structures may help develop more rational environmental policies for industrial management. One crucial aspect of such reform is improved enforcement. Environmental enforcement agencies should, among others, start to work with tools such as compliance promotion.

- Although little investment has been made across the board in modernisation of production technologies in most EECCA and SEE countries, this is expected to change as strong industrial growth continues and the companies need to compete for export markets. There is a sizeable potential for environmentally sound technologies and in particular for the use of renewable energy.

- For some export-oriented industrial companies (e.g. food, textiles) improved environmental management is a necessity for entering or maintaining their share of foreign markets. In those countries more advanced in transition, there is already an increasing demand from industrial companies for services related to EMS (ISO 14001) to meet environmental requirements in export and supply chains.

- Pollution and resource use intensities are still high in EECCA and SEE as compared to the EU, including the new Member States. Even taking into account that many economies rely heavily on those more polluting sectors, there is still a big potential for more efficient production, with less pollution and a smaller use of resources.

- Some countries may choose to pursue a strategy to make their environmental legislation conform to that of the European Union. Aligning local industrial pollution control legislation with the IPPC Directive would probably result in a wider adoption of the best available technique (BAT) approach, trigger investments in environmentally sound technologies, and generally boost demand for EME services.

- It would be useful to conduct an evaluation of the underlying reasons behind the emerging examples of decoupling between growth in industrial output and environmental emissions. A deeper understanding of the changes would help responsible actors to respond more effectively to challenges of dealing with industrial pollution. It also seems that many of those successful lessons could be repeated in a number of other countries in the SEE and EECCA regions.

All in all, the challenge for SEE and EECCA countries remains to address environmental management in enterprises more effectively on a strategic level. This includes improving capacity to understand and better respond to the issues at hand, strengthening and enforcing environmental regulations, providing industry with economic incentives to improve compliance, creating conditions for domestic provision of EME services on a commercial basis, and making preferential financing available to implement EME-driven investments.

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