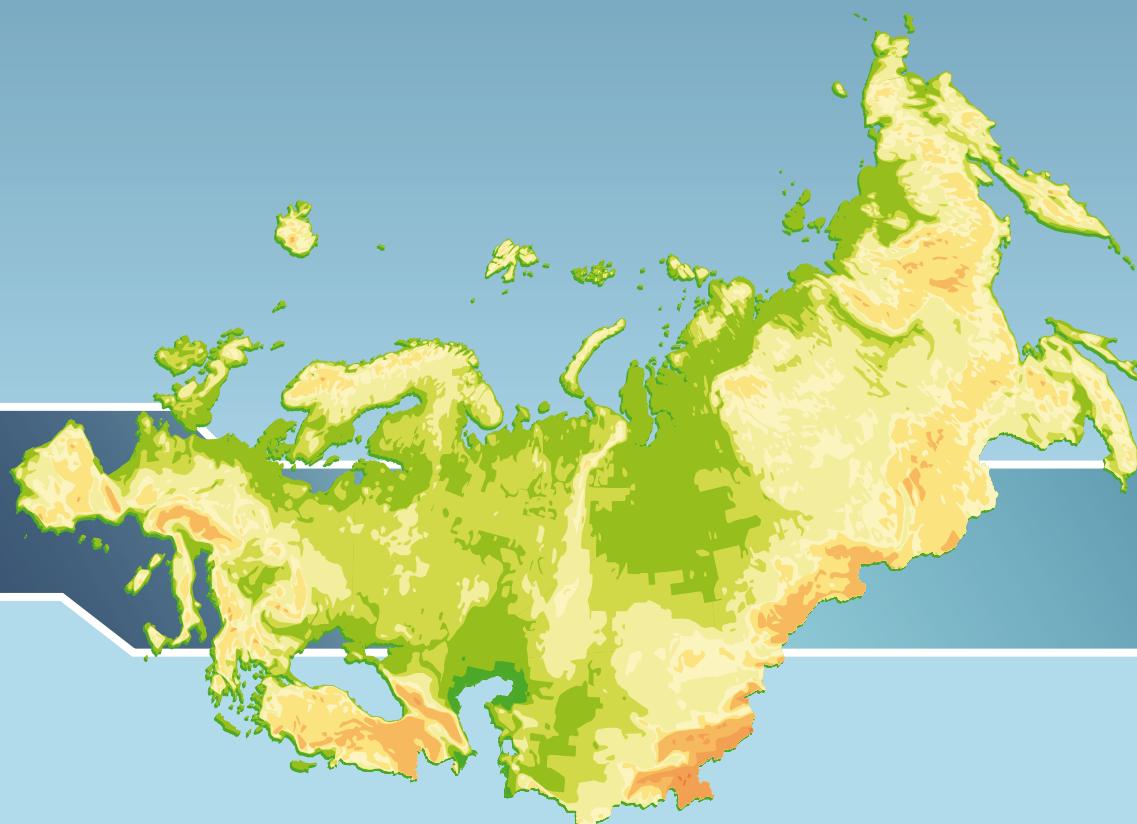


# Sustainable consumption and production in South East Europe and Eastern Europe, Caucasus and Central Asia

Joint UNEP-EEA report on the opportunities and lessons learned

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# Contents

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<b>Executive summary .....</b>	<b>5</b>
<b>Acknowledgements .....</b>	<b>11</b>
<b>1 Background, scope and methodology .....</b>	<b>14</b>
1.1 Introduction .....	14
1.2 Scope of the report .....	16
1.3 Data collection methods.....	17
<b>2 Broad trends in production and consumption .....</b>	<b>19</b>
2.1 Regional overview .....	20
2.2 Economic restructuring .....	20
2.3 Increasing international trade and impacts on production .....	21
2.4 Resource and energy consumption and greenhouse gas emissions.....	23
2.5 Economic growth, welfare and increasing inequality.....	26
2.6 Consumption by state and households .....	27
2.7 Socio-demographic trends with relevance for consumption .....	28
2.8 Household consumption patterns and environmental pressures .....	29
2.9 Ecological footprint .....	31
2.10 SCP perspectives for SEE and EECCA countries .....	32
References.....	33
<b>3 Policies supporting SCP .....</b>	<b>35</b>
3.1 Introduction .....	35
3.2 Evolution of the environmental protection framework .....	35
3.3 Examples of SCP-relevant policy instruments used in SEE and EECCA	36
3.4 Green Public Procurement .....	39
References.....	48
<b>4 Industry .....</b>	<b>50</b>
4.1 Introduction .....	50
4.2 Trends and current situation .....	51
4.3 Policies and implementation .....	58
4.4 Conclusions.....	70
References.....	72

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<b>5 Food .....</b>	<b>74</b>
5.1 Introduction .....	74
5.2 Trends, driving forces and impacts .....	75
5.3 Policies for sustainable food production and consumption .....	92
5.4 Conclusions .....	95
References.....	97
<b>6 Buildings .....</b>	<b>99</b>
6.1 Introduction, approach and SCP perspective .....	99
6.2 Trends, driving forces and impacts .....	101
6.3 Opportunities and policy initiatives .....	113
6.4 Conclusions .....	122
References.....	124
<b>7 Transport.....</b>	<b>127</b>
7.1 Introduction.....	127
7.2 Trends and current situation .....	128
7.3 Policy initiatives.....	141
7.4 Conclusions .....	146
References .....	150
<b>8 Waste .....</b>	<b>152</b>
8.1 Introduction.....	152
8.2 Trends and the current situation .....	153
8.3 Policy initiatives and innovative approaches .....	167
8.4 Opportunities for improving waste management .....	171
8.5 Conclusions.....	174
References.....	175
<b>9 Way forward.....</b>	<b>178</b>
Impact of socio-economic changes on SCP policies .....	178
SCP challenges in specific sectors .....	179
Existing opportunities for SCP initiatives .....	179
Remaining challenges .....	180
<b>Annex 1 Responses to the questionnaire survey on policies on sustainable consumption and production .....</b>	<b>182</b>

# Executive summary

## Purpose

This report was jointly prepared by the United Nations Environment Programme (UNEP) and the European Environment Agency (EEA) to support the development of sustainable consumption and production (SCP) policies and implementation activities in the countries of South East Europe (SEE) and Eastern Europe, the Caucasus and Central Asia (EECCA). The report was prepared for the Sixth Ministerial Conference 'Environment for Europe' held in Belgrade in October 2007.

The objective is to identify opportunities for and barriers to more sustainable consumption and production in the SEE and EECCA countries, and to highlight relevant experience which could be replicated throughout the region.

The main part of the report provides detailed information and a review of SCP initiatives in key production-consumption areas — industry, food, buildings, transport and waste. The analysis in each of these areas is illustrated by examples of implementation of SCP initiatives at local level, drawing on 18 city studies carried out for this report in 11 of the 18 SEE and EECCA countries covered.

## What is sustainable consumption and production?

Sustainable consumption and production is broadly defined as a holistic approach to minimising environmental impacts and maximising social benefits related to production and consumption. Considered a practical implementation strategy to achieve sustainable development, this approach addresses economy, society and environment.

Some key SCP policy challenges currently include: achieving a decoupling between economic growth and environmental deterioration, integrating life-cycle thinking in policy-making; improving the quality of life without increasing negative environmental impacts; and preventing the rebound effect, where growing consumption outstrips technology improvements and efficiency gains.

## Macroeconomic situation in EECCA and SEE

The 18 countries covered by the report encompass a vast area with widely differing economic, demographic and social situation and development trends. Populations, generally declining in the countries of Eastern Europe and SEE and growing in Central Asia, range from 2 million (former Yugoslav Republic of Macedonia) to 143 million (Russian Federation). GDP per capita varies by a factor of 10 between Tajikistan and Croatia.

Economic restructuring had a significant effect on all economies of the region during the first half of the 1990s. This effect was exacerbated by conflicts in SEE and the Caucasus and extended in some parts of EECCA by Russia's currency crisis in 1997/1998. Despite continuous economic growth since the late 1990s, catalysed largely by foreign investment and increasing prices of exported resources, by 2005 GDP in most countries had still not exceeded 1990 levels.

The structure of the economies in the region has changed significantly since the early 1990s. The share of services now exceeds 50 % in all economies in the Eastern Europe sub-group and in SEE. The agricultural sector has stagnated or declined in most countries and its share of GDP has shrunk throughout the regions. Industry has enjoyed growth in almost all countries since 1995. However, industrial growth in many countries has been predominantly due to the exploitation and processing of fossil fuels, metals and minerals at the expense of less energy- and resource-intensive manufacturing and light industry.

These structural economic changes may partially reflect shifts in domestic consumption patterns, but the strongest influence has been the growth in international trade. This has been characterised by the increasing export of raw materials from a number of resource-rich EECCA countries and a greater import of manufactured goods from other parts of the world.

In several EECCA countries, energy and material use has been decoupled from economic growth since the beginning of the decade. This has been partially due to structural changes in the economies and to increasing production efficiency in some sectors. However, the energy intensity of the EECCA economies remains significantly higher than in SEE and the EU.

CO<sub>2</sub> emissions per capita in the fossil fuel-rich countries of the region are comparable to, or higher than in, the EU despite much lower levels of economic activity. Other countries have very low CO<sub>2</sub> emissions per capita due to lower energy intensities, lower economic activities and high levels of renewable energy use.

### *Trends in household consumption*

In all countries of the region, household consumption expenditure exceeds government expenditure by a significant margin but remains far lower than consumption expenditure in the EU. In terms of purchasing power parity, the consumption expenditure of households recovered more rapidly than GDP and now exceeds 1990 levels in all sub-regions except Central Asia. While this has had a positive impact on the standard of living, it is also likely to have resulted in an overall rise in environmental impacts from household consumption.

The benefits of economic growth since the late 1990s have not been distributed evenly in SEE and EECCA countries. The gap between the wealthiest and poorest groups of society has increased, and there are also significant differences in incomes between urban and rural areas. In many EECCA countries and to a lesser extent, in parts of the SEE region, the share of the population living below the poverty line is still considerable and many, particularly in rural areas, do not have access to basic needs of clean water, clean fuel and sufficient food. On the other hand, there is a growing urban middle class and a small, but increasing, wealthy elite, who are rapidly adopting some of the less sustainable western consumption patterns.

Even though household consumption patterns vary widely across the region, food and clothing are the two categories that tend to dominate household expenditure in most countries. Other significant categories include housing and energy expenditure, home appliances, transport and communication. Two trends which are likely to have important implications for consumption patterns and resulting environmental pressures are the increasing levels of

urbanisation in all regions except Central Asia, and the ageing of populations which is most critical in Eastern Europe.

A comprehensive analysis of environmental impacts of household consumption has yet to be carried out in EECCA and the SEE countries. It is expected that life-cycle impacts of food, electricity, heating and hot water, and transport could be of greatest concern, although they are at the same time the sectors with potentially great benefits for the improvement of living standards.

### *Development of policies on SCP*

SCP requires an integrated approach to policy-making. The need to address both production and consumption issues calls for a broad participation of such different sectors as agriculture, energy, transport, development, industry, commerce, and economic and financial affairs.

While in Western Europe the SCP needs to address high levels of consumption, SCP policy and action in EECCA and SEE countries may need to concentrate more on improving efficiencies in production, consumption and resource use. Economic restructuring offers a unique opportunity to 'leapfrog' towards more sustainable production patterns and also to guide consumption patterns towards sustainability before consumption reaches the levels observed in Western Europe.

Social inequalities and lack of access to basic needs are other key focus areas of SCP in SEE and EECCA regions. These may in part be solved through economic growth, but they also require improved distribution of the benefits among the wider population.

Despite policy declarations, framework strategies or policies specifically targeting SCP have not yet been developed in EECCA and SEE countries. Possible reasons for this are that SCP has not yet reached a high priority on the political agenda and that there is weak inter-sectoral and inter-ministerial coordination. However, in most of the 18 countries covered in this report there are examples of SCP-relevant topics being tackled, albeit in an isolated fashion and lacking any overall coordination.

### *Green Public Procurement*

Considering the very large volume of public procurement (estimated to be between 5 % and 15 % of GDP, equivalent to 50 and 150 billion euro

annually across the 18 countries), significant environmental and economic benefits could be achieved through Green Public Procurement (GPP). This would include reduction of emissions and waste, an increase in energy efficiency, development of eco-industry and contributions to job creation. However, there has been very little progress in implementing GPP in EECCA and SEE countries, and the concept has received little attention so far. To realise the potential benefits, the challenge is to initiate GPP on both policy and operational levels.

#### *Environmental management in industry*

Industry is the first of the five thematic areas covered in detail in this report. Strong growth in industrial output was recorded in most of the region since the year 2000. In most countries pollution- and resource-intensive industrial sub-sectors (including oil, gas, metals and food processing industries) dominate industrial production.

Data on pollution and resource use in industrial companies, and specific data sets from the industry sectors are neither systematically collected at the nation-wide level nor published in EECCA and SEE countries. The absence of reliable data impedes the development of realistic, targeted and effective policies on environmental management in industry, and hinders the measurement of progress towards more sustainable industrial production.

Overall progress in environmental management in industry in EECCA and SEE countries has been limited. Among the various relevant services only the implementation of environmental management systems (EMS) is offered on a commercial basis. Other services supporting more sustainable production practices in industry continue to be provided primarily through donor-supported programs.

Examples in this report show that a significant number of case studies and demonstration projects on cleaner production, energy efficiency and, to a lesser extent, on eco-technology and related financing mechanisms are now available in most countries. These were mostly established through donor-funded programmes.

The challenges for all countries of the EECCA and SEE regions include:

- addressing environmental management in enterprises on a strategic level;
- improving compliance with relevant legislation;

- promoting market-based provision of relevant services;
- ensuring that financing mechanisms exist which favour implementing eco-efficient technologies.

#### *Food production and consumption*

The second area of detailed analysis in the report – food – is fundamentally a quality-of-life issue. Production of food decreased significantly in EECCA countries during the early to mid-1990s and this, combined with decreasing imports of food, led to high incidence of undernourishment in some areas. Consumption of high-cost foods (meats and dairy products) was particularly affected. Economic recovery since the late 1990s has increased access to food for many households and consumption of almost all food groups has been growing steadily. Malnutrition rates have mostly declined, but in some countries remains an important social problem.

Food and environment are closely interlinked: environmental deterioration limits food production capacity, while unsustainable food consumption and production patterns cause environmental damage. Agriculture accounts for most of the environmental impacts of the food production and consumption cycle. Food processing, packaging, transportation and storage and related energy use and wastes also play substantial roles.

The transition period saw a reduction or stagnation in agricultural and food production activities in much of the region, accompanied in EECCA by a strong decline in the use of fertilisers and pesticides. Food production has partially recovered in EECCA but remains lower than pre-transition levels in all but three countries. In much of SEE food production has been declining since the late 1990s. The use of pesticides and fertilisers remains very low in EECCA but has been rising in SEE.

Despite low current inputs to agriculture, the agro-environmental problems of salinisation, soil erosion, and contamination of surface waters continue. This is largely the result of poor management of irrigation, lack of collection and treatment of manure from livestock and other sub-optimal management practices. It is expected that livestock numbers and intensification of agriculture will increase with further economic growth which could exacerbate the situation.

Privatisation processes and globalisation of markets have stimulated foreign investment in the

food sector and both imports and exports of food have been increasing steadily, leading to a growth in environmental pressures from transportation. Growing consumption of processed and packaged food along with increasing use of private cars for food shopping in and around cities, are household trends that add to food-related pressures. Household waste generation is growing across EECCA countries, and a large part of this growth is in food-related waste.

Market reforms have been the main driver of changes in food production in EECCA and SEE countries, and much remains to be done to integrate environmental concerns into agricultural and animal production policies. The last few years have seen the emergence of strategies in a few countries which integrate agricultural development with environmental protection and actions to address rural poverty. The adoption and implementation of similar strategies throughout the regions would bring about significant environmental, social and economic benefits.

A wide range of food and food safety policies has been introduced in EECCA and SEE countries, but implementation has not always been consistent.

Finally, there are significant opportunities for promoting organic farming in SEE and EECCA countries, given the low level of pesticide and fertiliser use, the significant share of small farms, and the availability of agricultural labour. Yet strong challenges remain for the development of organic farming. Organic certification schemes still need to be adopted in most of EECCA. There is generally low public awareness of organic products, little advice and support available to farmers, and an absence of well-defined policies and regulations.

### *Residential, public and commercial buildings*

Buildings account for a large part of the material and energy use of SEE and EECCA economies. Energy consumption in buildings typically represents one-third of national total energy consumption.

Annual residential energy consumption per capita varies from 11 000 kWh in Russia to just 600 kWh in Armenia. Differences between greenhouse gas emissions per capita are even higher. High energy consumption in Eastern Europe and parts of Central Asia is due in part to cold climates, but is also the result of the availability of cheap fossil fuels, low thermal efficiency of buildings, and

widespread but inefficient district heating and distribution systems. Per capita water consumption for domestic purposes is also high in most cities in both SEE and EECCA regions. There are limited economic incentives for urban householders to reduce heat and hot water consumption due to the lack of metering and payment by use, artificially low tariffs, and lack of information on how to reduce the consumption of energy and water.

The current construction boom presents an opportunity to improve the thermal efficiency of new building stock. Examples in this report show that retrofitting the dominant, old, low-efficiency multi-apartment buildings also offers a significant potential for reducing environmental impacts and spreading significant social benefits by making possible affordable heating for low income families. Widespread district heating systems could bring about environmental benefits through greater use of combined heat and power generation and the use of biomass or waste to replace fossil fuels, provided that the necessary modernisation of distribution systems takes place.

Current appliance ownership is low in many parts of EECCA and SEE, but is expected to increase as incomes rise. In those SEE and Caucasus countries with abundant hydro-electricity, electricity use for heating and hot water is widespread. Where new hydro capacity is limited, increasing electricity demand for appliances could be more sustainably met by switching to solar or geothermal energy for heating and hot water supply.

Many countries have established energy efficiency strategies, but fewer have translated them into concrete action. Institutional capacity and the political will to ensure their implementation is uneven. Examples in the chapter show that policy instruments recently used in some countries include: new thermal building standards; building energy auditing and labelling; metering installation programmes; tariff reform; and economic incentives to promote use of combined heat and power plants. Sustainable heating strategies, energy labelling, minimum standards for appliances, and economic instruments promoting energy efficiency are generally lacking. In addition, recycling and reuse of construction and demolition waste could significantly reduce the demand for resources in the construction of buildings.

A large number of local initiatives on improving energy efficiency in residential, public and commercial buildings have been carried out in cities in EECCA and SEE, often with international

funding. Barriers to their wider adoption — despite reasonable payback periods — include lack of available financing, low payment discipline for energy services, and lack of locally available affordable efficiency technology.

### Transport sector

Following a deep decline in the 1990s, levels of freight and passenger transport have been growing since 2000. Despite a few exceptions, the use of transport has not yet returned to the levels of the early 1990s. Economic recovery, with its increased levels of production and import and export of goods, is a key factor behind the growing transport activity.

Greater individual wealth has led to greater demand for passenger travel, both for the purposes of employment and for leisure. Private car ownership is rapidly increasing, particularly in SEE and Eastern European countries, stimulated by the desire for increased private mobility and because of deteriorating public transport services.

Transport infrastructure in the regions has suffered from a lack of investment. Public transport especially has been affected by declining investment and a sharp decrease in state subsidies. Attracting investment for infrastructure development has proved to be easier for major roads than for either local roads or for public transport. In urban areas some authorities are reallocating road space previously used by public transport to cater for the increases in private mobility.

The greater use of transport has been accompanied by an increase in energy use and emissions of greenhouse gases as well as other pollutants. The latter are causing considerable air quality problems in many cities, exacerbated by old and poorly maintained vehicle fleets. Some progress is being made in addressing these problems, but there is plenty of scope for further regulatory and economic measures to ensure that new vehicles are cleaner, and that existing vehicles are maintained properly. Consideration might also be given to actively phasing out older, more polluting vehicles.

Progress has been made in improving the quality of transport fuel, e.g. banning leaded petrol in most countries. However, insufficient use is generally made of regulatory and economic instruments to reduce the adverse environmental and social impacts of transport, and little attention is paid to measures to manage the demand for transport. The

use of public transport can be encouraged by wider use of demand-management measures, such as dedicated lanes for buses and trams.

Case studies in the chapter demonstrate that the countries of SEE and EECCA are beginning to put in place the strategic policy and institutional frameworks to address some transport-related problems. Nevertheless, environmental and transport concerns are still not well integrated with each other and with spatial planning.

Given the still moderate levels of private transport use and car ownership and the need for modernisation of transport systems, there are opportunities for the SEE and EECCA countries to avoid the widespread transport problems of developed western countries. A coordinated and integrated approach needs to be taken to ensure that the benefits of all transport modes — from private car use, to public transport, cycling and walking — are recognised and maximised.

### Waste management

Waste management is the fifth area covered in detail in the report. Total waste generation in EECCA and SEE countries is high, mostly because of large-scale resource extraction and processing.

Total waste generation per capita in EECCA is 14 tonnes per year compared with 4 tonnes in the EU. There are massive differences between individual countries in total waste generation.

Significant amounts of hazardous waste are generated, but only a small fraction is managed in an environmentally safe manner. This adds to the already existing problems of many legacy hazardous waste dumps in the region.

Amounts of industrial and municipal wastes are increasing as economies grow and the level of wealth rises. However, municipal waste still accounts for a small part (up to 5 % in EECCA and 20 % in SEE) of total waste generated, and the per capita levels are much lower than in Western Europe.

Almost all municipal waste is landfilled. Most landfills are in a poor technical condition, and very few have collection of landfill gases and leachate. Moreover, significant amounts of municipal wastes are disposed of in illegal or unprepared sites.

Some industrial waste is recycled, in response to economic demand for their resources. Incineration

or recycling of municipal waste is not common. Current reuse and recycling of demolition and building waste is very low. There are few comprehensive attempts to implement waste prevention strategies.

While there is considerable potential and a need for more sustainable solutions to waste management, in general only limited improvement has taken place over the last several years. However, case studies in the chapter show examples of encouraging initiatives in some countries, including the recent development of hazardous waste strategies, and gradual improvements in landfill and waste collection infrastructure. Some successful waste management programmes have been implemented at municipal level.

In many municipalities the waste management systems have yet to be modernised. Increasing public participation to ensure proper municipal waste management and higher rates of recycling and reuse remains a challenge. It is also important to stimulate industries to take advantage of opportunities in recycling and resource recovery.

Development of waste strategies or action plans, better enforcement of legislation and introduction of financial incentive mechanisms for waste management are necessary to achieve more SCP-oriented waste management. At institutional level, strengthening of the political commitment, and improved coordination and cooperation among the different authorities responsible for waste are essential.

### *The way forward*

The on-going economic and social restructuring in the region provides a unique opportunity to establish more resource-efficient, safe and sustainable production patterns and, at the same time, improve the quality of life. Some elements of the 'legacy of the past' can support a society with more sustainable production and consumption patterns. These include the widespread existence of district heating systems, extensive railway infrastructure, relatively widely used public

transport or reuse and recycling systems. Low use of synthetic fertilisers and pesticides in agriculture opens good prospects for organic food production. In the building sector the current construction boom presents an excellent chance to improve the thermal efficiency of new building stock.

There are many promising opportunities for EECCA and SEE countries to 'leapfrog' and avoid many of the production- and consumption-related problems common in Western Europe. But this will require political commitment to ensure appropriate policy development, including regulatory frameworks, economic incentives, and integrating environmental concerns into sectoral policies.

The keys for future success of SCP policies include: development of national SCP strategies and programmes reflecting the country's priorities and with focus on the improvement of quality of life; strengthening institutional capacity for SCP; and raising public awareness about SCP. One critical factor is building the capacity and knowledge to allow the actors not only to recognise and understand the problems, but also to choose the best way to respond to the specific SCP challenge.

Policy action should not only focus on technological aspects. Experience shows that technology alone will not be the solution because of the rebound effect, where despite increases in efficiency of products and services, a resulting reduction in cost and an increase in consumption eats into the energy and material savings.

In conclusion, there are numerous opportunities for regional cooperation and the sharing of experience in implementing more sustainable consumption and production. To some degree this is a result of the common language. As the case studies in this report show, the key factor is that many countries face similar problems, which may well have similar solutions. Many successful initiatives have been implemented at local level, especially in such areas as energy efficiency for buildings, the transport sector, and municipal waste management. These could be shared and possibly replicated throughout the SEE and EECCA countries.

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- Chapter 5: Elena Cebrian Calvo and Peter Kristensen (EEA);
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- Chapter 7: Peter Wiederkehr (Lebensministerium, Austria), Elisa Dumitrescu (UNEP);
- Chapter 8: Nino Antadze, Tamuna Gugushvili, Kohei Watanabe (Teikyo University), Thomas Weissenbach (Umweltbundesamt, Austria),

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Valuable suggestions on the concept and the contents of this report were made by participants of the ANPED Annual General Meeting (Kiev, Ukraine 2006).

Lastly, the authors wish to extend their thanks to the SEE and EECCA governments and many individuals who provided comments and suggestions as part of the public consultation of the draft report. Extensive consultation on the English and Russian versions of the report took place during May and June 2007.

# 1 Background, scope and methodology

## 1.1 Introduction

Unsustainable patterns of production and consumption are recognised as one of the major contributors to environmental problems, including climate change, degradation of natural resources and loss of biodiversity, and environmental impacts caused by emissions and waste.

The challenge of achieving sustainable consumption and production (SCP) patterns has been addressed at global level since the 1992 United Nations Conference on Environment and Development in Rio de Janeiro. Ten years later the Johannesburg World Summit on Sustainable Development in 2002 recognised that:

*fundamental changes in the way societies produce and consume are indispensable for achieving global sustainable development.*

All governments were invited to promote sustainable consumption and production, and the Johannesburg Plan of Implementation called for the:

*development of a 10-year framework of programmes in support of regional and national initiatives to accelerate a shift towards sustainable consumption and production patterns that will promote social and economic development within carrying capacity of ecosystems.*

In the follow-up, the so-called 'Marrakech Process' was launched at the first international meeting on the 10-year framework held in June 2003 in Marrakech, Morocco. The process is intended to strengthen international cooperation, increase exchange of information and facilitate the implementation of national and regional SCP programmes.

Sustainable consumption and production will be one of the key focus areas of the UN Commission on Sustainable Development's round of meetings in 2010 and 2011.

At the Fifth Ministerial Conference 'Environment for Europe' in Kiev in 2003, the European Environment Ministers recognised:

*the importance of a shift towards sustainable production and consumption patterns' and committed themselves to 'encourage regions, sub-regions and countries as appropriate, to devise programmes to accelerate this shift.*

Since then, work has been carried out in the European Union to analyse consumption and production patterns and their effects on society and the environment. The European Commission (EC) is to propose an SCP Action Plan for the EU during 2007. Several European Union countries have also developed Sustainable Consumption and Production strategies and action plans. On the other hand, SCP has still to be placed on the political agenda in much of South East Europe (SEE) and Eastern Europe, the Caucasus and Central Asia (EECCA).

This report, jointly prepared by the United Nations Environment Programme (UNEP) and the European Environment Agency (EEA) for presentation at the Sixth Conference of European Environment Ministers in Belgrade in 2007 (hereafter Belgrade Conference), is intended to support the development of SCP policies and implementation activities in SEE and EECCA. It provides detailed information and analysis of key thematic issues from an SCP perspective and identifies opportunities to achieve greater sustainability within these sectors.

The EEA has prepared an assessment of the state of the environment in the pan-European region for the Belgrade Conference. This includes a chapter on SCP, providing data and analysis throughout Europe at an aggregated regional level. In addition, the Organization for Economic Co-operation and Development (OECD) has compiled an overview of progress in implementing environmental policies in the EECCA region. This joint UNEP-EEA initiative will complement those two reports, by providing

more detailed information on the status of SCP implementation in EECCA and SEE countries, and an analysis of policy relevant to cross-sectoral SCP issues. In addition to country-level and regional (i.e. country-grouping level) analysis, the report also includes examples of activities on the local level. Eighteen city-based studies were carried

out to support this report, illustrating more detailed SCP issues and providing examples of implementation practices at the local level. The report can provide an input to the development of regional and national strategies and implementation mechanisms under the Marrakech process.

**Box 1.1 Sustainable consumption and production – implementation strategy for sustainable development**

Sustainable consumption and production is a holistic perspective on how society and the economy can be better aligned with the goals of sustainability. Sustainable consumption and production (SCP) has been defined as:

*a holistic approach to minimizing negative environmental impacts from the production-consumption systems in society. SCP aims to maximise the efficiency and effectiveness of products, services, and investments so that the needs of society are met without jeopardizing the ability of future generations to meet their needs* (Norwegian Ministry of Environment, Oslo Symposium, 1994).

SCP is a practical approach to achieving sustainable development which addresses the economy, society and environment.

SCP aims to reduce emissions, increase efficiencies and prevent unnecessary wastage of resources within society, through the stages of material extraction, investment, production, distribution, consumption, to waste management. In addition to these environmental and economic goals, the social component is concerned with equity within and between generations, improved quality of life, consumer protection and corporate social responsibility. Some key principles and challenges include:

- i) improving the quality of life of populations without increasing environmental degradation, and without compromising the resource needs of future generations;
- ii) decoupling the link between economic growth and environmental degradation, by
  - reducing the material intensity and energy intensity of current economic activities and reducing generation of emissions and waste during extraction, production, consumption and disposal
  - encouraging a shift of consumption patterns towards groups of goods and services with lower energy and material intensity without compromising quality of life;
- iii) applying life-cycle thinking (Box 3.5), which considers the impacts from all life-cycle stages of the production and consumption process and guards against unforeseen shifting of impacts from one life-cycle stage to another, from one geographical area to another, or from one environmental medium to another;
- iv) guarding against the rebound effect, where technological efficiency gains are cancelled out by resulting increases in consumption.

Cross-cutting in character, SCP needs the active involvement of all stakeholders and a wide range of locally-adapted policy responses. These can range from introduction of more eco-efficient technologies, holistic policy approaches which combine regulatory frameworks, the use of economic instruments, dissemination of environmental information, development of physical and social infrastructure and improved education and public awareness.

## 1.2 Scope of the report

### Objectives and geographic coverage

In order to map out SCP activities in the SEE and EECCA regions, and to support the implementation of SCP activities in countries, this report sets out to:

- provide an overall picture of the current state and recent trends in consumption and production patterns in EECCA and SEE, focusing on the key thematic issues from an SCP perspective, including selected economic sectors with high environmental impacts;
- identify key existing policies aimed at reducing the environmental impacts of these activities while maintaining their economic viability;
- discuss options for achieving more sustainable consumption and production patterns, including opportunities presented by behavioural and infrastructural characteristics; and
- review existing economic, social and institutional barriers to the realisation of these opportunities, and to provide information on on-going and completed initiatives aimed at overcoming these barriers.

The report's geographical coverage extends to the regions and countries in the Table 1.1.

Serbia and Montenegro are considered as separate countries, even though until 2006 data were jointly reported for Serbia and Montenegro. Bulgaria and Romania, which joined the European Union in January 2007, are used in some chapters as reference points for comparison. Comparisons are also made with other Member States of the European Union, or with the EU as a whole.

### Structure of the report

Chapter 2 sets the scene for further analysis by providing an overview of the economic, demographic

and social situation and trends which have relevance for SCP. Chapter 3 begins with a review of SCP policy developments in the region, followed by a more detailed discussion of current status and future prospects for Green Public Procurement, the policy instrument considered effective in stimulating more sustainable government consumption patterns. Chapters 4 to 8 look in more detail at the developments in five key theme areas relevant for SCP in the region: industrial production, food production and consumption, residential, public and commercial buildings, transport services, and waste generation and management. The chapters consider the relevance of each theme to SCP, current status and trends, resulting environmental and social impacts, and the status of SCP-relevant policies related to the theme. In addition, opportunities for greater sustainability are examined, and positive initiatives presented. Barriers to the spreading of positive initiatives are investigated and options for breaking down these barriers are suggested. Finally, Chapter 9 concludes the report by identifying some possibilities for future work.

In chapter 2 and the five theme chapters, information and data are presented at sub-regional and country levels, where relevant. It is beyond the scope of the report to provide data on every indicator, individually, for every country within the two regions.

A number of theme chapters focus on implementation initiatives taking place in cities. There are several reasons for this approach:

- cities are increasingly becoming the driving engines of national economic growth and in much of the region urban populations are growing at the expense of rural populations (with the exceptions of Kyrgyzstan and Tajikistan);
- there is evidence that a growing wealthy urban middle class are beginning to adopt some of the more impacting consumption patterns of western European countries. At the same time cities typically show the greatest levels of social and economic disparity, and this disparity is increasing, putting the sustainability of cities under pressure;

**Table 1.1 Countries covered in this report**

South East Europe (SEE)		Albania, Bosnia and Herzegovina, Croatia, former Yugoslav Republic of Macedonia Montenegro, Serbia
Eastern Europe, Caucasus and Central Asia (EECCA)	Eastern Europe	Belarus, Republic of Moldova, Russian Federation, Ukraine
	Caucasus	Armenia, Azerbaijan, Georgia
	Central Asia	Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan

**Note:** Due to data collection practices prior to 2006, data is available for Serbia and Montenegro jointly.

- large cities can act relatively independently and, in the right circumstances, act as drivers for change and test-beds for sustainability initiatives;
- the opportunity for large-scale environmental and social gains may be greater in cities through more integrated and efficient spatial planning, investment in collective transport, the multi-apartment housing stock, energy services, waste collection and management, and the provision of environmental information to the public.

### 1.3 Data collection methods

A number of strategies have been pursued to gather data and look at case studies used in this report. These include:

- secondary statistical data sets and qualitative information available from international institutions which have been used for economic,

demographic and consumption overviews in Chapter 2, and for national and regional data and internationally-funded initiatives in the theme chapters. Sources include the European Environment Agency, the World Bank, the International Energy Agency, the Commonwealth of Independent States Statistics Committee, the UN Economic Commission for Europe, the UN Development Programme, the Organization for Economic Cooperation and Development, the World Health Organization, the European Bank for Reconstruction and Development and the UN Food and Agriculture Organization;

- the results of the 2006 EAP Task Force Secretariat questionnaire survey of the development of environmental policies in the EECCA countries, and the 2006/2007 UNEP survey where a questionnaire was sent to EECCA and SEE governments on policies and initiatives related to SCP. At the time of writing, 16 countries had provided a response to the UNEP survey.

#### Box 1.2 City studies carried out to collect information for this report

During autumn/winter 2006 UNEP and the EEA commissioned and coordinated 18 city studies in 13 cities, under the four theme areas of food, transport, building/housing and waste. The cities are spread throughout EECCA and SEE and represent 11 of the 18 countries covered by the report. These studies were carried out by local NGOs, researchers, and government agencies.

Theme	City	Country	Contributor
Transport	Tbilisi	Georgia	Ministry of Environment Protection and Natural resources (1)
	Almaty	Kazakhstan	Centre for Sustainable Production and Consumption
	Yerevan	Armenia	Ministry of Nature Protection
	Minsk	Belarus	Ivan Narkevitch
	Zagreb	Croatia	Green Action (ANPED)
Buildings and housing	Dnipropetrovsk	Ukraine	Youth Environmental League of Prydniprovye (ANPED)
	Minsk	Belarus	Institute of Regional and Urban Planning
	Ashghabat	Turkmenistan	Batyry Karryev
	Dushanbe	Tajikistan	UNEP NatCom
	Tbilisi	Georgia	CENN — Caucasus Environment network
Waste	Belgrade	Serbia	Young Researchers of Serbia (ANPED)
	Donetsk	Ukraine	EcoClub (ANPED)
	Tbilisi	Georgia	Green Association Alternative
	Dnipropetrovsk	Ukraine	Youth Environmental League of Prydniprovye (ANPED)
	Bishkek	Kyrgyzstan	Independent ecological expertise
Food	Belgrade	Serbia	Young Researchers of Serbia (ANPED)
	Kosiv and Ivano-Frankivsk	Ukraine	Green Dosier (ANPED)
	Ramenskoye	Russia	Aleksandra Mazurova

(1) Used as a background document for a workshop of the UNECE-WHO Transport, Environment and Health Pan-European Programme and funded by the Netherlands and Switzerland.

The results of both surveys have been used for policy analysis in chapter three and in the theme chapters;

- eighteen city studies commissioned by UNEP-EEA to support this report <sup>(2)</sup>, and carried out by local organisations and researchers (Box 1.2 and Map 1.1). The studies have made use of secondary data and information available in local languages including national and municipal policies and plans, publications of local statistics offices, independent reports, papers and PhD studies. In addition, city studies have generated new data through interviews with municipal departments, government enterprises, privatised
- the work on the report was carried out in cooperation with EECCA and SEE governments, and with contributions from cleaner production centres, NGOs, local authorities and researchers in the two regions. Extensive consultation on the English and Russian versions of the report took place in May and June 2007, with SEE and EECCA governments and individuals providing comments and suggestions how to improve the draft report.

**Map 1.1 Location of the 18 city studies carried out for this report**



<sup>(2)</sup> Selected city studies will be published on-line.

## 2 Broad trends in production and consumption

### Facts and figures

- The SEE and EECCA regions cover 16 % of the global land area, contain 4.7 % of the world's population, but generate only 2.4 % of the global GDP.
- Economic restructuring during the first half of the 1990s affected all economies of the region. GDP in most countries in 2005 remained lower than in 1990. Current growth in GDP is rapid, however.
- Share of the service sector has grown in all countries and now exceeds 50 % across Eastern Europe and SEE. The industrial sector has partially or fully recovered from the collapse of the early 1990s. The recovery has been dominated by the relatively polluting and energy-intensive extraction industries producing fuel and minerals for export.
- Despite improvements, energy intensities of most EECCA countries are still significantly higher than in the Member States of the European Union, while energy intensities of the economies of SEE countries are generally similar to the EU.
- Populations have declined significantly in Eastern Europe and SEE since 1995 but have grown in most of Central Asia. Every country is experiencing a declining percentage of children and an increasing proportion of persons over 65.
- Not all segments of the population have benefited from economic growth. The gap between the poorest and wealthiest groups of society is significantly higher than it was pre-transition. In much of EECCA, and to a lesser extent in SEE, the proportion of the population living below the poverty line remains significant.
- In all countries of the region, household expenditure by far exceeds government expenditure and is growing rapidly. Consumption expenditure of households now exceeds 1990 consumption expenditure levels in all sub-regions except Central Asia. Household energy use, private transport and food are likely to be those consumption categories leading to greatest environmental pressures.
- The ecological footprint per capita exceeds sustainability limits for at least half the countries of the regions.
- Whereas in Western Europe much of the focus for SCP needs to address impacts arising from high levels of consumption, SCP policy and action in EECCA and SEE may need to be more weighted towards improving efficiencies of production, infrastructures and municipal services.

The EECCA and SEE regions covered in this report encompass a vast area of widely differing economic, demographic and social situations and development trends. To set the scene, this chapter

provides a brief economic and demographic background to the regions and outlines trends in production and consumption and related environmental pressures.

## 2.1 Regional overview

The two sub-regions cover 16 % of the global land area, contain 4.7 % of the world's population, but generate only 2.4 % of the global GDP. Table 2.1 gives a breakdown of population, land area and GDP for the countries covered by the report.

Differences among the countries are considerable. Population ranges from 2 million in the former Yugoslav Republic of Macedonia to 143 million in the Russian Federation, population density from 6 persons per km<sup>2</sup> in Kazakhstan to 128 persons per sq km in Moldova, and GDP per capita from 1 300

in Tajikistan to 13 200 dollars per capita purchasing power parity (PPP) in Croatia. The greatest differences among countries are in their size, ranging from fewer than 30 thousand square kilometres in Albania, Armenia and the former Yugoslav Republic of Macedonia, to 2.7 million square kilometres in Kazakhstan and 16.4 million square kilometres in the Russian Federation.

## 2.2 Economic restructuring

Economic restructuring during the first half of the 1990s had a significant effect on all economies of the

**Table 2.1 Area, population and GDP (2005)**

	Population	Land area	Population density	GDP purchasing power parity (PPP)		Agricultural land use*		
	Million	Thousand sq km	People per sq km	Thousand million constant 2000 int. USD	Thousand constant 2000 int. USD per capita	Thousand sq km	% of total land area	Sq km per 1 000 population
<b>Eastern Europe</b>	<b>204.2</b>	<b>17 201</b>	<b>12</b>	<b>1 758</b>	<b>9.6</b>	<b>2 684</b>	<b>16 %</b>	<b>13</b>
Belarus	9.8	207	47	69	7.9	89	43 %	9
Republic of Moldova	4.2	33	128	7	1.9	25	77 %	6
Russian Federation	143.2	16 381	9	1 395	10.9	2 157	13 %	15
Ukraine	47.1	579	81	287	6.8	413	71 %	9
<b>Caucasus</b>	<b>15.9</b>	<b>180</b>	<b>88</b>	<b>68</b>	<b>4.8</b>	<b>92</b>	<b>51 %</b>	<b>6</b>
Armenia	3.0	28	107	14	5.0	14	49 %	5
Azerbaijan	8.4	83	102	42	5.6	48	58 %	6
Georgia	4.5	69	64	13	3.2	30	43 %	7
<b>Central Asia</b>	<b>58.2</b>	<b>3 927</b>	<b>15</b>	-	-	<b>2 828</b>	<b>72 %</b>	<b>49</b>
Kazakhstan	15.1	2 700	6	115	8.5	2 076	77 %	137
Kyrgyzstan	5.2	192	27	9	1.9	107	56 %	21
Tajikistan	6.5	140	46	8	1.3	43	30 %	7
Turkmenistan	4.8	470	10	-	-	330	70 %	68
Uzbekistan	26.6	425	63	48	2.0	273	64 %	10
<b>South Eastern Europe</b>	<b>21.7</b>	<b>262</b>	<b>83</b>	-	-	<b>128</b>	<b>49 %</b>	<b>6</b>
Albania	3.1	27	114	15	5.3	11	41 %	4
Bosnia and Herzegovina	3.9	51	76	27	7.6	21	42 %	5
Croatia	4.4	56	79	52	13.2	27	48 %	6
FYR of Macedonia	2.0	25	80	13	7.1	12	49 %	6
Serbia and Montenegro	8.2	102	80	-	-	56	55 %	7

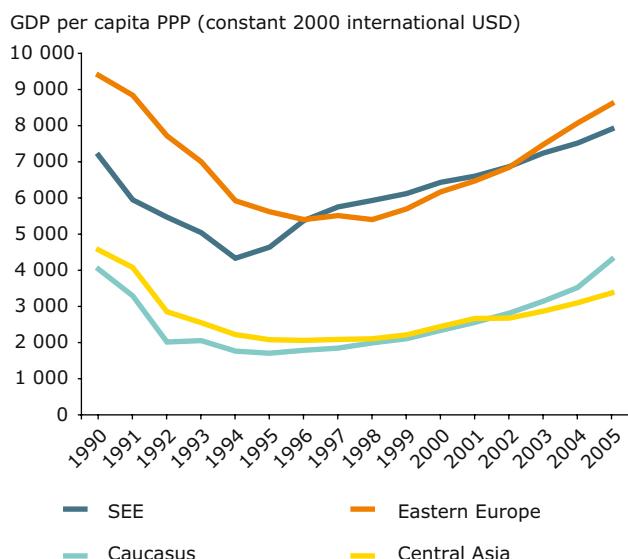
**Sources:** World Bank, 2006 and \* FAOSTAT, 2006.

regions, exacerbated by conflicts in SEE, the Caucasus and other areas. Russia's economic crisis of 1997/1998 caused a further decline in large parts of EECCA. Since the late 1990s economic growth has been rapid in all regions, running at around 4–5 % per year in SEE, 6–8 % per year in Eastern Europe and Central Asia and close to 10 % in the Caucasus (Figure 2.1). Nevertheless, in most countries, GDP remains lower today than it was in 1990 before the transition began. The exceptions are Albania, Azerbaijan, Belarus, Croatia, Georgia and Kazakhstan whose economies are between 17 % and 54 % larger than they were in 1990 (World Bank, 2006).

Growth since the mid-1990s has not occurred evenly across the economic sectors. The industry and service sectors grew in all but one country, while agricultural growth has been limited or even negative in most countries (see Figure 2.2 for details).

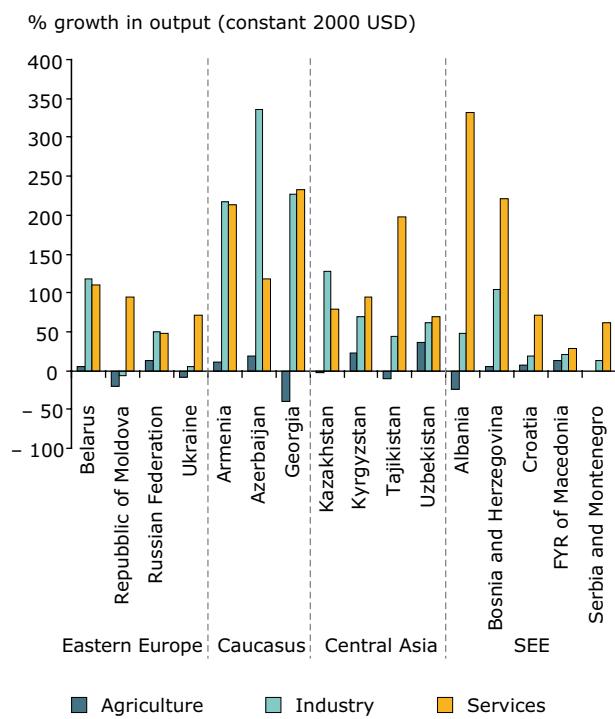
These developments have strongly affected the structure of the economies across the region (Figure 2.3). The share of services now exceeds 50 % in all economies in Eastern Europe and SEE. The share of agriculture has fallen in all but one country although it still represents a key sector in most Central Asian countries as well as in Moldova and Albania. In Armenia, agriculture, while still important, has fallen back to pre-1990 levels and industry has again begun to dominate. Industry also dominates in Azerbaijan and Turkmenistan primarily

**Figure 2.1 GDP in purchasing power parity (PPP) per capita by region, (1990–2005)**



Source: World Bank, 2006.

**Figure 2.2 Growth in the main economic sectors (1995–2005)**



Note: Turkmenistan not included due to lack of data since 2003.

Source: World Bank, 2006.

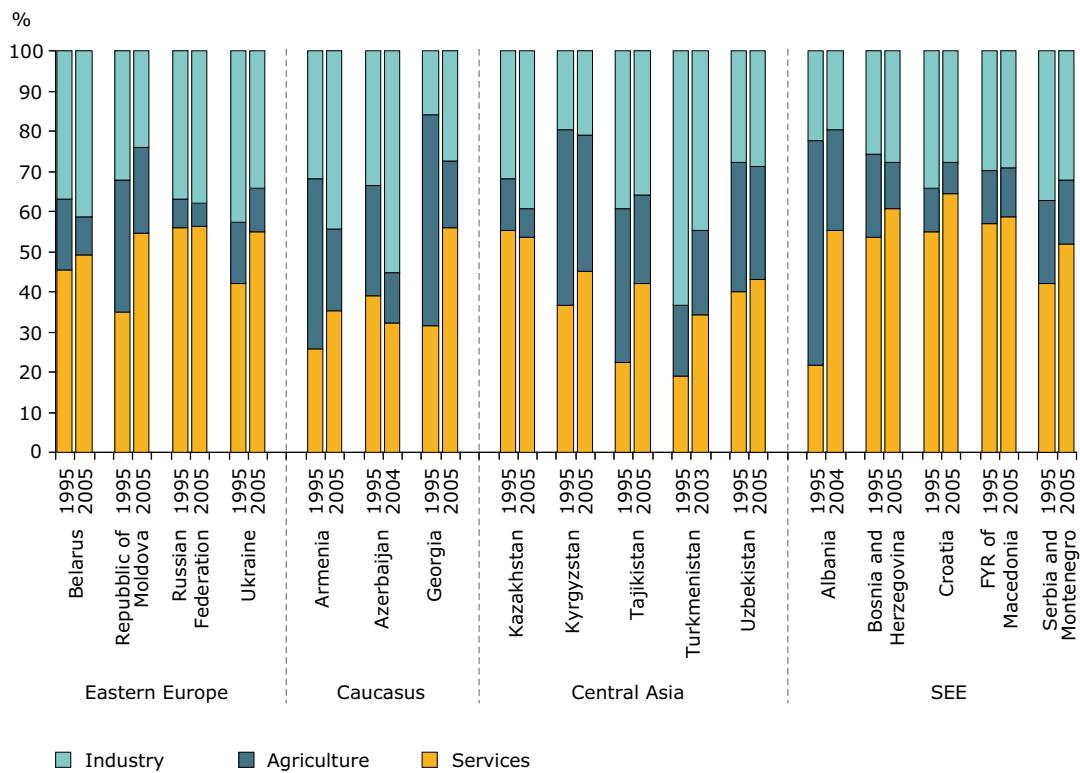
within energy. However, in most countries growth in industry since 1995 represents only a partial return to its pre-transition strength (see Figure 4.1 in Chapter 4). Only in three countries, (Azerbaijan, Belarus and Uzbekistan) is current industrial output greater than it was in 1990. (World Bank, 2006). On the other hand, the dominance of the service sector in Eastern Europe and SEE is a relatively new phenomenon.

Economic structural changes may partially reflect changes in national consumption patterns and a greater demand for services. However, structural changes in national economies have also been significantly influenced by growth in international trade, particularly exports of fossil fuels and metals, and increasingly, the import of manufactured goods from other parts of the world (CISSTAT, 2006).

## 2.3 Increasing international trade and impacts on production

Increasing levels of globalisation since the mid-1990s has affected both EECCA and SEE, with all countries showing upward trends in imports and exports. While trade within the EECCA region has increased

**Figure 2.3 Economic structural change, shares in gross value added (1995–2005)**



**Source:** World Bank, 2006.

at similar rates to economic growth, exports to the rest of the world have grown rapidly rising from 11 % to 28 % of regional GDP between 1994 and 2004 (CISSTAT, 2006). Figure 2.4 shows the growth

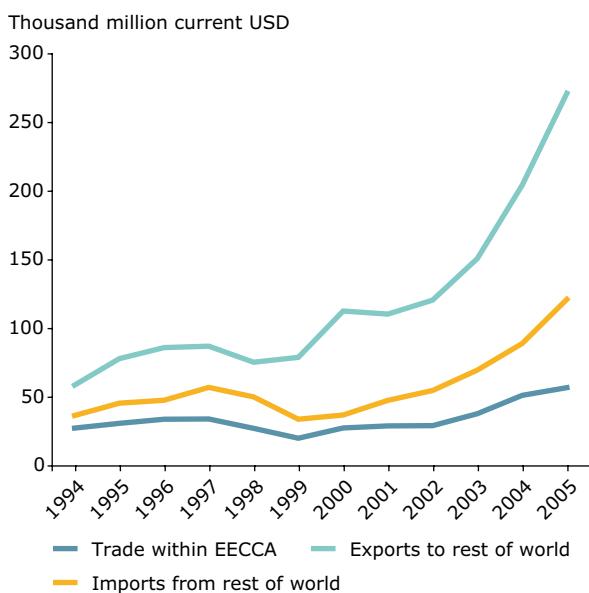
in international trade within EECCA and between EECCA and the rest of the world.

Foreign investment and the increasing demand for exports have been the driving forces of economic growth in a number of EECCA and SEE countries. However, foreign investment and exports have tended to focus on a few key sectors and products, ensuring strong growth in these industries but less elsewhere.

In Ukraine, economic growth was catalysed by the export of steel and chemicals (Kolesnichenko, 2005). In Russia (UNEP, 2006), Kazakhstan (Embassy of the Republic of Kazakhstan in Japan, 2005), Azerbaijan and Turkmenistan growth has been largely based on exports of energy-carriers. In 2005 fossil fuels and mining products represented 65 % of all exports from EECCA to the rest of the world, compared to 24 % for manufactured products and 7 % for agricultural products (WTO, 2006). Around two thirds of the total export of fossil fuel and mining products goes to the EU. More information about exporting industries is given in Chapter 4.

Meanwhile, imports to EECCA from the wider world are dominated by machinery and transport equipment, chemical, mineral and metal

**Figure 2.4 International trade in the EECCA region (1994–2005)**



**Source:** CISSTAT, 2006.

manufactured products, and processed foods (CISSTAT, 2006).

Due to exports, the industrial sector, especially in the EECCA region, is now dominated by one or a few industrial sub-sectors. Typically, these dominating sub-sectors are polluting and resource-use intensive. Examples include extractive industries in Azerbaijan (oil), Kazakhstan (oil and metals), Kyrgyzstan (gold), the Russian Federation (oil, gas, metals), Ukraine (metals and oil), Tajikistan (aluminium), and Turkmenistan (gas and oil). In Uzbekistan and Tajikistan, cotton industries account for large shares in industrial production (see Chapter 4 for more details).

The specialisation of countries as exporters of one or two dominant commodities can have a detrimental effect on efficiency in other sectors. These commodities begin to attract an ever-increasing share of capital investment at the expense of improvements in other industry sectors. This has occurred even in the large diverse economy of Russia. Here the share of fuel extraction in total investments increased to 20 % by 2003, while investments in other industries dropped, e.g. the chemical industry, machine building and processing of metals, construction materials and light industry (UNEP, 2006). A number of heavy industries (e.g. steel production, mining) are in urgent need of modernisation. Currently, a considerable part of the industrial sector uses equipment and processes which are 30 years or more out of date.

## 2.4 Resource and energy consumption and greenhouse gas emissions

Moving towards more sustainable consumption and production requires a *decoupling*<sup>(1)</sup> between economic growth, on the one hand, and resource and energy use and their associated environmental impacts, on the other (see Section 2.10).

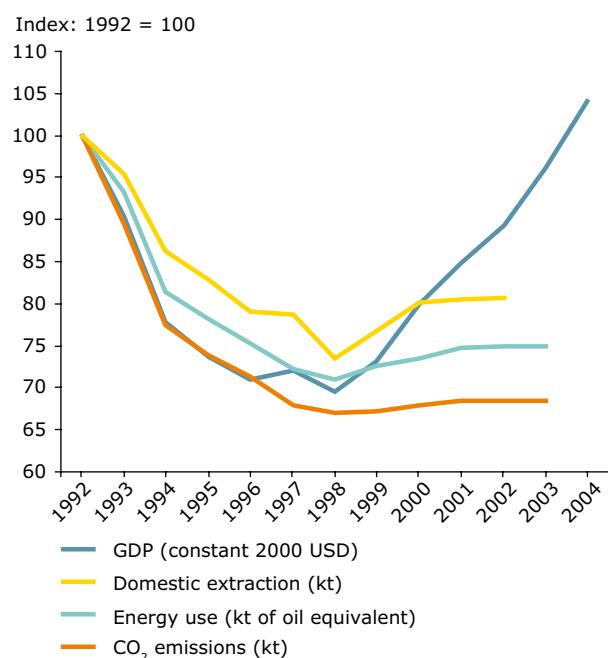
In EECCA countries a number of counteracting trends are affecting any potential decoupling. The first trend is the increasing dominance of the service sector in most economies (see Figure 2.3). This potentially has a positive decoupling effect because services generally tend to have lower energy and materials use per unit of output than industry and agriculture. Notable exceptions to

this rule are transport services (see Chapter 7), and some social and communal services, such as the provision of drinking water and sanitation which have high energy intensities. The second trend is the gradually improving efficiency of some established industries. Like the first trend this is also having a positive decoupling effect. However, the shifting of industry from manufacturing and light industries to the exploitation and processing of fossil fuels and minerals may be pulling in the opposite direction.

It would appear that the first two trends dominated the third during the growth years of 1999 to 2004. As a result these years saw a relative decoupling of resource use, energy use and CO<sub>2</sub> emissions from economic growth across EECCA as a whole (Figure 2.5). Resource use and energy use in 2004 were 20–25 % below 1992 levels despite a higher GDP.

Nevertheless, energy intensities of most EECCA countries are still significantly greater than the

**Figure 2.5 Relative decoupling of resource use (energy, material extraction) and environmental pressures (CO<sub>2</sub>) from economic growth, EECCA (1992–2004)**



**Sources:** World Bank, 2006; Mosus-project, 2006.

<sup>(1)</sup> Decoupling, which can be relative or absolute, occurs when the growth rate of an environmental pressure is less than that of a given economic driving force (e.g. GDP) over a certain period. Relative decoupling occurs when an environmental pressure grows, but more slowly than the underlying economic driver. By contrast, absolute decoupling is achieved when an environmental pressure decreases while the economy grows.

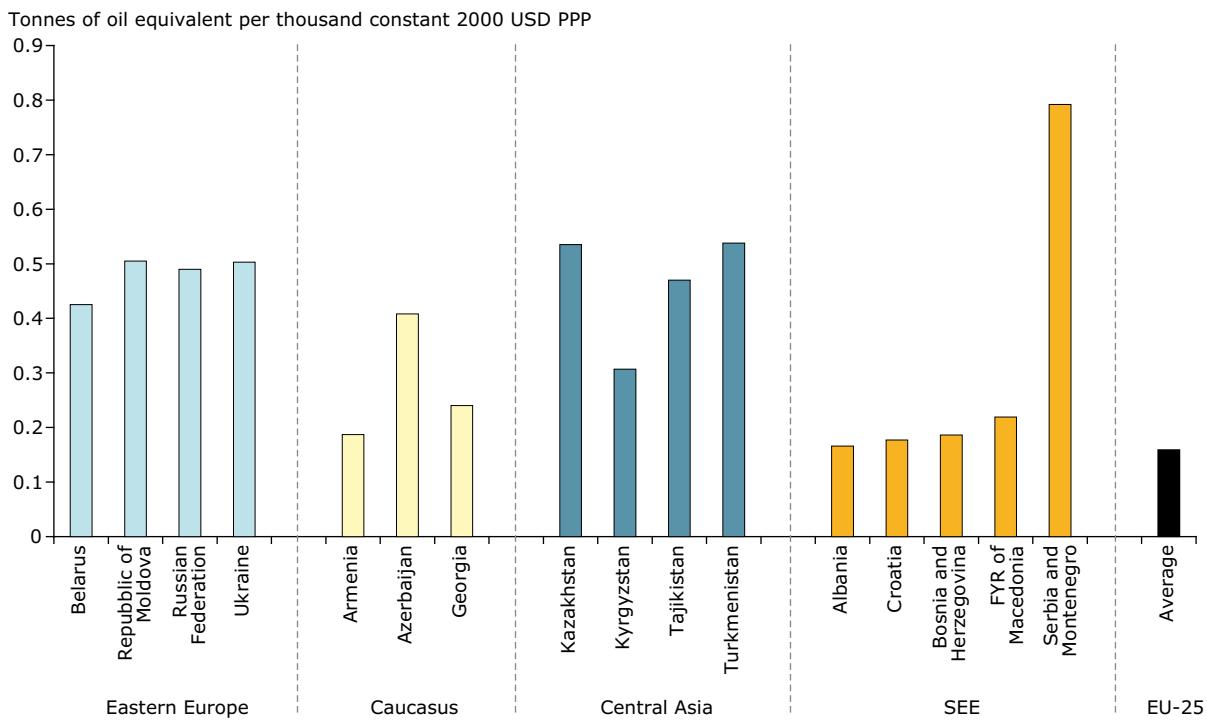
European Union (Figure 2.6). This is due in part to the structural differences between those economies (i.e. a larger share of resource and energy-intensive industries). However, lower energy efficiencies of industries and municipal services resulting from long-term lack of investment are also significant factors in the higher energy intensities of many EECCA countries. Meanwhile, most economies of SEE countries show much lower energy intensities, comparable to those of EU Member States.

Energy intensity of the economy is one key factor in overall greenhouse gas emissions per capita. A second influential factor is the proportion of energy coming from non-fossil fuels (see Figure 2.7 for the proportion of electricity produced using non-fossil fuels). Fossil fuel-rich nations (Russia, Kazakhstan, Uzbekistan, Turkmenistan, Azerbaijan, Ukraine) tend to have low shares of renewable energy

although the availability of renewable resources is also a key factor (e.g. Moldova is poor in fossil fuels but also in hydro-energy potential).

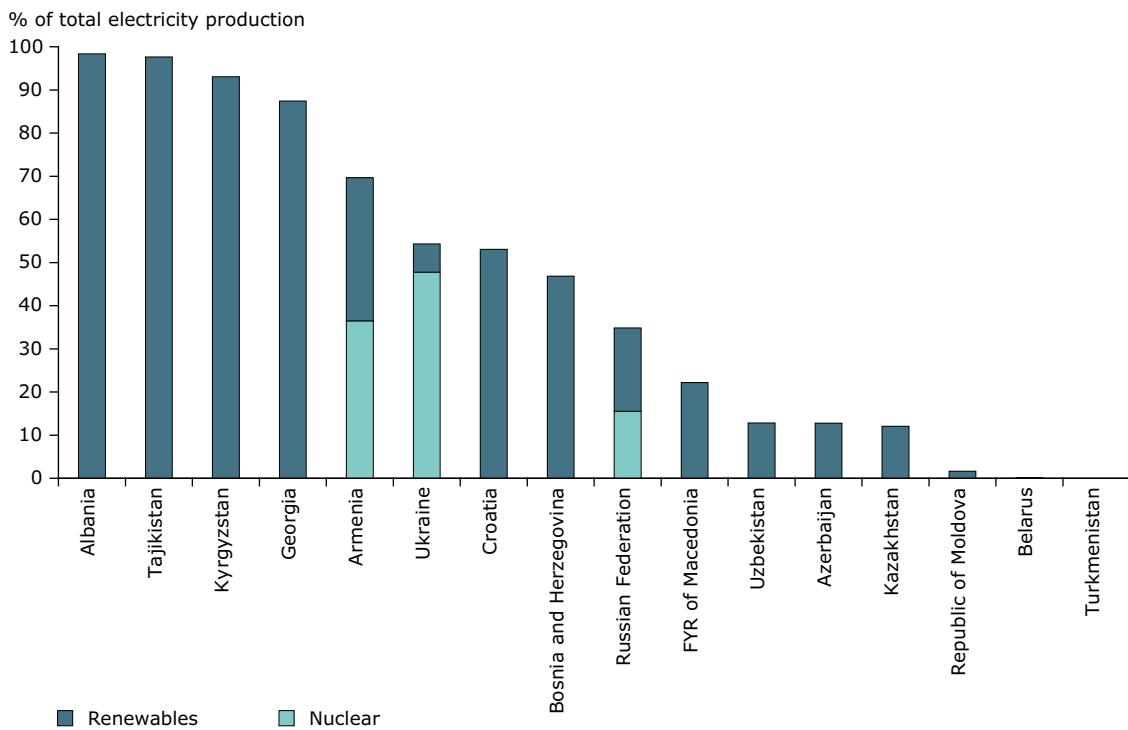
The wealth of a country (Table 2.1) and the resulting patterns of consumption are the third major driving force in pushing up energy use and greenhouse gas emissions per capita. The wealthier fossil fuel-rich nations with high energy intensities (e.g. Russia and Kazakhstan) have higher CO<sub>2</sub> emissions per capita than the European Union despite significantly lower levels of economic activity (Figure 2.8). Similarly, fossil fuel-rich Azerbaijan has more than double the CO<sub>2</sub> emissions per capita of its Caucasus neighbours with similar GDPs per capita. Finally, some less affluent countries with high levels of renewable energy have very low CO<sub>2</sub> emissions per capita (Armenia, Georgia, Tajikistan, Kyrgyzstan).

**Figure 2.6 Energy intensities of EECCA and SEE countries measured in tonnes of oil equivalent per unit GDP in purchasing power parity**



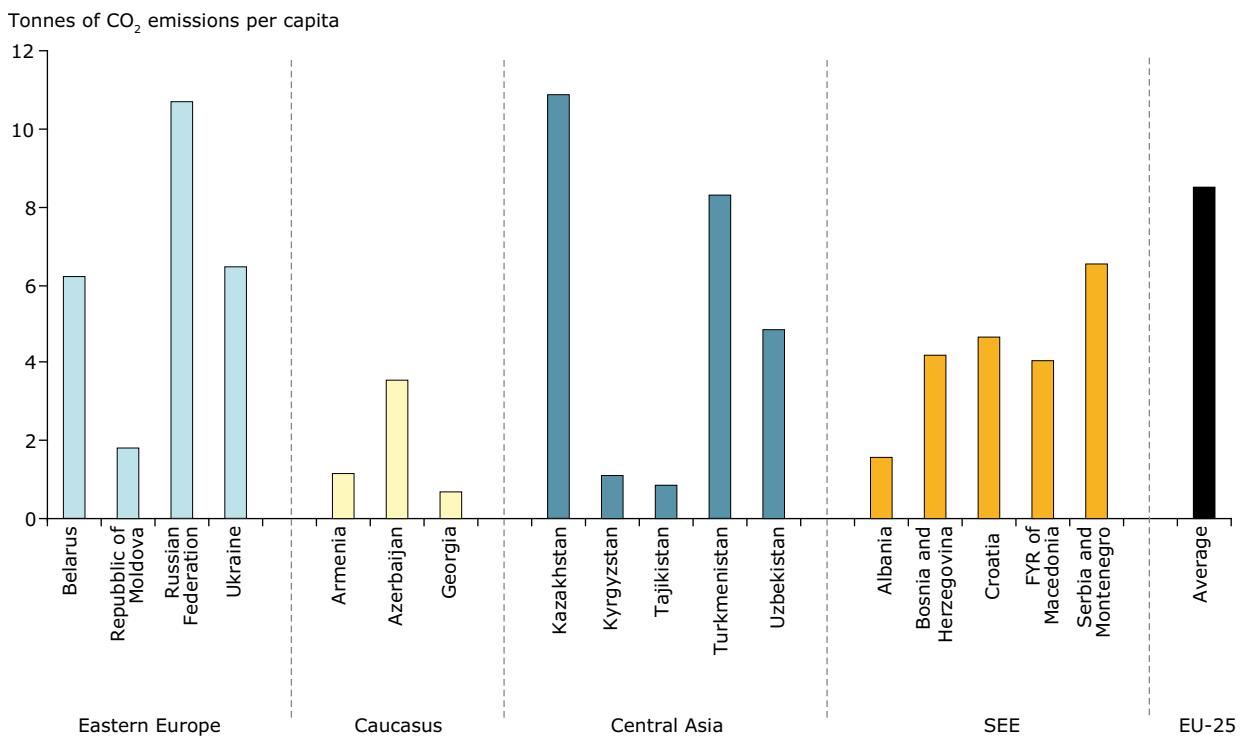
**Source:** IEA, 2006.

**Figure 2.7 Non-fossil fuel contribution to total electricity generation**



Source: IEA, 2006.

**Figure 2.8 Carbon dioxide emissions per capita in EECCA and SEE countries (2004)**



Source: IEA, 2006.

## 2.5 Economic growth, welfare and increasing inequality

Economic development can, and should, bring with it improvements in human well-being and quality of life. The UN's Human Development Index (HDI), which takes into account life expectancy, literacy, education, and standard of living, shows a reasonably strong correlation with GDP in SEE and EECCA (Figure 2.9). Thus, economic growth in SEE and EECCA since the mid- to late-1990s is likely to have led to an increase in well-being.

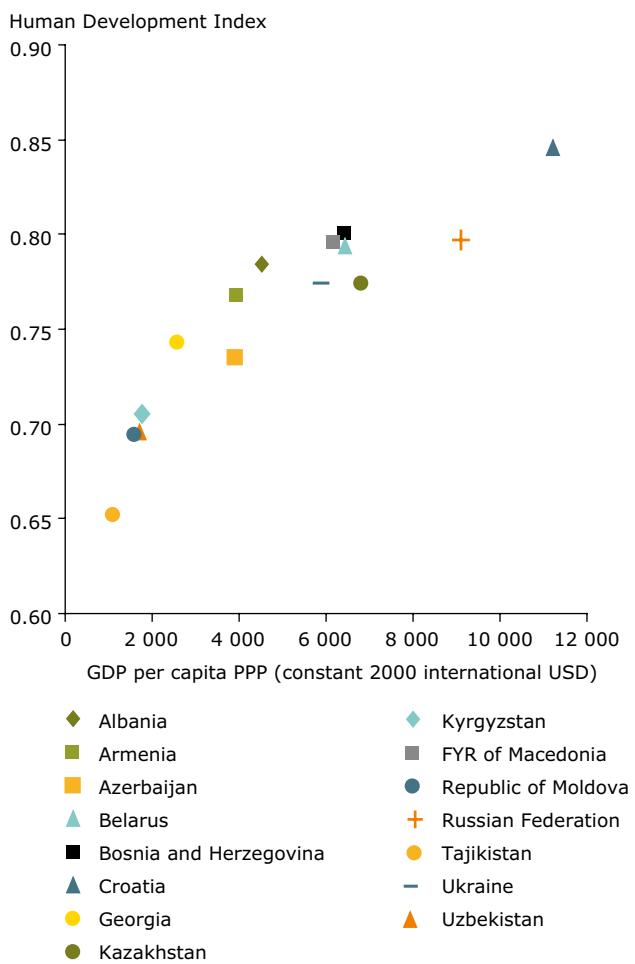
HDI increases most rapidly with rising GDPs for the poorer economies. In more affluent economies, however, further growth in economy brings less rapid improvements in HDI. The HDI of most of EECCA fell during the early- to mid-1990s and in some countries was still well below 1990 levels by 2004 (Moldova, Russia, Tajikistan, Ukraine). Other countries have improved their HDI significantly since 1990 (Albania, Armenia, Croatia) (UNDP, 2006). These trends are in most, but not all, cases similar to trends in GDP.

Some countries appear to be less successful than others at transferring economic wealth into quality of life. The Russian Federation, Kazakhstan, Ukraine and Azerbaijan fall into this group (Figure 2.9). Russia has a similar HDI score as Bosnia and Herzegovina, Belarus and the former Yugoslav Republic of Macedonia despite a 50 % higher GDP.

The positive impacts of economic growth on quality of life are limited if the increasing wealth is not distributed evenly across society. The gap between the poorest and wealthiest groups of society has increased in much of EECCA and is significantly higher than it was pre-transition. For example, in Russia in 1991 the poorest 20 % received 12 % of total national income, while the richest 20 % received 31 % (Simai, 2006). By 2003 the income gap had widened significantly with the poorest 20 % receiving only 6 % and the richest 20 % receiving 47 % (World Bank, 2006).

In many EECCA countries, and to a lesser extent in parts of SEE, the proportion of the population living below the poverty line is still significant (UNECE, 2006). In Armenia, 43 % of the population was still living in poverty in 2004, although this had decreased from 55 % in 1999 (International Monetary Fund, 2005). Even in Ukraine some 29 % of the population live below the poverty line with 3 % in extreme poverty (UNICEF, 2006).

**Figure 2.9 Human Development Index versus GDP in EECCA and SEE (2004)**



**Sources:** UNDP, 2006; World Bank, 2006.

Differences in incomes between urban and rural areas also remain high in most countries of EECCA although there is no consistent trend. Some countries (Moldova, Russia, Georgia and Tajikistan) show a widening gap between urban and rural incomes, while other countries show the opposite trend (Belarus, Azerbaijan, Kazakhstan) (CISSTAT, 2006).

Access to basic needs such as supplies of clean water and sanitation remains limited for a large part of rural populations particularly in Central Asia where between 25–50 % of mostly rural population has no sanitation (WHO, 2005). According to WHO estimates, more than 13 000 children under the age of 14 die every year in the pan-European region due to bad water supply and sanitation, most of them in

EECCA countries (WHO, 2005). While improvements have been recorded in the larger cities, the situation remains critical in rural areas, where water services have effectively collapsed (OECD, 2007).

Access to clean energy sources is also limited for many, especially in rural areas. According to WHO, over 50 % of the population of Ukraine, Moldova, Armenia and Georgia and most of Central Asia use wood or coal for cooking on open fires or rudimentary stoves, although this situation tends to be limited to rural areas (WHO, 2005), leading to bad indoor air quality and associated respiratory effects.

Meanwhile in the large cities, there is evidence of a growing urban nouveau riche and middle class. Their adoption of western European consumption patterns (Myers and Kent, 2003; Vendina, 2007) have environmental consequences, such as increasing private car ownership in cities (Chapter 7), an increase in meat consumption (Chapter 5) and the emergence of low density detached housing developments in suburban areas (Chapter 6).

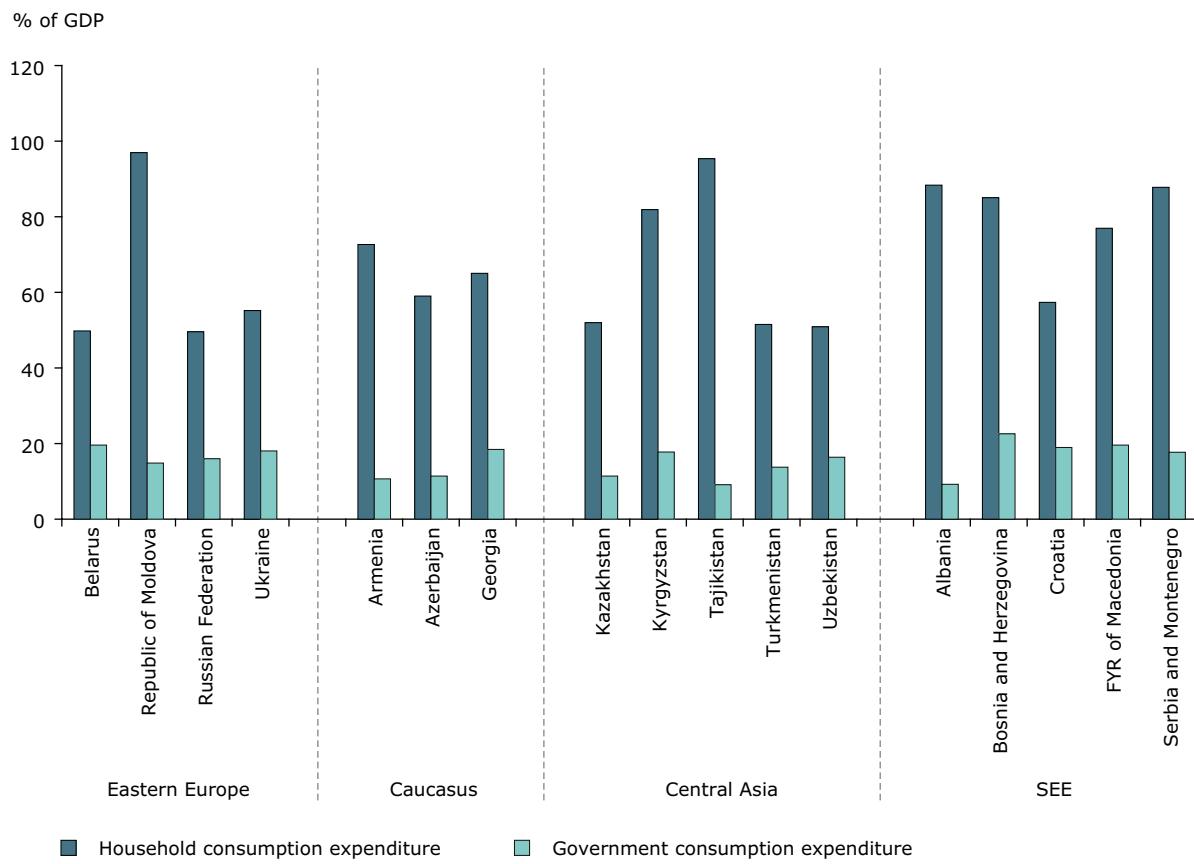
## 2.6 Consumption by state and households

In all countries of the region, household expenditure exceeds government expenditure by far (Figure 2.10). The ratio of household-to-government expenditure ranges from 2.5 in Belarus, to over ten in Tajikistan.

Absolute levels of consumption expenditure since 1990 have followed similar trends to those of GDP. However in terms of purchasing power parity (the best proxy for comparing material welfare) consumption expenditure of households recovered more rapidly than GDP and now exceeds 1990 consumption expenditure levels in all regions except Central Asia (Figure 2.11). Household consumption expenditure in Eastern Europe is growing particularly rapidly and by 2005 was already 40 % higher than in 1990.

Government consumption expenditure per capita has recovered less rapidly and remains lower than 1990 levels in all regions (Note: this is partly to

**Figure 2.10 Household expenditure and government expenditure as a percentage of GDP**



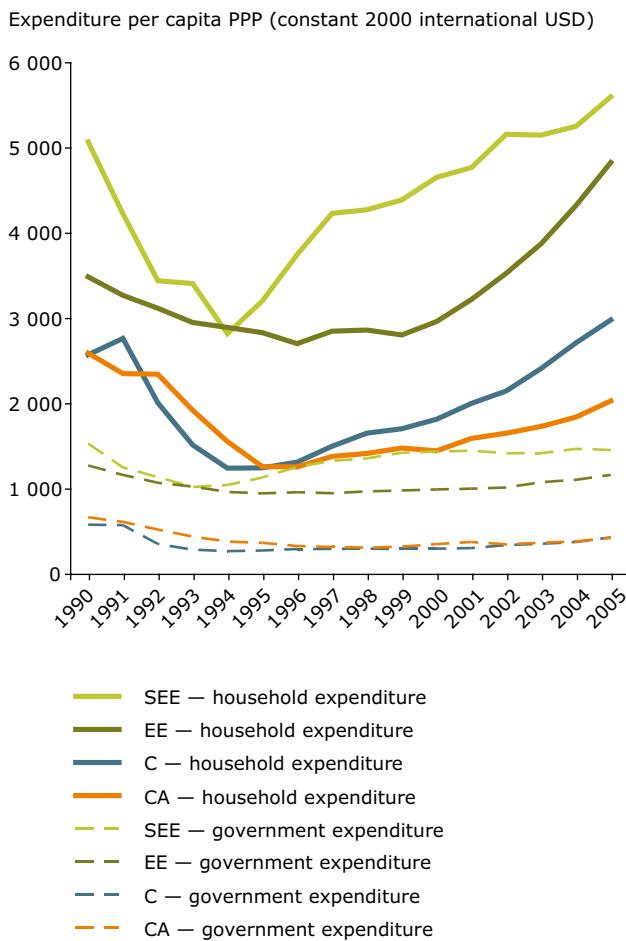
**Note:** The graph does not include all elements contributing to GDP: exports, imports and investments are not shown. Hence the two bars shown here can add up to less than or be greater than 100 %.

**Source:** World Bank, 2006.

be expected in transition economies undergoing decentralisation and privatisation). There are exceptions to this at country level — the former Yugoslav Republic of Macedonia, Tajikistan, Ukraine and in particular Georgia have seen increases in governments' expenditure share of GDP, and government expenditure per capita is higher in these countries than it was in 1990. With respect to government consumption, the potential benefits of sustainable procurement policies remain significant in these countries (see Chapter 3).

A rise in income levels and household expenditures has potentially positive social implications, provided that the majority of the population is benefiting (see Section 2.5 above). However, it also tends to lead to an overall rise in environmental impacts related to household consumption.

**Figure 2.11 Trends in household and government final consumption expenditure per capita in PPP (1990–2005)**



**Source:** World Bank, 2006.

## 2.7 Socio-demographic trends with relevance for consumption

Populations have declined significantly in Eastern Europe and SEE since 1995 (Table 2.2), with Ukraine having the third most rapidly falling population in the world (UNICEF, 2006). Russia's population decline is a result of increasing mortality rates and a declining birth rate (Lissovolik, 2005), while the Moldovan decline is mostly a result of the mass emigration of workers. The Ukrainian population decline results from both factors; approximately three-quarters due to increasing death rates and one-quarter to emigration of people of working age (Shanghina, 2004). By contrast, populations in Central Asia have increased by over 10 % in all countries except Kazakhstan.

Every single country covered by this report is experiencing a declining percentage of children born and an increasing proportion of persons over 65. However, while populations in the Caucasus and particularly in Central Asia remain relatively young, populations in Eastern Europe (except Moldova) and SEE (except Albania and the former Yugoslav Republic of Macedonia) have a higher percentage of older people. This is particularly true of Russia. Besides causing major societal effects and changing patterns of consumption, this trend will have economic consequences as the percentage of the population of working age begins to decline over the coming years.

Eastern Europe, except for Moldova, is highly urbanised, with levels of urbanisation comparable to those of Western Europe. The level of urbanisation has a strong impact on the patterns and impacts of consumption. Dense urban areas can benefit from more efficient provision of services such as multi-apartment housing, heating, collective transport, or waste collection and treatment. On the other hand, in sprawling urban areas the demand for transport can be high and the provision of collective services more difficult to organise. In addition, consumption of processed food and goods, electronics etc. and generation of household waste is generally higher in urban than in rural areas.

In most of Central Asia, Moldova and parts of SEE, the majority of the population is rural. While in general populations are rapidly becoming more urbanised, in Tajikistan and Uzbekistan the situation is quite the opposite; rural populations are growing faster. It has been suggested that this de-urbanisation process is due to the closure of mines and other industrial activities during the 1990s and the subsequent return of workers to agrarian livelihoods (UN Secretariat, 2002).

**Table 2.2 Socio-demographic trends in EECCA and SEE countries (1995–2005)**

	Population change 1995–2005	Percent population under 14		Percent population over 65		Urban population %		Housing space per capita m <sup>2</sup>		Change in total housing space
		1995	2005	1995	2005	1995	2005	1995	2005	
<b>Eastern Europe</b>	<b>– 5 %</b>	<b>21 %</b>	<b>15 %</b>	<b>12 %</b>	<b>14 %</b>	<b>71 %</b>	<b>71 %</b>	<b>18.4</b>	<b>21.2</b>	<b>10.1 %</b>
Belarus	– 4 %	22 %	15 %	13 %	15 %	68 %	72 %	19.5	22.6	11.1 %
Republic of Moldova	– 3 %	27 %	18 %	9 %	10 %	46 %	47 %	19.9	21.4	4.2 %
Russian Federation	– 3 %	21 %	15 %	12 %	14 %	73 %	73 %	18	20.9	12.2 %
Ukraine	– 9 %	20 %	15 %	14 %	16 %	67 %	68 %	19.2	22	4.8 %
<b>Caucasus</b>	<b>0 %</b>	<b>30 %</b>	<b>23 %</b>	<b>8 %</b>	<b>10 %</b>	<b>56 %</b>	<b>54 %</b>	–	–	–
Armenia	– 7 %	30 %	21 %	8 %	12 %	66 %	64 %	17.5	23.1	23.4 %
Azerbaijan	9 %	34 %	26 %	5 %	7 %	52 %	51 %	12	12.6	14.6 %
Georgia	– 11 %	24 %	19 %	11 %	14 %	54 %	52 %	19.8	–	–
<b>Central Asia</b>	<b>9 %</b>	<b>37 %</b>	<b>31 %</b>	<b>5 %</b>	<b>6 %</b>	<b>43 %</b>	<b>41 %</b>	–	–	–
Kazakhstan	– 4 %	30 %	23 %	7 %	9 %	56 %	57 %	15.4	17.5	8.8 %
Kyrgyzstan	12 %	38 %	31 %	5 %	6 %	36 %	36 %	12.5	12.3	10.5 %
Tajikistan	13 %	44 %	39 %	4 %	4 %	28 %	25 %	9.1	8.6	6.6 %
Turkmenistan	15 %	40 %	32 %	4 %	5 %	45 %	46 %	10.8	–	–
Uzbekistan	16 %	40 %	33 %	4 %	5 %	38 %	37 %	12.8	–	–
<b>South East Europe</b>	<b>– 9 %</b>	<b>23 %</b>	<b>19 %</b>	<b>10 %</b>	<b>14 %</b>	<b>50 %</b>	<b>52 %</b>	–	–	–
Albania	0 %	32 %	27 %	6 %	8 %	39 %	45 %	–	–	–
Bosnia and Herzegovina	14 %	22 %	17 %	8 %	14 %	41 %	46 %	–	–	–
Croatia	– 5 %	19 %	16 %	13 %	17 %	55 %	57 %	–	–	–
FYR of Macedonia	4 %	25 %	20 %	9 %	11 %	61 %	69 %	–	–	–
Serbia and Montenegro	– 23 %	22 %	18 %	11 %	14 %	51 %	52 %	–	–	–

**Sources:** World Bank, 2006; CISSTAT, 2006.

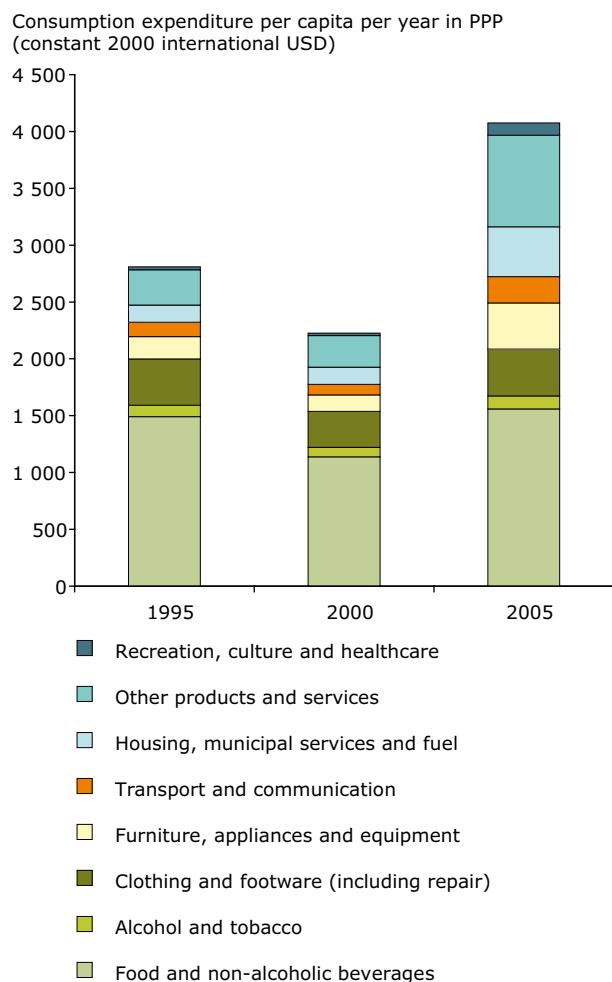
In eastern European countries and Armenia and Kazakhstan the housing space per capita is increasing. In absolute terms, total residential space in all EECCA countries increased by between 4 % and 23 % between 1995 and 2005. In Russia alone total residential space increased by some 340 million m<sup>2</sup> during the same period, equivalent to the entire residential space of Austria (ENERDATA, 2006). Such development leads to increased energy required for heating. In addition, the resulting construction boom across EECCA is likely to consume significant quantities of raw materials and energy.

Meanwhile, in the less affluent countries of Tajikistan and Kyrgyzstan, the housing situation, which is already squeezed, cannot keep up with population growth and increasing family size. In Tajikistan the space available per person is falling below sanitary norms of other countries.

## 2.8 Household consumption patterns and environmental pressures

Figure 2.12 shows how the share of household expenditure on various goods and services has changed in EECCA between 1995 and 2005. Basic food and clothing still dominate household expenditures across the EECCA region although their consumption decreased from 65 % to 48 % of overall household consumption expenditure between 2000 and 2005. Total household expenditure grew by more than 80 % over the same period. This additional income was used increasingly on housing and utilities, transport and communication, home appliances and recreation — all categories with significant environmental implications. Spending on recreation increased by a factor of 5 between 2000 and 2005, but still remains a relatively small consumption category.

**Figure 2.12 Changing household consumption patterns in EECCA (1995–2005)**



**Note:** Consumption categories are presented in the order of the most rapidly growing — most rapidly growing at top.

**Sources:** CISSTAT, 2006; World Bank, 2006.

Household consumption patterns vary widely across countries (Figure 2.13). In the lower-income countries of Central Asia and the Caucasus, greater proportions of household expenditures are set aside for food. This is most pronounced in Tajikistan and Armenia where food represents 64 % and 57 % of average household expenditures, respectively. In Tajikistan, despite increases in incomes since the mid-1990s, there remains little surplus for non-essentials in the average household.

At the other extreme, Croatia, which has the highest household expenditure per capita across the regions, uses the smallest proportion on food (33 %) and the highest on transport and communication and recreation, culture and healthcare. The expenditure patterns of Croatian

and Serbian households are much closer to the consumption patterns of EU households, demonstrating surplus wealth for non-essentials.

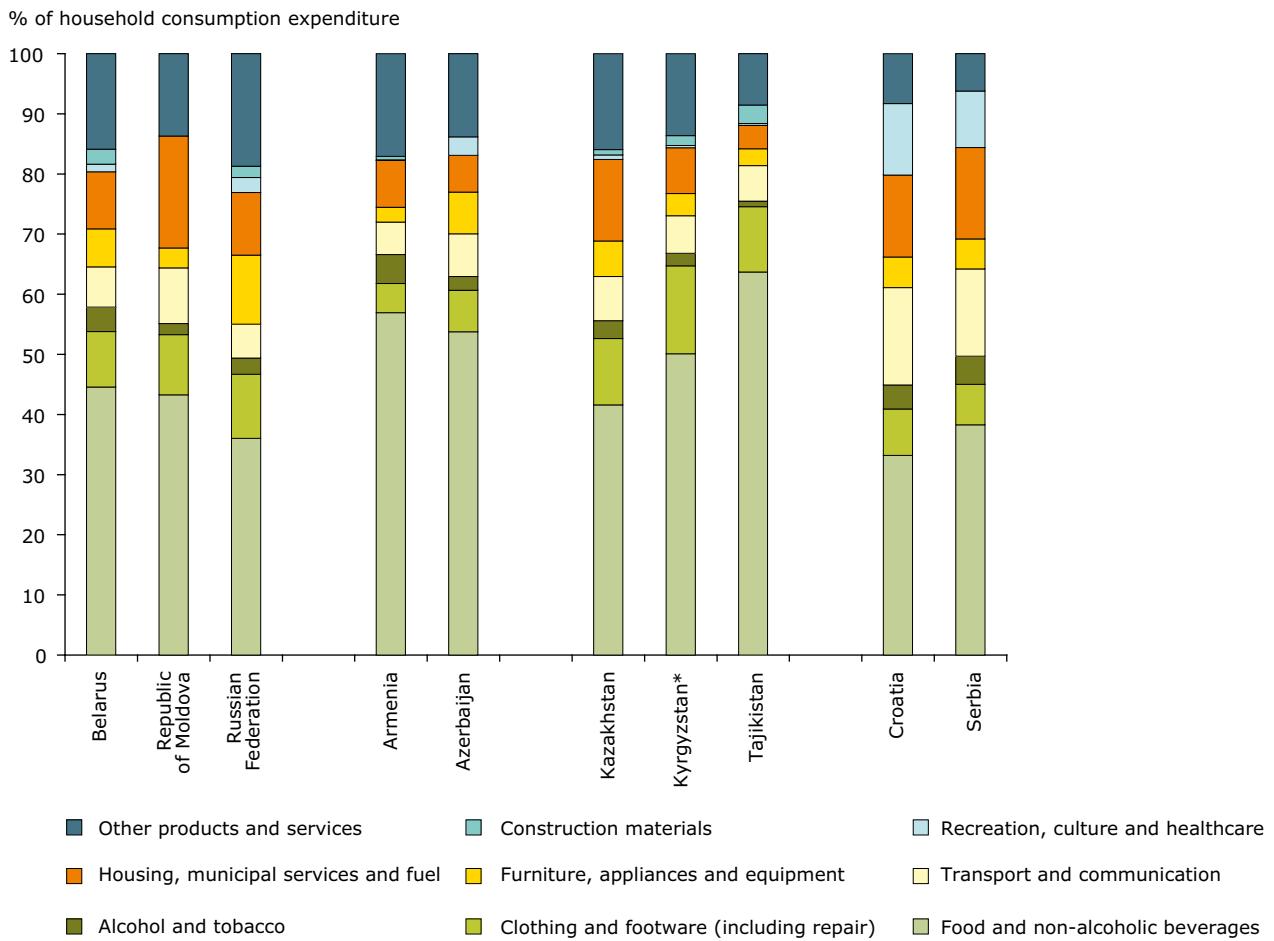
The level and type of environmental pressures (see Box 2.1) associated with household consumption depend both on absolute levels of consumption (how much is consumed) and on patterns of consumption (what products and services) as well as on the various pressure intensities of these products and services (i.e. environmental pressures per unit of consumption). For some goods and services, environmental pressures dominate during the consumption phase of the life cycle and can be directly attributed to households. For other goods, such as food, the majority of pressures can be associated with production (or disposal).

A number of economy-wide studies have identified the consumption categories with the highest pressures in the European Union (EU Commission, 2006; EEA, 2005; Moll *et al.*, 2006). These studies

#### **Box 2.1 From environmental pressures to impacts**

One of the main concerns about production or consumption activities is the environmental impact that they cause. Environmental pressures include: emissions of air pollutants such as greenhouse gases, solid waste and waste-water production, releases of toxic substances to air, soil and water, consumption of resources beyond reproductive capacities and conversion of natural land into built-up areas. These cause changes in environmental conditions which in turn lead to impacts on human beings, ecosystems and infrastructures.

Environmental pressures can be expressed in terms of quantities of pollutants discharged, weights or volumes of resources extracted or material consumed, volumes of fish or timber harvested, or, at the most aggregated level, presented as material flows in tonnes. However, with current knowledge, pressures from production or consumption cannot easily be converted into information on specific environmental impacts. As a general rule of thumb, the higher the use of materials, energy and land, the higher the resulting impacts on the environment. However, more research is needed to express environmental impacts and link them to specific environmental pressures. Throughout the remaining chapters of this report, environmental pressures are generally used as a proxy for environmental impacts.

**Figure 2.13 Patterns of household expenditure in individual countries (2005)**

**Note:** \* Kyrgyzstan data are for 2003.

**Sources:** CISSTAT, 2006; Statistical Office of Serbia, 2006; Croatian Central Bureau of Stats, 2006.

have consistently identified food and drink, private transport, and housing as the consumption categories with highest overall environmental pressures. They are also consumption categories with the highest pressures per unit consumption (i.e. pressure intensive). Within the housing category, energy use (for heating and hot water) dominates, followed by structural work (i.e. construction and refurbishment) and use of electrical appliances.

Economy-wide analysis of environmental pressures from households is yet to be carried out in EECCA and the SEE countries. It is expected, however, that the life-cycle impacts of food consumption (Chapter 5), electricity, heating and hot water (Chapter 6), and transport (Chapter 7) will be of greatest concern. These consumption groups are covered in some of the theme chapters later in this report.

## 2.9 Ecological footprint

An ecological footprint provides a useful indicator of the degree to which a country's consumption is sustainable. Resources consumed to meet the country's demand for food, energy and goods are translated into equivalent land area in hectares per capita to provide those resources and to absorb emissions such as CO<sub>2</sub> without permanent change. These can then be compared to the total global available bio-capacity per person. Countries whose footprint significantly exceeds the global available bio-capacity (1.8 hectares per person in 2003) can be considered to have unsustainable consumption and production patterns.

By 2003, Eastern Europe (excluding Moldova), Kazakhstan, Turkmenistan and all SEE countries except for Albania show indications

of unsustainable consumption and production. Among them, Russia and Kazakhstan have footprints which are twice the available global bio-capacity per capita, though they still remained below the average figure for EU-25, at 4.8 hectares per capita in 2003.

A country's ecological footprint is influenced by levels of wealth per capita, but is not firmly linked to it. For example, Croatia despite a 40 % higher GDP per capita than Kazakhstan, has a significantly smaller footprint. The difference is the result of higher energy consumption and energy-related emissions in Kazakhstan, due mainly to higher energy intensities of industry and communal services, etc., (Figure 2.6) and also to the more limited use of renewable energy sources. The differences between Croatia's and Kazakhstan's footprints and GDPs would suggest that economic growth can be achieved while simultaneously reducing the ecological footprint.

### 2.10 SCP perspectives for SEE and EECCA countries

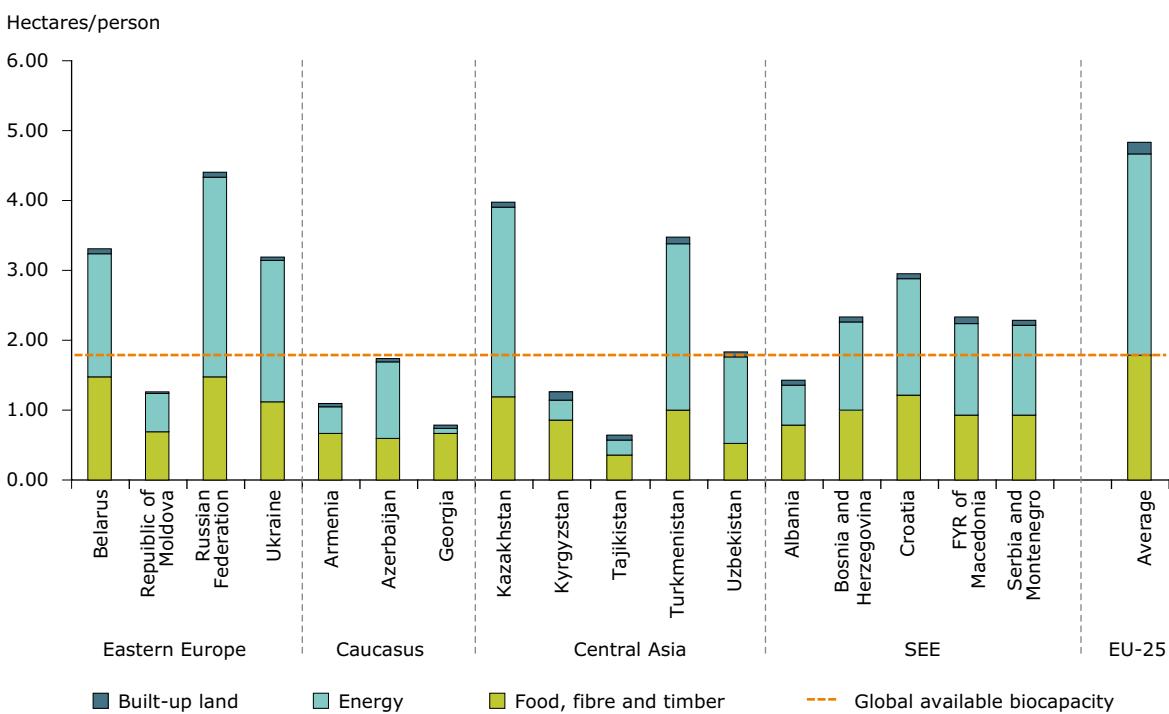
In every society, production, consumption and investment patterns should be managed with due

consideration to environmental, economic and social elements of sustainability. SCP provides such an integrated approach to policy-making, requiring close collaboration among different sectors and a wide participation of stakeholders.

The EECCA and SEE regions as a whole face very different SCP challenges than those faced by Western Europe. The majority of the population in Western Europe and increasingly in Central Europe has access to 'reasonable' income levels and can afford goods and services which exceed their basic needs. The focus of current and future SCP action in those countries is on the environmental pillar of sustainability — improving efficiency of production and using economic incentives and various other means to orient consumption towards less pressure-intensive goods and services.

In contrast, in much of SEE and EECCA there is a clear need to address the social pillar of sustainability. Significant segments of the population live in poverty and many, particularly in rural areas, do not have reliable access to basic needs, such as clean water, energy for household and adequate nutrition levels. The main challenge in a number of countries will be how to satisfy the basic needs of the population.

**Figure 2.14 Ecological footprint versus global available bio-capacity per person (2003)**



**Source:** Global Footprint Network, 2006.

At the same time the environmental pillar of sustainability also needs to be addressed. At least half the countries of the region have higher ecological footprints than the global available bio-capacity per capita, and rapid economic growth is likely to further increase ecological footprints in the future. For these countries, as in Western Europe, achieving sustainability will require an absolute decoupling of resource use and impacts related to energy consumption from economic growth.

While overall levels of consumption are lower than in Western Europe, energy intensity (i.e. energy consumption per unit GDP) is generally higher. In Russia, Belarus, Ukraine, Kazakhstan and Turkmenistan, energy intensities are very high (Figure 2.6). This is due in part to a greater dominance of industry in economic structure, in particular the resource extraction industry, but also to serious inefficiencies in industry as well as community and housing services, such as the provision of heat (See Chapters 4 and 6). There are major opportunities for decoupling in these countries through steady improvements in efficiencies. The on-going economic and social restructuring offers a unique opportunity to establish more resource-efficient and sustainable production patterns.

Moreover, there are many opportunities in EECCA and SEE to 'leapfrog' towards more sustainable consumption patterns before consumption-driven impacts reach the levels observed in Western Europe. There is already evidence of an increase in environmentally unsustainable consumption patterns, such as private car ownership, consumption of electronic consumer goods and highly processed and packaged food, and the increasing generation of household waste. These trends will spread to a greater proportion of the population as economic growth continues. SCP strategies applied now will safeguard against unsustainable patterns of consumption and production in the future.

National differences give varying priorities for future SCP action, and require the use of a range of SCP policy instruments. However, there are also many similarities in the problems faced by countries in EECCA and SEE, some of which are also shared by EU Member States. This creates opportunities for the exchange and transfer of experiences among EECCA and SEE and other countries. A large array of such opportunities are identified and presented in the following chapters.

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### 3 Policies supporting SCP

#### Facts and figures

- Framework SCP strategies or policies specifically targeting SCP have not yet been developed in SEE and EECCA countries. However, in most countries covered in this report there are examples of SCP-relevant topics being tackled, albeit in an isolated fashion and lacking any overall coordination.
- Many countries have adopted ambitious environmental legislation and some seek to comply with EU directives. However, it is often the case that environmental legislation is incomplete or inconsistent. Coordination between various environmental bodies, notably central and local authorities, also remains a challenge.
- SCP-relevant policy instruments in use throughout the region include laws and regulations, economic instruments and, increasingly, information campaigns aimed at consumers (e.g. eco-labels).
- Considering that public procurement accounts for 5–15 % of GDP, or between 50 and 150 billion Euro annually across the SEE and EECCA regions, Green Public Procurement could provide a strong impulse for implementing SCP. Nevertheless, there has been very little progress so far in implementing GPP, which remains a new concept for the authorities in most SEE and EECCA countries.

#### 3.1 Introduction

This chapter reviews policies and policy instruments which can support implementation of sustainable consumption and production.

The chapter first provides a brief overview of the evolution of the environmental protection framework and then presents examples of policies and initiatives which can support implementation of sustainable consumption and production in SEE and EECCA countries. The information is based on the survey carried out by UNEP, requesting governments of all 18 countries to provide the most recent information on implementation of SCP. A summary of the responses is presented in Annex 1 to this report. A detailed discussion of environmental policies and instruments related to industry, food, buildings, transport and waste takes place in Chapters 4 to 8.

While a comprehensive analysis of all available policy instruments to support SCP was beyond

the scope of this report, this chapter does give a more detailed insight into the current status and future potential for the implementation of Green Public Procurement (GPP). Considering that public procurement accounts for 5–15 % of GDP, which would roughly translate into EUR 50 to 150 billion per annum for the region, the implementation of GPP could provide a strong impulse for implementing SCP. Information about this is based on a GPP survey carried out by the authors.

#### 3.2 Evolution of the environmental protection framework

One of the main effects of the political and socio-economic transformation in SEE and EECCA countries was a fundamental change in the system for environmental protection. Governments made efforts to establish a national regulatory framework, to create a decentralised environmental administration, to provide funding for strategic programmes and financial incentives for private

enterprises, and to ensure more effective enforcement. Many countries have now built up, or strengthened, institutions responsible for environmental protection, established environmental laws and regulations, and streamlined environmental responsibilities.

Most countries have developed basic laws and national strategies or plans for sustainable development or environmental protection. In the 1990s most EECCA countries drew up National Environmental Action Plans, often with the assistance of international experts and support from donors. The agreed priorities tended to focus on air pollution control and protection of water quality, especially in those areas where there were international obligations from international treaties (OECD, 1999). Problems more local in nature (e.g. waste management or mining activities) or less clearly defined (e.g. sustainable management of natural resources or protection of biodiversity) were, and remain, less of a priority. Furthermore, only a small percentage of the activities listed in the NEAPs have been achieved (UNECE, 2003).

In SEE, Sustainable Development Strategies are under preparation in four countries (Croatia, former Yugoslav Republic of Macedonia, Montenegro and Serbia). Montenegro set up a government office supporting the National Council on Sustainable Development and Bosnia and Herzegovina established a National Steering Committee for Environment and Sustainable Development (UNDP, 2007).

Implementation mechanisms in use throughout the regions include environmental laws and regulations, economic instruments, environmental permitting systems, environmental impact assessment requirements and, increasingly, information campaigns targeted at consumers (e.g. eco-labels). Many governments have adopted ambitious environmental legislation (OECD, 2007) and quite a few countries are currently attempting to comply with EU directives.

However, as is often the case, environmental legislation is incomplete or inconsistent, or sometimes even contradictory. Complicated permitting systems, inconsistent enforcement, and the low level of pollution fines do not provide strong incentives for more proactive environmental management. Moreover, many existing environmental institutions suffer from a weak mandate, overlapping or poorly defined responsibilities, frequent restructuring, and inadequate budgets, particularly at the local level (OECD, 2007; EBRD, 2005; UNECE, 2006). For

example, environmental authorities in Moldova and the Russian Federation have significantly reduced their staff since 2003 (EAP Task Force Secretariat, 2006). Ukraine has reorganised its key environmental authority four times since 1998, and the fifth major restructuring was approved in January 2006 (UNECE, 2006).

Coordination between various environmental bodies, including central and local authorities, remains a major challenge, as demonstrated in Bosnia and Herzegovina (UNECE, 2004).

Environmental policy-making is also negatively affected by limited systems for collecting and processing pollution and environmental data. In many cases information that has been collected locally is not compiled at the national level to support policy-making. Concerning consumption patterns and their environmental impacts, little data of relevance have been collected at all, although this is not a phenomenon limited to the SEE and EECCA regions.

### **3.3 Examples of SCP-relevant policy instruments used in SEE and EECCA**

Cross-cutting in nature, sustainable consumption and production bring under its umbrella the environment, consumption and consumers, and a supply of products and services. A number of horizontal policies, strategies and instruments under development or already existing in the SEE and EECCA countries are illustrated in this report, including the following:

- Strategic policy framework and sectoral plans to support implementation of SCP;
- Integrated product policies which seek to minimise environmental impacts from manufacturing, use or disposal of products over their life cycle;
- Economic instruments (e.g. pollution fees and charges, energy taxation, differential taxation, preferential tariffs etc.);
- Consumer information (e.g. eco-labels, awareness-raising and public information, food labels, pollutant emission register, etc).

Information in this section is based on government responses to the questionnaire-based survey carried out in the first half of 2007 by UNEP. This survey, building on earlier work by the European

Commission (EC, 2004) and UNEP (UNEP, 2004a), was conducted in all 18 SEE and EECCA countries. Sixteen governments responded to the questionnaire, either partially or in full. A survey of governments was chosen as the most effective way to collect most up-to-date and comprehensive information on the existing policies, instruments and activities in the field of SCP.

The questionnaire addressed both general and sectoral SCP-related policies and strategies. Please note that most of the collected information on various policy instruments, initiatives, campaigns and projects is presented in the five thematic chapters of this report: industry, food, buildings, transport, and waste.

#### **Strategic framework to support SCP**

National strategies or programmes specifically focusing on SCP have not yet been developed in any EECCA or SEE country. However, some sporadic SCP initiatives have already taken place on regional or national levels, i.e. SCP stakeholder conferences in the SEE region and in the Russian Federation. This limited progress indicates that in reality, despite political declarations, SCP has yet to reach a high priority on the policy agenda.

Nevertheless, in several countries existing strategies for sustainable development or specific sector-oriented plans address some aspects of SCP, as reported by Armenia, Belarus, Croatia, Georgia, Kazakhstan, Moldova, Serbia, Tajikistan, and Ukraine (see Box 3.1)

#### **Integrated product policy**

So far no policies in SEE and EECCA countries address the question of minimizing the

environmental impacts of products at the various stages of their life cycles. In some countries, there are general references to the principle of sustainable development in regard to products, and to the minimisation of economic impacts on environment (Moldova), and to sound management of natural resources (Uzbekistan). Responding to the questionnaire, Armenia reported adopting some measures relevant to integrated product policy. Since 1999, pollution fees have been applied to the production and import of environmentally harmful goods, such as asbestos, slate, thermo-asbestos machinery, vehicle brakes, goods and paints containing lead, fluorescent lamps, and products containing mercury. Similar initiatives have been implemented in some SEE countries, especially those which aim to align their environmental legislation with the EU.

#### **Economic instruments**

Various economic instruments are in use in EECCA and SEE countries which provide financial incentives for SCP. Pollution fees and charges are commonly used, continuing the pre-transition system where fees and fines were charged for the use of natural resources and adverse impacts on the environment. The level of fees rose in the late 1990s, although they are generally still too low to provide a strong incentive for making production processes cleaner (see Chapter 4).

The examples of instruments used, reported by countries, range widely. Moldova, for example, charges fees on environmentally harmful products (petrol, diesel, packaging materials, tires and batteries). Some governments encourage more environment-friendly products by applying differential taxation. In Uzbekistan companies that implement environmental activities are eligible

#### **Box 3.1 SCP components in national strategies**

- The principle of cleaner production in Croatia is addressed both in the *National Environmental Action Plan and National Environmental Protection Strategy*. The latter sets the priorities for strengthening environmental protection and the implementation of cleaner production projects.
- In Kazakhstan, some elements of SCP are included in the *Strategy on Sustainable Development for 2007-2024*. The objectives of the strategy include, among other things, achieving balanced levels of natural resources extraction, introducing sustainable production and consumption initiatives (including a cleaner production strategy), developing sustainable transport; establishing sustainable development targets for large industrial and energy facilities, setting up requirements and deadlines for transition to best available technologies; and developing alternative energy sources.
- In 2004, Armenia adopted a *Strategy on Sustainable Development for Agriculture* with the objectives to promote sustainable agricultural production and sound use of natural resources (i.e. soil and water), achieving better quality and safety standards in agricultural activities, increasing the wealth of the rural population, and improving their living standards.

**Box 3.2 Environmental loans and targeted distribution of pollution fees.**

- Georgia established a revolving fund with low-interest loans to promote private sector activities in renewable energy.
- In 2005 Ukraine adopted a new budget programme on financial support for environmental activities, operating within the framework of the state fund of environmental protection.
- An Environmental Protection and Energy Efficiency Fund was established in Croatia to support waste management activities, including those related to landfills.
- Armenia adopted measures on the direct return of environmental fees to support local environmental projects. Pollution payments collected from 14 companies are given to the local communities where the polluting companies operate to support local environmental projects. In 2005 several projects were financed through this system, including the renovation of the sewage system, improvement of solid waste collection, and development of the health system in three communities.

All EECCA and SEE countries have a broad range of programmes, laws and regulations to protect consumers' health and safety. Kyrgyzstan reported that consumer protection legislation includes the law on Sanitary and Epidemiological Welfare of the Population and a government regulation on Procedures for Sanitary and Epidemiological Production Assessment based on Human Health Safety Indicators. In Ukraine, the relevant regulations include laws on Consumer Rights Protection, Safety and Quality of Food Products, State Regulation of Agricultural Production Imports, Sanitary and Epidemiological Welfare; the resolution on State Control over Standards and Rules Compliance and on Liability Rules for its Violation. It is interesting to note that responses to the questionnaire indicated that such policies and legislation were usually developed with little or no inputs from the public.

Most EECCA and SEE countries use obligatory labels that provide information on the content of foods and their nutritional values. Exceptions here are Georgia, Montenegro and Tajikistan. In Croatia, the National Institute of Public Health is responsible for educational campaigns for consumers on how to use this information in food-related matters. Serbia initiated educational programmes in agricultural universities and adult education centres. In some countries initiatives are undertaken by NGOs. In Tajikistan awareness raising on consumer protection is mainly carried out by NGOs although the activities are sporadic. In Montenegro, in the absence of a law on consumer protection, NGOs began an educational campaign supported by USAID to inform and educate civil society about consumers' rights and the need to adopt appropriate legislation on consumer protection.

***Ecolabels***

Ecolabels (see Box 3.3) are less widely used in the SEE and EECCA regions, and have been reported only by Croatia, Serbia and Uzbekistan. In Croatia, the national Eco-label scheme had already been established in 1994. In Kazakhstan there are some preliminary initiatives, (including relevant provisions in the draft Environmental Code) for applying eco-labelling on a voluntary basis. Ecological labelling in Kazakhstan will be applied to products that have a potentially harmful effect on the environment, human health and biological resources. In Moldova the system of eco-labelling is under preparation.

Some countries participate in voluntary international initiatives run by non-governmental organizations. For example in 2007 in Croatia 117 beaches and

for the 30 % VAT exemption on their products. Ukraine introduced in 2002 a tax exemption to support resource- and energy-efficient equipment and low-waste technologies. Another objective was to encourage setting up facilities for waste recycling and processing. This latter initiative has been evaluated as quite successful in encouraging entrepreneurs to start collecting materials and recycling businesses. This resulted in a significant increase in the amount of collected paper, glass, plastic, and used oils, and Ukraine has now reached the 1990–1991 levels of recycling, when the collection of these materials was at its highest.

Other reported examples of economic incentives include preferential loan systems, and the use of pollution fees to support environmental protection projects (Box 3.2).

***Consumer information tools***

To educate consumers and to increase their awareness of sustainable consumption and production, EECCA and SEE countries have initiated a variety of policies and campaigns, but they tend to focus on other aspects and the SCP angle is a side benefit. The area of food safety and consumer protection is a good example.

**Box 3.3 What are Eco-labels?**

Eco-label is a voluntary scheme that generally has a dual purpose: 1) to promote the design, production, marketing and use of consumer products and services that have a reduced environmental impact during their entire life-cycle; and 2) to provide consumers with better information on the environmental quality of products and services, to help them make informed environmental choices in their purchases.

Products that meet defined ecological and performance criteria are awarded the eco-label logo.

**Note:** For more information on eco-labels, see also: [http://ec.europa.eu/environment/ecolabel/index\\_en.htm](http://ec.europa.eu/environment/ecolabel/index_en.htm).

20 marinas were awarded a Blue Flag eco-label, in Montenegro 20 beaches, in Romania seven beaches and one marina, and in the Russian Federation – one marina. The ecolabel is awarded for compliance with 29 criteria covering water quality, environmental management activities, various aspects of environmental education and information, and for safety and services provided.

**Box 3.4 Pollutant emission registers**

- In Kyrgyzstan, certain industrial facilities (large mining facilities, thermal power stations, the water authority) are required to report on their environmental activities in a format approved by the National Statistical Committee.
- In Moldova the government collects statistical data on emissions and releases of pollutants into air and water, including hazardous pollutants. Authorities define which enterprises must report information related to environmental protection and the use of natural resources.
- The Ukraine Ministry of Environment has developed a draft regulation on informing the public through the mass media about major polluters. Regional authorities of this Ministry are responsible for collecting statistical data on key indicators of water use and discharges and air emissions, and reporting these data to the state agencies of statistics.

Romania is not strictly within the scope of the SEE region as defined in this report, but the country provides an interesting example of eco-labelling in the energy sector. According to the 2005 Energy Labelling Regulation, a supplier of electric energy has an obligation once a year to provide every customer with an 'energy label' which should include the following information: 1) the contribution of each primary energy source to the total amount procured by the provider; 2) the level of specific CO<sub>2</sub> emissions and radioactive waste for the energy provided; 3) a comparison of these data with national average figures.

***Pollution release and transfer registers***

In some western countries citizens can obtain information on environmental pollution through pollutant emission registers, which are publicly accessible through the Internet and free of charge. Even though many EECCA countries have reporting systems that include some elements of the full-scale register (Box 3.4), the data collected are generally not available online. In fact, as discussed in Chapter 4, there are no indications that data are even compiled or used at the nation-wide level.

***Life-cycle assessment and costs***

LCA and LCC are important methods for helping to determine the overall environmental impacts of goods or products, and their lifetime cost. This is especially important in procurement (Box 3.5). A life-cycle based approach is increasingly being adopted in environmental policy-making in the EU. However, at the present time no SEE and EECCA country has adopted policies introducing LCA and LCC.

**3.4 Green Public Procurement**

This section reviews experiences with Green Public Procurement (GPP) in EECCA and SEE countries in the period 2003–2006. This is the first comprehensive effort to review GPP implementation in these regions. The information presented is based on an extensive literature review and on two surveys, the UNEP policy questionnaire on SCP distributed to the national authorities in SEE and EECCA countries, and a GPP questionnaire addressed to public procurement offices in the countries.

### **Box 3.5 Life-cycle assessment and life-cycle costing**

#### Life-cycle assessment (LCA)

The life-cycle of a product includes all the phases of its 'life' ranging from the extraction of natural resources necessary to manufacture it, through the design phase, manufacturing, assembly, marketing, distribution, sale and use to their eventual disposal as waste. LCA analysis is often long and complicated. LCA is an internationally standardised methodology (ISO 14040 and 14044), which helps to quantify the environmental pressures related to goods and services, the environmental benefits, the trade-offs and areas for achieving improvements taking into account the full life-cycle of the product.

**Source:** Adapted from CEC, 2003.

#### Life-cycle costing (LCC)

In public procurement the price offered is always one of the most influential factors. However, the purchase price represents just one of the cost elements in the whole life-cycle. Other costs occur in the use and disposal phase. More energy-efficient products tend to be more expensive to buy, but less expensive to use, and LCC is sometimes used in a procurement procedure to factor this in. According to the life-cycle costing approach, all the costs that will occur during the lifetime of the product or service should be taken into account. For example, life-cycle costing should cover:

- the purchase cost, including associated costs such as delivery, installation, commissioning, staff training, etc.;
- operating costs, including energy, spares, maintenance;
- 'spending to save', for example, a higher initial expenditure for additional insulation that leads to energy cost savings over time;
- cost savings, for example, the creation of self-run recycling markets (e.g. printer cartridges) and the sale of used goods to recycling companies;
- end of life costs, such as decommissioning, removal and disposal.

LCC discloses the costs of resource use, e.g. energy and water use, as well as disposal costs. LCC is therefore an effective tool to back up not only more fiscally responsible procurement decisions, but reduced environmental impacts as well.

**Source:** Adapted from CEC, 2004; OECD, 2003.

#### **3.4.1 Introduction to Sustainable Public Procurement**

Governments exercise great influence as major consumers of goods and services, spending large amounts of money every year on public procurement. The concept of Sustainable Public Procurement takes into account economic, environmental and social criteria in the tender process, where the fairly well established Green Public Procurement addresses the environmental component of SPP (Box 3.7). This chapter focuses on Green Public Procurement (GPP) since GPP is often the first step in the implementation of the SPP, as demonstrated by on-going international practice (Box 3.8).

The procured goods produce environmental impacts during their entire life cycle, that is, production, use or consumption, and disposal. When governments choose to buy goods and services that are environmentally preferable, they support sustainable production and consumption. Application of GPP can benefit the environment by:

- reducing GHG emissions and air contaminants;
- improving energy and water efficiency;
- reducing ozone-depleting substances;
- reducing waste and supporting reuse and recycling;

### Box 3.6 Key requirements of public procurement processes

Procurement should seek first and foremost value for money. Procurement systems should be driven by the principle that an open, fair and transparent procurement process will allow for competition, and that competition will result in the most competitive prices. Practices should be built-in throughout procurement processes to discourage corrupt practices (e.g. favouritism, collusion, fraud) and to safeguard competition. Key requirements of public procurement processes include:

- *economy*: value for money;
- *administrative efficiency*: the process should involve minimum time and cost;
- *equal opportunity*: business opportunity should be open to all competent suppliers and contractors;
- *transparency*: process should be open and procurement authorities accountable;
- *dispute resolution*: possibility to challenge an award and seek remedies from a court or other independent body.

**Source:** Adapted from OECD, 2003. See also OECD, 2005; OECD, 2006.

### Box 3.7 What are Sustainable Public Procurement and Green Public Procurement?

According to UN Environment Programme (UNEP, 2004b), Sustainable Public Procurement (SPP) is a process in which organisations buy supplies or services by taking into account:

- the best value for money (price, quality, availability, usefulness);
- environmental aspects over the entire life-cycle of products;
- social aspects (including poverty eradication, labour conditions, human rights).

Environmental aspects in SPP are often referred to as Green Public Procurement (GPP). GPP is an approach whereby public authorities integrate environmental criteria into all stages of their procurement process. This encourages the dissemination of environmental technologies and the development of environmentally sound products by seeking and choosing outcomes and solutions that have the least possible impact on the environment throughout their whole life-cycle.

**Source of GPP definition:** Adapted from Bouwer *et al.*, 2005.

- reducing hazardous waste generation; and
- reducing toxic and hazardous substances.

Additional benefits of GPP include:

- applying GPP in public sector procurement can help achieve economies of scale in the acquisition of environmentally preferable goods and services. This reduces the cost for government and strengthens green markets and industries;
- GPP can result in more environmentally responsible planning, acquisition, use and

disposal practices in governmental and other public institutions;

- GPP can support a healthier working and living environment for employees and for citizens.

GPP promotes the development and adoption of environmental technologies, particularly in those areas where public authorities are important consumers. This can also help to create new markets and jobs in the eco-industry sector. For example, the EU eco-industries sector <sup>(1)</sup> already accounts for one-third of the global eco-industry market, estimated at EUR 550 billion per year, and with an average annual growth rate of around 5 % since the mid-1990s. Many governments and public

<sup>(1)</sup> Source: 'The Power of Green Procurement' published on <http://ec.europa.eu/comm/environment/gpp/media.htm>. For more information on the EU eco-industry sector, see CEC, DG Environment, 2006.

institutions in OECD countries have started to implement GPP in recent years. In SEE and EECCA, however, SPP and GPP are new subjects which have received very little attention so far.

Implementation of GPP has been supported by heads of government and environment ministers in all important environment-related political processes relevant to EECCA and SEE:

- **Agenda 21, adopted in 1992 at UNCED:** 'Governments themselves also play a role in consumption, particularly in countries where the public sector plays a large role in the economy and can have a considerable influence on both corporate decisions and public perceptions. They should therefore review the purchasing policies of their agencies and departments so that they may improve, where possible, the environmental content of government procurement policies, without prejudice to international trade principles.'
- **Plan of Implementation adopted in 2002 at WSSD:** 'Encourage relevant authorities at all levels to take sustainable development considerations into account in decision-making,

including on national and local development planning, investment in infrastructure, business development and public procurement. This would include actions at all levels to: (...) (c) Promote public procurement policies that encourage development and diffusion of environmentally sound goods and services; (...)'.

- **Ministerial Declaration of the 2003 Kiev Environment for Europe Ministerial Conference:** 'We underline the importance of the shift towards sustainable production and consumption patterns and encourage regions, sub-regions and countries, as appropriate, to devise programmes to accelerate this shift. (...) the greening of government at all levels is imperative. We will continue to work on the adoption of public procurement policies that encourage the development and diffusion of environmentally sound goods and services.'

### 3.4.2 *Green Public Procurement in SEE and EECCA countries*

It proved a challenge to obtain data on overall volumes of public procurement in SEE and EECCA countries. Only two countries reported statistics

#### Box 3.8 GPP and SPP implementation at the EU and international level

- In 2006 an EU-funded survey (Bouwer, 2005) on the status of GPP in EU Member States found that currently 7 Member States (Austria, Denmark, Finland, Germany, the Netherlands, Sweden and the United Kingdom) practice a significant amount of green purchasing, i.e. more than 40 % of their tenders contained environmental criteria. The survey also revealed that GPP practice needs to be improved in all Member States, as many of the 'green' tenders were not formulated in a clear and non-discriminatory way.
- DG Environment is currently drafting a new EU Communication on GPP, and non-mandatory performance targets for GPP are being discussed with Member States. At the level of EU, 12 Member States have established or are in the process of establishing national GPP action plans. Five Member States have taken action at governmental level to implement GPP. Other Member States have reported decentralised GPP initiatives. The EU Handbook 'Buying Green', addressed to PP authorities, explains how to include environmental criteria in the various stages of a PP procedure, and presents a number of case studies from various EU Member States. The GPP website, <http://ec.europa.eu/environment/gpp/index.htm>, provides further background information on environmental criteria for products, and links to national GPP websites, to eco-label websites, etc.
- The OECD Council adopted in 2002 a Recommendation on Improving the Environmental Performance of Public Procurement. The Recommendation invites member countries to take greater account of environmental considerations in public procurement of products and services, and encourages them to develop greener public purchasing policies, as well as to take concrete steps to ensure the incorporation of environmental criteria into public procurement including environmental impacts throughout the life-cycle, while ensuring that transparency, non-discrimination and competition are preserved.
- A Marrakech Task Force on SPP was launched in 2006 with the main aim to promote and support the implementation of SPP by developing tools and capacity building in both developed and developing countries.
- The International Training Centre of ILO, in cooperation with UNEP, launched in 2007 a training programme on SPP, which will target PP officials and experts of international development institutions and national government entities.

on public procurement (PP) in 2005 as part of their reply to UNEP's SCP questionnaire. In Croatia, the estimated overall volume of procurement of governmental institutions on the national level in 2005 was EUR 4.5 billion, equivalent to about 14 % of GDP. About 80 % of this amount was awarded by public tender. In Armenia, the 2005 public procurement from the state budget was about 184 billion drams — approximately USD 0.4 billion — equivalent to about 8 % of GDP. About 26 % of this amount was procured by public tender.

Based on these limited data, it can be surmised that the yearly volume of public procurement in EECCA and SEE countries is probably in the range between 5 % and 15 % of the GDP, or equivalent of some EUR 50–150 billion across the SEE and EECCA regions. Using GPP for some of this procurement could bring significant environmental and economic benefits to every EECCA and SEE country.

#### *Reform of public procurement systems in EECCA and SEE countries*

GPP functions as a part of the overall public procurement system in a country, and when the overall system has deficiencies, the effectiveness of GPP is also negatively affected. Typical deficiencies include:

- corruption (e.g. favouritism, collusion, fraud);
- abuse of authority;
- political interference;
- low administrative capacity;
- insufficient, incomplete or unclear legal basis;
- inefficient, unfair and non-transparent tender procedures;
- lack of fair and effective dispute resolution mechanisms.

**Table 3.1 Key findings of recent OECD/SIGMA country assessments of PP systems in selected countries (Country & Date Main findings (shortened original text cited directly from the respective assessment reports)**

Croatia, 2004	'Croatia has implemented a new Public Procurement Law, largely modelled on the EC Directives, which introduces a number of changes and new procedures of a rather complex nature for the procurement community to consider. The quality of the Law is generally satisfactory, but a number of deficiencies still need to be addressed by the Government. The lack of adequate mechanisms for review of complaints and external audit remains a serious problem.'
Montenegro, 2004	'The Montenegrin public procurement law is incompatible with EU legislation in many crucial aspects. The law is not only stiff, costly, time-consuming, bureaucratic and inflexible, but it also allows for the application of non-competitive procedures too freely. Further substantial changes in the Law (including the development of a comprehensive set of implementing regulations) will be required in order to bring it into line with the EC Directives. Substantial work will be required to upgrade the administrative capacity and the systems for monitoring and controlling procurement activities (including the independent control and audit functions outside the procurement system itself). Continuing efforts to improve the efficiency of the public procurement system at the operational level are needed in order to ensure fair competition and professional handling of tenders, and to encourage the development of competition in the domestic market. The presence of corruption and fraud in the awarding of public contracts needs to be seriously addressed.'
Serbia, 2004	'The new PPL, largely modelled on the EC Directives (through the Slovene model), introduces changes and new procedures for the procurement community which are rather complex. The quality of the Law is generally good, but there are a number of deficiencies that need to be addressed by the Government. The Public Procurement Office established in 2003 has been able to both initiate and carry out a number of valuable activities, including the provision of training, preparation of supplementary regulations and model documents to support the implementation of the Public Procurement Law. The reform is still in its initial phase, and a lot of work remains to be done over the coming years. The lack of adequate mechanisms for review of complaints and external audit remains a serious problem.'
Ukraine, 2006	'The Sigma review concludes that the changes that have been introduced in the public procurement system during the past 12 months give rise to a number of serious concerns. Those changes will certainly not contribute to a strengthening of public procurement in Ukraine. On the contrary, the steps and actions taken as a result of recent developments will, in Sigma's view, most likely represent a significant deterioration of the system in a number of key aspects. The most important implications foreseen are that the system (i) will not promote efficient, transparent and cost-effective PP; (ii) may risk undermining the credibility and integrity of the entire public procurement system; and (iii) may not contribute to Ukraine's ambitions for closer integration with the EU and future membership of WTO.'

**Source:** PP assessment reports available at the SIGMA web pages ([www.oecd.org](http://www.oecd.org)).

Public procurement offices or agencies have recently been established in most SEE and several EECCA countries. Typically, these public institutions are involved in developing or amending PP legislation and are responsible for providing training to operational PP offices on all levels, including central/regional/local government and other public institutions, which are subject to PP legislation.

OECD and the World Bank recently published a joint report which summarises international good practices on procurement capacity development (OECD, 2005). This report also provides information and advice on strengthening a public procurement framework and on measuring and monitoring procurement performance in a country. In addition, OECD recently published a Methodology for Assessment of National Procurement Systems (OECD, 2006). It is somewhat surprising that neither of these two documents includes guidance and information on SPP or GPP.

The OECD SIGMA program and a World Bank support program have focused on providing advice on improving PP systems in SEE and EECCA countries. The SIGMA program, carried out on behalf of the European Commission, assessed public procurement systems in some SEE countries and in Ukraine (Table 3.1). The World Bank PP assistance program has reviewed PP systems in Armenia, Azerbaijan, Georgia, Moldova and Uzbekistan. The SIGMA and World Bank reports concluded that in spite of considerable improvements which have taken place in recent years, PP systems in most SEE and EECCA countries still have major deficiencies when compared with good international practice or EU legislation.

Overall, Croatian and Serbian PP systems were evaluated as being closest to good international practice. Continued improvements in overall PP systems in the future should eventually facilitate more widespread adoption of GPP and SPP.

### ***GPP in current public procurement legislation and policies***

Adoption of GPP practices is facilitated when national public procurement legislation contains appropriate provisions. As part of the research conducted during the preparation of this chapter, national PP legislation currently in force in SEE

and EECCA countries has been screened for notions of sustainable development, environment, environmental protection, recycling, ecology, eco-labels, certification and ISO 14001. The result of this research is presented in Table 3.2. Bulgaria and Romania were also reviewed for comparison. In general, it appears that GPP is not practiced to any significant extent.

The provision in the Uzbek Decree on Procurement of Chemicals for Agricultural Purposes concerning the consideration of ecological factors for imported chemicals covers only a small part of the GPP concept. Environment-related provisions included in Bosnian, Bulgarian, Montenegrin and Romanian PP legislation do, however, lay a basis for applying environmental (and in case of the Bulgarian PP Law, also social) criteria in public procurement. Bosnia and Herzegovina reported that environmental criteria were used in the procurement of various types of products.

According to the Croatian National PP Office, the Croatian PP Law is currently being revised and there are plans to update it with GPP provisions in line with EU practice and recommendations. To facilitate the new provision, the Croatian National PP Office plans to organise training seminars for Croatian PP managers. As Bulgaria and Romania have now joined the EU, it should be expected that EU GPP practice will gradually be implemented in these two countries. Romania is planning to create a National Action Plan on GPP in 2007 (2).

As discussed in Box 3.5, LCA and LCC are important methods to help determine the overall environmental impacts and the true costs of a good or service to be procured and purchased. The research for this chapter identified no evidence that LCA or LCC have been used or referred to in any of the procurement policies in the region. Eco-labels (see Box 3.3) can be a useful tool for GPP for defining environmental criteria in tenders. Most SEE public procurement legislation, as well as that of a number of EECCA countries, provides for the use of labels in technical specifications. However, in none of these laws is the term 'eco-label' explicitly mentioned.

Lastly, some of the PP legislation of SEE countries provides for the possibility to require ISO 9000 certification in case of procurement of certain goods and services. However, no reference to ISO 14001 could be found in the PP laws. Taking as an example the new EU Member State Romania, its

(2) Source: Reply of the Romanian Ministry of Environment and Waster Management to the UNEP SCP questionnaire.

**Table 3.2 References to Sustainable Public Procurement in PP legislation currently in force in EECCA and SEE countries (and in the reference countries of Bulgaria and Romania)**

Country	References to GPP/SPP found in PP legislation
Bosnia and Herzegovina	<b>Law on Public Procurement for Bosnia and Herzegovina (2004):</b> Article 14 <i>Technical Specifications</i> (...) (2) (...) technical specifications shall make reference to: (...) c) (...) the desired functional characteristics or performance requirements, which shall also include those related to the protection of health and safety of citizens, as well as of the environment; these characteristics or requirements must be precise and clear so as to allow the suppliers to draw up their tenders and the contracting authority to acquire the supplies, services or works fulfilling the objective requirements set by the contracting authority. Article 34, <i>Contract Award Criteria</i> (1) (...) the criteria on which the contracting authority shall base the award of contracts shall be: a) either the most economically advantageous tender for the contracting authority, based on stipulated evaluation criteria identified according to the nature and scope of the subject matter of the public contract in question, for example: quality, price, technical merit, functional and environmental characteristics, running costs, cost-effectiveness, after-sales service and technical assistance, delivery date and delivery period or period of completion; or b) the lowest price of a technically compliant tender.
Bulgaria	<b>Public Procurement Law (1999):</b> <i>Section V. Decision for Initiation of a Public Procurement Procedure.</i> Article 22: (2) The contracting authority may also include in the decision additional requirements to contract performance, such as: 1) those relating to the solution of environmental issues, unemployment, job creation for disabled workers, and to local resources and raw materials; 2) those relating to preserving national security, defence, and public peace; 3) those relating to stimulating small and medium-sized enterprises as subcontractors.
Montenegro	<b>Public Procurement Law, Republic of Montenegro (2001):</b> <i>Chapter 5: Instructions to Bidders:</i> (...) Article 20 (...) (2) <i>Equipment requiring supplies or maintenance:</i> Equipment shall be procured on the basis of a calculation which makes possible the determination of the lowest calculated price per unit obtained from the operations of such equipment; this determination shall (...) include, where necessary, the spare parts for preventive maintenance, the after-sales services, the payment schedule, the operating costs, the efficiency, the training, the safety, the environmental benefits or any other relevant costs for tabulation; (...) <i>Chapter 7</i> (...) Article 34: <i>Evaluation and comparison</i> (...) (5) <i>Methods and criteria for evaluation and comparison:</i> (...) (a) for goods, among others, costs of transportation and insurance, payment schedule, delivery time, operating costs, efficiency, compatibility of the equipment, availability of services and spare parts, related training, safety, environmental benefits or losses by damages.
Romania	<b>Governmental Emergency Ordinance No. 34/2006, approved by the Law no. 337/2206,</b> regarding the award of the public procurement contracts, public works concession contracts and services concession contracts: <i>Section 3, Rules for elaboration of the tender documentation</i> (...) Article 39: The contracting authority has the right to impose within the tender documentation, to the extent that these are compatible with Community law, special conditions relating to the performance of the contract with the goal to obtain certain social effects or related to environmental protection and promoting the sustainable development. <i>Note: the Law explicitly mentions in various paragraphs the possibility to use environmental management systems and national or international eco-labels as technical specification in tender documentation.</i>
Uzbekistan	<b>Decree on Procurement of Chemical Substances for Agriculture Purposes:</b> Article 8: The Commission shall (...) select the winner taking into account economical, ecological and social factors of utilization of chemicals to be imported (...)

**Note:** All other SEE and EECCA countries (except Turkmenistan, for which no PP legislation could be identified): No GPP/SPP references found in reviewed PP legislation.

PP legislation provides for the possibility of using ISO 14001 as a selection criterion. The GPP survey revealed, indeed, that ISO 14001 has been used in the city of Timisoara, Romania, as a selection criterion in the procurement of construction work.

Overall, however, based on the results of the research for this chapter, none of the SEE and EECCA countries at present has GPP provisions in its public procurement laws, and no specific GPP policies could be identified.

### 3.4.3 Survey of GPP practice in SEE and EECCA countries

The information presented in this section is based on a GPP questionnaire survey carried out by UNEP and the author of the chapter between November 2006 and February 2007. A questionnaire designed to identify current GPP practices in SEE and EECCA countries <sup>(3)</sup> was distributed to about 350 city governments and authorities in EECCA and SEE countries, including the largest cities in each country as well as to some procurement offices in EECCA. In addition, all national public procurement offices/agencies established in SEE and EECCA were contacted to complete or distribute the questionnaire. Consultants were also contracted to conduct on-the-ground research in three cities (Bishkek in Kyrgyzstan, Timisoara in Romania, and Yerevan in Armenia) through direct interviews with relevant PP offices.

However, the response rate to the survey was poor, and only about 20 completed surveys were received. Detailed information from the responses received is available online <sup>(4)</sup>. The following discussion will identify some of its key results.

Environmental criteria have not been widely used in public procurement in the categories of food/beverages, textiles/clothing, wood/furniture and paper/print. The 'worst' result, which was surprising, because the price difference between alternatives is fairly small, concerned paper/print, where only three of 19 respondents said that they have tried to procure recycled paper. Seven of 19 respondents did not know whether recycled paper actually was available in their town. None of the respondents has procured biological or organic food, although most respondents said that biological/organic food is available in their cities.

Various environment-related criteria have been used in the procurement of vehicles. In Yerevan, three respondents have used the criterion 'vehicles should run on natural gas', which may reflect a growing awareness of the economical and environmental benefits of the use of natural gas (see Chapter). Energy-saving criteria have been widely used in the procurement of machinery. Only 4 out of 16 respondents indicated initiatives to procure energy-saving light bulbs.

ISO 14001 certification has been a requirement for construction-related tenders in Timisoara, Romania, but not elsewhere and not in the provision of cleaning and gardening services. Energy-saving criteria have been used quite widely in procuring construction work. There is a limited experience with environment-related criteria for cleaning products and chemical products used in public parks and green areas. Experience in buying eco-technologies also appears to be very limited.

As regards information sources used for defining environmental criteria, the survey showed that information from the internet is the most commonly used source. As for the obstacles to GPP, no clear trend could be detected from the replies. This shows that GPP is a new concept in SEE and EECCA, and that a wide range of activities will be necessary to overcome obstacles.

In regard to support for overcoming obstacles to GPP, access to information, experience exchange with similar organisations from abroad and training were the categories selected by most of the respondents. Only two of 18 respondents thought that work aimed at amending national procurement legislation would be useful.

The results presented above can serve as only an incomplete indication of current experience with GPP in SEE and EECCA countries. To draw more firm conclusions and recommendations, a comprehensive survey of the status of GPP in the EECCA and SEE regions would be needed. Such a survey should not only focus on self-assessments of PP offices. It ought also to include independent expert analyses of environmental criteria as required in actual tenders.

The notion that self-assessments might be too optimistic is based on a finding of a recent similar study for the EU (Bouwer, 2005). This study not only asked PP officers about their use of environmental criteria in procurement, but also included tender analysis by independent specialists. The investigation found that out of 865 questionnaire responses from all EU Member States, 67 % of respondents said that environmental criteria were used in purchasing. However, the analysis of about 1 100 tenders by independent experts revealed that only 37 % of all analysed tenders actually included sound environmental criteria. In addition, a large number of

<sup>(3)</sup> For this purpose, a questionnaire used for a similar study on GPP practice in the EU (Bouwer, 2005) was adapted to SEE/EECCA circumstances.

<sup>(4)</sup> Please see UNEP's website at: [www.unep.ch/scoe](http://www.unep.ch/scoe) for detailed results of the GPP survey.

analysed tenders did contain environmental criteria, but these criteria were not well defined and it was unlikely that the tenders would result in greener purchases<sup>(5)</sup>.

#### 3.4.4 Prospects for GPP in the SEE and EECCA countries

Given that public procurement in SEE and EECCA countries is estimated at between EUR 50 and 150 billion, Green Public Procurement offers a substantial potential for environmental and economic benefits, including reduced emissions and waste, an increase in energy efficiency, support for eco-technologies, development of eco-industry, and a contribution to economic growth and job creation. One of these benefits, the positive effect on the eco-industry sector, should be emphasised. A stronger eco-industry sector in SEE/EECCA countries would greatly facilitate the implementation of environmental policies and improve dissemination of environmental technologies in local markets.

So far, however, there has been very little progress in implementing GPP in EECCA and SEE countries. GPP is a new concept in the region and very few steps to adopt GPP have been taken. Only 4 out of 18 countries covered by this report have established some legal basis for GPP. None of the countries has a national GPP policy in place. Even where GPP-relevant provisions have been enacted in legislation in a few countries, operational policies are lacking. There appears to be little understanding of environmental and social aspects in procurement, in national public procurement institutions (regulatory, supervisory and supporting bodies), and on the operational level.

Procurement offices had limited knowledge about availability of greener goods and services. Except for Croatia, Serbia, and Uzbekistan, none of the countries in the EECCA and SEE regions has introduced eco-labels. Life-cycle assessment and costing have not been applied so far, and ISO 14001 is not yet widely used in public tendering. Despite considerable improvements in recent years, national public procurement systems in most EECCA and many SEE countries require additional efforts to live up to good international practice.

In spite of the absence of GPP policies, there are indications, nonetheless, that some public procurement offices in SEE and EECCA countries

have occasionally used certain environmental criteria in tender documentation. Such criteria were primarily used in cases where obvious and quick economic gains could be had (e.g. energy saving equipment, fuel efficient cars). Experience is very limited with more complex environmental criteria and with the purchase of environmentally sound products and services.

Several factors could facilitate future progress with Green Public Procurement in SEE and EECCA countries:

- A growing amount of information and literature on GPP is already available on the internet, and could be used to advance GPP and SPP. However, most of this information was elaborated in and for OECD countries, and would need to be adapted to EECCA and SEE conditions. Unfortunately, most of this documentation is available only in English.
- So far, no targeted international work related to SPP and GPP has been completed, or even started, in EECCA and SEE countries. Closer collaboration between EECCA and SEE countries and those regions and countries with experience and know-how of SPP and GPP practices could be beneficial.
- There is a broad range of possible support activities. On the national level, it would be desirable to strengthen public procurement systems, enact a legal basis for GPP/SPP, and develop national GPP/SPP strategies. On the operational level, training, information resources and other practical assistance will be required. Numerous projects facilitating GPP and SPP are already on-going in OECD countries.
- A nation-wide comprehensive effort would be necessary to realise the great potential for GPP in EECCA and SEE countries. Support and action would be required from national public procurement offices (regulatory, supervisory and supporting bodies), and closer cooperation between environmental authorities and national public procurement offices will be essential.
- A powerful signal could be given to the governments and the public in the region, if GPP were applied to procurement projects carried out under multilateral and bilateral assistance programmes in EECCA and SEE.

<sup>(5)</sup> An example of such an unclear criteria, which likely will not result in greener purchases, would be the following criteria found in some of the analysed tenders: 'Environmental aspects are considered'.

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**Additional GPP and SPP related websites:**

<http://ec.europa.eu/environment/gpp/index.htm> – EC's GPP website.

UNEP SPP work; see <http://www.uneptie.org/pc/sustain/policies/green-proc.htm>.

ITC ILO SPP training program; see [http://www.itcilo.org/pub/page\\_calendar\\_list.php](http://www.itcilo.org/pub/page_calendar_list.php).

Marrakech Task Force on SPP <http://www.un.org/esa/sustdev/sdissues/consumption/Marrakech/conprod10Y.htm>.

SIGMA homepage at OECD ([www.oecd.org](http://www.oecd.org)) – Information and analysis on PP in OECD and SEE countries, many links.

[www.procuraplus.org](http://www.procuraplus.org), Procura+ is an ICLEI GPP initiative currently working with 30 municipalities/cities in nine countries.

United Kingdom's SPP websites; see <http://www.sustainable-development.gov.uk/government/task-forces/procurement/index.htm>; and <http://www.defra.gov.uk/environment/business/scp/>.

Norway's Green Procurement website; see <http://www.gronnstat.no/start.asp>.

Canada's GPP pages; see <http://www.greeninggovernment.gc.ca>.

The Swedish Instrument for Ecologically Sustainable Procurement; see <http://www.eku.nu/eng/>.

Swiss guide to sustainable public procurement; see <http://www.igoeb.ch/f/achatspublics.htm>.

Proceedings from a conference *Green Public Procurement: Turning policy into practice!*; see [www.iclei.org/itc/gpp2006](http://www.iclei.org/itc/gpp2006).

# 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) <sup>(1)</sup>. 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) <sup>(2)</sup>.

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.

## **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 as 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

#### **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'.

<sup>(1)</sup> [www.unece.org](http://www.unece.org).

<sup>(2)</sup> 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
Georgia	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 the requirements of world markets
- Companies now need to address the issue of staff training.

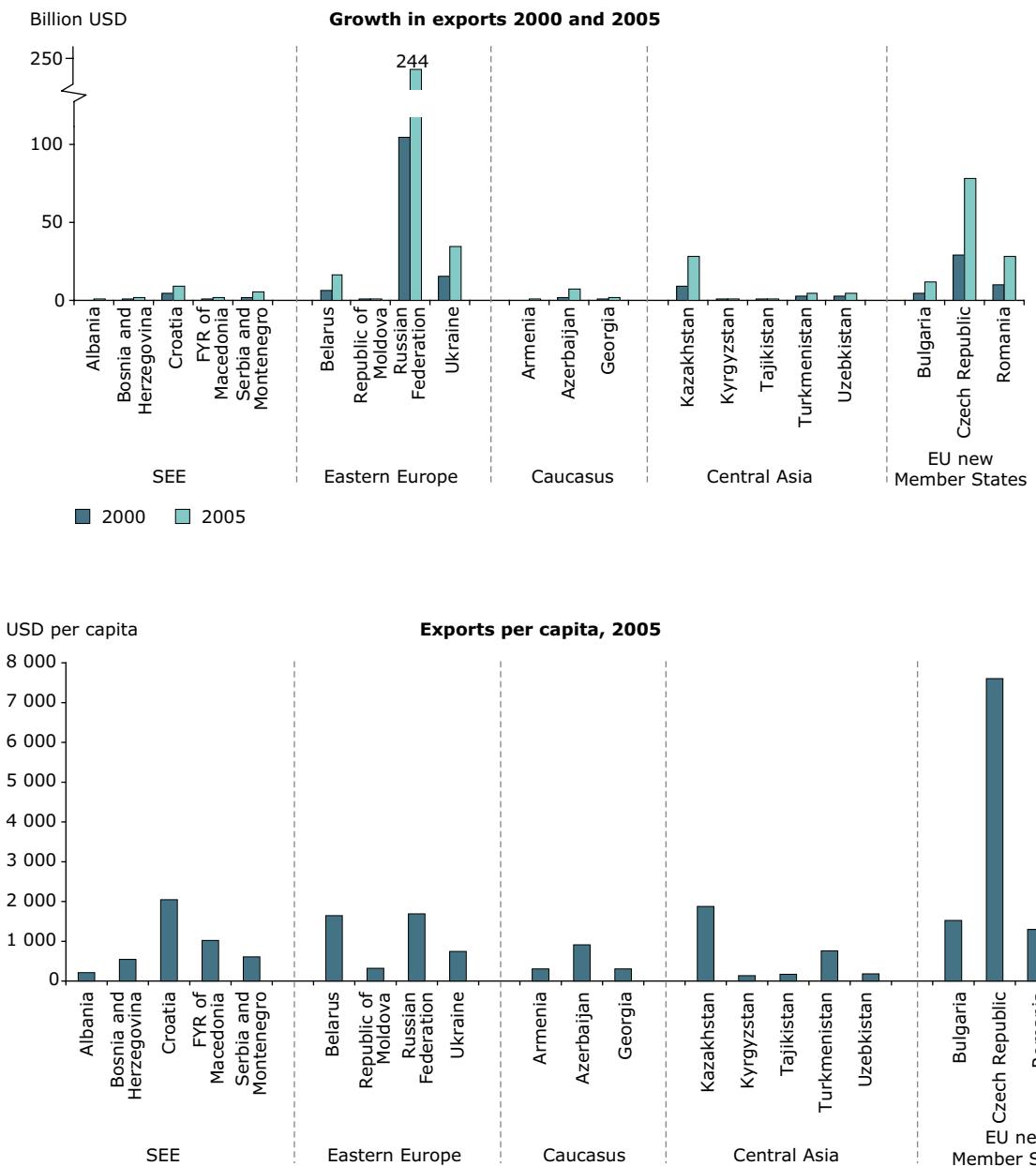
**Source:** Adapted from Bogdetsky *et al.*, 2002.

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	%	Commodity	%
Albania	2003	Clothing and accessories	34.3	Footwear	29.8	Metal manufactures	4.3	Iron and steel	4.1	Metaliferous 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	Metaliferous 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	Metaliferous ore	1.3	Plastics in primary form	1.2	Other	8.3		
Georgia	2003	Metaliferous 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	Metaliferous 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	Aluminium	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, research 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).

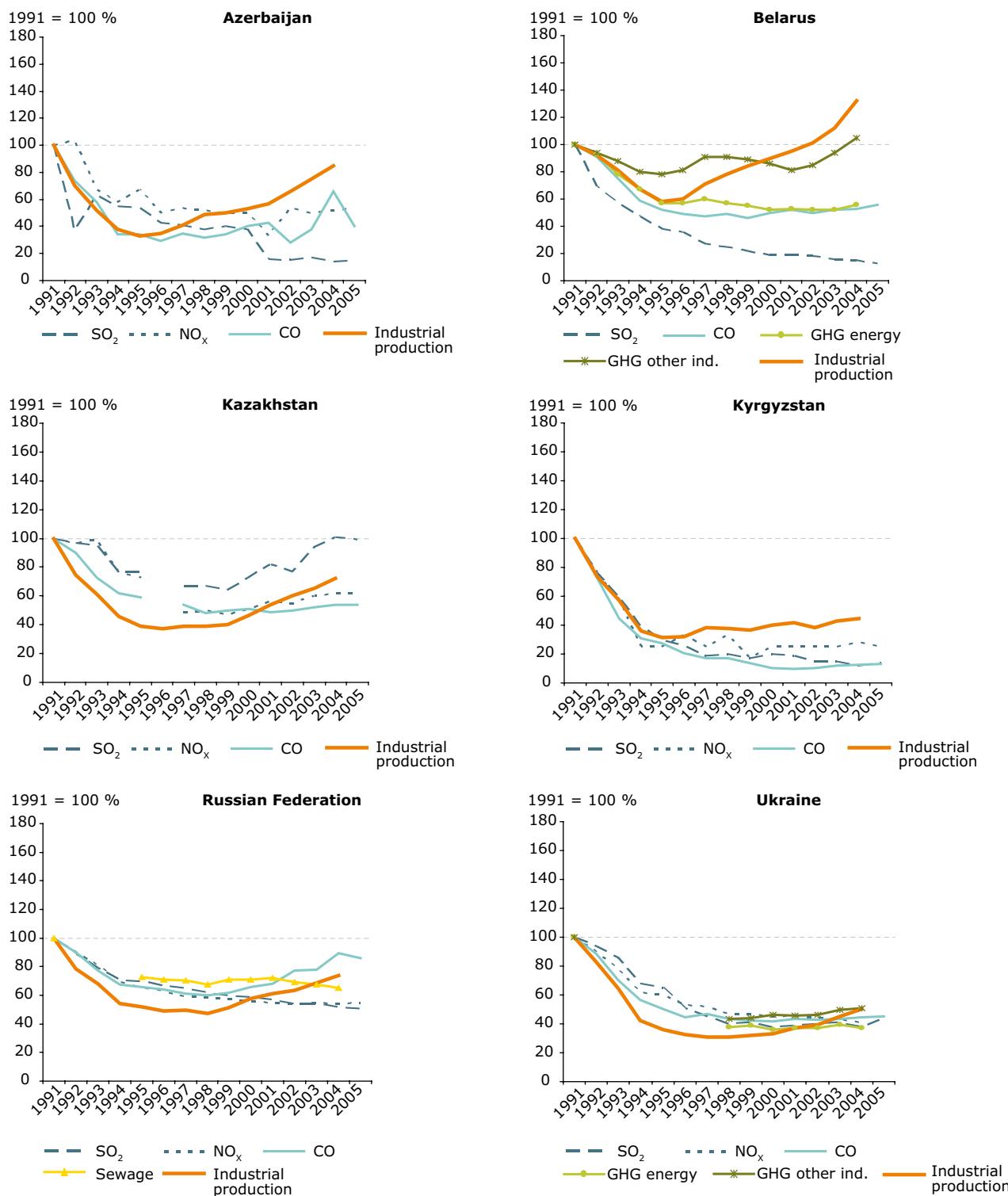
Given the poor data situation, it was not possible to prepare a comprehensive review of trends in industrial pollution and resource use since 1990 in all SEE and EECCA countries. Available limited information is presented in Figure 4.2.

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  $\text{SO}_2$  in Azerbaijan, Belarus, Kyrgyzstan and Russia;  $\text{CO}$  in Belarus, Kazakhstan and Kyrgyzstan;  $\text{NO}_x$  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<sub>2</sub>, NO<sub>x</sub> and CO data: CIS. Industrial GHG emission data: authors' calculations based on absolute GHG emission data published by [www.unfccc.int](http://www.unfccc.int). Industrial sewage discharges: authors' calculations based on absolute values in billion m<sup>3</sup> 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 <sup>(3)</sup>. 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

<sup>(3)</sup> 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.

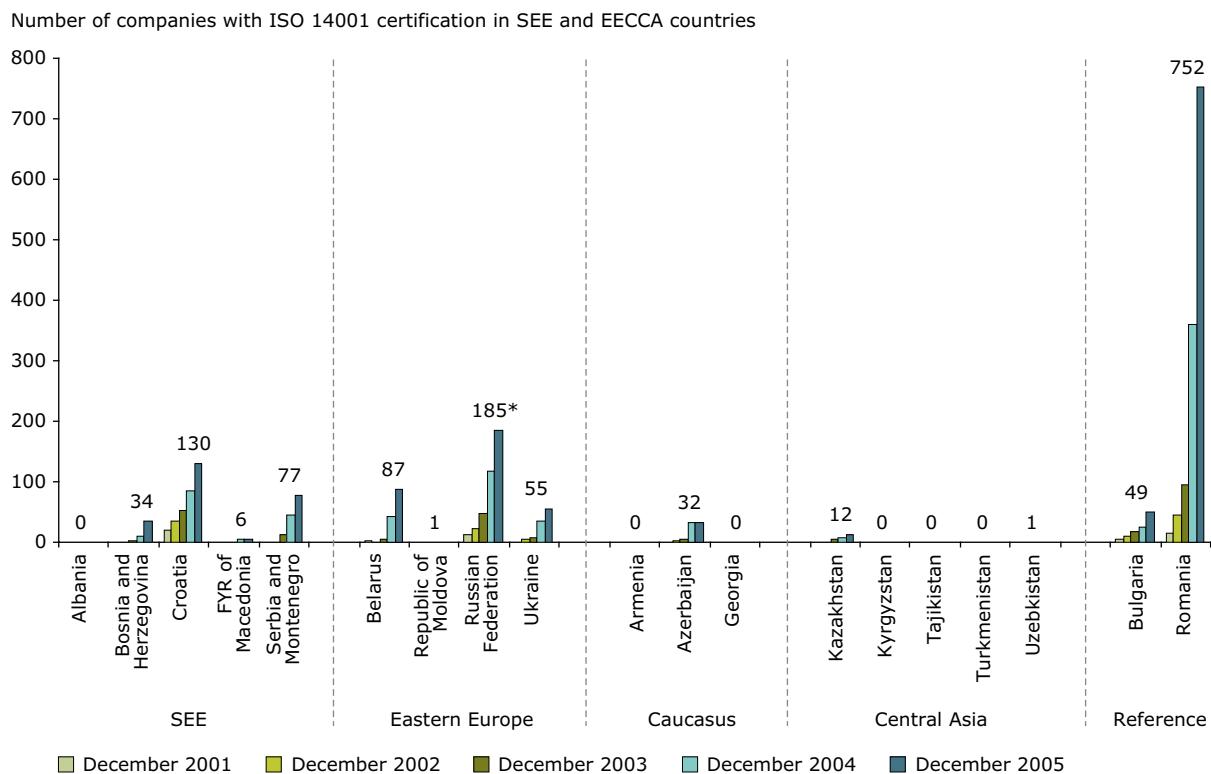
#### Challenges to possible convergence with EU IPPC Directive

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

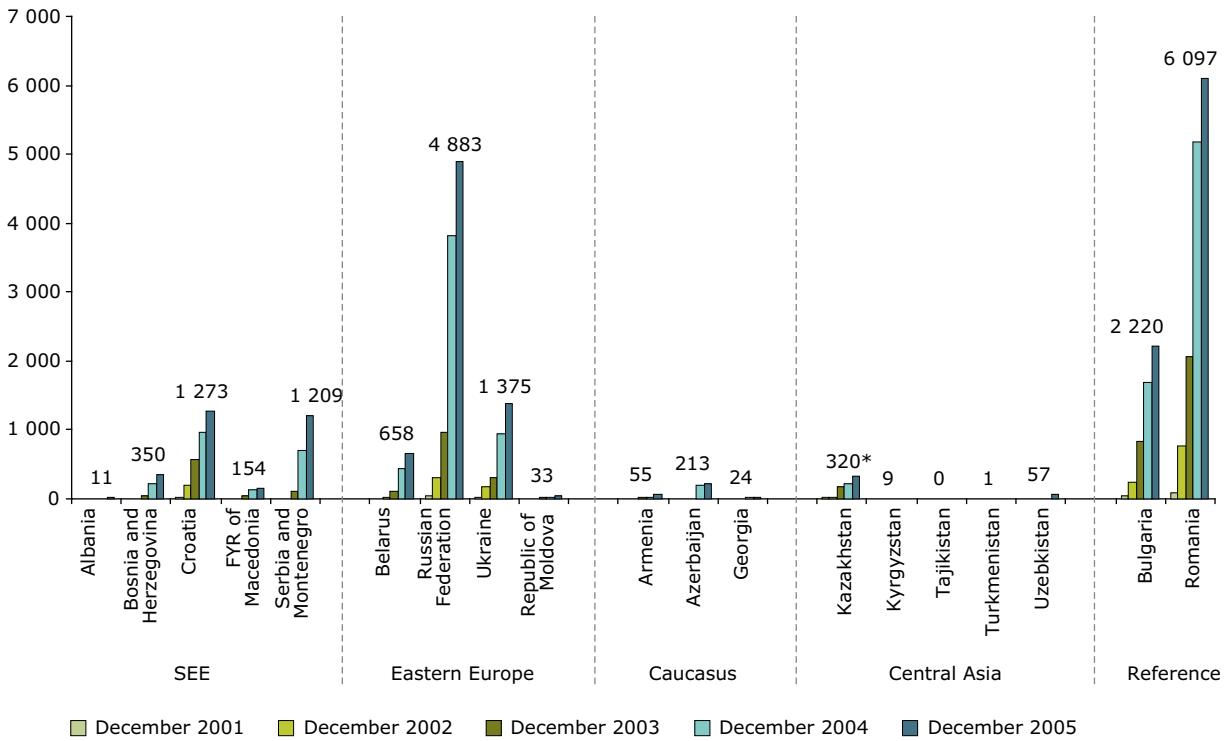
- major change in permitting philosophy required;
- a major reform of standards would be necessary;
- BATs are generally not defined in EECCA country legislation, although some countries have started to use the term in their legislation or policy documents without really defining it or implementing the 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)**



Number of companies with ISO 9001:2000 certification in SEE and EECCA countries



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

**Source:** [www.iso.org](http://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 (<sup>4</sup>) 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

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

**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.

<b>Low cost investment projects</b>		<b>Developed</b>	<b>Implemented</b>
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 <sup>3</sup>	0.74 in m <sup>3</sup>
• decrease in waste water discharge		0.99 million m <sup>3</sup>	0.74 million m <sup>3</sup>
• 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 <sub>2</sub> emissions		2.93 million m <sup>3</sup>	—
• economy of diesel oil		174 000 litres	26 650 litres
• economy of thermal energy		5 684 000 kWh	5 684 000 kWh
<b>Medium size investment projects</b>		<b>Large size investment projects</b>	
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 <sup>3</sup>	• decrease in waste waters discharge	3.7 million m <sup>3</sup>
• decrease in waste waters discharge	3.52 million m <sup>3</sup>	• 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 <sup>3</sup>	• economy of thermal energy	130 million kWh
• economy of thermal energy	130 mln kWh	• economy of natural gas	6.07 million m <sup>3</sup>
• reduction of SO <sub>2</sub> 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 <sup>(5)</sup>.

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 <sup>(6)</sup>.

#### *UNIDO activities*

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

<sup>(5)</sup> [www.npaf.ru](http://www.npaf.ru)

<sup>(6)</sup> 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](http://www.ensi.no); [www.tekna.no](http://www.tekna.no); [www.energy-links.com](http://www.energy-links.com), [www.barentsenergy.org](http://www.barentsenergy.org). Related financing activities and credit lines: [www.nib.int](http://www.nib.int) and [www.nefco.fi](http://www.nefco.fi).

(8) [www.cpnis.karec.kz/eng](http://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<sup>3</sup> of gas per day. The annual capacity is 160 000 tonnes/year of oil and 36 000 000 m<sup>3</sup>/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
<ul style="list-style-type: none"> <li>Gas: 6 000 000 m<sup>3</sup>/year; USD 95 700 (all gas is lost in the technological cycle)</li> <li>Diesel fuel: 220 tonnes/year; USD 79 570</li> <li>Lubricants: 4 tonnes/year; USD 1 608</li> </ul>	<p>The use of the gas-diesel equipment 'Kubota' (KNG 3200) would allow for the following savings:</p> <ul style="list-style-type: none"> <li>Savings from gas not used: 4 600 000 m<sup>3</sup>/year; equivalent to USD 74 000</li> <li>Increased oil production: 5 110 tonnes/year, equivalent to USD 751 170</li> <li>Savings from diesel fuel not used: 220 tonnes/year, equivalent to USD 86 900</li> </ul> <p>Total savings: USD 912 070 for all 20 wells.</p>

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](http://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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## 5 Food



Location of city studies covered in this chapter

### Facts and figures

- Food, along with housing and transportation, is one of those household consumption categories which cause the highest environmental impacts over the life-cycle from the household sector.
- Access to food is a fundamental quality-of-life issue, and yet availability and access to food varies a great deal within each country and across countries. Although the rate of undernourishment has declined in most countries, some still face serious problems of under-nutrition for their citizens.
- Production of food is intrinsically associated with the use of water and land, and agriculture accounts for most of the environmental impact of the food production and consumption chain. Other significant impacts originate from processing, packaging and storage of food, and its transport and waste disposal.
- Food production in SEE and EECCA countries has been affected by a relative stagnation of the agricultural sector during the 1990s and early 2000s. Total production volume declined in half of the countries. Fish production declined by more than a third between 1992 and 2005, as a result of overfishing and collapsing stocks. Some species are on the verge of extinction.
- The sharp reduction in agriculture and food production in most EECCA countries was accompanied by a strong drop in the use of fertilisers and pesticides until the mid-1990s. The use of pesticides and fertilisers began to increase again after the year 2000.
- There is good potential for the expansion of organic food in SEE and EECCA countries that saw a reduction in the use of mineral fertilisers and pesticides during the 1990s. Many farms, although not officially classified as organic, are clean of chemicals and could potentially produce certified organic products. The availability of agricultural labour also constitutes a great competitive advantage.

### 5.1 Introduction

Detailed analysis carried out in Western Europe has shown that food, together with housing and transportation, is one of those consumption categories which causes the highest environmental impacts when viewed across the whole life cycle (European Commission, 2006; Moll *et al.*, 2006). While similar life-time economy-scale analyses have yet to be carried out in EECCA and SEE, food would be expected to emerge as a key consumption category with respect to energy use and environmental impacts.

Production of food is intrinsically associated with the use of water and land, and agriculture —

encompassing both crop production and animal husbandry — accounts for most of the environmental impact of the food production and consumption cycle. For example, agriculture consumes on average 70 % of the total water used globally. However, there are other significant effects of the food production and consumption chain, including impacts from transportation, processing, packaging and retailing of food, and food wastes generated at the point of consumption.

Food consumption is also a fundamental quality-of-life issue, and yet availability and access to food varies a great deal within each country and across countries. In the more affluent sections of society, high food consumption combined with

sedentary lifestyles leads to a growing incidence of obesity, diabetes and cardiovascular diseases. Conversely, a significant proportion of the population in many SEE and EECCA countries lives below the poverty line and often suffers from food deprivation.

With respect to the environmental pillar of SCP, environmental impacts related to the food sector should be analysed across the entire life-cycle chain, as they occur at different stages of production — from crop and livestock production to transportation, storage and distribution, through food consumption and generation of waste (Figure 5.1).

This chapter first investigates historical and current trends in food production. It then turns to the question of supply and consumption of food in EECCA and SEE, and considers the economic, environmental and social implications of these trends. Finally, it discusses policies, and opportunities and barriers to improvements.

Analysis in this chapter is based on data and information available from international

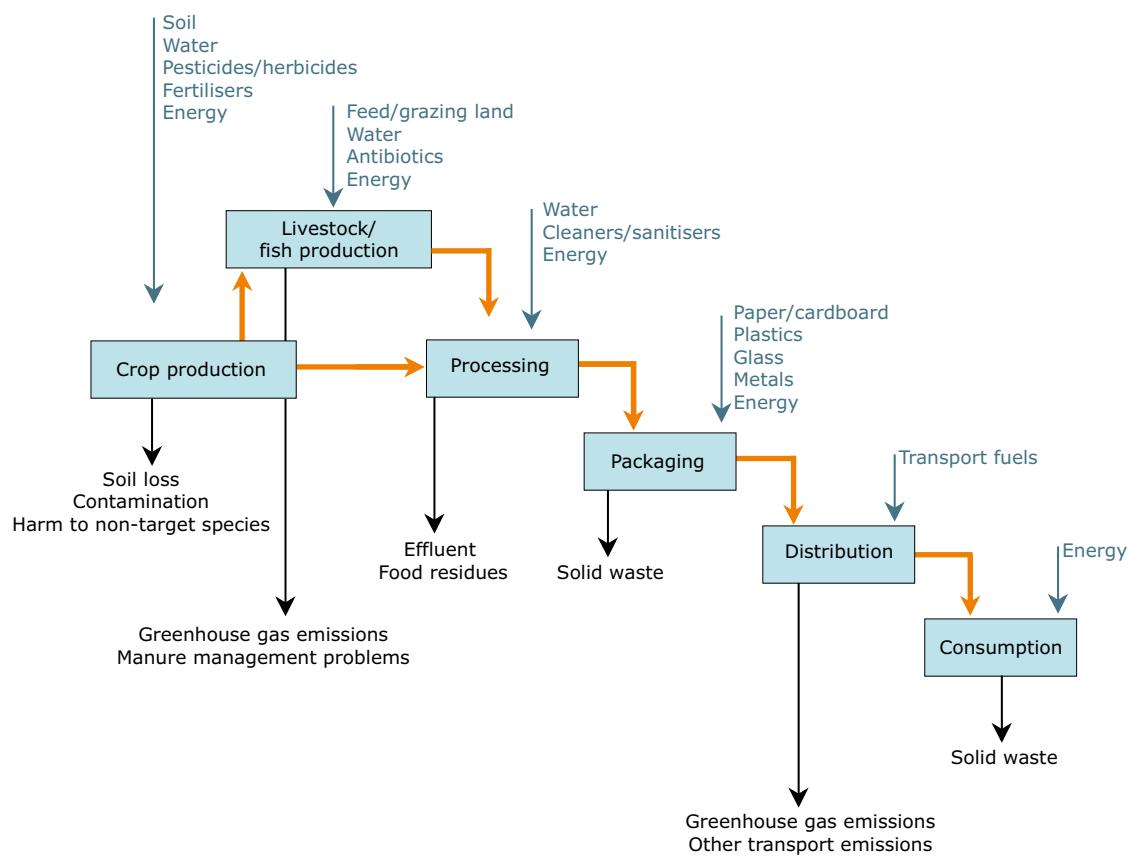
organisations and the published literature on the topic. Information on consumption trends and consumption behaviour in the SEE and EECCA countries was limited by the lack of appropriate statistics at the country level. Therefore, most of the analysis on food consumption behaviour is based upon the results of three city studies carried out for this report in Ramenskoye (Russia), Belgrade (Serbia) and Kosiv (Ukraine). These case studies were conducted by local experts using focus groups and questionnaire surveys.

## 5.2 Trends, driving forces and impacts

### 5.2.1 Historical background of food consumption and production

The structure of consumption and production of food in SEE and EECCA countries was dramatically affected by the Soviet and Yugoslav legacies as well as by transition experiences during the 1990s. Agriculture in the Soviet Union was relatively specialised with some regions dedicated to the production of cereals, others to livestock or

**Figure 5.1 Food life-cycle chain and related use of resources and environmental effects**



**Source:** UNEP Forum on Sustainable Agri-Food Production and Consumption. <http://www.agrifood-forum.net/issues/index.asp>.

vegetable production. In some EECCA countries agricultural production was structured around large-scale collective farms, producing in many cases monoculture crops. The agriculture industry had centrally-established norms for food production that were imposed on state farms. Farm machinery, fertilisers and pesticides were distributed to farms to meet these norms.

At the same time, those people who had plots of land or *dachas* (summer houses for urban dwellers) grew various kinds of food for home consumption and small-scale trading to supplement the family budget. Where food was bought, purchases were mainly made in state-run shops and farmers' markets.

The state run system was highly centralised and allowed the distribution of staple foods at guaranteed low prices throughout the country. At the same time significant quantities of food were wasted or traded on the black market and serious inadequacies in food provision occurred. Centrally planned agricultural production often took little account of resource efficiencies or the suitability of production of a particular crop to the local environmental conditions. Arable land was expanded at the expense of forests, and the drive to increase production relied heavily on extensive irrigation and drainage schemes and the intensive use of fertilisers and pesticides (EEA, 2007). Not surprisingly, the environmental consequences were highly negative. There is a significant legacy of environmental damage linked to agriculture from the Soviet period, often associated with intensive exploitation of resources (such as freshwater for irrigation) close to or within unique ecosystems (EEA, 2003).

Fisheries, which in terms of tonnage and catch were dominated by Russian and Ukrainian fishing fleets, were also centrally controlled during the Soviet period. Fishing companies were allocated vessels and catches were regulated according to resource assessments by research institutes located at some of the main fishing ports (for example, Murmansk and Kalingrad in Russia) (Shotton, 2003). From the mid-1950s onwards, the Russian fleet was expanded and became the largest in the world with catches reaching their peak in the mid-1970s. Fish became an important part of diet in Eastern Europe countries, with far lower consumption elsewhere in the regions.

The splitting up of the Soviet Union and Yugoslavia had fundamental effects both on food production (agriculture and fisheries) and on incomes and

food consumption. With respect to agriculture, the transition towards market economies in EECCA and in former Yugoslavia and the resulting economic recession led to reduced levels of subsidies, increasing competition from abroad, and in SEE in particular, widespread privatisation of the state-owned farms. In some instances privatisation was accompanied by partition into smaller farms. Privatisation imposed financial pressures on small-farm owners, and in many cases the result was an increase in subsistence farming, a decline in the cultivation of less productive land, and a reduction in employment and incomes for agricultural workers (EEA, 2007). A few countries (e.g. Armenia), responded by trying to convert from specialised to more diversified agriculture to reduce dependence on imports from the other newly independent states. Elsewhere, there was a sharp reduction in food production, extensive land abandonment in some regions (e.g. Kazakhstan), much reduced input of fertilisers, pesticides and energy (e.g. for irrigation pumps), and deterioration of infrastructures such as irrigation channels and pumps.

The transition period hit the livestock sector especially hard. Prior to transition, countries of the former Soviet block had considerably expanded this sector. By 1990 livestock herds and meat production were 50 % higher than in 1970 (EEA, 2003) and livestock products were heavily subsidised (Rask and Rask, 2004). The diets of Central Asia and Eastern Europe were rich in meat products during this period. For livestock producers transition meant price and trade liberalisation, accompanied by the removal of subsidies for producers and consequently higher prices for consumers.

Fisheries were also affected by the transition. Commercialisation of the fisheries led to the almost complete loss of control by the EECCA countries over levels of catches and sizes of fleets. Economic interests began to take precedence over any encompassing strategy for sustainable long-term exploitation. In addition a significant part of the Russian fishing fleet withdrew from international waters and relocated to Russian seas, leading to increasing pressure on fish stocks in those fisheries. Catches soon exceeded the biological potential of the stocks of the most valuable species. Subsequent reductions in catches led to a decline in commercial interest and the number of people working in the sector dropped by a third, leading to general impoverishment in coastal areas (Matishov *et al.*, 2004).

During the recession which accompanied the transition and conflicts of the mid-1990s,

consumption of high cost foods (e.g. meat and dairy products) fell while consumption of staple foods (e.g. bread and potatoes) remained stable in EECCA and increased in SEE (FAOSTAT, 2007). In general, the recession of the mid-1990s saw an increase in the percentage of populations across the regions who were unable to secure an adequate diet. Under-nourishment became prevalent, particularly in the less wealthy countries.

At the same time there was a general reduction in environmental pressures arising from agriculture. However, abandoned land, undergrazing and lack of capital to improve farm infrastructure also resulted in shrub encroachment on flower-rich grasslands and a consequent loss in biodiversity.

As described in Chapter 2, economic growth has been rapid in most countries since the late 1990s. In all sub-regions, except Central Asia, expenditure on household consumption is higher now than it was prior to transition. This has led to a general reduction in poverty and under-nourishment, and the diets of some regions are beginning to turn towards meat products again (for relevance of this point, see Box 5.2). The agricultural sector has not recovered to the same extent as the rest of the economy, and rising demand for food is being increasingly met by imports. The consumption of food is becoming more complex, with a more diverse range of products, including non-seasonal imports from abroad, an increasing use of supermarkets in urban areas, and a longer distribution chain between producers and consumers. All these developments will have environmental, social and economic implications.

### 5.2.2 Food production

#### *Ecosystems and productive constraints*

To understand the current levels and the evolution of food production in SEE and EECCA countries, it is first necessary to appreciate the diverse range of climatic and geographical conditions and the variety of eco-systems across the vast area covered by this report.

Within Eastern Europe, Belarus, a mainly flat country, has generally good conditions for the production of food, although large stretches of the country require drainage to support agriculture. About one-fourth of its agricultural land is also contaminated by the radioactive fallout from the Chernobyl disaster. Moldova is one of the most productive agricultural areas of EECCA as a result of rich soils and a temperate continental climate. Russia

has a wide variety of habitats, but much of its area contains agricultural land and pastures favourable to food production. Ukraine is made up mostly of fertile plains, steppes and plateaux crossed by rivers, with one-quarter of the country being classified as 'very productive'. The country suffers from a lack of water in the south.

Within the Caucasus, Armenia has many high-rolling plateaus and wide river valleys, with sharp mountains from the southern edge of the Caucasus. Food production is constrained by limited agricultural resources. Azerbaijan is also a mountainous country characterised by a great variety of landscapes and climate zones. Georgia also has a variety of landscapes, with forests covering around 40 % of its territory. Around 75 % of the summer pastures lie in sub-alpine and alpine regions, favouring certain types of livestock.

In Central Asia, Kazakhstan has favourable conditions for agricultural production, and grain and livestock are the most important agricultural commodities. However, the country has been affected by two well-known ecological disasters, namely, the reduction of the Aral Sea and the radioactive disaster of Semipalatinsk. Farming was restricted, due to salinisation and radioactive contamination in these areas. The food sector in Kyrgyzstan is shaped by the Tien Shan Mountains that divide the country; and inadequate precipitation prevents most crop production without irrigation. Due to its limited arable land, livestock represents a large food production activity in the country. Tajikistan is one of the most mountainous countries in the region — 93 % of its territory is mountainous with peaks reaching over 7 000 meters. Agriculture is dominated by cotton production on irrigated lands with food production taking second place. Turkmenistan is predominantly dry with most of its arable land and pastures being subject to desertification. Uzbekistan is also a dry country, with 60 % of its land characterised by arid landscapes. These are focused on cotton production around the Aral Sea in the north of the country with less land dedicated to food (De Rijck and Kazakova, 2006).

A high diversity of ecosystems and habitats are found in SEE countries. This is the case for Albania which produces most of its food in its lowland region. In Bosnia and Herzegovina food production is still shaped by the conflicts of the 1990s: the percentage of uncultivated land was 42.8 % in 1997. Bosnia and Herzegovina is a heavily forested mountainous country. Croatia has many different climatic conditions: alpine in the northwest,

Mediterranean in the west and southwest and continental on its northern and eastern plains, supporting a variety of agricultural production. The former Yugoslav Republic of Macedonia is a country rich in water resources due to its great lakes Ohrid, Prespa and Dorjan, but uneven precipitation and supplies of surface waters means that water demand for food production is not totally met. Montenegro is a mountainous country with some of the most rugged terrain in Europe and it does not have favourable conditions for agriculture. Finally, Serbia with fertile plains in the north, an abundance of rivers, and various types of climates has excellent conditions for diverse agricultural production.

All in all, the general conditions for agriculture in EECCA and SEE are less favourable than in Western Europe although there are some outstanding productive areas. Many ecosystems are very vulnerable (e.g. arid steppes, tundra and mountains) and cannot sustain significant agricultural activity.

### ***Trends in food production and supply***

The response to the dismantling of the system of state-controlled agricultural production was determined by how financial constraints and lack of managerial capacity were overcome in each case (Swinnen and Maertens, 2006). Those countries with better managerial capacity, especially for the production and distribution chain, and with easier access to funding, fared better in overcoming the difficulties imposed by economic transition.

Food production became crucial for some former Soviet Republics during the transition period's economic crisis. This was, for instance, the case of Armenia which before the transition was a relatively industrialised country relying heavily

on imports for its food. Transition and the collapse of much of the industrial sector saw Armenia transforming itself into an agrarian economy, with agricultural employment evolving from 15 % during the early 1990s to more than 40 % by the end of the decade. This transformation was, however, not widespread across EECCA and SEE and most countries saw agricultural outputs decrease following transition.

Trends in the output of the agricultural sector between 1992 and 2003 are shown in Figure 5.2. Agricultural production dropped significantly in most of EECCA between 1992 and the bottom of the economic recession in 1998. Economic recovery since 1998 has generally been accompanied by relatively small increases in agricultural output (Box 5.1).

In most of SEE, meanwhile, economic growth has actually been accompanied by reductions in agricultural output. As shown in Figure 2.2 in Chapter 2, economic growth across SEE and EECCA has been led by growth in industry and the service sector, rather than in agriculture, and few countries have achieved the same level of production as they had prior to the transition period. Exceptions to this are Albania, Armenia, Croatia, Georgia and Kyrgyzstan.

Shortfalls between national production and food demands of the population can be met by imports, but only when prices and incomes as well as trade structures allow. During the worst years of the recession following transition, falling incomes and worsening exchange rates led to reductions in imports despite simultaneous declines in national production (see Figure 5.3). The result was reduced consumption of food and critical levels of

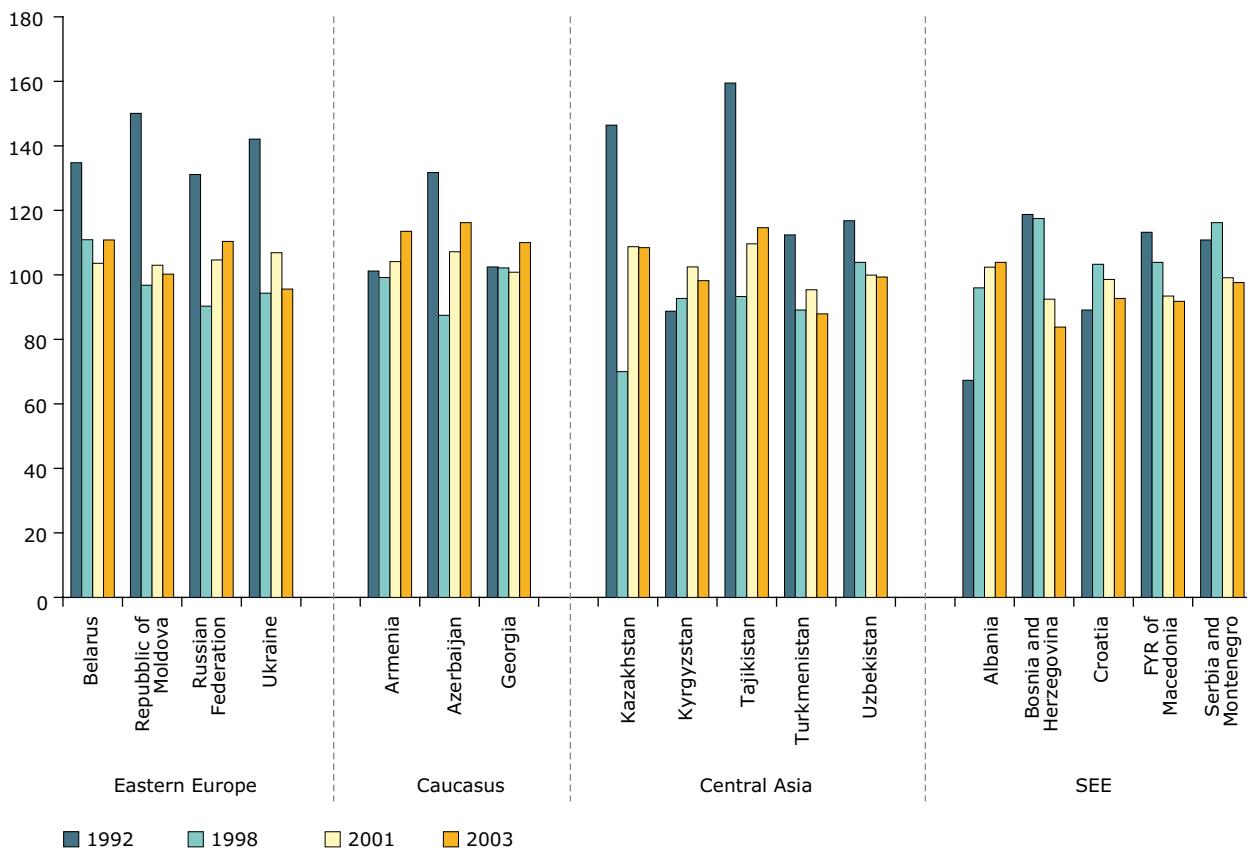
### **Box 5.1 Food production in Ukraine**

Prior to transition, food production in Ukraine was mainly organised in collective farms called *kolkhozes*. Reforms in 1992 aimed to improve the economic efficiency of agricultural enterprises, but they failed to fully meet expectations. Most agricultural products today have lower levels of production than in the past. The situation with livestock is no better: cattle decreased 3.9 times, pig livestock declined 2.8 times, while poultry decreased 1.6 times, sheep and goats 5.5 times.

However, during recent years the food processing industry in Ukraine achieved high growth rates, amounting today to 1/5 of total industrial production. The most developed food sectors are: sugar, oil, meat, milk, alcohol, wine, baking and brewing. The case study in the Ivano-Frankivsk region revealed a fragile trade infrastructure in which producers do not effectively participate in the determination of prices. Food supply and demand mechanisms are not fully operative (based on the case study for Ukraine by Green Dossier).

**Figure 5.2 Agricultural production per capita (indexed to 1999–2001 average)**

Agricultural production per capita (indexed to 1999–2001 average)

**Source:** UNEP, 2007.

under-nourishment in many countries of the regions (see Section 5.2.4).

Other factors also drive imports. These include an increasing demand for non-seasonal foods, or foods which cannot be produced domestically due to climatic and/or soil conditions. The market place for food is increasingly global and EECCA and SEE countries are no exception. Imports have been increasing relatively steadily along with increasing incomes since the beginning of this decade and are now significantly higher than pre-transition levels in all sub-regions except Central Asia.

Increasing globalisation has also stimulated exports from EECCA and SEE (see Figure 5.3). Exports of agricultural food products have increased from all sub-regions except Central Asia since the end of the 1990s, with growth in exports exceeding growth in imports in Eastern Europe and the Caucasus. This may indicate a future increase in foreign investment and growth in irrigated areas and intensification of agriculture in EECCA and SEE with consequent

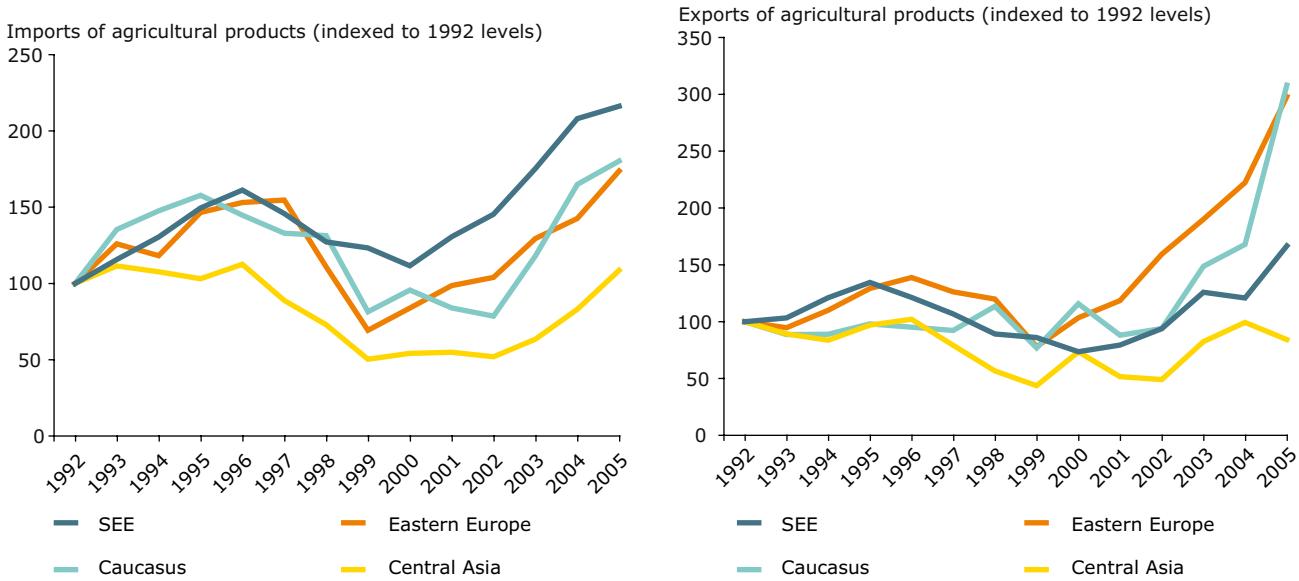
economic benefits, but also with simultaneous increases in environmental pressures.

Despite the high growth in exports from Eastern Europe and the Caucasus, all countries in SEE and EECCA with the exception of Moldova, Ukraine and Uzbekistan are net importers of food. This situation has changed little since 1992 (FAOSTAT, 2007).

The fact that many of the same crops and food products are being imported and exported to and from the same countries (for example, all sub-regions are large importers and exporters of cereals) demonstrates typical energy inefficiencies in the dynamics of global food markets. This issue is discussed further under Section 5.2.4.

#### *Use of fertilisers, pesticides and energy*

The removal or reduction in agricultural subsidies, privatisation, changes in size and structure of farms, and the opening of EECCA and SEE to global agricultural markets have had profound effects

**Figure 5.3 Imports and exports of agricultural food products (1992–2005)**

Source: FAOSTAT, 2007.

on the level of agricultural inputs per hectare of agricultural land.

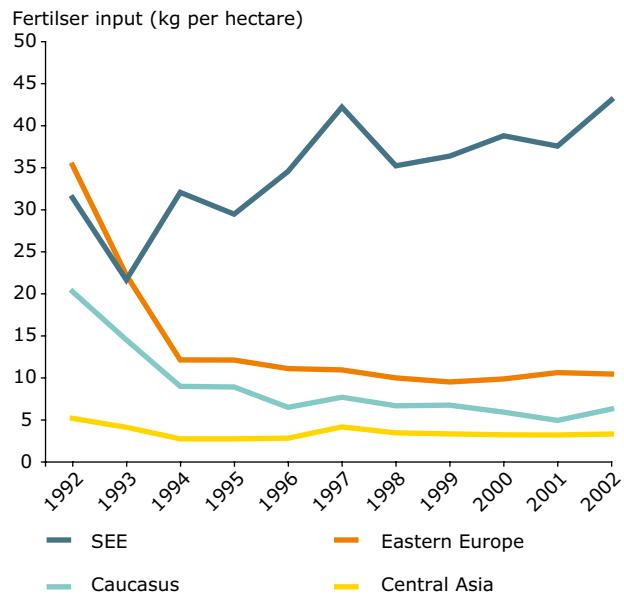
The use of fertilisers decreased significantly during the first half of the 1990s in Eastern Europe, the Caucasus and, to a lesser extent, in Central Asia (see Figure 5.4). There have been more gradual declines in the first two sub-regions since then. In SEE, meanwhile, fertiliser use has increased rapidly since 1993 and is now nearly 50 % higher than pre-transition levels. Despite this growth fertiliser consumption per hectare in SEE is still less than half that of the EU.

The sub-regional averages hide significant variation at country level. More than three-quarters of total fertiliser used in Central Asia is in Uzbekistan and a large part of this is for the cotton industry (Uzbekistan is the world's second largest exporter of cotton and government subsidies are available for fertilisers) rather than for food production. In all other countries of Central Asia, fertiliser input was very low by 2002 at between 0.6 and 6 kg/ha. In Kazakhstan and Tajikistan fertiliser use fell by a factor of 6 and 4 respectively between 1992 and 2002.

There are also large differences in fertiliser consumption in Eastern Europe. Belarus has the highest fertiliser consumption across the whole of the SEE and EECCA regions at 84 kg/ha, though down from 148 kg/ha in 1992. The fertiliser consumption in Belarus is close to the levels of the EU. Moldova's fertiliser consumption, meanwhile, is

20 times lower at just 4 kg/ha, dramatically reduced from the high consumption rate of 53 kg/ha prior to the transition, when the country was one of the chief food producers for the Soviet Union.

Data are lacking on pesticide inputs, but the data that do exist suggest reductions in pesticide inputs in much of EECCA and possible increases in parts

**Figure 5.4 Trends in fertiliser input per hectare (1992–2002)**

Source: FAOSTAT, 2007.

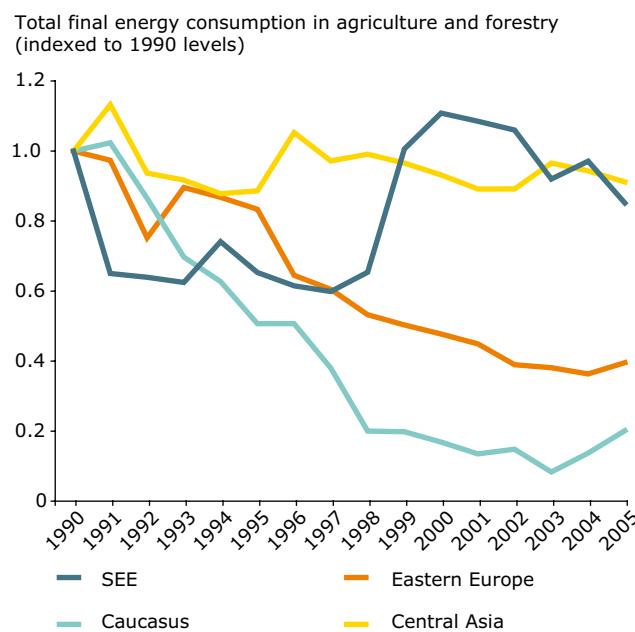
of SEE during the 1990s. Levels of pesticide input per hectare in SEE are approximately the same as in the new EU Member States and about three or four times lower than in Western Europe (EEA, 2007).

Meanwhile energy inputs to agriculture (i.e. for agricultural machinery, irrigation pumps, etc.) fell significantly after 1990 in Eastern Europe and the Caucasus (Figure 5.5) but not in Central Asia. Again, Uzbekistan dominates energy consumption for agriculture in Central Asia, using more than half of all agricultural energy inputs, mostly for cotton production.

### Organic farming

According to the International Federation of Organic Agriculture Movements, organic farming is a form of agriculture which is based on sustainability principles of health, protection of ecosystems, and social equity. While voluntary, it is supported by certification systems for farms, and labelling of their products for consumers. Certification systems differ from country to country but common elements are the avoidance of use of artificial fertilisers and pesticides, plant growth regulators, livestock feed additives, the existence of minimum indoor space, and access to pastures for animals (IFOAM, 2005).

**Figure 5.5 Energy consumed by agriculture and forestry (1990–2005)**



Source: IEA, 2006.

Prospects for organic food production were improved in SEE and EECCA countries during the 1990s due to the reduction in the use of mineral fertilisers and pesticides during the transition years. The availability of agricultural labour and areas with good soils unsaturated with artificial fertilisers also lent itself to organic agriculture in SEE and EECCA.

However, organic production has not been supported by widespread government-led certification schemes in EECCA and SEE and has mostly grown under foreign certification labels and export schemes. There is little awareness of, or demand for, organic food amongst populations of EECCA or SEE. Despite this Ukraine, with the 8th largest area of organically farmed land within Europe, has over 240 000 hectares dedicated to organic farming representing 0.5 % of total agricultural land. Most of the production is for export to the EU (Stoll, 2006). The only other countries within EECCA and SEE with more than 10,000 hectares of organically farmed land are Kazakhstan, Russia and Azerbaijan. Organic farming represents 0.4 % of agricultural land use in Azerbaijan but an insignificant proportion in Russia and Kazakhstan (IFOAM, 2006).

In general, the development of certified organic farming in EECCA and SEE countries lags significantly behind that in the EU. Nevertheless, there is great potential for organic food production in these countries. It is likely that for some years to come the market will continue to be driven by demand for exports to the EU, rather than by demand at home.

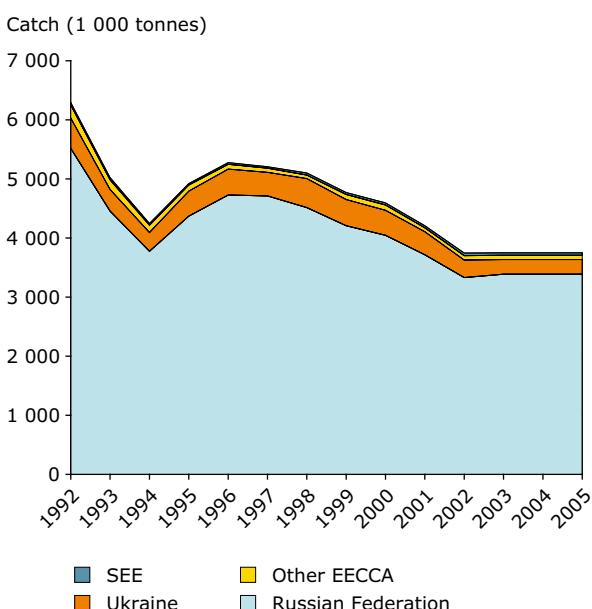
### Fisheries

In terms of tonnage and catch, the fisheries of the EECCA and SEE<sup>(1)</sup> regions are dominated by the Russian Federation, and to a lesser extent, Ukraine. Fish, mollusc and shellfish catches in these two countries made up 97 % of total catches by countries of the regions in 2005 (see Figure 5.6). Of the other countries the catches of Croatia, Kazakhstan, Turkmenistan and Belarus are currently the greatest in size. At the beginning of the 1990s, Azerbaijan and Georgia were among the most productive countries other than Ukraine and Russia, but they have since seen significant declines. Catches shown in Figure 5.6 show registered catches only, but illegal catches may also be significant (EEA, 2007).

Much of the Russian fish catch takes place in the economic zones of foreign states and in international

<sup>(1)</sup> As defined in this report, SEE does not include Bulgaria and Romania.

**Figure 5.6 Production by the fishing fleets of EECCA and SEE (1992–2005)**



**Source:** FAOSTAT, 2007.

waters of the world's oceans, but this catch diminished by around 50–60 % during the 1990s, as the Russian fleet largely relocated to areas within the country's economic zone (Matishov *et al.*, 2004). Main fisheries within the economic zones of SEE and EECCA countries comprise: atlantic cod (the largest remaining cod stock in the world), haddock, cat-fishes, red-fishes, halibut, plaice, herring and polar cod in the Barents Sea; anchovy, bluefin tuna, mackerel, sprat, whiting in the Black Sea; sturgeon, sander, carp and bream in the Azov Sea; and sturgeon and salmonids in the Caspian Sea (EEA, 2007; Matishov *et al.*, 2004).

Many of these fisheries have been overfished and catches have been declining in recent years as a result. One of the most dramatic examples has been the decline in the catch of sturgeon. The Caspian Sea supports 85 % of the world's sturgeon which are fished principally for caviar for export. The catch has fallen from close to 30 000 tonnes in 1975 to just 800 tonnes in 2005. This is partly due to the regulation of water flow, invasive species and a decrease in natural spawning sites, and also due to illegal fishing and trade. For example, illegal fishing is estimated to exceed legal catches by more than 500 % (EEA, 2007).

Within the Barents Sea, catches increased during the early- to mid-1990s due to an increase in an abundance of cod, but these stocks have since declined. Nevertheless, their exploitation has

remained high and since 1998 cod stocks and fishing pressure has exceeded safe biological limits (Matishov *et al.*, 2004).

Meanwhile, in the Black Sea, fish stocks have been affected by overfishing, but also by pollution. Phosphates and nitrates flowing into the sea from the Danube basin have led to high levels of eutrophication, with substantial effects on ecosystems and food chains (EEA, 2005a).

### 5.2.3 Food consumption

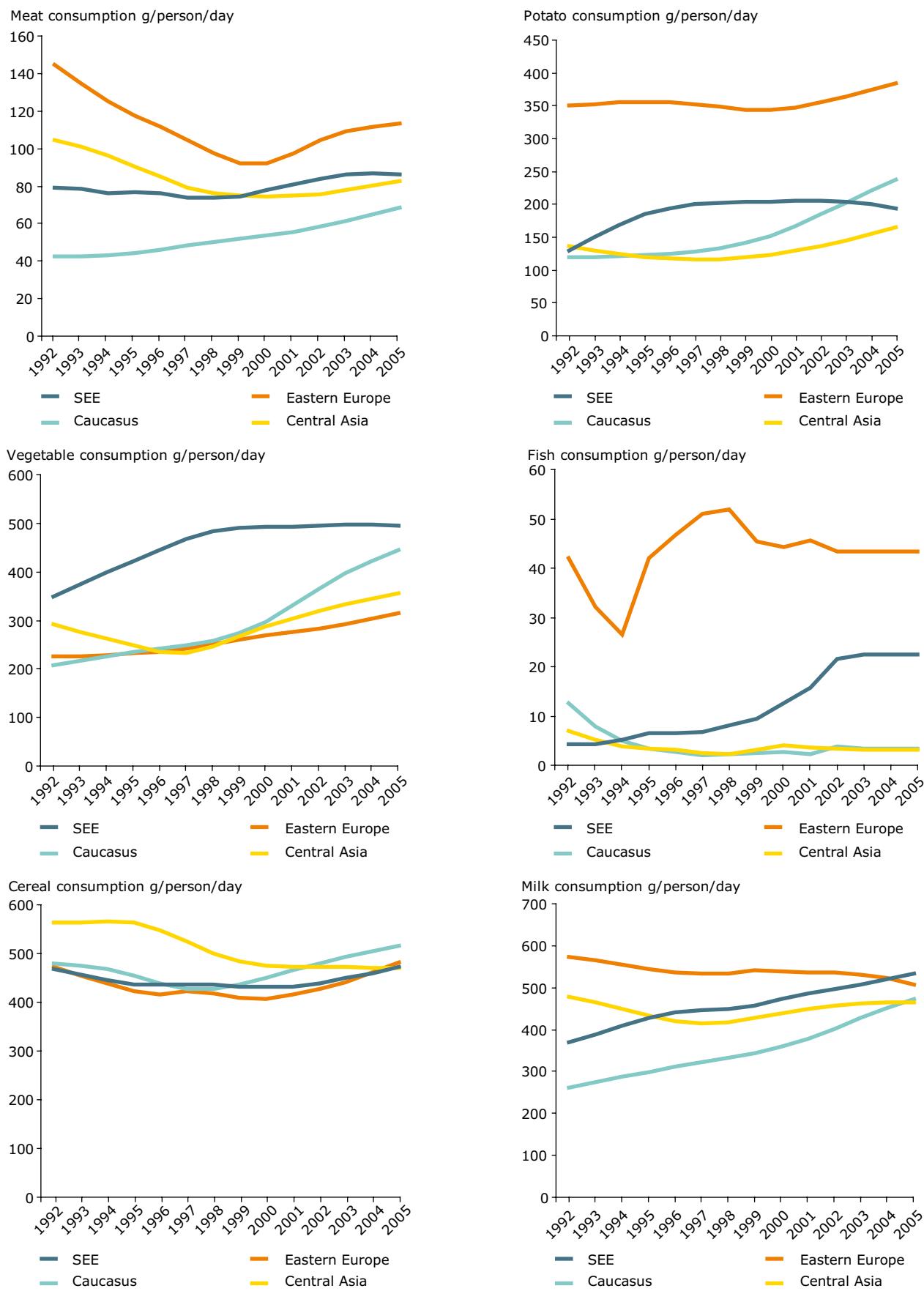
Figure 2.11 in Chapter 2 shows trends in household consumption expenditure in the various sub-regions between 1990 and 2005.

Expenditure on food, along with clothing, was the most stable element of household expenditure during the shrinkage in household incomes during the 1990s and the subsequent recovery (see Figure 2.12 in Chapter 2). During the worst economic years of the late 1990s, expenditure on food comprised more than half of total household expenditure, although this had reduced to 38 % of consumption expenditure by 2005. However, there are big differences between individual countries of EECCA and SEE. In Croatia, with the highest GDP per capita, expenditure on food represents 33 % while in Tajikistan, at the other extreme, food accounts for 64 % of household expenditure.

While household spending on food declined and recovered again over the past 15 years, there were also significant changes in the kinds of food being consumed (Figure 5.7).

The graphs show some underlying differences between the diets of the various sub-regions which are likely to reflect the long-term availability and affordability of types of food. They are also affected by cultural differences and varying energy requirements due to climate. Eastern Europeans in general eat more meat, fish and potatoes than people in the other regions, while the populations of SEE have a high consumption of vegetables.

The graphs also show how food consumption changed during and following the transition. One clear trend is that the consumption of meat and cereals dropped during the economic recession (except for meat in the Caucasus), but has been rising again as incomes have gone up. In Central Asia and Eastern Europe meat consumption has yet to recover to pre-transition levels. Trends in SEE clearly show that the consumption of staples such as vegetables and potatoes increased during

**Figure 5.7 Regional developments in food consumption (1992–2005)**

Source: FAOSTAT, 2007.

the recession, as a result of comparatively lower prices and/or greater production on householders' own land in response to lower incomes (Figure 5.7). Similar trends might be expected in other regions, but they are not visible, possibly due to difficulties in collecting data on householders' own production.

A study of households carried out in Velikiy Novgorod in Russia (Ekström, *et al.*, 2003) suggest that at least here similar changes in patterns of consumption occurred as in SEE. Households reported less consumption of meat and/or fruit, citing the rise in food prices and the decline of income as the reason. Many households in Russia were self-sufficient in the provision of vegetables and potatoes (Table 5.1), relying on their own production at their *dachas* (country houses).

Consumption of fish in Eastern Europe (Figure 5.7) closely followed developments in the catch (Figure 5.6), rather than being dependent on income or macro-economic changes.

### *Food consumption and life styles*

Only limited data on lifestyles and their impacts on food choices and habits are readily available. To support this report, three case studies were carried out in the regions of Ramenskoye (Russia), Belgrade (Serbia) and Kosiv (Ukraine). Some of the findings show positive implications for SCP while other trends present challenges for future sustainability.

### *Food purchases versus own production*

Figure 2.12 in Chapter 2 illustrated important national differences in the choices of food within household budgets. However, the proportion of income spent on food also differs widely within countries and within communities. In Dagestan (southwest of Russia) it accounts for 60 % while in Western Siberia it is around 30 %. In the city study of Ramenskoye, the average proportion of household expenditure spent on food is more than 50 % but was found to be as high as 90 % for retired persons with low incomes.

However, income is not the only influencing factor in the proportion of income used to buy food — lifestyle, tradition, and preferences all play a role. Another important factor is access to land where householders can grow their own food. As can be seen from Table 5.1, Russian householders produce significant quantities of their own food.

In rural areas, home production accounts for a large share of consumed foods, ranging from 38 %

**Table 5.1 Food sources in Russia in 2004 (%)**

Products	Urban area	Rural area
Bakery foods		
Bought	99.9	96.9
Own production	0.1	3.1
Potatoes		
Bought	56.0	13.6
Own production	44.0	86.4
Vegetables		
Bought	66.8	31.9
Own production	33.2	68.1
Fruit and berries		
Bought	76.6	49.8
Own production	23.4	50.2
Meat and meat products		
Bought	97.8	62.5
Own production	2.2	37.5
Dairy products		
Bought	97.9	55.8
Own production	2.1	44.2
Eggs		
Bought	96.7	48.9
Own production	3.3	51.1
Fish and fish products		
Bought	97.3	79
Own production	2.7	21

**Source:** Экономика сельского хозяйства России №10'05, стр.17 (Agricultural economics in Russia, 10/2005).

for meat, to 86 % for potatoes. City dwellers, while purchasing most meat and dairy products, produce 44 % and 33 % of their potatoes and vegetables, respectively.

This high level of self-sufficiency in food production is a good example of sustainable living which, due to its large scale, is likely to bring about important environmental and social benefits. These include reducing energy consumption in the production and transportation of food, as well as increased food security. The tradition of home production has its origins in necessity, but has become so much a part of Russian culture that it may continue long after the economic necessity has disappeared. The concept of *dachas* also spread to other parts of the Soviet Union during the 20th century, particularly in Eastern Europe.

### *Place of food purchase*

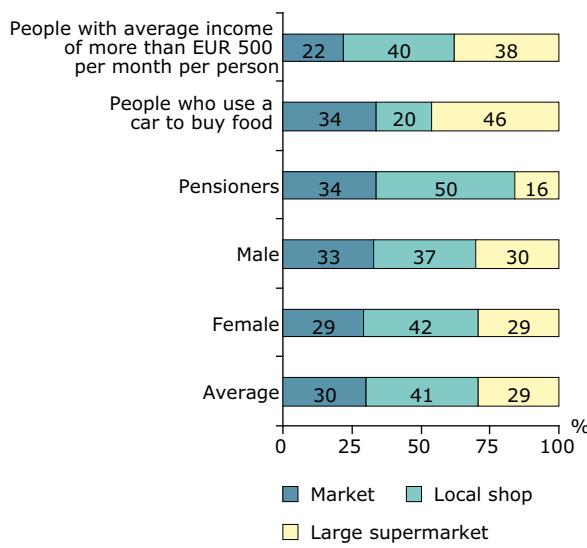
As shown in Figure 5.8, the most popular places to buy food in Ramenskoye are still local markets (40 %), but with an increasing presence of large

supermarkets (30 %). In particular, those with private cars buy 44 % of their food in supermarkets. While supermarkets in themselves are not necessarily less sustainable, the combination of cars and supermarkets can potentially lead to a spiral in environmental and social effects in suburban and rural areas, such as closure of local shops and difficulties for people without a car to purchase their food conveniently, and increasing environmental pressures from fuel use and air emissions. As described in Chapter 7, car ownership remains low in EECCA and most of SEE, but is increasing rapidly. Use of the car for shopping is therefore likely to grow unless accompanied by integrated urban and transport planning in towns and cities.

In Belgrade, the use of cars for shopping remains low. The large majority of those contacted walk to local shops (Figure 5.9) and more than half shop for food within 200 meters of their home. Shopping for food is usually done in small local shops (42 %), followed by large supermarkets (33 %) and traditional vegetable markets (25 %) (Figure 5.10).

Price remains the most common factor that affects customers' decisions on where to purchase their food, but most people take into consideration other factors. In Kosiv, Ukraine, preference for buying food in supermarkets appeared to be related not only to price and marketing but also to buyers' perceptions that supermarkets exercise stricter quality and hygienic control than local shops.

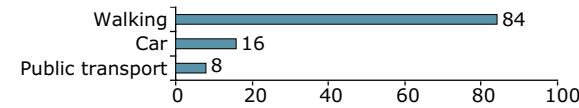
**Figure 5.8 Food purchase by place of sale in Ramenskoye**



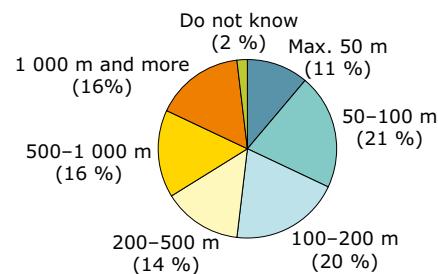
Source: Ramenskoye city study.

**Figure 5.9 Food shopping preferences, by distance and mode of transport, Belgrade**

**Mode of transport for shopping trips**



**Distance to place of food purchase**



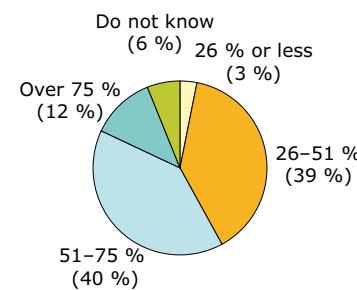
Source: Belgrade city study.

**Attitudes to food labelling**

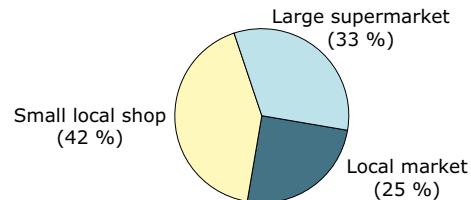
The concept of organic food is little known among consumers in Belgrade. Nevertheless, when explained to them what it was, 88 % of respondents claimed that they would probably buy certified organic food because they believe it to be healthier. However,

**Figure 5.10 Food as a share of household budget, and place of purchase, Belgrade**

**What percentage of your household budget is spent on food?**



**How much of your food do you buy from**



Source: Belgrade city study.

there is a general distrust in current certification schemes. In Kosov in Ukraine, 91 % respondents claim to verify whether the food they buy is organic, but there was a similar widespread distrust about information on organic products.

Sales of organic food remain very low in Serbia and Ukraine. While this may partially be a result of a lack of trust in certification schemes, it may also represent a typical gap between stated willingness and concrete action. All the same, the high stated awareness of organic food in Ukraine and a willingness to pay extra in Belgrade are positive signs which could be nurtured by governments and retailers through support of certification schemes and provision of information. In Armenia a market study carried out by Urutyan (2006) concluded that a lack of knowledge and information is crucial in defining the consumption of organic products in that country, where the organic movement already began in 1988.

Householders in both Belgrade and Kosov stated a strong preference for food produced in their own country. In Belgrade this is due to the belief that they have a higher level of quality than foreign goods. In Kosov the purchase of domestic food products is more motivated by 'buy local product' sentiments than by ecological awareness. However, these stated preferences for nationally produced food may have

positive environmental effects by slowing down the increase in the transportation of food products from the producer to the consumer.

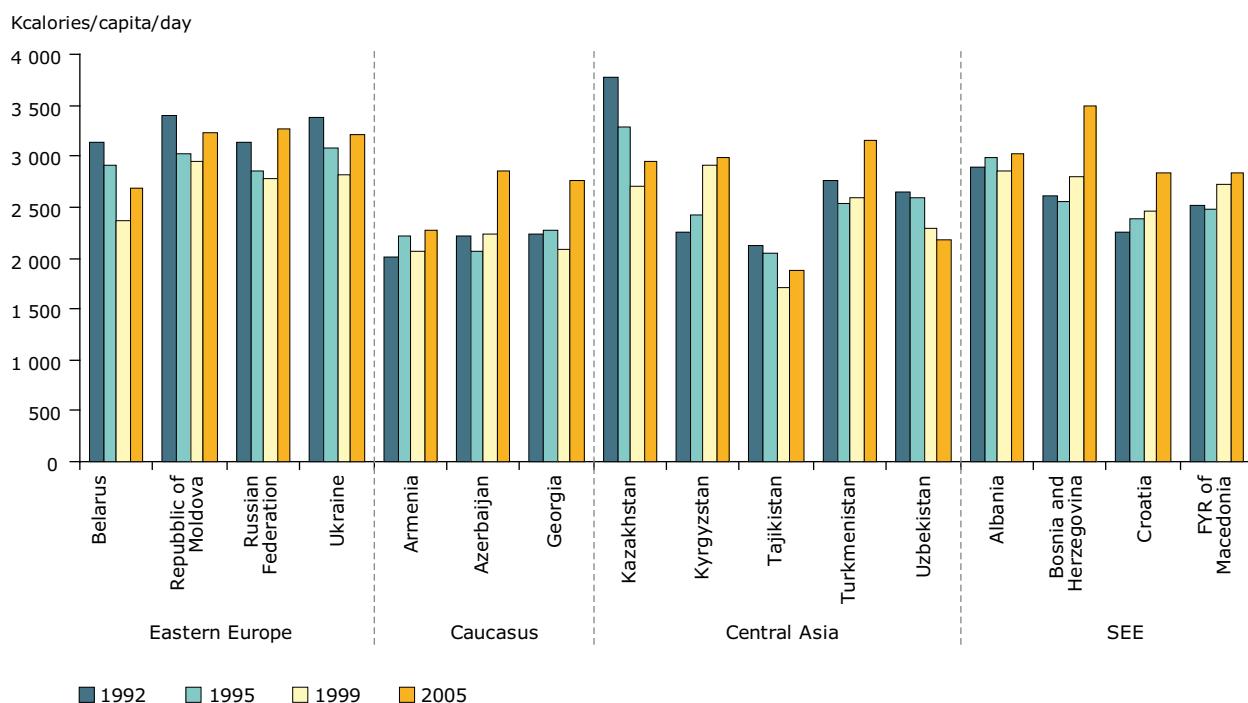
#### 5.2.4 Social and environmental implications

##### Food consumption and health

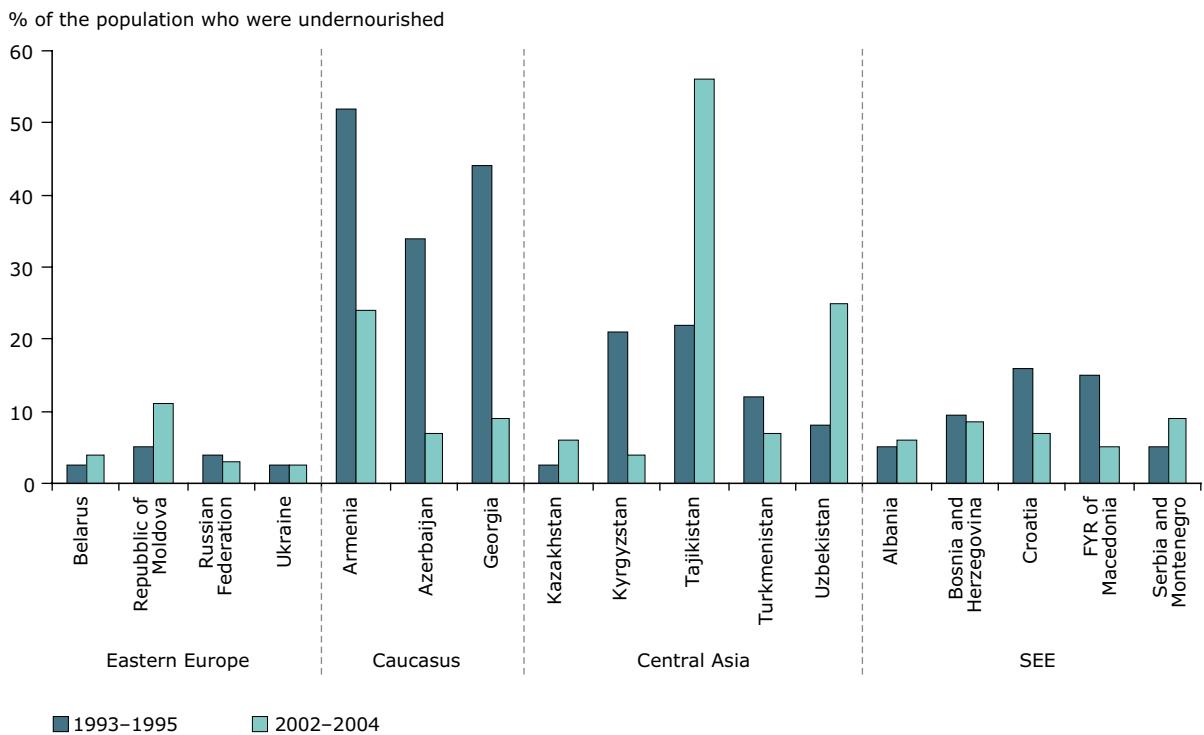
Trends in calorie intake between 1992 and 2005 in EECCA and SEE are shown in Figure 5.11. Calorie intake decreased in most of EECCA during the recession of the mid- to late-1990s, but has partially recovered since then in all countries except Uzbekistan. Only in four out of the 12 EECCA countries, however, was calorie intake in 2005 higher than pre-transition levels. Average calorie consumption in Armenia, Tajikistan and Uzbekistan remains below or close to the WHO average recommended levels for men and women.

Under-nourishment was a critical problem in the Caucasus and parts of Central Asia during the mid-1990s, but was also high in parts of SEE. Most countries have seen progress since then (Figure 5.12). Of most cause for concern are developments in Tajikistan and Uzbekistan, and to a lesser extent Moldova, where under-nourishment has increased. Under-nourishment also remains a significant problem in Armenia, in spite of striking improvements.

**Figure 5.11 Dietary energy consumption (kcal/person/day)**



**Source:** FAOSTAT, 2007.

**Figure 5.12 Prevalence of under-nourishment in EECCA and SEE**

**Source:** FAOSTAT, 2007.

At the other extreme, in the more affluent sections of society, high food consumption combined with sedentary lifestyles leads to a growing incidence of obesity, diabetes and cardiovascular diseases. EECCA, followed by SEE countries, already have the highest mortality rates from cardio-vascular disease in Pan-Europe, with 17 out of the 18 countries of EECCA and SEE lying within the top 20 places (WHOSTAT, 2007). However the main reasons for this are probably inadequate resources for medical care rather than diet and life-style choices.

#### *Impacts from agriculture*

As shown in Figure 5.1 at the beginning of the chapter, environmental pressures arise at many points during food production, transportation, retailing and consumption. The majority of impacts occur during agricultural (and fishery) production and food processing (EEA, 2005b). With the growing global market for food, transportation and refrigeration are increasingly adding to these impacts through the use of energy and resulting air emissions. Within households, transportation to and from shops, energy used for refrigerators and cooking, and finally the generation of food waste all lead to increased environmental impacts.

In the EECCA and SEE regions, food production has led to a number of environmental problems:

- salinisation;
- desertification;
- erosion of soils in mountain and foothill areas;
- contamination of ground and surface waters with pesticides;
- overfishing and collapse of fishstocks;
- eutrophication of surface water from fertiliser and manure run-off;
- loss of soil fertility from the application of agricultural chemicals;
- biodiversity loss due to both expanding agriculture and abandoned grazing.

Desertification can be a result of insufficient crop rotation in agriculture, overgrazing, irrigation, drainage, and soil erosion. In addition, excessive use of mineral fertilisers and pesticides in agriculture can affect the quality of groundwater and lead to land degradation.

The percentage of land under irrigation is high in the Caucasus, Albania, and parts of Central Asia. At approximately 3.5 %, averages across the regions are still low in comparison to Western Europe (9 %) and have changed little since the early 1990s. Nevertheless at current levels, irrigation in Central Asia and the Caucasus is causing declines in local water resources and quality, falling groundwater tables, salinisation and degradation of land as well as impacts on ecosystems (EEA, 2007).

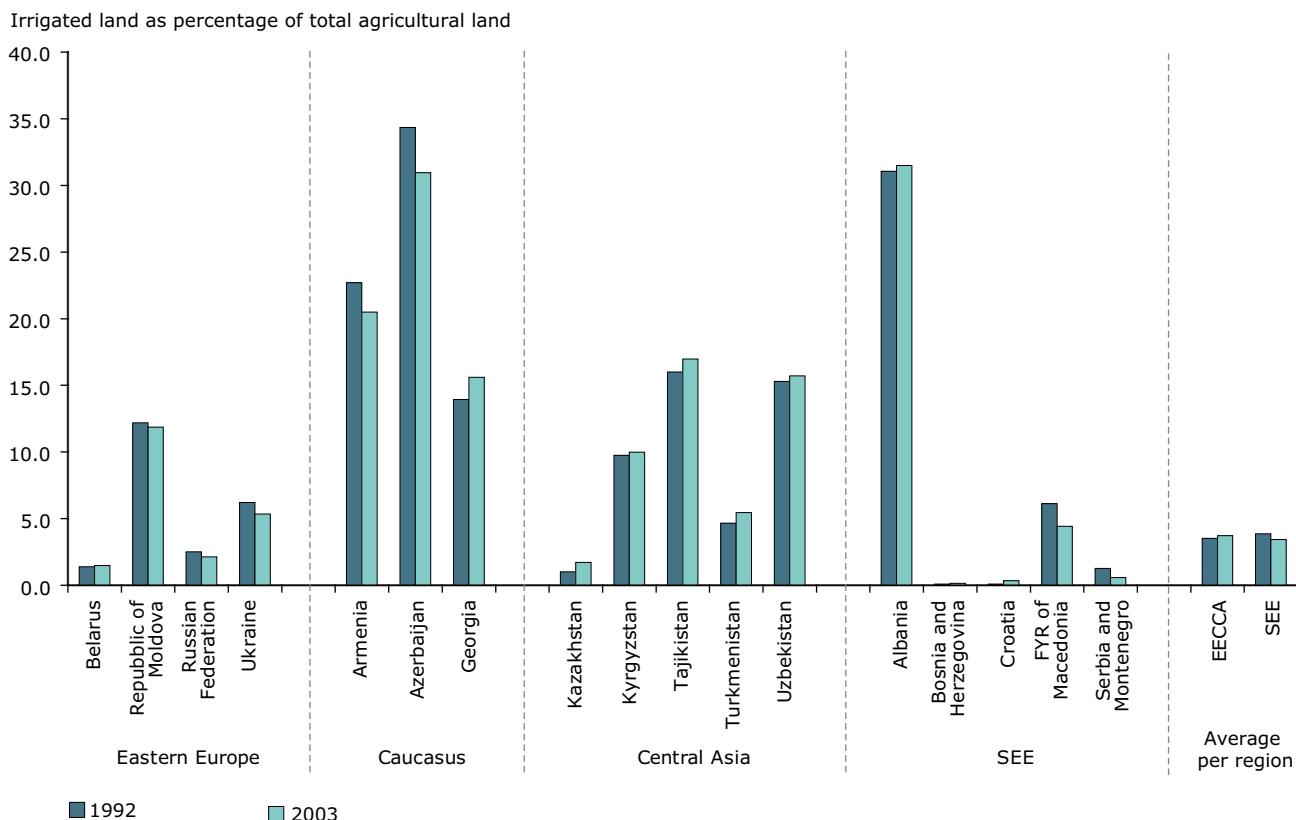
In Central Asia 78 % of the water is polluted due to irrigated agriculture. Discharge from irrigated lands, excessive mineralisation and pesticide and chemical fertiliser pollution have been pointed out as 'the acute problem of Central Asia' (UNEP, 2006). In the south of Kazakhstan untreated drainage waters from irrigated fields affect an area of 900 000 ha. In Kyrgyzstan pollution by irrigation systems and inadequate methods of watering lead to leakage and pollution discharges from irrigated fields and these result in contamination of surface water by fertilisers and pesticides. Similar problems are seen in Uzbekistan. Increasing water contamination in Central Asia is not so much

due to an increase in food production or growth of arable land, but rather due to the reduced effectiveness in the management of irrigation (UNEP, 2006).

Livestock is also responsible for a considerable amount of pollution of surface and ground waters. In many mountain ecosystems livestock provide the principal food production activity, but there are generally poor or non-existing systems for the collection, storage and treatment of manure. Livestock farming can have other impacts. In many EECCA countries, overgrazing by sheep has also produced erosion and desertification.

Soil erosion due to overgrazing, land use conversion and tilling also presents a problem in parts of SEE. The problem of erosion and the washing-away of soil is most serious in Albania, where there is an annual loss of 20 to 70 tonnes of soil per hectare. It is estimated that as a direct result of intensive agriculture, around 20 % of the territory of Serbia and Montenegro (20 000 km<sup>2</sup>) is classified as 'degraded by water and wind erosion' (Marczin, 2005).

**Figure 5.13 Irrigated area as a percentage of agricultural land area**



**Source:** FAOSTAT, 2007.

As shown earlier in Figure 5.4, fertiliser use in SEE is growing and eutrophication and water pollution from high nutrient loads and from manure discharges from animal farms (especially pig farms) is a growing problem. The most affected regions in SEE are the Pannonian parts of Croatia, the western and eastern parts of Kosovo as well as northern and central Serbia, the area around Shkoder lake in Montenegro, and the lower regions of the former Yugoslav Republic of Macedonia (Marczin, 2005).

The use of fertilisers per hectare of agricultural land meanwhile declined dramatically in EECCA during the 1990s and in most countries it is an order of magnitude below averages in Western Europe. However, while the decline in fertiliser use and livestock numbers in EECCA have reduced pollution problems, practices in the use of fertilisers and the treatment of manure in these countries are not environmentally sound (EEA, 2003). Moreover, inorganic fertiliser consumption is expected to increase in many EECCA countries in response to new market and export opportunities as has been seen in SEE. Fertiliser and manure treatment may be an area that calls for policy attention (EEA, 2007).

The use of pesticides can lead to pollution of drinking water, surface and ground waters and of soils with persistent substances which are harmful to ecosystems and humans. Although available data are fragmentary, there is some evidence that pesticide use decreased in EECCA and SEE countries during the 1990s and early 2000s. It certainly remains at very low levels compared to those in the EU. However, significant pesticide concentrations can be found in surface water bodies in parts of EECCA (UNECE, 2000 and 2003) and some local situations deserve attention. For example, recent efforts in Armenia to increase food production have led to an increase in pesticide use. In the agricultural regions of Ararat and Oktemberian agrochemicals are found in high concentrations in soil, water and food and have accumulated in mothers' breast milk (Huijbens *et al.*, 2005).

Some areas of EECCA remain affected by the high use of fertilisers and pesticides during the Soviet period. For example, in some parts of Moldova, the large use of pesticides (up to 14 kg per ha before 1990) and fertilisers, combined with other environmental risks like landslides, salinisation, erosion, flooding, have resulted in pollution of rural wells (60 %) by nitrates and other nitrogen compounds. Another problem in Moldova is the big stockpiles of pesticides left over from the

collective farming period (UNECE, 2005). They present potential environmental and health risks from leakage. Often, no one is willing to take responsibility for the removal and disposal of these stockpiles (EEA, 2007).

Water pollution from pesticide use and pesticide run-off has also been a problem in parts of SEE. The most severely affected water systems are those of the Danube, Drava and Sava rivers (Marczin, 2005).

As higher incomes lead to increased meat consumption, the demands on water will intensify with the expected increase in livestock numbers and the production of animal feed. As Box 5.2 shows, the production of meat and beef in particular puts a very high demand on water resources.

Biodiversity has been affected by both the expansion of agriculture in some areas and the abandoning of land in others. With respect to the former, high levels of rural poverty and extreme dependence on land resources for food have led the poor to use land for agriculture within the boundaries of national parks and protected areas, particularly in Serbia and Montenegro and Kosovo (Marczin, 2005). Land abandonment or reduced grazing, on the other hand, affects more semi-natural areas, especially species-rich grasslands.

Energy used in agriculture also has environmental impacts mostly resulting from emissions to the air from the combustion of fuels. These emissions lead to climate change, acid rain and eutrophication. Agriculture is a reasonably important consumer of energy within the national total, accounting for between 2 % of total final energy consumption in SEE to 5 % in Central Asia. However, as shown in Figure 5.5, energy use for agriculture fell during the 1990s in Eastern Europe and the Caucasus, and the contribution to final energy consumption went down accordingly from 4.1–2.6 % in Eastern Europe and from 5.4–2.7 % in the Caucasus between 1990 and 2005 (IEA, 2006).

Again, the increasing consumption of meat and milk in all regions, but particularly in Eastern Europe, has implications for energy consumption of the agricultural and food sectors, as meat and dairy products have generally much higher fossil fuel energy inputs than those required to produce an equivalent quantity of vegetable protein (see Box 5.2).

**Box 5.2 Choice of diet matters**

Food products vary widely in terms of the environmental pressures they create along their full production chain. The full production chain for beef, for example, includes all inputs invested in the growing of grain for animal feed, energy used in producing artificial fertilisers and pesticides which are applied to the grain during its growth, energy used for transporting animal feed to the livestock farms, fertiliser and water inputs into pastures, and energy and water used in farms and during the slaughter and processing of the cows.

Studies, albeit mostly based on intensive agriculture in Western Europe and North America, have consistently found that meat and dairy products require considerably higher inputs of energy, water and land and lead to greater environmental pressures than equivalent amounts of vegetables, cereals and other crops (European Commission, 2006). This is particularly true where animals are fed with processed vegetable feeds rather than put to pasture. On average, 10 g of vegetable protein are needed to generate 1 g of animal protein (Reinjders and Soret, 2003).

Inputs of fossil fuels are also much higher for meat than vegetables and are highest for beef. Comparisons in the US found the following:

- 3.3 kcal of fossil fuel required for 1 kcal of vegetable protein from grain
- 4.1 kcal of fossil fuel required to produce 1 kcal of chicken protein
- 50 kcal of fossil fuel required to produce 1 kcal of lamb protein
- 54 kcal of fossil fuel required to produce 1 kcal of beef protein

The amount of water consumed in the production of foods is also significantly greater for meat than for vegetables or cereals. The World Water Council (2004) and Pimentel (1997) found the following differences:

- 500 litres of water to produce 1 kg of potatoes
- 1 000 litres of water to produce 1 kg of wheat
- 2 700 litres of water to produce 1 kg of eggs
- 13 500 litres of water to produce 1 kg of beef.

Another study found that 26 times more water was required to produce the same amount of meat protein as compared with vegetable protein, although in areas where intensive irrigation is necessary (as in large parts of the Caucasus and Central Asia) the difference is reduced to a factor of 4 (Reinjders, 2001).

All in all, the choice of diet has significant — if perhaps surprising — environmental implications, especially concerning energy and water use.

***Impacts from fisheries***

Fisheries can cause significant pressure on marine and coastal eco-systems through a number of direct and indirect mechanisms. Direct impacts of fishing occurring in EECCA and SEE countries have included:

- ***Fishing of the target species beyond sustainable limits and their effects on other species.*** This leads to a drop in the stocks of the target species, but the ecosystem disruptions affect the rest of the food chain. As stated earlier, much of the fisheries of the seas around EECCA and SEE have shown strong signs of over-fishing combined with other environmental changes over the past two decades and dramatic declines in target fish populations. Examples include Atlantic cod and whiting in the Barents Sea and Russian Arctic; the virtual disappearance of swordfish, tuna and mackerel, a decline in anchovies in the Black Sea and the dramatic decline of sturgeon stocks in the Caspian Sea (EEA, 2005a; EEA, 2007; Matishov *et al.*, 2004).
- ***Mortality of non-target species due to by-catch and discards.*** Discards of commercial species were estimated to be as high as 5–12 % in the Barents Sea during the 1990s (Matishov *et al.*, 2004). By-catch of non-commercial fish is

higher, up to approximately 30 % by weight in the Northeast Atlantic including the Barents Sea (EEA, 2007). Discard is lower in the Black Sea at approximately 4.9 % (FAO, 2005). Some species, for example sharks, are particularly vulnerable.

- **Destruction of the sea bed and benthic life through trawling.** Bottom trawling in high-intensity fishing areas can cause long-term damage to the structure of the sea bed and to benthic life. Data on the extent of this in trawling areas in EECCA, such as the Barents Sea, are limited, however.

Overfishing and the resulting loss of catch have led to decreased investments in fishing fleets during the 1990s in the main northern Russia fishing ports. Employment in the fishing sector in these areas dropped by a third, causing impoverishment within coastal communities already suffering from the effects of the recession (Matishov *et al.*, 2004). This has also been the case in the coastal communities of the Black and Azov Seas (EEA, 2005a).

#### *Impacts from transportation*

Long distance trade in food is no new phenomenon in the EECCA region. For example, during the Soviet period Russia's northern regions imported food from a large part of the Soviet Union (Kuo

*et al.*, 2006). Imports and exports of food products to and from EECCA countries decreased during the late-1990s, but have generally been on the increase since the beginning of this decade (see Figure 5.3). The same is true of SEE countries. This growing international trade in food is likely to have led to an increase in environmental impacts from transportation. Besides transportation, deep-freezing of vegetables and other products has increased, resulting in additional energy use (see Box 5.3).

It is typical of global food markets that much of this transportation of food appears repetitive and unsustainable. In many cases EECCA and SEE countries are importing and exporting similar quantities of the same food products. For example, cereals are one of the top three import and export products in all four sub-regions and this is not only due to trade within the sub-regions. For example, Russia exported 2.1 billion dollars worth of cereals and imported 2.3 billion dollars worth of cereals in 2005. Similarly, Croatia exported 96 million dollars worth of milk and milk products and imported 50 million dollars worth (FAOSTAT, 2007). Such practices are encouraged by low transport costs which do not include the full costs of environmental and social impacts.

With respect to transport use by consumers, anecdotal evidence from case studies suggests that increasing car ownership (see Chapter 7) may be

#### **Box 5.3 Choice of food origin matters**

Box 5.2 described how meat and dairy production is much more energy and water intensive than vegetable and cereal production. The choice of a diet is therefore a key in determining the environmental pressures resulting from food consumption. However, the origin of the food is also critical.

Impacts from food produced by intensive agriculture can be greater than food produced using organic methods. Meat and vegetables from organic and intensive production were evaluated according to a set of environmental factors. Meat from intensive agriculture was found to have twice the environmental pressure score as organic meat, while the difference between vegetables from intensive agriculture and organic agriculture differed by a factor of more than three (Reinjders and Soret, 2003). Other studies have shown that organic milk production is almost five times more energy efficient on a per animal basis and three-and-a-half times more energy efficient per litre of milk than intensive milk production (ADAS Consulting, 2001).

The country of origin is also critical. The energy used to transport food between countries can be high when compared to the energy content of the food itself. For example, 97 calories of transport energy are needed to import one calorie of asparagus by plane from Chile to Europe, and 66 units of energy are consumed when flying 1 unit of carrot energy from South Africa to Europe (Church, 2005). Energy consumed when transporting food by ship or lorry is lower but in many cases requires additional cooling or freezing.

If organic food is not available locally, in some cases buying local non-organic food may have lower overall environmental implications than buying organic food imported from another continent.

leading to greater use of the car for shopping trips and expanded frequenting of large supermarkets. Impacts from transportation further increase with big supermarkets since they are more likely than local shops to stock imported foods. Changing the place of shopping from local shops to supermarkets also has socio-economic impacts on local producers, and if local shops are forced out of business, it can have impacts on local communities and residents without cars.

On the other hand, householders' own production of food appears, at least in Russia, to be significant. Together with preferences for local and national food products (albeit not on environmental grounds), this may be having a positive social effect and reduce demand for transportation of food. Its positive implications for transport are dependent on how urban householders travel to their plots of land and dachas. Traditionally, transport to dachas, which lie anything from a few km to 100 km from city centres, was via electric trains and buses, but, increasingly, it now relies on private cars. This leads to traffic congestion at weekends moving in and out of the larger cities, especially during the summer period.

#### *Food-related wastes from households*

As described in Chapter 8, the average generation of municipal waste per capita in the EECCA and SEE countries (250–280 kilos) is still much lower than the average level in the EU of 550 kilos per capita. However, municipal waste collection has been growing rapidly in the EECCA countries since the late 1990s, as much as 8–10 % annually in several countries. Growth has been much slower in SEE where on average municipal waste collection increased by 3 % between 1999 and 2005. At least some of these increases may be due to improved collection systems, rather than to increased generation.

A large part of household waste in these countries is related to the consumption of food, both organic wastes and, increasingly, plastic, paper and cardboard from food packaging. Organic food wastes represented at least 30 % of total municipal wastes in all four cities with composition data available (see Figure 8.7 in Chapter 8).

Environmental impacts from these wastes result primarily from their improper management. Almost all municipal waste generated in SEE and EECCA ends up in a landfill resulting in a loss of potential resources, i.e. compost and/or biogas for energy from organic food waste, and recycled

paper, plastic and cardboard or alternatively energy from packaging waste. In addition, placing organic food waste in landfill leads to the generation of methane, which is a potent greenhouse gas. There is practically no capture of methane at landfills across SEE and EECCA (see Chapter 8).

### **5.3 Policies for sustainable food production and consumption**

This section of the Chapter draws heavily on the responses provided by countries to the SCP survey carried out by UNEP in 2007, in support of this report (see Table 5.2).

#### *Agro-environmental strategies*

Although an increased environmental awareness and recognition of the complexity of rural socio-economic problems are apparent, agro-environmental policy development is still at an early stage (EEA, 2007). This needs to be carried through to implementation if the often interlinked problems of rural poverty and environmental degradation are to be tackled.

Under-developed programmes and lack of legislative enforcement, together with inadequate agricultural practices, were identified as the main causes of localised environmental problems in *Europe's Environment – The third assessment* (the Kiev Report) (EEA, 2003). The report advocated the development of an agro-environmental policy framework, strengthening of the agricultural advisory services, the provision of agro-environmental advice and training materials, and the provision of grants for animal waste storage units.

EECCA and SEE countries have committed themselves to the principles in the Convention of Biological Diversity (CBD) and the Regional Environmental Reconstruction Programme for Southeast Europe (REReP). The Pan-European Biological and Landscape Diversity Strategy (PEBLDS) has worked as an instrument for regional implementation of the provisions of the CBD in the pan-European region, for example, by stimulating better land-use planning in order to preserve biological and landscape diversity. The Kiev Resolution on Biodiversity adopted by Environment Ministers in 2003 includes resolutions on agriculture and biodiversity, which seek to discourage the intensification of agricultural activities in areas to be designated as high nature

**Table 5.2 Summary of UNEP policy questionnaire response in area of food**

		Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Croatia	FYR of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Republic of Moldova	Montenegro	Romania (2)	Russia	Serbia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
<b>Sustainable consumption and production: policies, strategies and initiatives (1)</b>																			
<b>Food production and consumption</b>	Food and food safety	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	
	Animal nutrition	-		-	+		+	+	-	+	-	+		+		-	-	+	
	Labeling and nutrition	+		+	+		-	+	-	+	-	+		+	+	+	+	+	
	Chemical safety	-		-	+		+	+	-	+	-	+		+		-	-	+	
	Biosafety	-		+	+		+	+	-	+	-	+		+		-	-	+	
	Food/feed controls	-		-	-		-	+	-	+	-	+		+	+	-	-	+	
	Restrictions on fertilisers and pesticides in agriculture	+		+	+		+	+	+	+	-	+		+	+	-	+	+	
	Measures for promoting sustainable food production and organic products	+			+	+		+	-	-	+	+	+	+	+	-	-	+	
	Information on food production and consumption initiatives	+				+	*	+	*	+	+	+	+	*	+	*	+	+	

**Note:** (1) Azerbaijan and the former Yugoslav Republic of Macedonia did not respond to the questionnaire whereas responses from Belarus, Russia, Serbia, Turkmenistan and Ukraine are incomplete.

(2) A response to the questionnaire from Romania was received in November 2006 before Romania joined the EU.

value farmland. However, it is important to note that the lack of implementation of general conventions or legal resolutions is widespread. Even some basic prohibitions agreed during the 1970s and 1980s on the use of the most hazardous pesticides have not always been respected (Huijben *et al.*, 2005).

In the SEE countries the most important driving forces for facilitating food policy development are the Stabilisation and Approximation Process (SAP), institutional support from international organisations, and in some countries the drive for closer integration with the EU.

Some individual countries have also adopted strategies which integrate agricultural policy with goals of environmental protection and reduction of rural poverty. For example, the Armenian Strategic Programme for Poverty Reduction includes provisions relating to: prevention of soil degradation and human factors that lead to desertification; improved management, use and recovery of Lake Sevan and its ecosystems including its fish stocks; improving the quality and safety of agricultural activities; and increasing the wealth and quality of life of rural communities.

Similarly, from 2005 the Serbian Strategy of Agricultural Development has sought to build a sustainable and efficient agricultural sector which provides good quality food to satisfy consumer

needs; to improve the standard of living of those within or depending on the agricultural sector; to provide support for sustainable rural development; and to protect the environment from agricultural pressures.

Some national agricultural development strategies are still under preparation. In July 2002 the Croatian Parliament approved the National Agriculture and Fisheries Development Strategy. It provides long-term guidelines for food production within a rural development context. It focuses on food safety and organic farming in order to achieve a more sustainable management of land resources.

While it appears that progress has been made in a few countries in developing integrated strategies and frameworks since the Kiev Report, these need to be implemented by concrete measures. Other countries have yet to begin the development of such integrated policies.

#### *Control on the use of pesticides and hazardous chemicals*

Eleven out of the 18 countries of EECCA and SEE are parties to the 2004 Stockholm Convention on persistent organic pollutants (largely comprising pesticides). Of these only five have until now submitted National Implementation Plans (see Table 8.9 in Chapter 8).

Laws and regulations on the use of these and other pesticides and chemicals exist within most countries of the region. The majority of countries have regulations controlling the production, trade and import of pesticides. As an example, Ukraine's law on Pesticides and Agricultural Chemicals requires public registration of all chemicals to be used in agriculture and in 2006 a list of prohibited chemicals was adopted. In Bosnia and Herzegovina, on the other hand, a framework law exists for the control of pesticides but has yet to be supported by a list of preferred or banned chemicals, except for those covered by the Stockholm Convention (although the country is not party to the convention).

Fewer countries have laws regulating how permitted pesticides should be applied. Such laws exist among others, in Albania (2), Armenia (3), Bosnia and Herzegovina (4) and Croatia (5). Required application methods are variously aimed at protecting consumers and the surrounding environment, i.e. specifying waiting times between application and harvesting or grazing, maximum concentrations to be used, protection zones for watercourses and lakes, restrictions on airborne applications etc.

### Organic farming

In SEE the legal basis for the development of organic agriculture was established by Croatia in 2001 (6), the former Yugoslav Republic of Macedonia in 2004 (7), Bosnia and Herzegovina in 2004 (8) and Serbia and Montenegro in 2005. In these countries laws on organic farming were adopted to promote rules for the production of crops and animal products with certified organic methods. Policies have been adopted for the introduction of labelling or the development of pilot projects for organic agriculture (as in Montenegro) or direct support to farmers (as in the former Yugoslav Republic of Macedonia and Serbia). In addition to the creation of a certification scheme for organic food Croatia has also included economic incentives to organic farmers in the Act of State Incentives in Agriculture, Fisheries and Forestry and is also promoting organic food at the national and local level.

Policies and legislation have not yet been established for organic food in EECCA countries, although

Kazakhstan is in the process of developing a framework for environmental labelling of food products

Another approach to diminishing the impact of agriculture is to support 'traditional agricultural systems'. As mentioned earlier, at the Fifth Environment for Europe Conference in Kiev (2003); ministers and heads of delegation put forward an agenda for the identification and promotion of high nature value areas in agricultural systems. This has created a culture of biodiversity-sensitive ecosystem management in the pan-European region. However, in most EECCA countries there are no administrative units able to deal with the interaction between agriculture and the environment and environmental considerations are not yet part of food sector policies.

### *Sustainable fishery strategies*

Recognition of the poor state of fish stocks and marine resources in Russian seas led in 2002 to a far-reaching strategy for sustainable fishery development. The strategy was aimed at tackling the main problems identified in the management of Russian seas during the 1990s. The first immediate stage of implementation (2003–2005) aimed at developing government mechanisms for managing fisheries and defining commercial quotas. The second stage (2006–2010) will focus on widening Russian participation in international fisheries and fisheries management, and the final stage of implementation (2011–2013) will develop mechanisms to ensure sustainable exploitation (Matishov *et al.*, 2004).

In the Black Sea the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea, amended in 2002, includes a commitment to the development of a fisheries management system containing the following elements: regular regionally-coordinated stock assessments; national fishing authorisations and regional licensing systems for vessels; and a catch quota system. The management system will have as its principle aim the development of more sustainable fisheries in the Black Sea.

(2) Law on Plant Protection Service issued in Albania in 1993 (regulating quality control of imported pesticides) has been amended in 1999 under the influence of EU regulation 91/414/EEC.

(3) Technical Procedures for Fertilisers 18.11.2004 N 1692-H and for Toxic Chemicals 03.11.2005 N 1899-H and Draft Regulation on Maximum Allowable Concentrations of Pesticides and Nitrates.

(4) In Bosnia and Herzegovina, the state Law on Plant Health Protection (that regulates pesticide application) and the Law on Phyto-Pharmaceutical Remedies were influenced by WTO agreement and EU advice.

(5) In Croatia, the Act on Plant Protection provides a regulatory framework for the use of pesticides.

(6) Act on Organic Production of Agricultural and Food Products (OG 12/2001, 14/2001).

(7) Law on Organic Agricultural Production (OG no. 16/04).

(8) Law on Organic Food Production (2004, SG RS No. 75 (7-21).

For the Caspian Sea, the five littoral states ratified the Framework Convention for the Protection of the Marine Environment of the Caspian Sea. Furthermore, the 2003 Strategic Action Plan for the Caspian Sea includes objectives such as ensuring sustainable use of commercial fisheries resources, rehabilitation of fishstocks of migratory species (sturgeon, inconnu, herring) and improvement of livelihoods in coastal communities to reduce dependency on unsustainable fishing practices.

Currently, Russia is in the process of taking more stringent measures to stop illegal fishing and trading in endangered fish species, responding to the request by CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora). The initiative covers such species as sturgeon, salmon, crabs and craboids, sea comb shrimps, sea-urchins and their products, e.g. caviar. It is expected that this measure would help crack down on the caviar black market.

#### ***Protection and information for consumers***

Legislation and technical documents on food quality, controls of inputs and handling of food products exist at various levels in all countries of the regions. Implementation of food quality control remains an issue in some countries, however. For example, illegal sales of livestock products, vegetables, fruits, etc., are a major income-generator for many families, but this has in some cases led to the spread of diseases. Animals are often butchered without veterinary control, there are few slaughterhouses with appropriate hygienic and sanitary conditions. Albania has experienced an increase in brucellosis, transmitted through contact with animal tissue or contaminated milk. Implementation of food controls is especially a problem at the municipal level where the responsibility of different inspectors is often not well-defined.

Most countries have some mandatory labelling of products although the extent of information provided varies. Croatia's labelling system for food products is completely harmonised with the European Union, including information on ingredients, food additives, nutritional value, and origin of various food types. Ukraine's labelling system covers the same information. Serbia's labelling system also includes information on any ingredients from genetically modified organisms (GMO). Kazakhstan has a similar law requiring labelling of GMO products along with ingredients and their nutritional value. Mandatory labelling systems, elsewhere, for example, in Bosnia and Herzegovina are less comprehensive.

Rules and legislation on the labelling of foodstuffs with respect to environmental information are much more restricted. For example, only a handful of countries (all located in SEE) have implemented certification systems for organic farms and the labelling of their products for consumers.

#### **5.4 Conclusions**

Food presents a complex challenge for achieving sustainable consumption and production. Significant environmental impacts arise along the entire food production and use chain, from agriculture and fisheries, transportation, food processing and refrigeration and waste. Food is also a fundamental quality-of-life issue, one which still has not yet been resolved. In some countries access to and availability of foodstuffs remains a challenge for some social groups. In others, unhealthy eating habits lead to health problems. It is also a major economic issue in those countries which rely heavily on agriculture for their economic growth.

Food production in SEE and EECCA countries has been affected by a relative stagnation of the agricultural sector during the 1990s and early 2000s. The total production volume declined in half of the countries, and there were mismatches between food demand and production levels in many countries. This and reductions in household incomes in most countries led to a drop in the consumption of cereals and meat. While consumption of staples such as potatoes remained relatively stable, supplemented in many cases by householders' own production of food, significant proportions of the population in a number of countries became undernourished.

The economic recovery that began in the late 1990s has improved the economic situation for many households and the consumption of almost all categories of food grew steadily during this decade. This has resulted in significant reductions in under-nourishment in all countries with the exception of Tajikistan and Uzbekistan.

The transition to market economies has been accompanied by an increase both in subsistence farming and in large-scale, commercially oriented farms. The latter, with the intensification of agricultural practices, may prove to constitute a challenge for fragile ecosystems in the region. It is expected that livestock numbers will increase following the very significant decline they suffered during the 1990s, and this in turn will result in

a further intensification of agriculture to meet the demand for grain for animal feed. Livestock is currently an important source of pollution of surface and ground waters.

In EECCA, transition was accompanied by a dramatic decline in inputs of fertilisers, pesticides and energy, and current agricultural inputs in EECCA remain significantly lower than pre-transition levels. While this may have led to some reductions in environmental impacts, agro-environmental problems of salinisation, soil erosion, and contamination of surface water persist. Many of these problems are exacerbated by poor management of irrigation, the lack of collection and treatment of manure from livestock, and other agricultural practices conducted with little knowledge of their environmental implications. Countries in SEE, where agricultural inputs are higher now than they were before transition, also experience similar problems. This situation could be improved through the establishment of advisory and training services to spread knowledge on good agro-environmental practice.

International conventions on biodiversity, and legal resolutions, for instance, affecting trade with the EU, are important drivers for the formulation of environmental policies that concern the food sector in SEE and EECCA countries. However, the lack of institutional capacity and funding mechanisms are a barrier to the implementation of these treaties and resolutions. The challenge ahead consists in strengthening institutional capacity for delivering sustainable food consumption and production policies, including legislative enforcement mechanisms. This should ideally lead to an integration of environmental considerations into agricultural policy and consumer legislation, but it is already clear that many countries in SEE and EECCA will require continued external support to develop sound agro-environmental policy frameworks.

Consumption of prepared and processed food as well as food imports have been increasing steadily since the end of the recession. This may be linked to growing customer preference for buying food in supermarkets instead of local shops and markets. Local studies in Russia, Serbia and Ukraine, carried out for this report, identified emerging environmental challenges related to affluent consumption patterns that result from increased incomes in the richer sections of the population. These challenges are associated with the preference of young urban dwellers and wealthier people to buy their food with more packaging in large

supermarkets. This also involves the need to use private cars for shopping. These developments are increasing transport-related pressures, and the trends are likely to continue in the future as the demand for non-seasonal food increases. At the other end of the spectrum, poorer groups are pushed into diets rich in carbohydrates and poor in proteins and in a number of countries food security is an urgent concern.

Household waste generation is increasing rapidly across EECCA countries and rising more gradually in SEE. Food-related wastes — organic food waste and food packaging — comprise a large part of household waste. There is also some evidence that packaging waste is on the increase. Almost all municipal waste generated in SEE and EECCA ends up in landfills, which leads to the generation of methane, a potent greenhouse gas. Environmental impacts from food-related wastes would be reduced by reducing the generation of waste at source — i.e. through reductions in food packaging — and by waste treatment aimed at extracting resources and energy from the waste prior to disposal.

There is evidence of a number of positive household practices with respect to the sustainability of food. Firstly, at least in Eastern Europe, it would appear that households satisfy a significant proportion of their food demand through their own production. In Russia even urban households grow more than a third of their vegetable and potato needs at their summer dachas. While this was a necessity during the economic hardships of the 1990s, higher incomes do not appear to have affected this tradition. Home production can reduce the demand for products from intensive commercial agriculture and the related impacts from pesticides, fertiliser use and energy for machinery and transportation. A second potentially positive sign is the continuing preference of many householders for locally and nationally produced foods due to perceptions of better quality and national sympathies. This can also have positive environmental effects by slowing down the increasing transportation of food.

There is a significant opportunity for the expansion of organic food production in SEE and EECCA countries. Thanks to the continuing low use of fertilisers and pesticides, many farms, although not officially classified as organic, are 'clean of chemicals' and could produce certified organic products without the need to wait years normally necessary to clean the soil. The availability of agricultural labour constitutes also a great competitive advantage for many of these countries for the production of organic food.

The opportunities to export organic food to meet the demand of EU markets are enormous, and some countries are already addressing this issue. National markets for organic food will also offer opportunities as the awareness and purchasing capacity of consumers increase. Consumers interviewed in the case studies expressed preference for local production and concern with quality, preferences that could be further cultivated through consumer education campaigns promoting sustainably grown food. Yet, strong challenges remain for the development of organic farming in SEE and EECCA countries, and organic certification schemes still need to be adopted in most of EECCA.

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# 6 Buildings



Location of city studies covered in this chapter

## Facts and figures

- Residential, public and commercial buildings use around one-third of total energy consumption in SEE and EECCA. Energy use is dominated by heating and cooling, followed by hot water, appliances and lighting.
- Typically, 80–90 % of total energy used during the whole life of a building is consumed during the use phase. Investment aimed at improving energy efficiency and heat loss during occupancy will give strong environmental and economic benefits over a building's lifetime.
- Residential energy consumption per capita in EECCA is slightly higher than the EU average, and twice as high as the SEE average. It ranges from about 11 000 kWh in Russia to less than 600 kWh in Armenia. Household water consumption is generally significantly higher than EU averages.
- Distribution losses are high in the heating and water supply networks. In Russia, for example, heat loss during distribution is estimated to be 20 % in some regions. For water distribution, losses of 30–50 % are typical in the SEE and EECCA regions, and in some countries many water distribution systems are close to collapsing.
- SEE and EECCA countries could dramatically reduce energy and water consumption through introduction and enforcement of stricter codes for new buildings; retrofit of the huge stock of inefficient multi-apartment blocks; modernisation of energy and water distribution networks; installation of metering and controls in apartments; and reform of tariffs to create economic incentives for saving.
- In SEE, there is widespread use of electricity for heating and hot water in households. Significant environmental gains could be achieved by switching to gas or renewable energy sources for heating and hot water, and freeing up electricity for use in the growing number of appliances.
- Reuse and recycling of demolition waste can be an effective measure for reducing the use of virgin construction materials in buildings. This does not currently occur on any significant scale.

## 6.1 Introduction, approach and SCP perspective

### 6.1.1 Introduction

Buildings are known to be responsible for a significant share of the resource use and the negative impacts on the environment in most developed societies. This chapter considers trends and the

overall importance of residential, public and commercial buildings with respect to environmental pressures. It identifies potential opportunities for reducing environmental and social impacts within this sector and outlines progress in making policy. Finally, examples of individual initiatives and good practices are presented.

Focus is placed on urban areas, especially large cities for the following reasons:

- i) Urban expansion between the 1960s–1980s involved the construction of a vast number of similar multi-apartment buildings, which consequently share many problems to which similar solutions can be applied.
- ii) In spite of growing privatisation, many multi-apartment blocks in cities in EECCA and SEE are still owned by local or national governments. This makes publicly funded retrofit programs possible.
- iii) District heating systems are common in larger cities of the regions. Antiquated systems are the cause of high energy consumption but at the same time present opportunities for efficient heating and cooling in the future.

To illustrate the analysis in this chapter, local studies on buildings were conducted in the following cities: Ashgabat, Turkmenistan; Dnipropetrovsk, Ukraine; Dushanbe, Tajikistan; Minsk, Belarus; and Tbilisi, Georgia.

### 6.1.2 General SCP aspects of buildings

Buildings provide for many basic needs, such as a comfortable inner environment, space and facilities for washing, cooking, eating and sleeping, or alternatively for carrying out business, administration, education, healthcare or leisure. Ideally, sustainable buildings should provide for these needs for all social groups as efficiently as possible with the least environmental impact.

### Infrastructure

Typically, 80–90 % of total energy used during the lifespan of a building is consumed during the use phase (Ala-Juusela *et al.*, 2006). Therefore, increased investment in the design and construction phase, aimed at reducing energy consumed in the use phase, can give strong environmental and economic benefits over a building's lifetime. For example, it is estimated that the European Union's 2003 Energy Performance of Buildings Directive (EC, 2002) will lead to an annual increase in infrastructure investment of EUR 3.9 billion by 2010, but the resulting annual energy cost savings will be nearly double this at EUR 7.7 billion per year (Ala-Juusela *et al.*, 2006).

Conversely, a lack of consideration and awareness at the design and construction stage can lead to a building which is predisposed to high energy consumption, regardless of the behaviour of its occupants.

Energy use in buildings during occupancy is typically dominated by control of the inner environment (heating and cooling), followed by use of hot water, appliances and lighting. Sustainable building design includes high levels of thermal insulation of walls, roofs and windows, efficient heating and cooling systems (i.e. using waste heat from industry, heat pumps/cooling pumps, efficient boilers etc.), design of the building to fit a specific location, use of passive lighting and active shading, solar water heating, and energy efficient appliances and lighting.

#### Box 6. 1 Buildings on the international policy agenda

Buildings are not specifically mentioned in the Sustainable Consumption and Production Section of the 2002 Johannesburg Implementation Plan. The following action, however, can be taken to relate directly to buildings as key long-life energy-consuming infrastructures:

'States have common but differentiated responsibilities. This would include actions at all levels to...integrate energy considerations, including energy efficiency, affordability and accessibility, into socio -economic programmes, especially into policies of major energy -consuming sectors, and into the planning, operation and maintenance of long-lived energy-consuming infrastructures.'

One of the Working Groups established as part of the Marrakech Process concerns Sustainable Building and Construction. The group's first report focuses on energy use in buildings. In addition, UNEP launched the Sustainable Buildings and Construction Initiative in early 2006, aimed at developing a broad global partnership to promote progress in sustainability in this sector with a focus on reducing climate change impacts.

The technology exists today to create sustainable buildings entirely independent of external energy supplies and with lower lifetime costs than conventional buildings. Typical barriers to the widespread implementation of these technologies include:

- real estate markets which place emphasis on cutting costs of construction;
- lack of building codes for architects and contractors which would promote construction of sustainable buildings;
- lack of energy information for potential buyers and lack of consumer interest when energy prices continue to be heavily subsidised;
- a widespread lack of knowledge and resistance to change within the construction industry.

A sustainable buildings policy needs to tackle all of these barriers. Moreover, it must optimise interactions with heating, electricity and water distribution systems in order to increase efficiencies. A sustainable building policy should also focus on improvements in efficiencies of the existing building stock, making the best use of potential positive characteristics, i.e. existing district heating and multi-apartment housing. More efficient building infrastructure will also yield social benefits by increasing access to and affordability of comfortable inner environments, considerable economic gains, and an increase in the security of the energy supply.

Finally, the construction industry is one of the sectors that consumes the greatest amount of material resources. Virgin material consumption can be reduced by extending the useful life of buildings, improving material efficiency, greater use of renewable materials (i.e. wood), integrating reusability into building design, and mobilising recycling and reuse of demolition waste.

#### ***Household behaviour***

In terms of energy consumption, household behaviour can be pre-determined by existing building infrastructure. For example, if the level of heating cannot be controlled, householders will make use of wasteful practices such as opening windows to reduce temperatures on milder winter days.

Other wasteful behaviour patterns in water and energy consumption can result from:

- a false perception dating back to centrally planned economies that water and energy are free resources;
- a lack of awareness of environmental, social and economic impacts of water and energy use;
- a lack of economic incentives to reduce consumption.

Economic instruments can only be brought to bear if actual energy and water use is measured and householders and building operators have control over their costs. Again, there is an intimate relationship between the building infrastructure and household behaviour.

## **6.2 Trends, driving forces and impacts**

### ***6.2.1 Historical background***

The forced transfer of populations from rural to urban areas in the 1930s, the destruction of urban infrastructure during the Second World War, and chronic under-investment in housing during the post-war years left the Soviet Union with just 4 m<sup>2</sup> of usable housing space per capita by the end of the 1950s. From the 1960s onwards, new construction principally in urban areas was designed to fill this gap as rapidly as possible. The effort was so enormous that by 1989, housing space had risen to 15.8 m<sup>2</sup> per capita (Renaud, 1992). Urban construction from 1960 onwards largely consisted of low- to medium-rise multi-apartment houses using a technique known as large-panel construction. Across the Soviet Union, 75 % of all urban housing was built with these construction techniques (Molnar, 2003) (Klyachko *et al.*, 2003).

Housing built during this period had characteristically low levels of thermal efficiency. Panel-built housing began to be phased out in the rest of Europe during the oil crises of the 1970s (Molnar, 2003). In the Soviet Union construction of such housing continued with only minor improvements. This was due to the continuation of three factors: low energy prices in the closed energy markets; a lack of cross-cutting energy policy; and monopolistic, non-innovative construction companies (Renaud, 1992).

A positive element of central planning was that heating and hot water were centrally administered with 50–70 % of urban households typically connected to district heating. However, heating, along with water and electricity prices for the

residential sector were largely subsidised by the State with payment unrelated to use. This gave no economic incentive to an occupant to save energy. In any event, the typical apartment-tenant had little or no way of controlling heating and temperatures other than by opening windows (Shapiro, 2006).

The results were low thermal efficiencies in housing and public buildings; little control over use; no incentive to reduce consumption where it was controllable; and inefficient distribution systems which led to high levels of primary energy use and water consumption in a number of countries.

The decade following the break-up of the Soviet Union saw the gradual collapse of the energy and water supply as well as the distribution systems. Wars and turmoil in the former Yugoslavia had a similar effect on energy and water networks in SEE.

The costs for municipalities of supplying energy and water services increased with rising primary energy costs. At the same time the economic recession hit municipal budgets and the widespread practice of cross-subsidising residential energy consumption by industry became less feasible as industry faltered. Meanwhile, the possibility of transferring the real costs of energy and water supply to residential consumers was still unrealistic. During the 1990s average incomes in the countries of the former Soviet Union dropped by 50 % while energy prices increased by 177 % (Lampiotti and Meyer, 2002). The result was a long period of under-investment during which supply and distribution systems deteriorated badly. This was characterised by continual breakdowns or the complete collapse of supplies.

During the mid-1990s many governments in the EECCA and SEE regions began a policy of intensive privatisation of state housing funds as well as the gradual privatisation of energy and water utilities. This was encouraged by the international community <sup>(1)</sup> and accompanied in some cases by tariff increases. Privatisation and tariff increases were largely confined to electrical power, and were most progressive in SEE countries. However, energy prices also escalated in other places, such as Georgia, as did heating tariffs in Serbia. Where tariff increases were not accompanied by improved service, non-payment became widespread, damaging the economic situation of energy and water supply enterprises. Disconnection from the district heating system and a switch to cheaper but dirtier forms of

heating (i.e. wood and oil-fired stoves) occurred in a number of countries <sup>(2)</sup>.

The economic upturn in the regions during the late 1990s improved the financial situation of energy enterprises and increased the potential for full cost recovery. Nevertheless, ten years of zero investments have taken their toll on supply systems, and resources still remain limited for making the necessary improvements to reduce inefficiencies. Furthermore, in many cases the ownership of utilities is still unclear, undermining incentives to invest in infrastructure.

Construction of new buildings has increased dramatically over the past five years, providing an opportunity for significantly improving the thermal efficiency of the building stock. However, this can only be achieved if carefully selected and enforced building codes are in place.

### 6.2.2 Trends and outlooks

#### Building stock and construction trends

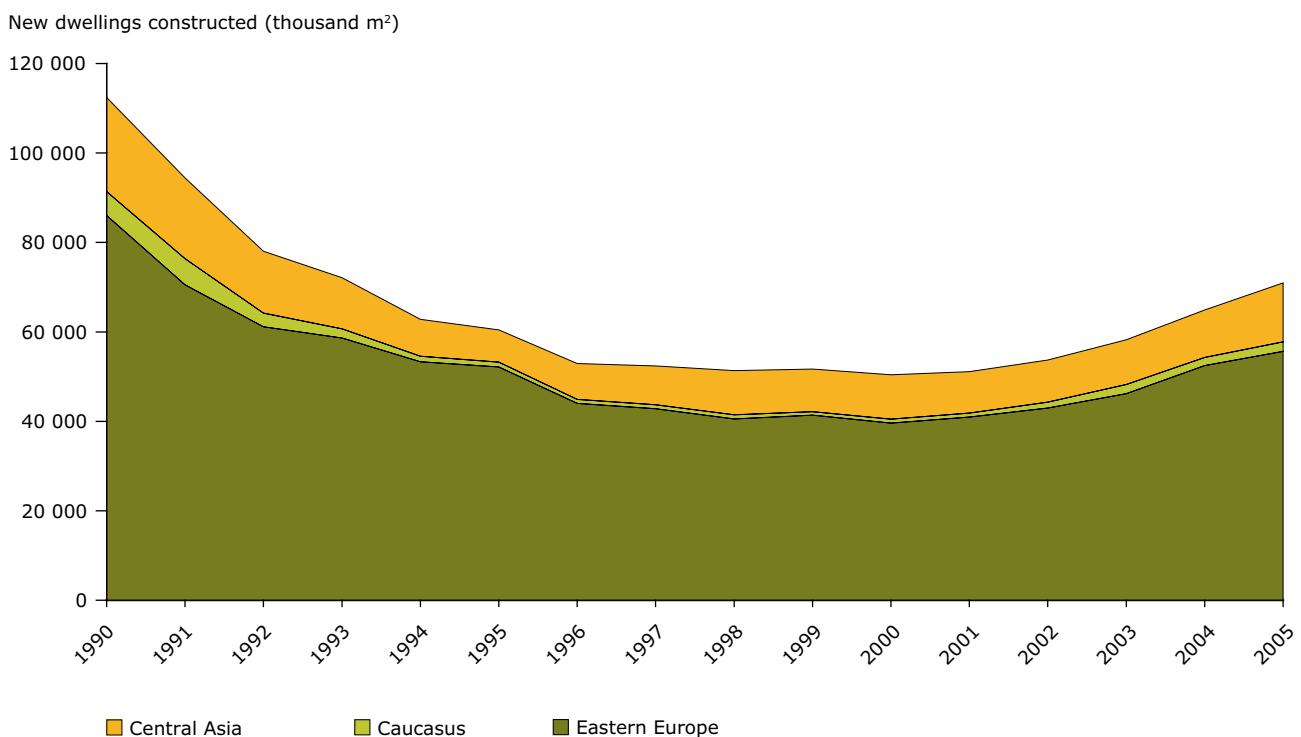
The building of new dwellings has generally corresponded with the developments in GDP since 1990 (Figure 6.1). Much of the EECCA region saw a construction boom after 2000, mostly centred in the larger cities. For example, in Moscow 15 % of current dwellings were built after 1998 compared to 7 % in the rest of the country (Matrosov, 2005).

Construction of new living space has outpaced demolition rates in all EECCA countries (even in countries with stable or falling population levels), and total living space has increased by between 4 % (Moldova) and 23 % (Azerbaijan) since 1990 (CISSTAT, 2006). These increases have been encouraged by policies that raise sanitary norms for living spaces. Moreover, they have had positive social effects, although energy demand for space heating has consequently increased. Nevertheless, housing space remains low in the less affluent countries of Central Asia (see Table 2.2 in Chapter 2).

Much of the construction is aimed at the new wealthier classes; a development which has been accompanied by a significant reduction in municipal housing. A new phenomenon appearing in a number of cities is the suburban district containing low density detached housing or luxury residential blocks. This style of urban living is particularly popular on the outskirts of Moscow (Boret *et al.*,

<sup>(1)</sup> Via, for example, the World Bank's 1998 Europe and Central Asia Energy Sector Strategy (World Bank, 2003).

<sup>(2)</sup> E.g. Armenia, Bulgaria, Moldova and Georgia.

**Figure 6.1 Construction of new living space after 1990**

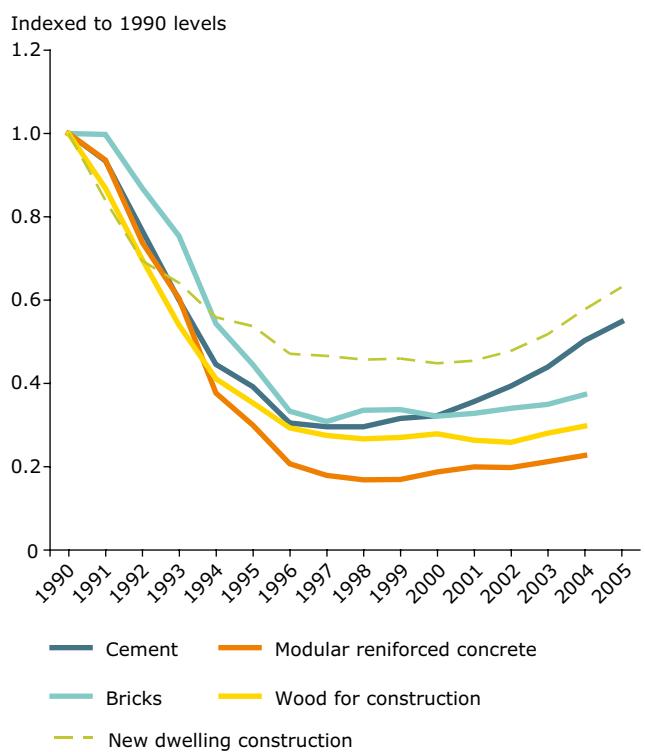
Source: CISSTAT, 2006.

2004) and other large cities, and is generally causing urban sprawl, increasing the demand for transport and reducing opportunities for district heating.

Despite recent strong growth, the construction of new dwellings remains significantly below the high levels seen during the 1960 and 1980s. It is approximately 60 % of 1990 construction levels in EE and CA, and 40 % in the Caucasus. The housing stock of most cities remains dominated by dense developments of multi-apartment buildings constructed during the 1960s and 1980s. Box 6.2 describes the stock of buildings in the five cities.

Production of construction materials by weight across the EECCA region between 1990 and 2005 has closely followed developments in housing construction. Only cement production has enjoyed a higher growth than housing construction. The relatively slower growth in the use of bricks, lumber and prefabricated concrete modules may demonstrate changes in construction methods (i.e. greater use of concrete), or an increase in the import of these construction materials.

Reuse and recycling of construction and demolition waste can be an effective measure for reducing the use of virgin construction materials. However, city

**Figure 6.2 Production of key construction materials in EECCA countries**

Source: CISSTAT, 2006.

**Box 6.2 Housing stock and new development in the five cities****Ashgabat**

Like Dushanbe and Tbilisi, Ashgabat lies in an earthquake zone. The city began to expand in earnest during the 1960s with the establishment of large panel multi-storey designs able to withstand earthquakes. The most intensive period of construction was between 1966 and the end of the 1980s. Some 70 % of the current housing stock consists of buildings 5 storeys or higher. Current living space per person is approximately 12 m<sup>2</sup>. Following a decision by the President in 1999, emphasis has been placed on the construction of buildings of 7–25 storeys with large comfortable apartments, and/or offices and shopping space, etc. In addition to high rise development, a very large new area of suburban detached housing has been planned to the north of the city, covering 1 million m<sup>2</sup> of living space.

**Dnipropetrovsk**

There are no official statistics for the age of housing stock for the city. Of new dwelling construction, 64 % consist of multi-storey apartment blocks, while 36 % are detached individual houses. One-third (33 %) of apartment blocks are aimed at the luxury end of the market. Almost all new developments are privately constructed and owned. Municipal housing construction for disadvantaged groups has almost disappeared.

**Dushanbe**

The entire city was not built until after 1922 and most of this since the development of an urban construction plan in 1956. By area, 98 % of the current stock are multi-apartment buildings of 4 storeys or more and 92 % are privately owned. The General Urban Plan aims to increase living space per person from the current 7 m<sup>2</sup> to 16 m<sup>2</sup> by 2030. This will require more than a doubling of the housing area. Most of the planned new development will be 4–5 storey housing (4.5 million m<sup>2</sup>), with some 6–9 storeys in the central area (0.8 million m<sup>2</sup>) and a small number of 2–3 storey apartments (0.4 million m<sup>2</sup>) in the suburbs. So far, new construction has not met the rigorous ambitions of the plan due to unattractive loan conditions. The involvement of international contractors may change this.

**Minsk**

Most of the housing stock has been built after World War II, with at least 80 % after 1960. Housing is dominated by medium-rise multi-apartment blocks (87 % > 5 storey). New development is continuing to focus on multi-apartment blocks. There is a strong political drive to increase the living space per person in apartments. In 2003 the sanitary norm was raised from 15 m<sup>2</sup> to 20 m<sup>2</sup> per person. By area, 20 % of all building space represents office space.

**Tbilisi**

Although the central area of the city is old, approximately 70 % of the building stock in the city was constructed between 1960 and 1990. It consists of multi-apartment blocks. Around 18 % of current dwellings are detached houses. Nearly two-thirds of all buildings built in Georgia since 2000 are in Tbilisi. Construction rates were highest between 2000 and 2003, but have now slowed. The area of the average new apartment has been increasing and approximately 91 % are privately owned. In 2002, a major earthquake damaged more than 10 000 of the city's buildings.

studies demonstrate that the reuse of demolition waste is unlikely to occur on a significant scale (see Box 6.3).

Finally, the use of hazardous substances in construction has been common in some parts of EECCA. Phenol formaldehyde was added to concrete in medium-rise buildings in Russia

during the 1970s and 1980s to add strength and to prevent fire and noise. Subsequently, during the 1990s apartments in such buildings were found to have high air concentrations of formaldehyde and phenol. Asbestos was also widely used in ventilation systems, partition walls and insulation. Its use remains widespread in new construction (Gormsen, 2006).

### Box 6.3 Construction and demolition waste handling in the five cities

#### Ashgabat

In 1999, the government recognised the opportunity to reduce the need for new construction materials by 40 % through recycling building waste. However, it is not known to what degree this potential has been utilised.

#### Dnipropetrovsk

Construction companies are responsible for the disposal of demolition waste. None of the 15 companies interviewed engages in recycling or reuse. This is not economically viable due to ready availability of cheap materials. Some ad hoc reuse is carried out by the public. The most pressing issue is ensuring that building waste is deposited according to law. Of a total estimated at 250 000 m<sup>3</sup> annually, only 63 000 is landfilled. The remainder is illegally dumped.

#### Dushanbe

By law, all residual building waste must be transported to a dedicated building waste disposal site. Deposited waste increased from 683 to 866 thousand m<sup>3</sup> between 2002 and 2005. The recycling of building waste is carried out ad hoc at the demolition site. Construction companies may reuse some elements while the public also scavenges.

#### Minsk

No statistics are available on building wastes. However, there is some reuse of reinforced concrete waste from multi-storey housing. The iron content is reused for scrap and a part of the rubble used for road surfaces. Some wood wastes are taken away by local residents for heating.

#### Tbilisi

There is only one building waste disposal site in the city that collects 120–150 thousand m<sup>3</sup> per year. As with the other cities, no reuse of building waste takes place at the official disposal site. An attempt was made in 2002 by a foreign firm to set up a recycling plant. However, it was abandoned shortly afterwards. As in the other cities, ad hoc recycling of windows, floorboards, tiles, etc. is happening at demolition sites by city dwellers for use in their homes.

#### Current trends in energy and water consumption

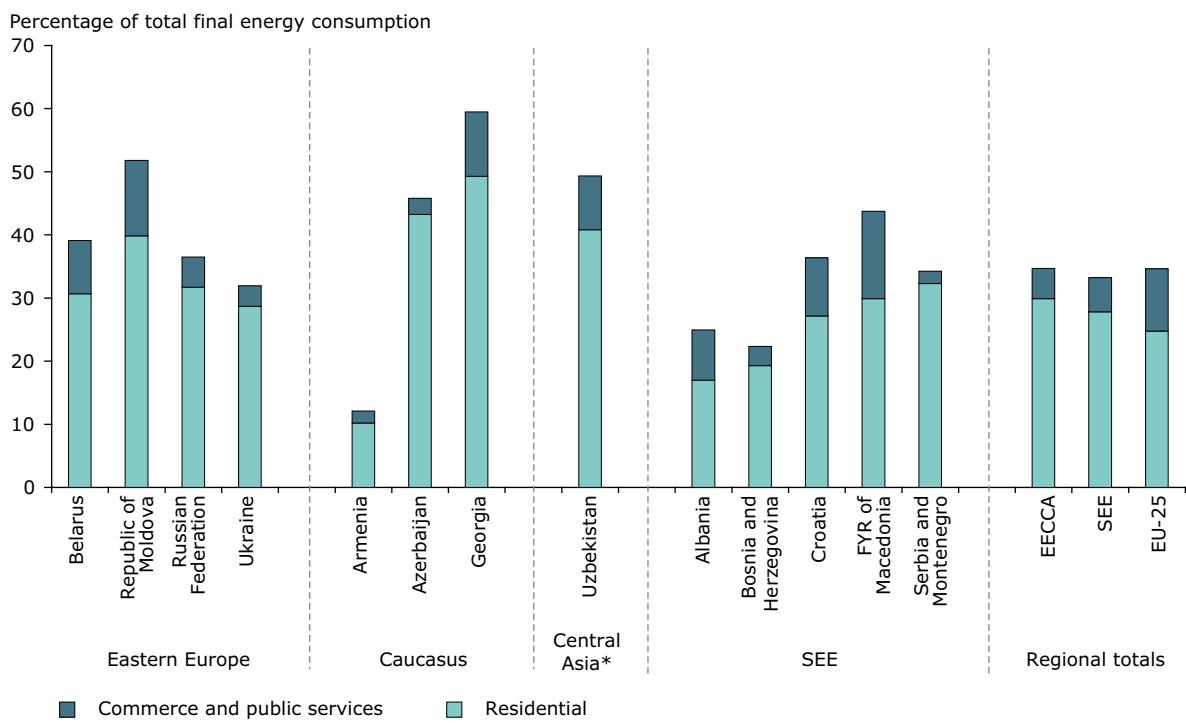
Across EECCA and SEE residential, public and commercial buildings consume around one-third of total final energy consumption (Figure 6.3). This compares very closely to the EU-25. However, there are significant differences across individual countries, with the share of buildings in total energy consumption ranging from approximately 12 % of the total in Armenia to 50 % or more in Georgia, Moldova and Uzbekistan.

Average residential energy consumption per capita across EECCA (Figure 6.4) has declined since 1994 despite economic growth due mostly to drops in Russia and Ukraine. Nonetheless, it remains higher than the average residential energy consumption in the EU-25. In SEE

countries, residential energy consumption per capita has grown by 40 %. However, it remains less than half the level of EECCA and EU-25 averages. This is partially the result of climatic differences.

Consumption per capita is lowest in the less affluent countries of Armenia, Georgia, Moldova and Albania, whereas in Russia residential energy consumption is 25 % and 40 % higher than the EECCA and EU-25 averages, respectively (Figure 6.4). While data are only available for electricity consumption for most Central Asian countries, the carbon dioxide output per capita presented in Figure 2.8 in Chapter 2 suggests that residential energy consumption in Kazakhstan and Turkmenistan could be of a similar order of magnitude to Russia's.

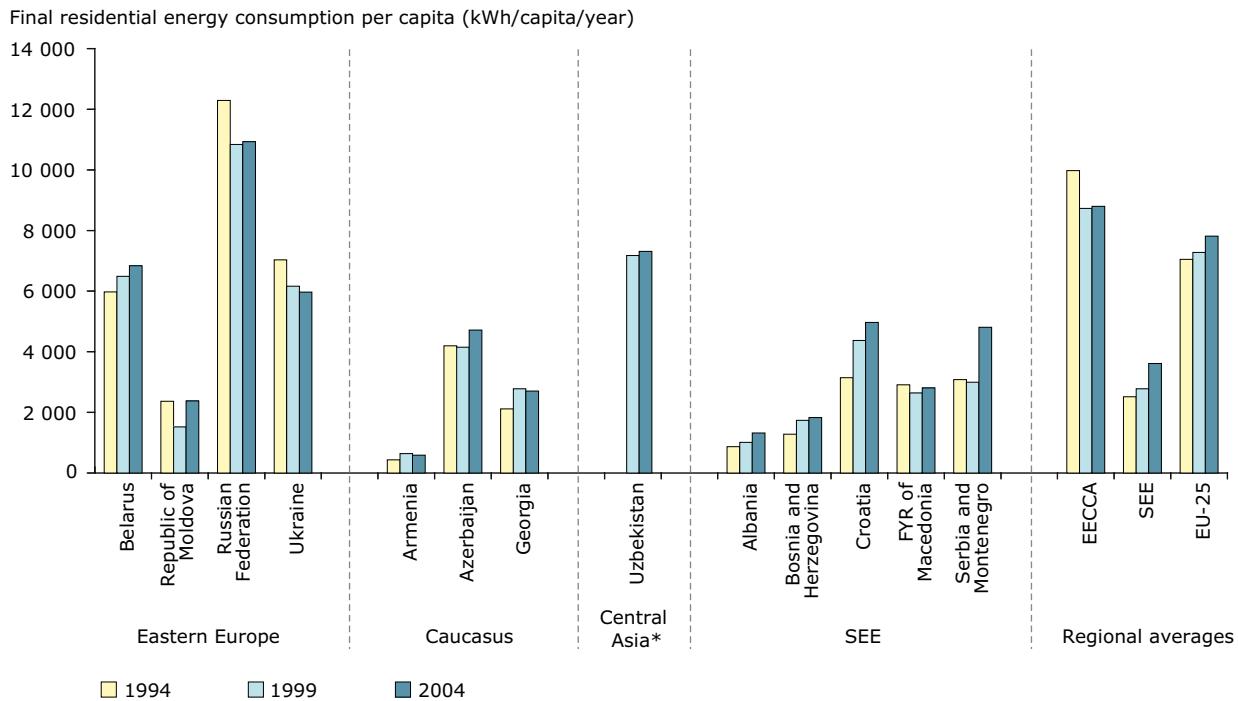
**Figure 6.3 Residential and services final energy consumption as a proportion of total final consumption (2004)**



**Note:** \* For Central Asian countries other than Uzbekistan, residential data exist only for electricity consumption. EECCA average does not include Central Asia other than Uzbekistan.

**Source:** IEA, 2006.

**Figure 6.4 Residential final energy consumption per capita (1994–2004)**



**Note:** \* For Central Asian countries other than Uzbekistan, residential data exist only for electricity consumption. EECCA average does not include Central Asia other than Uzbekistan.

**Source:** IEA, 2006.

Figure 6.5 divides final residential energy consumption into the various energy carriers directly used in residencies, i.e. gas where gas is burnt directly in the building for heating and cooking, or hot water where hot water is provided by district heating companies for direct use in buildings for heating or bathing<sup>(3)</sup>. Across EECCA as a whole, heat from district heating systems represents 45 % of total final energy consumption in households. This is significantly higher than in SEE or the EU and is largely due to Eastern Europe. Natural gas is the other main energy carrier consumed directly in households across EECCA.

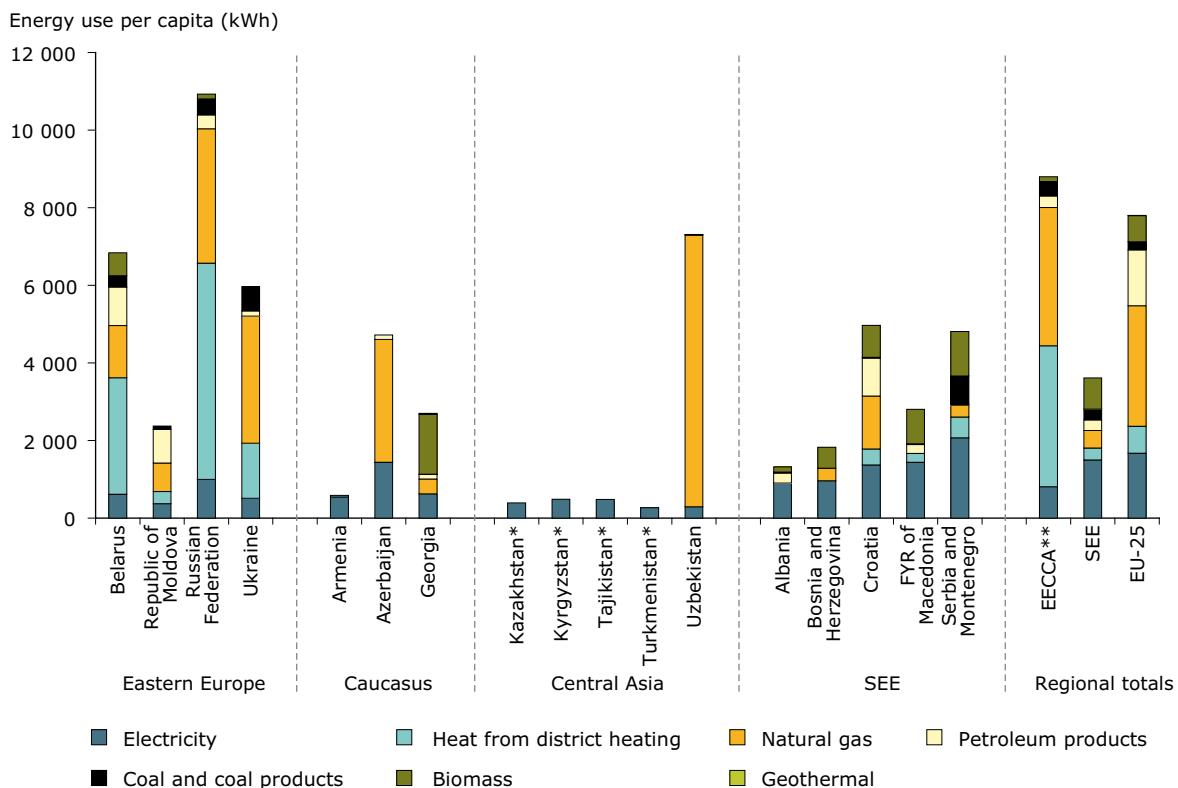
In SEE, nearly half of the energy consumed in households comes in the form of electricity, and electricity consumption per capita is three times higher on average than in EECCA countries. However, the reason for high residential electricity consumption in SEE countries is not a result of

high appliance use, as in the EU, but rather the widespread use of electricity for space heating and hot water. Ownership of electrical appliances is generally significantly lower in SEE and EECCA countries than in the rest of Europe.

Typical proportions of functional energy used in residential buildings in EECCA countries in colder climates are 65–75 % for heating, 10–20 % for hot water, 10–15 % for cooking, appliances and lighting. These proportions may also be typical for SEE<sup>(4)</sup>.

Compared with energy consumption, the share of water consumption in buildings in EECCA and SEE is less significant than the share of other sectors. In EECCA countries, the agricultural sector accounts for 44 % of water consumption, industry/energy sector for 41 %, and residential and services for only 15 % (EEA, 2007).

**Figure 6.5 Residential energy consumption per capita by final use energy carrier (2004)**



**Note:** \* For Central Asian countries other than Uzbekistan, residential data only exist for electricity consumption.  
\*\* EECCA average does not include Central Asia other than Uzbekistan.

**Source:** IEA, 2006.

<sup>(3)</sup> Only the energy carried by the energy carrier is included. No account is taken of the primary energy consumed to produce hot water at the district heating plant or for producing electricity in the power plant.

<sup>(4)</sup> For the former Yugoslav Republic of Macedonia, for example, the figures are 71 % (heating and cooling), 17 % (hot water) and 12 % (appliances) (Energy Charter Secretariat, 2006a).

Water consumption for the residential and services sector in EECCA fell by 20 % between 1990 and 2000 and has remained stable since then (EEA, 2007). In Russia, residential water consumption per capita dropped from 304 litres/day in 1995 to 247 litres/day in 2005 (UNEP, 2006). These figures are comparable to the upper end levels of consumption in the EU<sup>(5)</sup>. However, water consumption in the larger Russian cities is nearly double this average (OECD, 2003). In Tbilisi and Ashgabat water consumption per capita is 800 and 700 litres/day respectively. Due to high losses and lack of available water, water services in many cities are rationed<sup>(6)</sup>.

In conclusion, energy consumption per capita in buildings is high in Eastern Europe (excluding Moldova), Uzbekistan, Kazakhstan and Turkmenistan, and to a lesser extent Azerbaijan, Croatia and Serbia. Some countries in the regions still have very low residential energy use per capita. Water consumption, meanwhile, appears to be higher than EU averages in most of SEE and EECCA.

### *Expected trends in future consumption of energy and water*

*Heating and hot water:* Russian forecasts show a reduction in residential district heat consumption of around 0.6 % per year until 2020 (APEC, 2006) as a result of the improvements in energy efficiency standards of new buildings (see Section 6.3) and rehabilitation programmes for district heating.

For apartment tenants not connected to district heating, energy consumption for heating is limited by income. Where average incomes rise, consumption increases. Increasing incomes may also encourage a switch in fuel types from kerosene or wood to electricity or gas for heating and hot water<sup>(7)</sup>.

An additional factor influencing heating demand is the general increase in total living space in all EECCA countries. In Eastern Europe living space is increasing by approximately 1 % per year (CISSTAT, 2006).

*Appliances:* Appliance ownership stagnated or even declined in most EECCA countries during the 1990s and early 2000s, as appliances bought during the 1980s fell into disrepair. In SEE, growth of appliances was slow in some countries but rapid in others<sup>(8)(9)</sup>. However, average incomes across Eastern Europe and SEE overtook pre-1990 levels in 2002 and are now growing rapidly at 5–10 % per year. It is expected that growth in appliance ownership will follow. Ownership of high-end appliances is highest in cities<sup>(10)</sup>.

Greater ownership will be accompanied by increasing electricity consumption unless the efficiency of appliances improves at similar rates. Residential electricity demand is expected to double in Kazakhstan by 2030 (Energy Charter Secretariat, 2006b) and increase in Russia by 1 % per year up to 2020 (APEC, 2006).

### **6.2.3 Current systems for the provision of heat**

There are three kinds of heating for urban households, commercial and public buildings across the regions.

- 1 District heating (DH) — supplying hundreds or thousands of homes and public buildings. Heat is generated at one or two central boiler stations and supplemented by many small boilers. The large boilers burn fossil fuels or occasionally waste or biomass.
- 2 Autonomous building-level heating — central boilers in multi-apartment or commercial/public buildings which provide heat to all apartments. These boilers tend to burn gas or oil.
- 3 Individual heating — apartment-level heating using gas heaters, wood stoves or electric heaters.

Connection to DH is highest in Eastern Europe and in Kazakhstan. Connection rates were even higher at the beginning of the 1990s, but lack of maintenance rendered many systems unusable<sup>(11)</sup> in EECCA while conflict in the Balkans damaged DH systems

<sup>(5)</sup> EU per capita consumption varies by country from 120 to 280 litres/day (Eurostat).

<sup>(6)</sup> For example, in Ukraine — 9 hours a day in Lviv, 9 to 10 hours a day in Mykolayiv <http://www.globalwaterintel.com/index.php?page=articleView&articleId=820>.

<sup>(7)</sup> In Montenegro, which has no district heating, 48 % of households use electricity for heating and 42 % use wood. However, only 36 % of households with incomes of less than EUR 125/month use electricity, while of households with over EUR 275/month, 77 % use electricity for heating (Austrian Energy Agency, 2006).

<sup>(8)</sup> Ownership of dishwashers doubled in Croatia and the former Yugoslav Republic of Macedonia, 1995–2005.

<sup>(9)</sup> Data collected from national statistics offices.

<sup>(10)</sup> In Belgrade, 20 % of households had air conditioning units in 2005 up from 14 % in 2003 (Statistical Office of Serbia, 2004 and 2006). Ownership is only 4 % in the rest of Serbia where incomes are lower. Similarly in Tirana, Albania, 4.1 % own air conditioners compared to 1.3 % in the rest of the country in 2001 (Albania Institute of Statistics, 2005).

<sup>(11)</sup> The DH network in Tbilisi, Georgia was abandoned at the end of the 1990s. In Baku City, Azerbaijan, 80 % of those houses connected to the DH network cannot receive heat (Kulichenko, 2005).

there (12). The system in Sarajevo was repaired as part of a World Bank-funded project during the late 1990s but similar work is yet to be carried out elsewhere (Austrian Energy Agency, 2006).

Autonomous heating is widespread in other parts of the region, for example, Turkmenistan (see

Box 6.4). In Kazakhstan most new multi-apartment buildings also have autonomous heating systems.

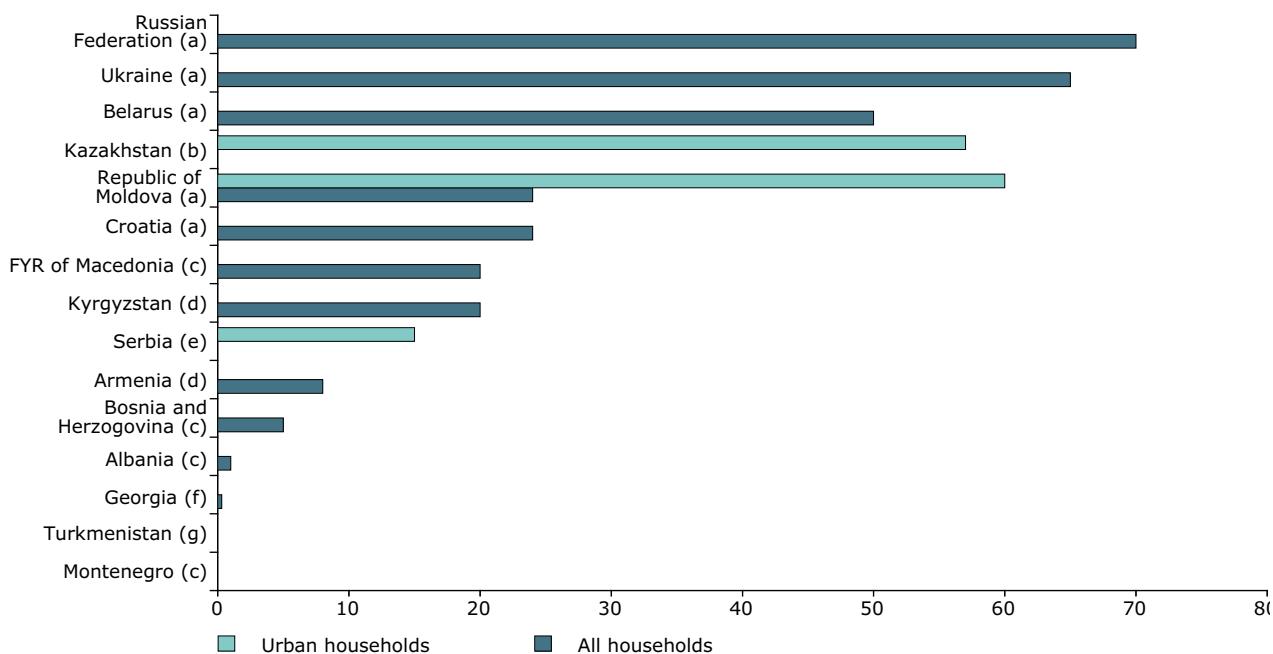
Other countries are less well supplied with either DH or autonomous heating. The situation is deteriorating due to the absence of legal requirements for establishing autonomous systems

#### Box 6.4 Heating systems in the five cities

The heating systems in the five cities vary widely. In Minsk 99.6 % of all multi-storey residential buildings are connected to district heating. The figure is 75 % in Dnipropetrovsk, with 15–20 % of households having autonomous heating and the remaining 5–10 % using apartment level boilers. Approximately 30 % of the buildings in Dushanbe are connected to the DH system with other buildings using autonomous systems powered by diesel. Around 60 % of the DH heat supply in Minsk, and 95 % in Dushanbe come from combined heat and power (CHP) plants. About 20 % of heat in Dnipropetrovsk is from CHP or industrial waste heat, with the remainder from heat-only boilers. The fuel used for CHP and heat-only boilers in Dnipropetrovsk is around 80 % gas and 20 % coal.

At the beginning of the 1990s, Tbilisi had a large DH network with 85 % of buildings connected to it. This network closed down when the gas supply to the city was discontinued. The population turned to kerosene or electricity for heating. By the time the gas supply returned in 1996, the DH system was in total disrepair. Residents turned to apartment-level gas connections for heating and cooking. In Ashgabat there is no large DH or CHP. However, approximately 95 % of buildings have autonomous heating either for a single building or for small groups of buildings, while new buildings are regularly fitted with autonomous heating.

**Figure 6.6 Percentage of households connected to district heating**



**Sources:** a) Lampietti and Meyer, 2002 taken from [www.districtheat.org](http://www.districtheat.org); b) Energy Charter Secretariat, 2006b; c) Austrian Energy Agency, 2006; d) Lampietti and Meyer, 2002 authors' own estimates; e) Beogradske elektrane, 2005; f) Georgian State Department of Statistics, 2005; g) City study.

(12) In Bosnia and Herzegovina, DH was available in most cities with a population of over 25 000 before the war, and served 120 000 households (Austrian Energy Agency, 2006). Damage during the war reduced this figure by two-thirds (Caigne et al., 1999).

or links to DH. Electric heaters in apartments are common in Georgia, along with gas heaters, in Armenia, the former Yugoslav Republic of Macedonia, Montenegro and Albania. 58 % of Albanian households use electricity for heating (Austrian Energy Agency, 2006).

### 6.2.4 Key driving forces in energy and water consumption

Residential energy consumption per capita (Figures 6.4 and 6.5) varies by a factor of nearly 20 across the region, ranging from ~ 11,000 kWh in Russian households to less than 600 kWh in Armenia. Part of the reason for this is the large climatic differences across the region. While this may explain differences in residential energy consumption in Russia, Ukraine and Belarus, it does not explain the much greater disparities between these countries and Armenia or Georgia.

These differences may be due to a combination of lower fuel prices, higher incomes and better connections to district heating systems (see Figure 6.6). The district heating systems inherited from the Soviet Union are largely inefficient due to poor design, lack of maintenance and losses in distribution. Nevertheless, those households connected to the systems have continually enjoyed subsidised heat, even during the economic crises of the mid- to late- 1990s. This has led to continually high levels of energy use. In contrast, countries with no DH, where householders purchase fuel for heating by the unit, and fuel prices are high (e.g. Georgia and Armenia), economic hardship has had a direct effect on consumption. Householders have cut costs by heating only those rooms in use and maintaining them at low temperatures during the winter.

Most countries within the regions share at least some of the following specific driving factors:

#### *Low thermal efficiencies of buildings*

Existing medium and high-rise buildings constructed between the 1960s and 1980s are characterised by low thermal efficiencies, low efficiency boilers (in those buildings with autonomous systems) and wasteful heat distribution systems which lack heat exchangers between the buildings and the DH system.

Even new buildings are being built with low thermal efficiency. While a number of countries have updated building codes for new buildings (see Section 6.3.2), several still use construction norms and regulations (SNiP) dating back to the Soviet period. Energy efficiency in Ukraine's housing stock is 3–5 times lower than that of western countries (Kopets, 2006). Heat loss in buildings in Kazakhstan is 50–60 % higher than in developed countries under comparable conditions (Energy Charter Secretariat, 2006b).

There is also evidence that even these building codes are not being complied with by contractors <sup>(13)</sup>.

#### *Losses in distribution systems*

There are some 180,000 km of district heating pipes in Russia alone, many of which are not insulated, leak or are broken. Currently only 250–300 km, i.e. ~ 0.15 % is being replaced annually, compared to the minimum requirement of 4 % which is needed to keep the networks running. Rosstat estimates heat loss is close to 20 % in some regions (Milov, 2006).

For water distribution, losses of 30-50 % are typical in the regions. Losses in Croatia are estimated at 50 % (EBRD, 2001), while Russia's Federal Agency for Water Resources reports losses of 30–40 % for its tap water during distribution <sup>(14)</sup>. Many water distribution systems are close to collapse. Approximately 60 % of the network is worn out in Moldova (Austrian Energy Agency, 2006) and in Russia 40 to 70 % of the systems are in need of replacement.

#### *Lack of finances for energy and water supply enterprises*

Losses and inefficiencies in supply and distribution systems can only be remedied through significant investment either from the private sector, the public sector or a combination of the two in joint ventures.

Most countries are in the process of raising tariffs. Currently, tariffs are closest to recovering the full cost for electric power, and farthest for water (Fankhauser and Tepic, 2005). Moreover, non-payment rates are high which can lead to financial crises for energy enterprises and limit their ability to fund improvements. Curiously this

<sup>(13)</sup> Some buildings constructed during the 1990s in Tbilisi have been found to have heating requirements 30 % greater than that required by the SNiP.

<sup>(14)</sup> [www.mosnews.com/news/2005/03/22/waterlost.shtml](http://www.mosnews.com/news/2005/03/22/waterlost.shtml).

problem is less critical for electric power despite higher tariffs.

Non-payment can have a number of causes:

*Non-affordability* — costs for electricity services are above affordability thresholds<sup>(15)</sup> for the 10 % of the population with the lowest incomes in both the former Yugoslav Republic of Macedonia and Croatia. Heating service costs are close to affordability thresholds in Serbia and Montenegro and Kyrgyzstan, and likewise for water in Russia and Tajikistan (Fankhauser and Tepic, 2005). Elsewhere, affordability is not an issue due to subsidised tariffs.

*Inability to control consumption and costs* — there is not a lot of willingness to pay higher costs when one has no control over them. This may explain why non-payment is lowest for electricity for which payment according to use is widespread (see below).

*Dissatisfaction* — willingness to pay is critically affected by the quality of the service.

#### ***Cultural attitudes and lack of economic incentives to reduce consumption***

Wasteful practices in the home are a contributory factor to excessive energy and water consumption.

A lack of metering and payment by use, and a lack of awareness are to blame.

A common perception inherited from the Soviet era is that access to energy and, especially, water should be free and unlimited. The earlier high levels of subsidies have created the impression that the water supply, in particular, comes without any economic and environmental costs. This has led to wasteful practices which have been documented for example in Georgia (Shubitidze, 2006). Many people find it difficult to come to terms with the transition to a market economy and a future with higher tariffs for the use of water.

Metering and payment according to use at the apartment level are most common for electricity and gas (see Box 6.5). Metering of heating as well as hot and cold water is reasonably common for large businesses, but much less so for households and public buildings; although this varies from country to country. Heat consumption meters are scarce in Kazakhstan, but hot and cold water meters are proving popular whereas the former Yugoslav Republic of Macedonia has 100 % apartment level metering for heat<sup>(16)</sup>. Water metering is increasing in Eastern Europe but the majority of apartments are still without it<sup>(17)</sup>. In general, heat and water metering is more common at the building level than at individual apartment level. Consequently,

#### **Box 6.5 Status of metering in the five cities**

Electricity meters are provided at apartment level in all five cities. In Minsk, Dushanbe and Dnipropetrovsk, 100 % of apartments are equipped with individual electricity meters, whereas the figures are 93 % and 90 % in Tbilisi and Ashgabat, respectively.

Metering for heat and water in Minsk and Dnipropetrovsk depends on the age of the building. Water and heat are provided only at building level for older buildings in Minsk, with all buildings constructed since 2002 having apartment-level metering. This is similar to the situation in Dnipropetrovsk, although older buildings are also gradually being equipped with apartment level meters under the 'Programme on Restructuring and Development of Households'.

There is no metering of heating in Dushanbe even in newly constructed buildings. In Tbilisi and Dushanbe there is no residential water metering even at the building level, although most commercial buildings are metered. The same is true in Ashgabat, since water is provided free and in unlimited quantity. While gas in Ashgabat is unmetered in older buildings, meters are commonly installed in new buildings at apartment level. In Tbilisi gas is 100 % metered.

<sup>(15)</sup> Fankhauser and Tepic (2005), based on a review of studies, suggest affordability thresholds of 10 % for electricity, 10 % for heat and 5 % for water. In Russia Bashmakov (2006) has identified two sets of thresholds. The first, when exceeded, will lead to a declining payment discipline which he sets at 7 % for combined services. There is a second threshold over which further increase will raise no additional revenue at 15 % for combined services.

<sup>(16)</sup> Skopje's DH company is privatised and the management had an incentive to meter and bill based on consumption because the demand exceeded capacity (Austrian Energy Agency, 2006).

<sup>(17)</sup> 9 % of multi-apartment buildings and 17.5 % of public buildings in Ukraine have water meters.

this does not create an incentive for individual consumers to control their consumption unless they know their neighbours will do the same.

#### *Limited ability by householders to reduce consumption*

In many older multi-apartment buildings supplied with autonomous or district heating, individual apartment owners can do little to adjust the supply of heating to their apartments. Cold and hot water and electricity can be controlled directly by turning off taps or light switches. In most countries of the region, however, residents and businesses have little means for controlling how much electricity and water is consumed by appliances, due to the still limited use of appliance labelling (see Section 6.3.2).

#### *6.2.5 Environmental and social impacts*

The construction sector is one of the biggest consumers of raw materials, other than fossil fuels, in most countries. The impacts of extraction and fabrication of construction materials in EECCA and SEE countries are not documented, but it can be assumed to have impacts on land use, impacts related to energy and water consumption and to generation of quarrying waste. The environmental impact of the use phase of buildings mainly relate to pressures arising from primary fossil fuel use either directly in buildings or at power stations and district heat plants. These pressures include the emission of gases which contribute to climate change, acidification and tropospheric ozone production.

While data are available on direct carbon dioxide ( $\text{CO}_2$ ) emissions from households (World Resources Institute, 2006), they do not provide any insight into the total indirect carbon dioxide emissions from primary fossil fuel use related to residential energy consumption. In other words, they do not include emissions from primary fossil fuel consumption<sup>(18)</sup> in district heating plants, electricity plants, etc. It is likely, however, that the differences between countries are at least as large as for total  $\text{CO}_2$  emissions per capita given in Figure 2.8 in Chapter 2. Energy consumption in buildings contributes a significant proportion of these emissions,

consuming on average about one-third of total final energy demand. The proportion of primary energy consumption attributed to buildings is typically even higher<sup>(19)</sup>.

Countries with probable low  $\text{CO}_2$  emissions related to residential energy use include Armenia, Georgia, Kyrgyzstan, Tajikistan and Albania. All of these countries have low residential energy consumption per capita (see Figure 6.4) and their use of non-fossil fuels is high either directly in households (i.e. biomass and geothermal in Georgia) or for production of electricity (see Figure 2.7 in Chapter 2). Renewable electricity production (mostly hydro) is high in: Albania (98 %), Tajikistan (98 %), Kyrgyzstan (93 %), Georgia (87 %) and Armenia (70 %).

In countries with high levels of final residential energy consumption and with high dependency on fossil fuels, direct and indirect carbon dioxide and other emissions per capita related to residential energy consumption are considerably higher. Examples include Russia, Ukraine, Belarus, Kazakhstan, Turkmenistan and Uzbekistan where direct and indirect residential  $\text{CO}_2$  emissions per capita are likely to be similar to or higher than those in the EU (see Figure 2.8 in Chapter 2).

In countries that rely mostly on fossil fuel sources for heat and power, the greatest efficiencies (and therefore lowest impacts) can be achieved in dense urban areas through the use of combined heat and power stations (CHP), provided that the accompanying DH distribution systems are modernised. Use of CHP is highest in Kazakhstan<sup>(20)</sup> and Russia<sup>(21)</sup> and lowest in the SEE countries (Energy Charter Secretariat, 2006a). The type of fossil fuel used for heat and power is also critical. Electricity can be produced from gas with 25 % lower  $\text{CO}_2$  emissions than oil and 40 % less than coal (Ecofys, 2006) with even greater improvements for sulphur dioxide and nitrogen oxides.

A heating hierarchy with respect to the impacts of air emissions can be drawn up for countries with low or moderate levels of renewable electricity (Figure 6.7).

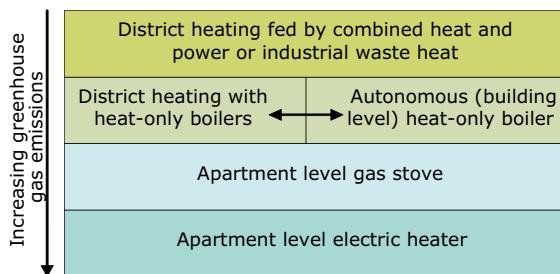
<sup>(18)</sup> Final energy use is the energy used directly by the final energy consumer. Primary energy use includes the total direct and indirect uses of energy to supply that consumer including intermediate uses of energy, energy in transforming one energy form to another (eg, coal to electricity), and energy used by suppliers in providing energy to the market.

<sup>(19)</sup> The Russian district heating sector accounts for about 45 % of all domestic energy consumption and for about 50 % of fossil fuel use (Alliance to Save Energy, in press).

<sup>(20)</sup> 40 % of heat to DH systems in Kazakhstan is produced by CHP (Energy Charter Secretariat, 2006b).

<sup>(21)</sup> ~ 30 % of heat to DH systems in Russia is produced by CHP (Pierce, 2004).

**Figure 6.7 Heating hierarchy for fossil fuel economies**



Meanwhile, high water consumption has the most serious environmental effects in countries with high levels of water stress (the ratio of water abstraction to fresh water supplies). Three EECCA countries, Uzbekistan, Turkmenistan and Azerbaijan, have the highest levels of water stress across pan-Europe (EEA, 2007).

The social impacts of low thermal efficiency in housing have been significant for lower income groups in those countries with little or no district heating. This was particularly in evidence in Moldova, Armenia and Azerbaijan during the late 1990s where many tenants heated their houses to survival levels only. These groups have also been using 'dirty' fuels, such as kerosene, in cheap stoves which have had detrimental effects on indoor air quality and health. Regular stoppages in energy and water services have also been widespread as a result of inefficiencies in households and distribution systems.

The lack of maintenance of water distribution systems is a growing cause of health and social problems. In Central Asia, one-third of the population drink water that does not meet WHO hygiene standards (OECD, 2003).

The use of toxic materials in construction has had adverse health effects for example in the so-called phenol buildings in Moscow. The use of asbestos in buildings can have adverse health effects on demolition workers if proper precautions are not taken. There is also a health risk for building tenants.

### 6.3 Opportunities and policy initiatives

#### 6.3.1 Opportunities

There is a huge potential for a reduction in energy and water consumption in SEE and EECCA

countries. Such efficiency improvements could also lead to considerable social benefits, as people heat their houses at comfortable temperatures without increasing energy consumption. The potential for environmental benefits is particularly high for those countries which currently use very high levels of fossil fuel energy: Belarus, Kazakhstan, Russian Federation, Turkmenistan, Ukraine and Uzbekistan.

The following opportunities exist to reduce final energy and water consumption:

- taking advantage of the current construction boom throughout the region by ensuring that new buildings are built to stricter thermal standards than previously, and with efficient heat distribution systems;
- thermal efficiency rehabilitation and heating system modernisation of the existing building stock, possibly to be financed by mobilising future cost savings;
- provision of technical expertise and funding for modernisation of energy and water distribution networks;
- furnishing householders with information on how to reduce wasteful practices and providing economic incentives to encourage this, i.e. by extending metering and payment by use at the household level;
- introducing energy labelling in electrical appliances to promote greater efficiency and/or introducing minimum energy efficiency standards for appliances.

Considerable savings in primary energy use and environmental pressures can be achieved through efforts to move up the energy hierarchy (see Figure 6.7) including:

- preserving and taking advantage of the widespread existence of district heating in urban areas to facilitate greater use of co-generation (i.e. CHP). CHP presents an opportunity for improvements in efficiency and cost-effectiveness of electricity and heat provision, provided that distribution systems are modernised;
- promoting autonomous heating systems or connections to DH (where it exists) for new multi-apartment buildings through building regulations or town planning mechanisms;

- discouraging the use of electricity for heating and hot water;
- encouraging a switch to fuels with higher calorific values, or to biomass or waste, in large heating boilers/co-generation plants.

There are also considerable opportunities for the construction industry to reduce raw material extraction by encouraging the greater recycling of building and demolition waste. In some countries of the EU the vast majority of demolition waste is recycled within the construction industry. For example, Denmark and the Netherlands recycle or reuse 90 % of building and demolition waste, while Germany recycles or reuses around 70 %.

### *6.3.2 National policies and legislation*

#### *Energy efficiency strategies*

Policies for the efficient use of energy in buildings are usually included in more general energy efficiency programmes under national energy strategies. Improving energy efficiency is a key element of energy strategies in those countries which are party to the Kyoto Protocol (Croatia, Russia and Ukraine), or have limited domestic energy sources (e.g. Albania, Georgia, Belarus, Moldova, Ukraine) or wish to limit their energy dependence on neighbouring states.

Moldova's energy strategy includes a goal of reducing energy intensity by 2–3 % annually between 2003 and 2010 (Austrian Energy Agency, 2006). The National Program of Energy Savings 2006–2010 of Belarus aims to reduce energy intensity by 25–30 % over 5 years, following on from the success of the first five-year programme which resulted in an 18.7 % reduction. Energy efficiency strategies and legislation (often combined with renewable energy strategies) have been recently adopted or are under consideration in Albania, Armenia (MUNEE, 2007), Moldova and the former Yugoslav Republic of Macedonia.

A few countries have policies or programmes aimed at the residential/buildings sector and/or district heating. For example, Serbia developed two Strategic Programs called 'Energy Efficiency in the Municipal Sector' and 'Energy Efficiency in the Building Stock'. The former Yugoslav Republic of Macedonia's draft Energy Efficiency and Renewable Energy Strategy requires the implementation of Residential and Commercial Buildings Programmes. Armenia has

also adopted a programme, 'Improving Energy Efficiencies of City Heating and Hot Water Systems'.

In Ukraine, the Law on Energy Conservation provides a comprehensive set of actions. Key elements with relevance to the buildings are: 1) creation of favourable economic conditions for energy conservation 2) educating the population in economic, social and environmental advantages 3) gradual transition towards usage of meters and charging by use 4) identification of financial support for energy conservation projects, and 5) the setting up of a fund on energy conservation.

Croatia is the only country in the two regions known to have adopted policies encompassing energy use during the full life cycle of buildings. Its Energy Efficiency in Building Construction Program is aimed at reducing energy needs during the design, construction and use of buildings.

It is not clear, however, to what extent energy efficiency policies are implemented in practice. A number of elements of Russia's 1996 Energy Efficiency Act proved too controversial (i.e. privileges to consumers utilising efficiency technologies) or were ignored (e.g. mandatory requirement for metering of all energy connections by 2000) (Milov, 2006). In Ukraine, the Fund for Energy Conservation has yet to be established. There are several such examples of implementation failures due to a lack of institutional capacity, a shortage of fiscal/budgetary resources or inadequate political will (22).

#### *Policies and strategies on more sustainable sources of heat and power*

A few countries have adopted policies whose aim is to shift towards a lower greenhouse gas emission heating and power supply (i.e. moving up the heating hierarchy in Figure 6.7).

Croatia's Centralised Thermal Systems Energy Efficiency Program encourages the development and enhancement of district heating in areas with a high density of heat or heat and electricity consumers (Austrian Energy Agency, 2006).

The 2005 Ukrainian Law on Combined Generation of Thermal and Electrical Energy (Co-generation) establishes a framework that favours combined heat and power (CHP) generators. This includes tax reductions for new CHP, and first rights of CHP

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(22) Personal communication: Angela Morin, Alliance to Save Energy.

plants to sell their electricity production through shared distribution networks.

One objective of the former Yugoslav Republic of Macedonia's National Development Strategy is to shift residential heating from electricity to gas in order to reduce primary energy consumption. Just such a shift was achieved in the principal cities of Georgia by tripling national tariffs on electricity and kerosene, but not on gas (World Bank, 2003). In the early 2000s in Serbia electricity rate increases and joint government/international donor projects encouraged 10 % of households to switch from electricity to other energy sources for heating<sup>(23)</sup>.

One current gap in the promotion of the heating hierarchy is a lack of building or planning regulations. This would either require new buildings to be connected to existing DH networks or require the supply of autonomous rather than individual apartment-based heating systems.

#### ***Thermal standards and energy labelling for new buildings***

New building energy codes (e.g. those introduced since 2000) have been developed in Albania, Armenia, Croatia, Kazakhstan, Russian Federation, Tajikistan, and Ukraine. New codes are being considered in Georgia and Moldova.

The Russian package of codes and standards is particularly comprehensive. It provides thermal efficiency standards for new and renovated buildings, so that the energy consumption is at least 35 % lower than in older buildings. It also provides technical assistance to architects and contractors on how to construct high-efficiency buildings. It seeks to ensure compliance with codes by requiring energy audits and gives guidance on carrying out energy audits as well as identifying retrofit measures for old buildings. Finally, it provides labelling schemes and energy passports to promote energy efficient buildings (Matrosov, 2005).

#### ***Energy labelling for appliances***

There is little use or knowledge of energy performance labelling of appliances for buyers in EECCA countries. While Russia, for example, has minimum but very low performance standards for a number of appliances, there is currently no

active energy labelling programme. However, the government has considered adoption of the European label (Harrington and Damnics, 2001). Recent Armenian legislation on the Renewable Energy and Energy Efficiency Programme requires energy labelling for appliances (MUNEE, 2007).

Energy labelling is more widespread in SEE. Croatia transposed the EU Directive on Energy Labelling into national law in 2006, and most large retail stores included energy labels prior to this on a voluntary basis (Kolega, 2006). The Albanian Energy Efficiency Law also makes energy labelling of appliances mandatory (Hido, 2005).

#### ***Tariff reforms***

Tariff reforms have three functions in improving energy efficiency and conservation: 1) improving finances for energy and water enterprises; 2) encouraging energy efficiency investments by building/apartment owners, and; 3) reducing wasteful practices by residents. The latter two functions require metering and payment by use.

Tariff reforms have progressed much further for electricity and gas than for other energy and water services, partially due to widespread metering and payment by use as well as higher levels of privatisation. Tariff increases for electricity have progressed most rapidly in SEE countries but also in Georgia, Armenia and Moldova. A number of countries still have laws that do not allow municipalities or privatised enterprises to raise tariffs unilaterally<sup>(24)</sup>.

Tariff reform can also include provisions which make utilities affordable for lower income families yet still encourage conservation. Block or lifeline tariff systems provide essential levels of energy and water at low cost, with tariffs increasing for higher levels of consumption (Box 6.6). Block or lifeline tariffs require apartment level metering.

#### ***Material efficiency in construction***

Only two countries among those that replied to the UNEP policy questionnaire have policies aimed at encouraging the reuse of demolition waste in new construction. The Waste Management Strategy of Croatia has the long-term aim of 80 % demolition waste recovery, and includes measures

<sup>(23)</sup> USAID and Alliance to Save Energy jointly funded and coordinated projects with the Serbian government. Electricity consumption for heating decreased by 1 700 GWh or 22 % from the previous winter (using weather-adjusted data). Total winter electricity consumption (for all uses, not just heat) declined by 5.5 percent and peak demand by 7 percent (500 MW).

<sup>(24)</sup> For example, in the Russian Federation tariff changes need to be approved by the Federal Energy Commission.

**Box 6.6 Examples of block tariffs in EECCA and SEE**

In Turkmenistan, electricity and gas are provided free to households up to limits of 530 kWh and 600 m<sup>3</sup> per year per family member. Households have to pay a fee per unit used over these limits (city study).

In 2001, Serbia became the first country in SEE to introduce block tariffs for electricity consumption. The block tariffs aim at allowing affordability and discouraging high consumption and use of electricity for heating. The three bands originally introduced were as follows: 0–7 200 kWh; 7 200–19 200 kWh; and over 19 200 kWh per household (Austrian Energy Agency, 2006). The lower tariff band was very broad and covered consumption of 70 % of households. It did not provide much incentive for reducing consumption and was subsequently revised to 0–4 200 kWh per household (SIEPA, 2005).

There is also a block tariff system in place in Georgia with the following three bands: 0–1 200 kWh; 1 200–3 600 kWh; and over 3 600 kWh per household per year (city study). Tariffs in the highest band are only 25 % higher than in the lowest. Either the lowest band rates are not affordable for low income families or conversely, the higher tariffs are unlikely to encourage conservation in affluent households.

for stimulating the use of 'environmentally friendly construction materials'. Moldova adopted a programme for the use of construction wastes in 2000. It is not known though whether either of these policies or programmes has been implemented.

***Control of toxic materials in construction***

Control of toxic materials in construction exists within the sanitary norms of a number of countries. This includes the control of toxic substances in cement (Armenia), control of radioactive substances (Tajikistan, Uzbekistan) and the control of a number of toxic substances in general construction materials (Moldova, Russia, Kazakhstan). Lists of controlled substances are significantly shorter than in the EU. In particular, asbestos is still widely used within

many EECCA countries. Within the region as a whole only Croatia, Serbia and Montenegro have limitations on the import and use of asbestos in construction (Global Unions, 2005).

Moscow municipality set the goal to pull down all apartment blocks where phenol formaldehyde was added to concrete. The first such buildings were pulled down in late 2006 (Gormsen, 2007).

***6.3.3 Local initiatives and innovative approaches******Decreasing raw material use in construction***

Box 6.7 gives two examples of initiatives to reduce the use of raw materials either through the reuse of building waste or more efficient material consumption.

**Box 6.7 Reducing raw material use in buildings**

Recycling of pre-fabricated building components, Germany. Beginning in 2001 the Institute for Rehabilitation and Modernisation of Buildings (IEMB) investigated the feasibility of re-using pre-fabricated components from Soviet-era multi-apartment buildings in former East Germany. Large prefabricated concrete panels were removed from buildings which were consigned for demolition and used to construct new detached houses. Houses required only 2 % of the energy input during construction, need fewer raw materials, and cost 75 % less in construction (IEMB, 2006).

Low material use buildings, Chisinau, Moldova. The 'Arhiconi-Group' has plans to construct small groups of 'Canadian-style houses' in Chisinau (25). These houses are made out of wood and lightweight materials, and only require 30 % of the material use of conventional buildings of the same size. They also have superior thermal efficiency. Such pre-fabricated buildings can be adapted, disassembled and re-used much more effectively than conventional buildings (26).

(25) <http://www.botschaft-moldau.de/eng/construction.html>.

(26) <http://www.artiindex.com/en/houses.html>.

**Box 6.8 System level cost-effectiveness studies****Heating strategy for urban multi-apartment buildings, Moldova**

A USAID/Alliance to Save Energy-financed project was begun in 2001 to identify measures to improve the financial status of district heating enterprises. Phase I of the project included the development of a heating strategy for urban areas. The cost-effectiveness of district heating supplied by CHP versus autonomous (building-based) heating was assessed for a number of cities (Kalkum, 2002).

**CHP schemes for public buildings, Albania**

In 2003, the Albanian National Agency for Energy (NAE) funded feasibility studies for two new CHP schemes — one for the largest hospital in Albania (Mother Teresa Hospital) and one for the campus of Tirana University. The schemes proved feasible and cost-effective, and the NAE and the Ministry of Industry and Energy are now seeking funds for implementation of a CHP system for the hospital (Recover, 2005).

**Combined heat and power, and district heating feasibility projects**

If sustainability is to be integrated into municipal energy planning, detailed economic and environmental assessments need to be conducted prior to making decisions over the future of heating networks (Box 6.8).

In densely-populated cities with colder climates, DH can be more cost-effective and environmentally advantageous than autonomous building level systems, provided the systems have been modernised and distribution losses reduced. Use of

CHP or waste heat from industry in the DH system should dramatically improve cost effectiveness. Where DH networks powered by CHP would not be cost-effective, individual boilers in the building (but not in apartments) may be the most sustainable solution. These options could be incorporated in planning and building regulations.

**System refurbishment projects**

A significant number of DH and water systems have undergone recent refurbishment or are about to be modernised to improve efficiencies and cost-effectiveness. A few of these are listed in Box 6.9.

**Box 6.9 District heating modernisation projects****Belgrade DH Refurbishment**

The Municipality of Belgrade, with co-funding from the EBRD, is about to launch a EUR 36 million refurbishment project for their district heating system, including installation of new substations and heat exchangers, burner management systems in boilers and new well insulated piping.

**Lviv, Ukraine DH Energy Efficiency Project**

Between 1997–1999 Lviv Teplokomunenergo, a state-owned heating enterprise, undertook a major refurbishment of distribution piping in the city network and the piping systems within buildings to reduce heat losses and water leaks. Heat meters were installed in buildings at the same time. The aim was to improve the financial situation of the enterprise and to reduce environmental pressures (EBRD, 1997).

**Irkutsk, Russia Heat Supply Renovation Project**

Between 1997–1999 the Irkutsk Municipal Enterprise, in association with the Irkutsk Energy Centre, and with a USD 3.2 million loan from Sberbank, carried out a DH renovation project. Inefficient boiler houses were closed down, three separate DH systems connected, and heat hydraulics in 33 residential and public buildings modernised to improve heat transfer.

### *Innovative technologies for new buildings*

The new Russian building codes mentioned earlier include mandatory energy labelling for new and renovated buildings. The two upper bands (A and B) in the five band labelling system are for low and very low energy buildings, which go beyond mandatory efficiency requirements for a new building. This has the potential to provide incentives for innovative high efficiency technologies. However, to encourage the full spectrum of innovative technologies the Russian codes need to be extended to cover hot water systems and lighting.

A number of initiatives have been completed or are under way in SEE and EECCA countries using innovative technology for buildings (see Box 6.10). Use of geothermal energy is being investigated especially in the SEE region. There is also an opportunity for innovative efficient cooling for buildings in Central Asia and SEE.

### *Retrofitting of existing buildings*

There is a huge potential for energy saving through the retrofitting of existing buildings in EECCA countries (CENEf, 2001). Retrofitting at building level can include:

- improved insulation of walls and roofs;

- refurbishment of heating boilers (where the building is not connected to DH);
- introduction of a heat exchanger between the DH and building circulation.

Retrofitting at the apartment level can include:

- improved sealing of windows and doors (weatherisation);
- installation of low energy appliances and lighting;
- installation of control valves and meters.

A World Bank project in Cherepovets, Russia, retrofitted 663 buildings to improve thermal efficiency during the late 1990s. Monitored buildings showed a 45 % average reduction in heat demand following retrofitting of which 27 % was gained from the retrofitting of the shared facilities, i.e. the building and its heating system, and 18 % gained from apartment-level improvements (Bashmakov, 2006). A feasibility project in Uzhgorod in Ukraine found similar overall savings available from retrofitting (Diefenbach and Luksha, 2006). Measures were identified which would yield savings of between 36 % and 64 %, depending on the housing type. Again, the majority of savings would

### **Box 6.10 Innovative technology initiatives**

#### **Geothermal heating for housing projects, Bosnia and Herzegovina**

A project led by a German-Bosnian company with the participation of EAN-Nord GmbH has set the goal of establishing a geothermal heating plant for a group of buildings in Lidza, a suburb of Sarajevo. If high geothermal temperatures are encountered there are plans for partial conversion to electrical energy. There are similar projects in progress at Bosanski Samac and Kakanj (Recover, 2005).

#### **Solar water heating capacity building and grants, Albania**

Demand for hot water in residential sectors of Albania is projected to grow from 600 GWh in 2000 to 875 GWh, by 2015. Meanwhile, 82 % of households in Albania use electricity to heat their water. The Albanian government has secured Global Environment Facility/UNDP funding to create policy and economic frameworks to help solar water heating. The target is 20 % growth per year to reach 540 000 m<sup>2</sup> of installed capacity by the end of 2020. More recently, the Government's Renewable Sources Fund supplied partial grants for solar panels in 2 650 private households in 2005 (Leskoviku, 2006).

#### **Water heating solar plant project, Kazakhstan**

Kazakhstan has a considerable solar energy potential which remains under-utilised. The UNDP/GEF financed a pilot and capacity-building project, with participation from the local DH Company (ATKE) to install a solar pre-heating plant at a district heating boiler house. Annual output of the solar plant is 193 000 kWh which would lead to savings of 24 000 m<sup>3</sup> of gas. The expected payback time is 10 years (UNDP, 2005).

be achieved through increased insulation of walls and roofs (Kopets, 2006).

Retrofitting projects must be implemented in a way that does not reduce ventilation to the detriment of inner air quality. This is especially important in housing blocks which contain phenol and formaldehyde in construction materials and which are released into the indoor air. The municipality of Moscow has a demolition policy for all such buildings in the near future, but other countries have not yet followed suit (Gormsen, 2006).

Where buildings are owned by municipalities or where municipalities subsidise a large part

of energy and water costs, there is a clear economic incentive to initiate retrofitting of the least energy efficient buildings (Note: this will only be acted upon where budgetary policy cuts across municipal departments). The effectiveness of economic incentives for retrofitting is much less clear for the increasingly high proportion of multi-apartment buildings which consist of privately owned apartments. In these buildings the collective body on which economic incentives can act is weak or non-existent. An example is Ukraine where privatisation contracts contain no obligation to establish bodies representing residents' interests (Kopets, 2006). There have been a number of initiatives to establish voluntary residents'

#### **Box 6.11 Building retrofit projects in EECCA and SEE**

##### **The Intelligent House, Moscow**

A pilot project is being funded by Danish Danfoss to retrofit a multi-apartment building with 83 apartments served by a city DH system. The project is called the Intelligent House. Improvements have included placing a heat exchanger and building heat control system between the DH and the building's hot water circulation (Shapiro, 2006).

##### **Improved energy efficiency of public buildings, Korca, Albania**

An initiative was carried out in Korca, Albania, to improve the energy efficiency of public buildings. Greatest energy savings were achieved through thermal insulation of external walls, followed by the insulation of roofs and terraces (Recover, 2005).

##### **Retrofitting of two multi-apartment buildings, Lviv, Ukraine**

This project funded by the Alliance to Save Energy (ASE) retrofitted the heating systems of two multi-apartment buildings with hot water and heating controls for each apartment and accompanying metering systems. This resulted in considerable reductions in hot water and heating consumption with combined pay-back times for the tenants and the municipality of 1.5 and 5.9 years for the two buildings (MUNEE, 2006).

#### **Box 6.12 Establishment of residents associations in EECCA and SEE**

##### **Strengthening of residents' associations, Gabrovo, Bulgaria and Almaty and Kokshetau, Kazakhstan**

A GEF-funded, demand-based, energy-efficiency demonstration project started operation in the late 1990s in Bulgaria. The project included strengthening and mobilising housing associations to make possible a number of concrete retrofitting projects (UNDP, 2004). This approach is to be adapted for implementation in Kazakhstan during 2007 (UNDP *et al.*, 2006).

##### **Overcoming barriers to energy efficiency in residential buildings, Vladimir, Russia**

This GEF- supported project from the mid-1990s established tenants' associations and developed billing incentives to encourage efficiency improvements in existing buildings (UNDP and GEF, 2004).

associations (Box 6.12), but these are considered a weak substitute for legally required bodies.

In the final analysis, the economic incentive for retrofitting will exist only if energy tariffs are set high enough (27). Pay-back times for the projects identified in Uzhgorod in all cases exceeded ten years due to low tariffs and the high cost of imported insulation. When the full cost savings are included, with reduced costs for municipalities, retrofit projects have much shorter payback periods, e.g. 1.5–5.9 years for the Lviv projects (Box 6.12).

Governments have additional opportunities for reducing pay-back times by providing incentives to establish domestic insulation production which would offer the advantage of both diminishing costs and providing jobs (28).

#### ***Metering and payment by use***

Introducing control, metering and payment by use for apartments can have an immediate effect on heating and hot water consumption in apartments even without any associated retrofit or weatherisation projects (29). It seems that increased control and awareness are not sufficient on their own, and economic measures constitute a crucial component. A case in point is a USAID project which installed apartment level radiator controls in a multi-apartment building in Kazakhstan, but without payment by use. Despite distribution of information on the importance of energy conservation, residents continued to control temperature in winter by opening windows rather than switching off their radiators (UNDP, 2004).

The ineffective controls over heat use at apartment level can be solved in the long term by including mandatory obligations in building codes for metering in new buildings. In existing buildings, retro-fitting programmes can gradually introduce metering or heat cost allocation devices and control at apartment level. For example, in Poland heat metering began to increase rapidly when the obligation for installation was transferred from building owners to district heating companies (30). In the short term building-level meters could be installed and residents' associations established to discourage wasteful habits.

#### ***Provision of information***

Economic incentives should be accompanied by information on how and why to carry out apartment level weatherisation and stop wasteful practices. The Centre for Energy Efficiency in Moscow produced a pamphlet, Plus 20, for distribution to individual families with information on cost and payback time for improvements and providing do-it-yourself advice.

#### ***6.3.4 Project financing***

Lack of available financing is one of the chief barriers in EECCA and SEE countries to achieving energy efficiency improvements in water and energy distribution systems, housing and buildings.

#### ***International funding***

The majority of energy efficiency projects to date, including DH system refurbishment, combined heat and power plants and retrofitting of large buildings, have been funded or co-funded by international donors. It has been estimated that in Russia alone, retrofitting of DH networks and residential buildings requires over EUR 50 billion of investment (Regional Enterprise Partnership, 2005). This is more than 2.5 times the entire capital base of the EBRD, the largest single investor in the region (EBRD, 2002). If all the potential energy efficiency projects are to be carried out, other sources of funding will have to be found. In the case of the resource-rich EECCA countries, national funding could increasingly be used.

A future major source of funding for four countries in the region (Russia, Belarus, Ukraine and Croatia) could be the Joint Implementation (JI) scheme under the Kyoto Protocol. The main focus for JI is likely to shift from the new EU Member States to Ukraine and Russia. Russia has the largest potential for JI projects among all eligible countries (ICFI, 2006).

There are, however, considerable institutional barriers in many EECCA and SEE countries which can make funding unattractive to donors and international investors. These obstacles and possible solutions are investigated in detail by the Alliance

(27) The fact that DH companies and water utilities are often state- or municipally-owned means that public institutions are both suppliers and consumers of these services and they have a say in tariffs and an interest in keeping them low.

(28) Rockwool Denmark recognises the huge potential for insulation materials in Eastern Europe. They have a factory in Moscow but demand has consistently exceeded the capacity of the factory. In response, a second factory has been established close to St. Petersburg, employing 150 people. It began production in 2006 (Rockwool, 2004). Factories are also being established in SEE in Romania and Croatia (Andresen, 2006).

(29) In the Lviv project (Box 11) average heat and hot water consumption was reduced by 28–38 %.

(30) Personal communication Anatoliy Kopets, MUNEE.

to Save Energy (31). UNDP has also produced a guide for alternative financing of energy efficiency projects (UNDP, 2005).

To date JI financing has only been used for large projects. The mechanism is very suited to refurbishment and modernising of DH systems, but may be less appropriate for financing retrofitting of multi-apartment buildings. An alternative mechanism under the Kyoto protocol is emissions trading of so-called Assign Amount Units (AAU). There may be possibilities for the Annex I countries of Russia and Ukraine to sell AAUs generated by retrofit projects to Annex I countries in Western Europe or elsewhere.

#### *Improving the finances of energy and water enterprises*

Financing improvements can be particularly difficult for energy and water enterprises as state subsidies are reduced. Tackling non-payment is a critical step in improving the finances of energy and water enterprises (see Box 6.13).

#### *Funding building retrofits*

Many retrofit projects to date have been partly funded by international donors, but alternative sources of funding are required to achieve the

enormous potential. When the full socio-economic costs of large retrofit projects are considered, most would pay for themselves in less than ten years, and many in less than five.

Bank loans are unlikely direct sources of funding for retrofitting of multi-apartment buildings unless the condominium or residents' association has external support. This is due to the high level of risk for the lender and correspondingly high interest rates (UNDP, 2005).

External support for residents' associations can come in the form of state or municipal collateral or grants to supplement bank loans. In return, the municipality can receive part of the energy cost savings. However, many municipalities do not have the budgetary autonomy that would enable them to keep these energy-cost savings (32). An alternative model is the Energy Services Company (ESCO) and performance-based contracting (Box 6.14).

Providing an environment in which ESCOs can thrive requires governments to take three key measures:

- furnish a strong legal base for energy performance contracting to protect the ESCO from the risks it assumes by financing the projects;

#### **Box 6.13 Tackling non-payment**

##### **Service improvement programme**

A promise of improvements in services is necessary to tackle non-payment problems in situations with rising tariffs. Information campaigns are necessary to convey the service improvement plan to consumers and explain why increases in tariffs are necessary. Consumers will react much more positively towards increasing tariffs if they can control their costs. This requires installation of apartment level metering.

##### **Georgian success stories**

In Tbilisi, electricity services have been considerably improved along with a quadrupling in tariffs between 1997 and 2003. By end of 2001, 94 % of households had received uninterrupted electricity in Tbilisi compared with 25 % in other cities and 7 % in rural areas (World Bank, 2003). Meanwhile, in the city of Rustavi 16-hour electricity stoppages were common during the 1990s. Four out of five households did not have electricity meters and non-payment was high. In 2003, the United Energy Electricity Company with US AID help offered residents the choice of paying USD 16 for installation of a meter or staying without electricity. Today residents in Rustavi enjoy a 24-hour electricity supply and payment rates have quadrupled. Meanwhile, consumption per household has declined by 50 % due to household electricity conservation (USAID, 2006).

(31) Guidelines on financing energy efficiency projects to be posted at [www.munee.org](http://www.munee.org) during 2007.

(32) Personal communication Angela Morin, Alliance to Save Energy.

**Box 6.14 The role of Energy Service Companies (ESCOs)**

ESCOs and energy performance contracts have played an important role in promoting energy efficiency in many developing states including a number of transitional countries. The model has been used with considerable success in the Czech Republic, and to a lesser extent, in Ukraine and Russia (Evans, 2001).

ESCOs can provide a number of services to residential and commercial building retrofitting projects, including feasibility studies, project management, financing, installation, and follow-up with maintenance and monitoring. ESCOs will generally accept payment through energy savings following retrofit. Under energy performance contracts between ESCO and the residents, ESCO agrees to implement measures to reduce energy use, and the client agrees to pay back a certain amount of the savings from the project (Evans, 2001; UNDP, 2005).

Some ESCOs are large enough and have sufficient liquidity to finance projects themselves. An example is the state-owned Ukrainian Energy Services Company (UkrEsco) which has access to loans and grants from the EBRD and the EU's technical assistance programme (TACIS) (Evans, 2001). In most cases, however, ESCOs need third-party financing to implement the project, usually from commercial banks.

- arrange training for engineering companies, banks, government officials and consumers; and
- provide seed financing, including provision of guarantees, to stimulate the initial growth of the market (Evans, 2001).

The final point could also include state or municipal ownership of the first ESCO with privatisation once the market has become sufficiently vigorous, e.g. in Ukraine with the state-owned UkrEsco.

Support for individual households can include grants for weatherisation projects, tax redemptions on weatherisation materials, revolving leverage funds <sup>(33)</sup> or micro loans for lower income families to carry out these projects with back payment taken from reduced energy bills.

## 6.4 Conclusions

Buildings account for a significant proportion of the material and energy use of developed and transitional economies. For example, final energy consumption in buildings represents one-third of total final energy consumption across SEE and EECCA.

Annual residential final energy consumption per capita varies from 11 000 kWh in Russia to just 600 kWh in Armenia. Differences between greenhouse gas emissions related to residential energy use are even greater since most countries with low residential energy consumption also have high levels of renewable electricity production. High energy consumption in Eastern Europe and parts of Central Asia is due in part to cold climates but also to widespread but inefficient district heating, inefficient distribution systems, low thermal efficiency of buildings, low energy prices and lack of economic incentives for householders. Water consumption in buildings is high throughout the whole region.

The future is likely to bring increasing residential energy demand in cities without district heating, increasing appliance ownership and a switch from kerosene and wood to electricity for heating in SEE and Caucasus countries as incomes rise. A growing demand for electricity for appliances in SEE and the Caucasus could be met more sustainably by switching from electricity to fossil fuels or preferably solar and geothermal energy for heating and hot water.

The current construction boom presents an opportunity to improve the thermal efficiency of new building stock. This and the huge

<sup>(33)</sup> The Alliance to Save Energy has initiated such funds in Gumri and Vazandor in Armenia with notable success. With USD 1 000 donor grants, starting revolving funds are used by housing associations to finance repairs and EE improvements to buildings. The projects so far pay back in a year or less (Alliance to Save Energy, Armenia 2006).

task of retrofitting the dominant stock of old, low- efficiency multi-apartment buildings would significantly reduce environmental and social impacts. Widespread district heating also presents a sustainability opportunity, provided it is modernised and combined heat and power (CHP) plants promoted (i.e. cogeneration of heat and electricity).

Many countries have energy efficiency strategies, but fewer have translated them into concrete action. Existing examples of implementation include new thermal building standards; building energy auditing and labelling; metering installation programmes; tariff reform; and economic incentives to encourage more CHP. Generally lacking are sustainable heating strategies, minimum efficiency standards and/or energy labelling for appliances and condominium-style privatisation contracts. Also missing are measures promoting energy efficiency technologies and the institutional capacity and political will to ensure implementation of strategies where they exist.

A large number of local initiatives have been carried out in cities in EECCA and SEE, often supported by international funding. Obstacles to their wider adoption include lack of available financing, poor tariff payment discipline, lack of locally available energy efficient technology and lack of public awareness of the environmental, economic and social benefits of decreasing residential energy use.

Use of virgin construction materials can be significantly reduced by the reuse and recycling of demolition and building waste. However, current rates of reuse and recycling are very low. Policies are needed to promote greater recycling of building demolition waste.

**National governments and municipalities** could promote more efficient heating systems with lower levels of primary energy use and lower carbon intensity through the following actions:

- carry out cost-effectiveness evaluations of local district heating (DH) systems, including scenarios where DH was powered by CHP or waste heat;
- where DH is potentially cost-effective, strengthen the system by requiring the linkage of new buildings to DH in relevant planning zones;
- where autonomous heating is more cost-effective, include requirements for

autonomous heating systems in building codes for multi-apartment, large office/public buildings;

- encourage alternatives to electricity for heating and hot water to free up electricity capacity for the increasing demand for appliances.

They could also promote greater energy efficiency in new and existing buildings and promote lower energy buildings (both new and existing) by:

- developing packages of new thermal efficiency building codes where these are lacking, including requirements for energy audits and energy labelling of new and retrofitted buildings;
- encouraging the use of innovative building technology and design by including codes and labels for very energy-efficient buildings;
- further promoting low energy buildings by extending energy audit standards to include hot water, cooling and lighting, using tax differentials to promote low energy technology, and creating information resources for architects/contractors;
- setting up funds for retrofitting projects and/or providing strong legislative and financial environments for Energy Service Companies (ESCOs) and energy performance contracting.

**National and municipal governments and energy and water enterprises** could take action to encourage householders to conserve energy and water consumption, and invest in energy and water efficient technologies. Such action could include:

- establishing a short-term programme of installation of hot and cold water and heat meters at building level and strengthening the legal base for residents' associations through standard condominium contracts in multi-apartment housing. In the longer term, establishing meter installation programmes at the apartment level. Responsibility for installation of meters could be transferred to energy and water enterprises;
- continuing tariff reforms, supported by concrete commitments and timetables for service improvements;
- where apartment level metering exists, encouraging block tariff systems to provide

affordable energy services while offering an economic incentive to reduce consumption;

- providing residents with information on cheap insulation and window and door- sealing initiatives including costs and pay-back times and setting up small revolving grants or micro-loans for apartment level efficiency improvements;
- carrying out promotional campaigns on conservation measures in homes and businesses where metering does not exist or where tariffs are currently low;
- adopting energy label legislation for appliances, or setting up minimum energy-efficiency standards for appliances.

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# 7 Transport



Location of city studies covered in this chapter

## Facts and figures

- Freight movement declined significantly between 1990 and 2000 after an initial rise during the period 1970–1990. Since 2000 the amount of freight transported in SEE and EE has begun to increase again. In some countries, transport, especially freight transport, has now recovered and is currently above 1990 levels. The use of transport — both freight and passenger — is expected to increase substantially in the near future.
- In EECCA, rail transport accounts for the greatest proportion of freight moved. In Eastern Europe and the Caucasus, rail freight has generally maintained a similar share of the freight market (e.g. at least 80 %) since 1970. The proportion of freight transported by rail is in decline in the SEE, although it is still generally higher than the equivalent figure in Western Europe, which was less than 15 % in 2004.
- The use of public passenger transport (rail, buses and coaches) experienced a significant increase in use between 1970 and 1990, followed by a substantial decline between 1990 and 2000. Subsequent recovery has been weak in most countries. A key factor behind the inability of public transport to recover from the decline of the 1990s has been the decrease in funding levels that many public transport systems in SEE and EECCA have experienced in the past 15 years.
- The use of private cars for transport has increased significantly over the last decade. However, the level of private car ownership, below 180 cars per thousand of the population in all EECCA countries, and below 290 in SEE, is much lower than the typical values of 400 to 600 in Western Europe.
- One of the main impacts of transport is energy use and emissions of carbon dioxide; the main greenhouse gas that causes climate change. Air pollution in the countries of SEE and EECCA is now becoming a serious problem, particularly in urban areas. Pollution is exacerbated by the age of the vehicles, poor vehicle maintenance, variable fuel quality, and the poor condition of many of the roads.
- Leaded petrol has been phased out in many SEE and EECCA countries. Where leaded petrol is still in use, plans for its phasing out will be made in the coming years. In many countries there are also plans to improve vehicle emission and fuel quality standards.

## 7.1 Introduction

### International policy context

The Johannesburg Plan of Implementation, agreed at the 2002 World Summit on Sustainable Development, discusses consumption and production in the transport sector as it affects the provision of transport services and systems to promote sustainable development. It considers

specific social and environmental areas and refers to the need for an integrated policy at all levels:

*'...including policies and planning for land use, infrastructure, public transport systems and goods delivery networks, with a view to providing safe, affordable and efficient transportation, increasing energy efficiency, reducing pollution, congestion and adverse health effects and limiting urban sprawl, taking into account national priorities and circumstances'.*

The action that the Implementation Plan prescribes can be divided into two areas:

- *Implement transport strategies for sustainable development... to improve the affordability, efficiency and convenience of transport as well as urban air quality and health and to reduce greenhouse gas emissions...*
- *Promote investment and partnerships for the development of sustainable, energy efficient multi-modal transportation systems, including mass public transport systems and better transportation systems in rural areas...*

Consequently, a transport system that supports sustainable development is one in which transport is used in a way that minimises demands on non-renewable resources, e.g. fossil fuels and metals. It also minimises adverse impacts on human health and the environment, e.g. pollution and contributions to climate change, or waste generation. Likewise, it provides for affordable mobility to allow access to services, jobs and education — as we travel more and farther both for work and leisure. In fact, for many Europeans a high level of mobility is no longer just a convenience but rather a basic need.

### *Objectives and approach*

This chapter first reviews existing transport trends in SEE and EECCA countries, within both the freight and passenger transport sectors. It then explores the reasons behind these trends and gives an overview of the adverse environmental and social consequences that result.

It then examines the role of the governments of SEE and EECCA countries, in response to these trends. This chapter gives an overview of the types of policies — including strategies, regulations and economic instruments — that are being pursued by national governments and city authorities in the region in order to make the consumption of transport more sustainable. The chapter concludes by identifying common issues and barriers faced by the countries of the region, followed by potential opportunities, given their particular circumstances.

The chapter draws on a range of sources, including information compiled by international organisations, such as the OECD, and through

questionnaire surveys of SEE and EECCA governments.

In addition to the above, specific case studies were undertaken for five cities — Almaty (Kazakhstan), Minsk (Belarus), Tbilisi (Georgia), Yerevan (Armenia), and Zagreb (Croatia) — to inform the preparation of this chapter. Reference to these case studies is made throughout this chapter. However, it should be noted that information on Almaty was also obtained from another study (i.e. Kok and de Koning, 2003) and that the Tbilisi case study was facilitated by UNECE/WHO (Georgian Ministry of Environment and Natural Resources, 2006) (¹).

Air transport, while growing at a steady pace, only accounts for a marginal share of overall transport in SEE and EECCA, and therefore is not covered in detail in this chapter. Furthermore, due to lack of comprehensive data and information in SEE and EECCA countries, the impact of transport on biodiversity, land use, and waste generation is not covered either.

## **7.2 Trends and current situation**

### **7.2.1 Transport trends**

In the past 15 years, the transport systems of SEE and EECCA have reflected the broader developments in the histories of the countries of these regions. As noted in Chapter 2, the wars in the former Yugoslavia and the economic and industrial collapse in the countries of the former Soviet Union adversely affected economic activity in these countries. The depth and duration of the recession varied significantly from one country to another but most countries suffered for much or all of the 1990s. While some have now returned to quite significant economic growth, others have barely recovered their position from 1990 in terms of GDP per capita.

In very general terms, a similar pattern is reflected in transport trends, for both passengers and freight and for most transport modes in most countries. A reduced level of freight transport was a direct consequence of economic disruption, lower employment levels led to less travel and reduced incomes left individuals with less money available for private travel.

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(¹) Thus, the authors of this chapter did not directly guide the Tbilisi case study. The report was presented at UNECE/WHO PEPTHE Sustainable Urban transport and Land Use Planning, 18–20 October 2006, Tbilisi, Georgia, funded by the Netherlands and Swiss governments.

## Freight

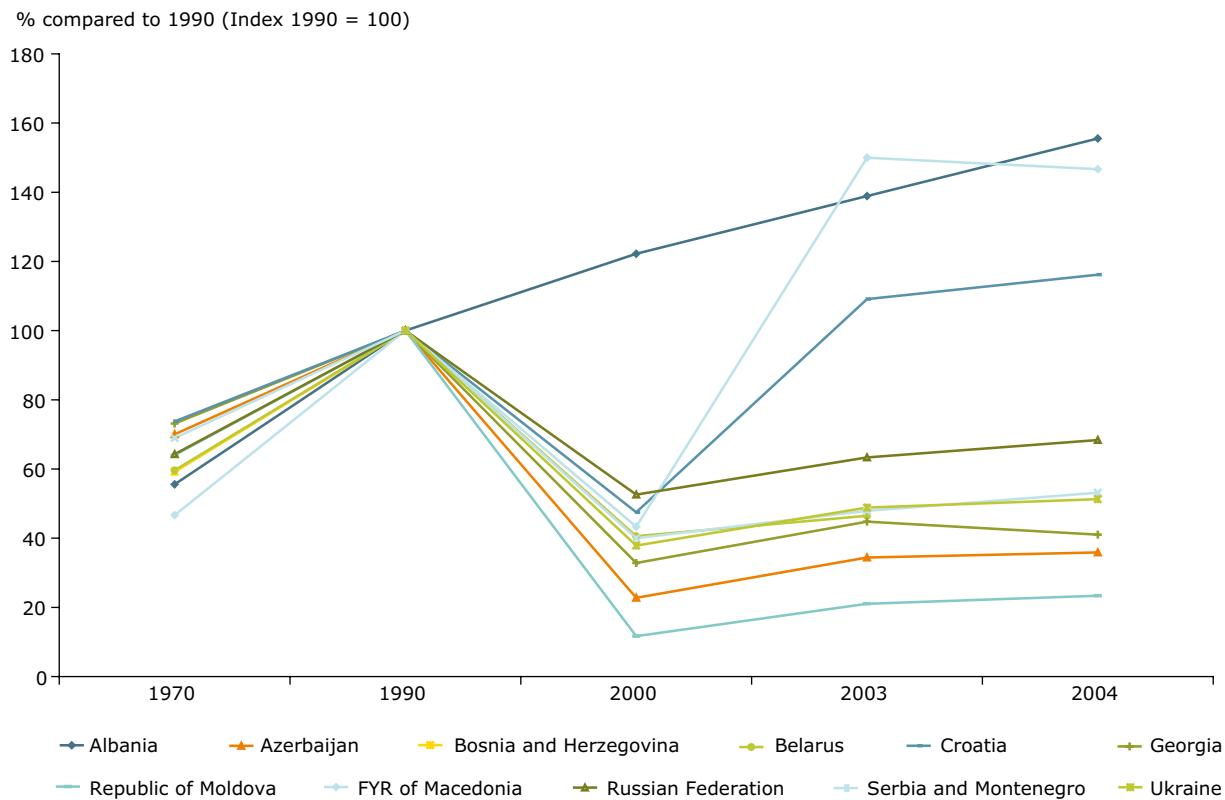
Between 1990 and 2000 freight movement (expressed in tonne-kilometres) — in all but one of the SEE and EE countries for which data are available — declined significantly after having risen between 1970 and 1990 (see Figure 7.1). Data for the total freight moved in the Central Asian republics are not as comprehensive, but the statistics suggest, at least in Kazakhstan and Kyrgyzstan, that freight transport declined by at least 65 % over this period (UNECE Statistical Database as cited in EEA, 2007).

Since 2000 the amount of freight transported in SEE and EE has begun to increase again, although for most countries the amount of freight transported in 2004 was still between 23 % and 68 % of the 1990 figure. For the Central Asian countries, the story was similar with total freight transport between 2000 and 2004 increasing by 20 % in Kyrgyzstan, 36 % in Tajikistan and 39 % in Kazakhstan. However, this activity was not enough to bring freight transport levels back up to 1990 levels (UNECE Statistical Database as cited in EEA, 2007). Notable exceptions — where the total amount of freight has passed 1990 levels — are in SEE countries (Albania, the former Yugoslav Republic

of Macedonia and Croatia) which are now largely surrounded by EU Member States. In the EE countries the effect is as yet much less marked, despite the fact that they border the EU.

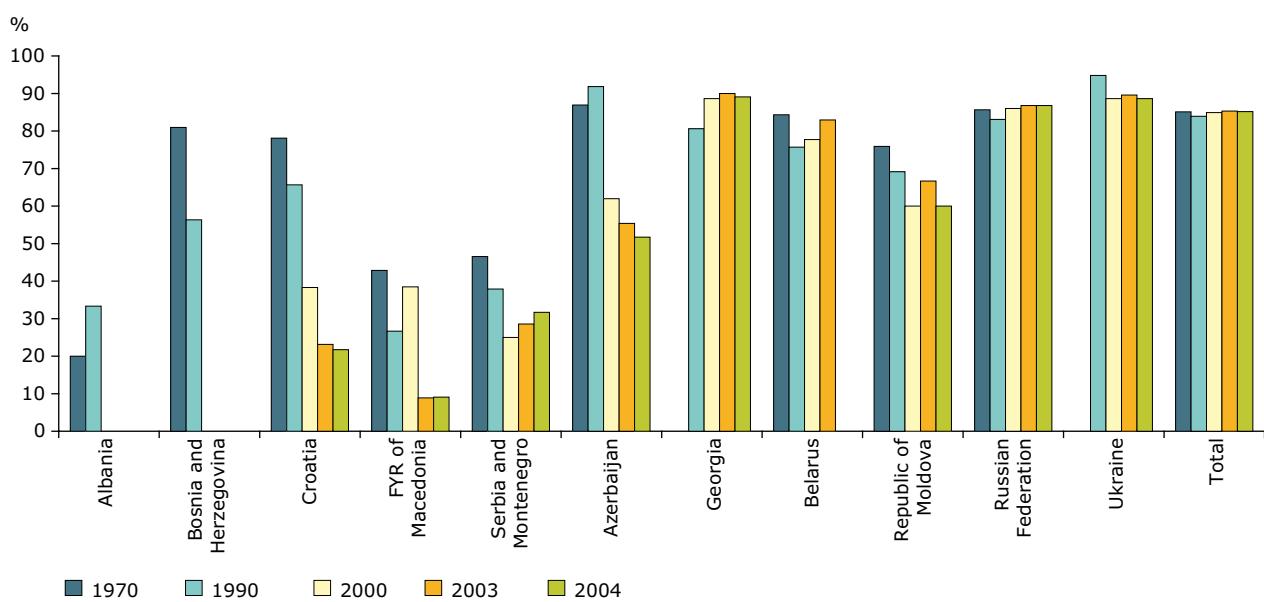
The extent to which the transport of freight by different means has increased since 2000 varies between countries. In the region as a whole, rail transport has maintained its proportion of the total freight moved since 1970 (see Figure 7.2). However, this total conceals differing trends in the countries of SEE and EECCA; the figures for Russia and Ukraine together account for almost the total rail freight moved in the region (98 % in 2004) (ECMT, 2006a). The proportion of freight transported by rail is in decline in the SEE, although it is still generally higher than the equivalent figure in Western Europe, which was less than 15 % in 2004 (ECMT, 2006a). In Eastern Europe and the Caucasus rail freight has generally maintained a similar proportion of the share of the freight market — at least 80 % — since 1970. Figures for Central Asia (see Figure 7.3) are not as comprehensive, but there appears to have been a relative decline in the proportion of freight transported by rail in the most recent years for which data are available (Note: notwithstanding a broader definition of road freight).

**Figure 7.1 Freight moved, excluding pipelines (tkm)**



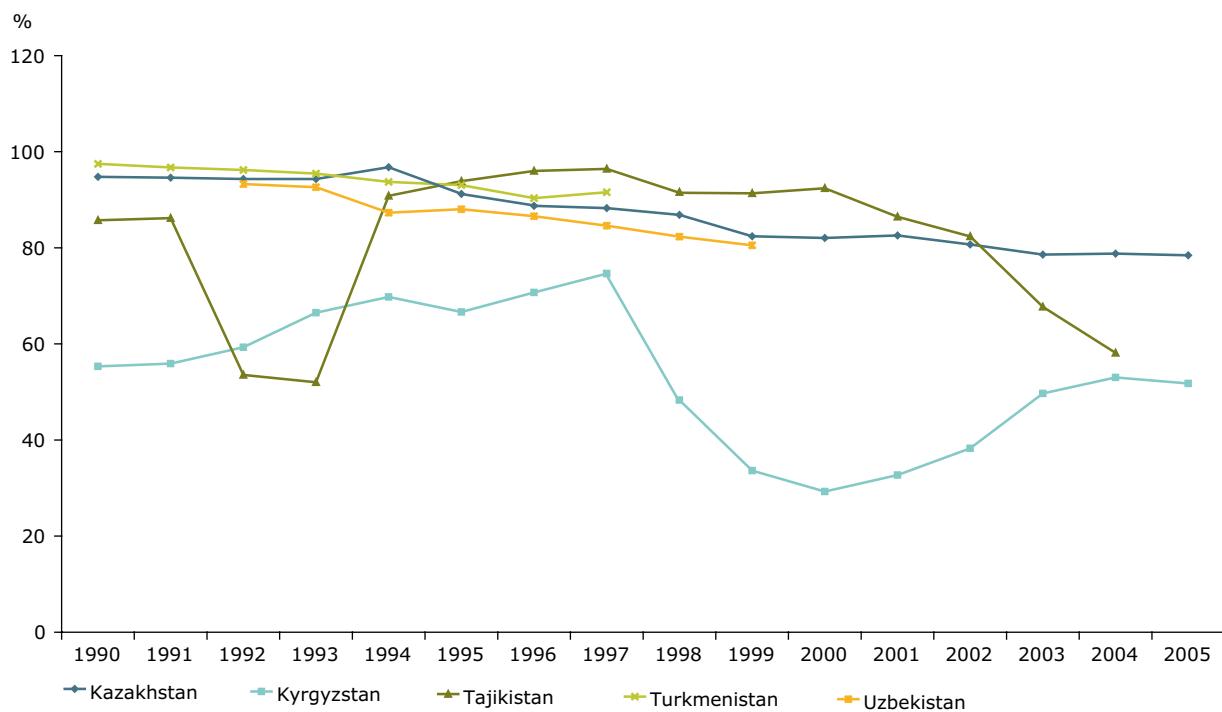
**Source:** Developed from ECMT (2006a) data.

**Figure 7.2 Rail as a proportion of total freight moved in selected SEE and EECCA countries (excluding pipelines)**



**Source:** Developed from ECMT (2006a) data.

**Figure 7.3 Rail freight as a proportion of total freight moved in Central Asia (tkm)**



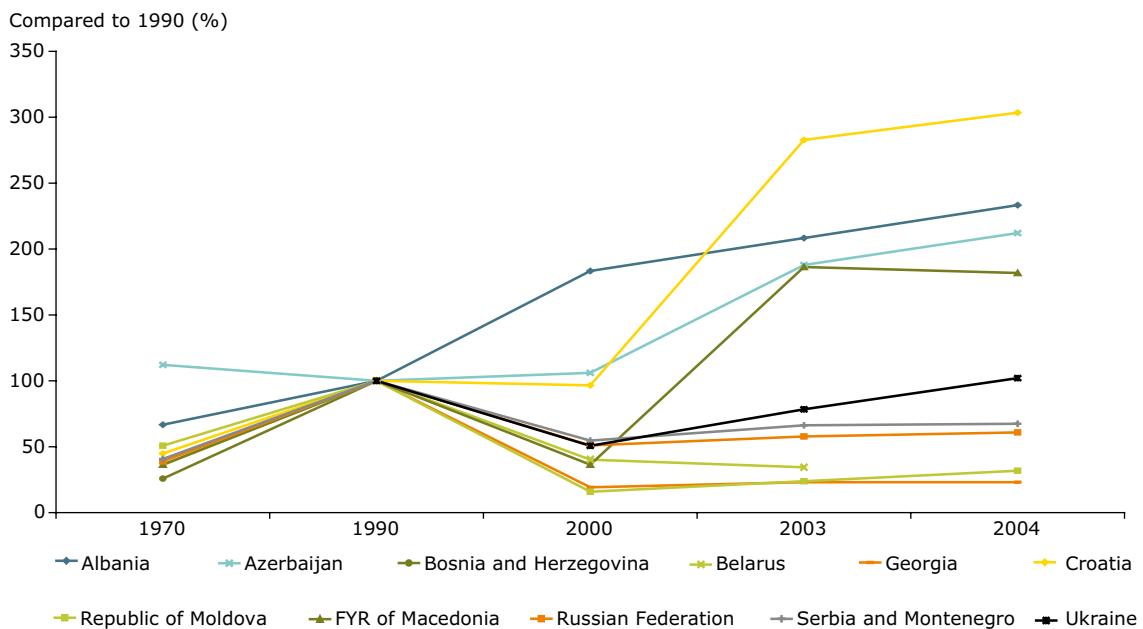
**Note:** Figures for later years based on a broader definition of road freight moved (as above); breaks in trends indicate where measurement methodology changed.

**Source:** Interstate Statistical Committee of the Commonwealth of Independent States, 2006.

Figures 7.4 and 7.5 show that the amount of freight moved by road has followed a similar percentage pattern to total freight movement in many countries (see Figure 7.1), i.e. a post-1990 decline. In turn this was followed by increasing amounts of use. But in some of the SEE countries

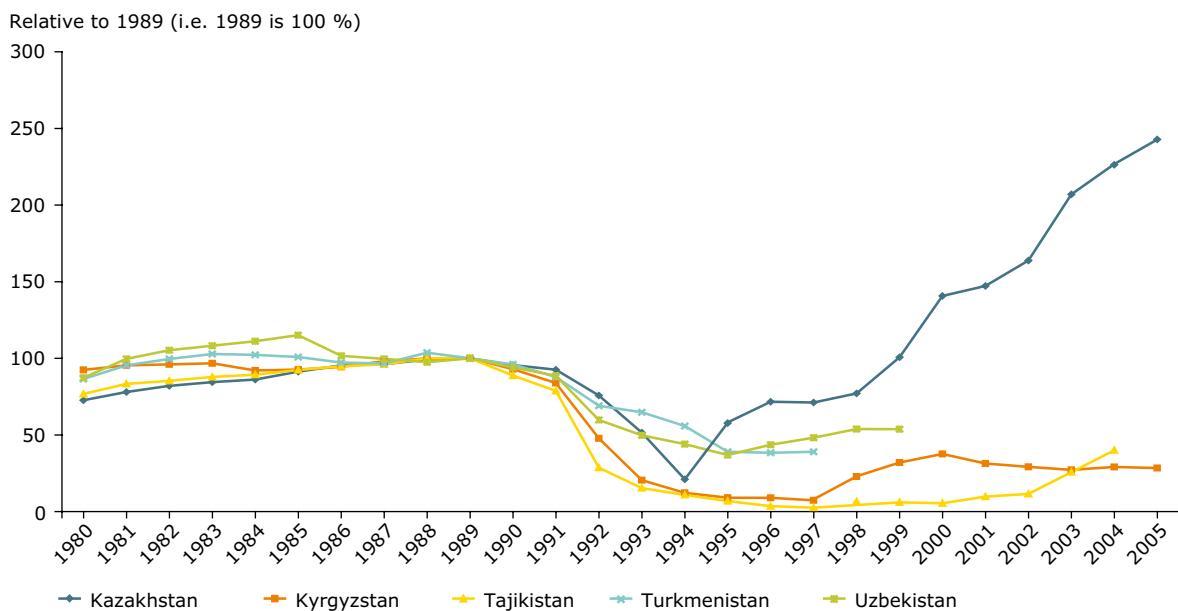
the quantity of freight transported by road has increased significantly since 2000, reflecting the decline in the use of rail (see Figure 7.3). In the EECCA countries, on the other hand, the levels of road freight in 2004 were lower — with the exceptions of Ukraine, Azerbaijan and Kazakhstan

**Figure 7.4 Road freight moved in selected SEE and EECCA countries (tkm)**



**Source:** Developed from ECMT (2006a) data.

**Figure 7.5 Road freight moved in Central Asia (tkm)**



**Note:** Figures for Kazakhstan (after 1995), Kyrgyzstan and Tajikistan (both after 1998) include estimates for freight transported by non-transport operators; breaks in trends indicate where measurement methodology changed.

**Source:** Interstate Statistical Committee of the Commonwealth of Independent States, 2006.

— and remained between 23 % and 67 % of those of 1990.

### Passenger transport

As noted above, both freight and passenger transport use declined in the SEE and EECCA countries in the 1990s. Unfortunately, comprehensive data on trends in total passenger transport use (i.e. travel by private car, public transport, bicycle and on foot) are not available. However, based on available statistics, it can be expected that the use of all passenger transport declined in the 1990s. The use of public passenger transport (rail, buses and coaches) followed a pattern similar to freight transport in SEE and EECCA after 1970, namely, that a significant increase in use between 1970 and 1990 was followed by a marked decline between 1990 and 2000. Subsequently, however, there has been little recovery in most countries (see Figure 7.6). The story is very different in Central Asia, where a post-1990 decline has been reversed in the three countries for which recent data are available (see Figure 7.7).

### Public transport in urban areas

Urban areas in both SEE and EECCA have generally seen a decline in the use of public

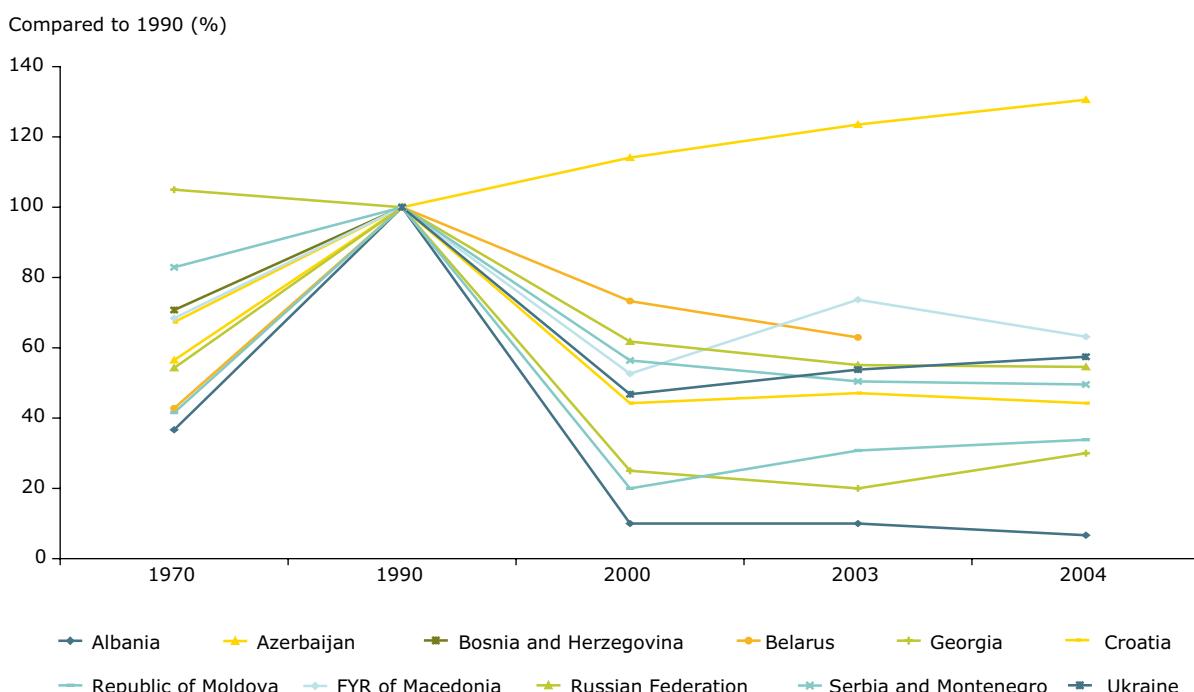
transport in recent years, although there are some positive developments (see Box 7.1). In some cities, such as those in the Caucasus, under-investment in public transport infrastructure and services has been the cause of the sharp decline in use. In these cities the road space that had been allocated to public transport is being *de facto* reallocated to cater for the increase in private road transport. Even in cities that have seen an investment in public transport after the 1990s slump, e.g. Zagreb, there have been declines. These have usually been caused by increases in automobile traffic and the effect of congested roads on the efficiency of the public transport system.

The situation is even worse in rural areas, where public transportation networks have declined significantly since the early 1990s. The withdrawal of subsidies, privatisation of transport services, rising fares and more limited schedules have all contributed to the decline. One additional effect of this is the increased use of private cars for personal transportation (see next section).

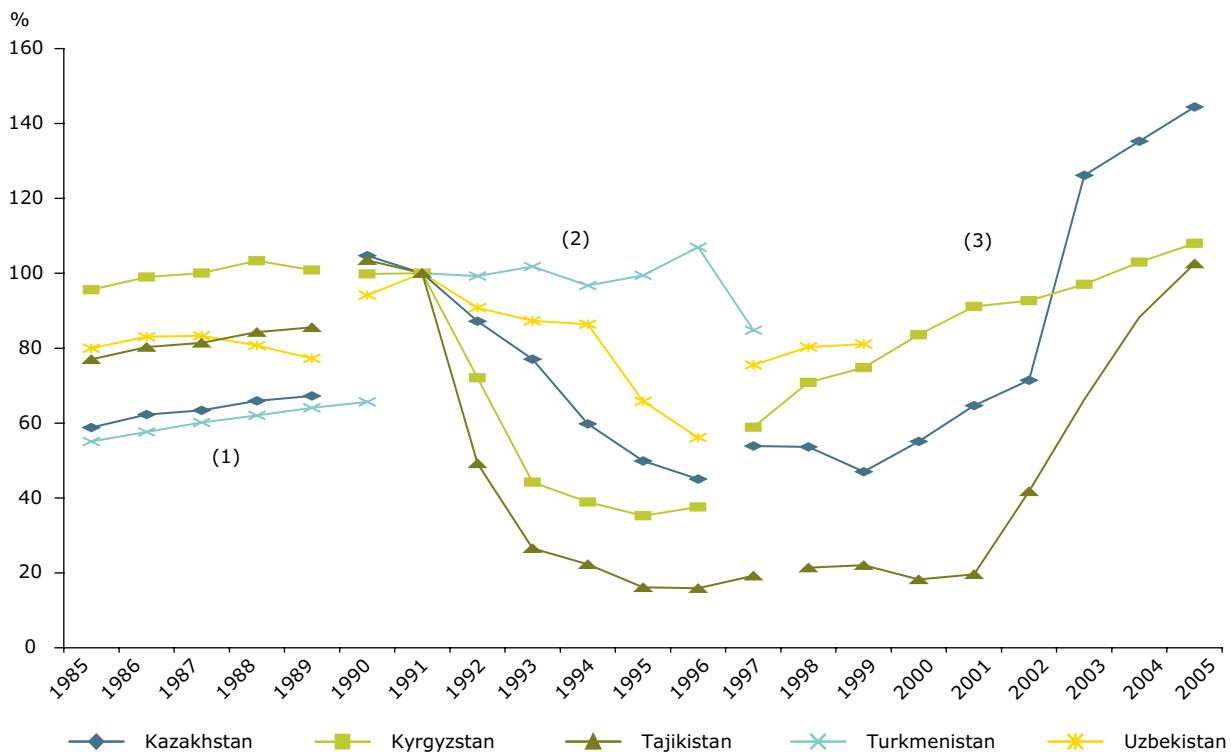
### The use of private transport: cars, bicycles and walking

Data for passenger travel by car and 'soft' modes, i.e. walking and cycling, are far less comprehensive and in some cases virtually non-existent. Figures

**Figure 7.6 Total public transport (passenger km)**



**Source:** Developed from ECMT (2006a) data.

**Figure 7.7 Land-based public transport use in Central Asia**

**Note:** (1) Bus only prior to 1989/1990, (2) Bus and rail from 1989/1990, (3) Private bus operators included from 1997/1998; in each case breaks in trends indicate a change of measurement methodology.

**Source:** Interstate Statistical Committee of the Commonwealth of Independent States, 2006.

for Serbia and Montenegro suggest that by 2004, car use had nearly recovered to 1990 levels (an increase of 58 % above 2000 levels), after a decline between 1990 and 2000. Recent data for Albania suggest that car travel increased by 24 % between 2000 and

2004 (ECMT, 2006a). Elsewhere, there are few data on trends in passenger car use, although anecdotal evidence suggests that these trends are increasing significantly, especially in urban areas. For example, all of the case studies used in this chapter,

### Box 7.1 Trends in urban public transport

In Zagreb in 1990 139 million passengers used buses. After a decline in the early 1990s, passenger numbers were revived to reach a peak of 105 million in 2002, only to drop in 2004 to less than 80 million. This has occurred in spite of recent investments in new buses. Tram use in the city, however, is on the rise. In 2004, 173 million passengers travelled on the city's trams. Although this figure is 25 % below the peak of 1985, it is still approximately 10 % higher than in the early 1990s. The length of the network was expanded in 2000 and is now longer than it has ever been in the city. There has also been extensive restoration of the associated infrastructure, e.g. rails and stops (Case study on Zagreb).

The decline of urban tram systems in the Caucasus has been particularly striking. As recently as 1998, Armenia and Azerbaijan each had over 40 km of tramways in their major cities. However, passenger numbers peaked at, respectively, 30 and 40 million people a year a decade earlier. Subsequently, declining services had brought about a steady decrease in tram use, which led to the trams halting all operations by 2005. In Georgia, the tram system is also declining, as the length of tramways in operation has fallen by 60 % in the past 20 years, while passenger numbers have declined by 94 % over the same period (Interstate Statistical Committee of the Commonwealth of Independent States, 2006).

e.g. Yerevan, Minsk, Almaty and Zagreb, noted that increasing car use was a problem in these cities as it led to congestion. Cities such as these were not designed to accommodate large numbers of private cars, and problems of congestion, road safety, etc., can be particularly acute for this reason.

Data on cycling and walking are even more difficult to calculate. In Zagreb it is estimated that at least every second household owns a bicycle and that bicycles make up 5 % of the city's traffic (Green Action, 2006). In other cities, e.g. Yerevan and Almaty, the level of cycling and walking is not considered to be high, and these transport modes are not seen as a solution by many people (Tsarukyan, 2006; Abenova, 2006).

Even though data on trends in passenger car use are not widely available, it is clear that in many countries the number of cars in use is on the increase. In Belarus and the Russian Federation, for example, the number of cars per head has doubled in the last 10 years (see Figure 7.8), whereas in other EECCA countries the growth in car ownership has not been as high. This probably reflects the relatively low incomes of the majority of the population of these countries. The number of passenger cars in SEE countries is mostly higher than in EECCA

(see Table 7.1), while the rates of growth vary significantly. Nevertheless, the levels are still significantly lower than in many Western European countries — i.e. still below 200 cars per thousand population in contrast to typical ratios of 400 to 600 in Western Europe.

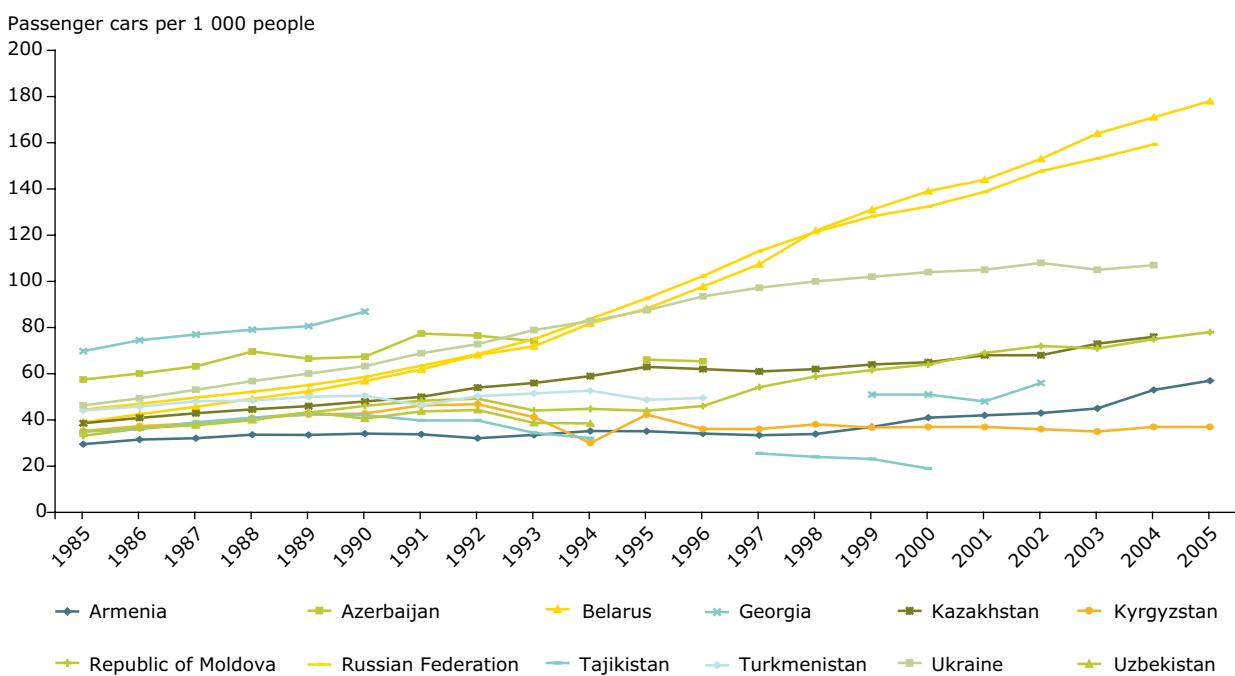
In urban areas, particularly capital cities, car ownership tends to be higher than elsewhere in the country (see Table 7.2). This pattern can be explained largely by the underlying economic circumstances. A recent report by the World Bank emphasises that

**Table 7.1** **Passenger car ownership in SEE countries (2003)**

	Car ownership per 1 000 people	% growth (1990–2003)
Croatia	289	61 %
Serbia and Montenegro	184	7 %
FYR of Macedonia	148	30 %
Albania	57	n/a
Germany	546	
Italy	596	

**Source:** UNECE Statistical Database as cited in EEA, 2007.

**Figure 7.8** **Ownership of passenger cars in EECCA**



**Note:** The registration system for motor vehicles in Georgia was revised in the late 1990s — a process that removed many cars that were no longer in use from the system. Hence, the numbers of vehicles registered declined significantly.

**Source:** Interstate Statistical Committee of the Commonwealth of Independent States, 2006.

**Table 7.2 Passenger car ownership (per 1 000 people) in capital cities**

Capital city	Car ownership	Country	Car ownership
Moscow	240	Russian Federation	160
Zagreb	357	Croatia	289
Tblisi	100	Georgia	79

**Sources:** Dimitrov, 2004; Green Action, 2006/UNECE; Georgian Ministry of Environment and Natural Resources, 2006.

strong economic growth is commonly concentrated in capital cities, while urban areas away from the capital often do not benefit to the same extent (World Bank, 2006). More detailed information on travel behaviour, e.g. the mode used for the journey to work, is generally not available in SEE and EECCA countries.

### Air transport

Based on the limited information available, passenger air travel accounts for approximately 14 % in EECCA and 5 % in SEE countries and enjoys modest annual growth. In addition, air freight transport accounts for a marginal share (fraction of a percent) of total freight in EECCA and SEE countries. Between 1993 and 2003 air freight showed an average annual growth of 4 % in EECCA and 7 % in SEE. However, the initial amount of air freight was low from the outset.

Therefore, the topic of air transport will not be covered in this chapter, although it should be recognised as a significant concern for the future.

### Future projections

Inevitably, it is anticipated that the use of transport – both freight and passenger – will increase

substantially in the near future. A study of transport infrastructure needs in the Balkans, for example, estimated that road traffic would grow by between 200 % and 300 % in the region during the period of 2001 to 2025, with the predicted growth in some countries, such as Albania, even higher. Rail use was also predicted to increase, but more slowly with an expected growth of between 60 % and 140 % over the same period. Meanwhile, the use of inland waterways is expected to grow by up to 215 %, while air travel might increase by anything between 315 % and 830 % (COWI, 2003).

Whether anticipated increases in the use of infrastructure on this scale occur or not, it can be expected that increased economic growth coupled with the likely accession of many SEE countries to the EU in the next 20 years, will increase the demand for transport, both for freight and passenger travel.

#### 7.2.2 The reasons behind changing consumption patterns

##### *Freight transport*

As noted above, transport trends have broadly followed trends in GDP. The decline and recovery of economic activity was reflected in the level of

#### **Box 7.2 Growth in air traffic versus aviation safety**

Commercial aviation has experienced enormous growth over the last few decades. After the 1991 break-up of the Soviet Union, about 500 local airlines were set up as a spin-off from the national carrier Aeroflot. Today, 180 remain in operation.

Despite bringing socio-economic benefits, this has led to increased environmental impacts. The problems in SEE and EECCA are compounded by the high number of small local carriers and the fact that older, more highly-polluting aircraft remain in service.

The rapid growth of small carriers also raises safety concerns. In 2006, Russia and the other former Soviet republics had the world's worst air traffic safety record. According to the International Air Transport Association (IATA), the accident rate in EECCA region was 13 times the world average.

goods transported. As the bulk of the population became rapidly impoverished and then gradually picked up, the level of demand for goods followed a similar pattern. Many of the countries have become substantial importers of manufactured goods from the EU. Consequently, some now have negative net trade balances with Western Europe, whereas countries that are rich in mineral resources, including oil and gas reserves, have become major exporters to Western Europe. All this has led to a recent increase in trans-European bulk freight activity, where recovering economies have seen rises in freight transport.

### *Passenger transport*

Economic recovery has also meant that standards of living have improved and spending on goods and services, including transport has risen. Some of this will entail additional journeys to work. In addition, greater wealth leads to more travel for either tourism or recreational activities. Perhaps the single most outstanding and important trend over the past 15 years has been the dramatic rise in car ownership. To some extent the recent increase in car ownership only satisfies a latent demand. Previously people in many EECCA countries had to wait many years before being able to purchase cars. As wealth has increased and imported second-hand cars have become more readily available, car ownership has soared. Owing to supply problems for private cars under the former socialist regimes, car ownership has traditionally been a symbol of high social status; a key factor in rapidly increasing ownership rates today. This situation is particularly pertinent for SEE and EECCA countries. Finally, cars are a necessity in rural areas, where the quality of public transport has declined. However, even in cities, bus and tram services are often of poor quality. Moreover, the growing popularity of retail outlets on the outskirts of towns may also be driving the demand for cars (see Chapter 5).

### *Investment in public transport*

A key factor behind the inability of public transport to recover from the decline of the 1990s has been the decrease in funding levels in SEE and EECCA in the past 15 years. For example, the public transport systems of the EECCA countries were previously state-owned and heavily subsidised. The subsequent transfer of ownership of much local public transport to municipalities was not accompanied by sufficient levels of funding. Consequently, the quality and quantity of public transport has declined, as has investment in the maintenance of the fleet and infrastructure.

Hence, public transport has become less attractive compared to private transport.

However, in EECCA countries, the development of informal, privately-operated public transport has increased. This tends to be more competitive than publicly-run public transport, but it has caused additional problems (Dimitrov, 2004; see also Box 7.3). SEE countries have seen greater investment in public transport, as networks have been maintained, and in some cases, e.g. in Zagreb (see Box 7.1), even expanded.

National rail networks have also suffered. For example, the quality of railway infrastructure in SEE is relatively poor with only 10 % of the network being in good condition. In spite of some recent investment, most of the railway lines in the region need modernisation and are suffering from neglect, both of which are the result of insufficient investment in previous years. This problem is exacerbated by the fact that the locomotives and rolling stock are old and in poor condition. All of these factors contribute to a reduction in the operational capacity of the network and in the speed of operations (World Bank, 2004). In the EECCA countries, the situation is often similar, e.g. in Armenia the railway infrastructure is also in a relatively poor condition (Tsarukyan, 2006).

The previously state-owned national rail networks and services are now the subject of reform in an effort to make up for the lack of investment since 1990. In SEE railway reform has progressed significantly in some countries, whereas in others it has not yet begun, e.g. in Albania (World Bank, 2004). The separation of the management of infrastructure and operations is often a key element of this reform (e.g. in the Russian Federation; Pittman, 2004).

### *Investment in roads*

Road networks in SEE and EECCA countries also lack investment, despite the fact that they have attracted far more investment than railways or any other forms of public transport. For example, the World Bank (2004) estimates that the overall condition of the road network in SEE was poor. Citing an earlier study (COWI, 2003), it suggested that only 28 % of the core road network in the region is in good condition, whereas 28 % needs resurfacing, 24 % repairs and 23 % reconstruction in one form or another. Within the SEE region, there are also significant differences between countries. For example, Croatia's road network is in a relatively good condition, whereas only 10 %

### Box 7.3 The decline of state-owned public transport and the rise of private operators

In the Russian Federation, public transport still has an 85 % to 90 % share of the market in urban areas despite recent increases in car ownership. The Russian public transport system is one of the largest in the world, but the system is currently suffering in the same way as elsewhere in EECCA. The level of service is declining, due to a lack of investment in vehicles both to replace older vehicles and also to meet new demand. It is estimated that only 25 % of the required annual investment in new vehicles is being funded. Other issues which contribute to the poor state of the system include: the number of users who are exempt from paying; the relatively low fares; poor fare collection; and inefficient service. Under the previous centrally-planned system, public transport was supported by a generous level of public subsidy, which proved to be unsustainable in a market-led system. Statistics suggest that the level of public transport subsidy in the Russian Federation is still significant — around EUR 351 million in 2000 — and increasing compared to recent years. But it is also estimated that the subsidy is still less than what is needed to cover operational costs, not to mention investment in new vehicles.

The relative decline of the state-owned public transport system has given rise to a growing number of private operators, usually operating minibuses, in many Russian cities. Such operators make up for the shortfall in the publicly-operated system and are a positive new element in many cities' public transport systems, as they can run more frequently and are particularly popular in the evenings. Additionally, such minibuses tend to be well utilised and thus more environmentally efficient than private car use. Nevertheless, the increased use of minibuses has led to concerns about the safety of the vehicles and the quality of the driving, as the sector tends to be poorly regulated (ECMT, 2005).

The rise of privately-owned public transport services is not a development limited to Russian cities. In Yerevan, for example, publicly-owned bus and tram services have declined due to a lack of financial support and poor infrastructure. Some of the shortfall has been compensated for by increases in the numbers of smaller privately-owned buses and taxis. As in Russian cities, these privately-owned buses have been beneficial in facilitating transport of citizens, but their relatively unregulated nature has contributed to worsening traffic problems in the city (Tsarukyan, 2006).

In Tbilisi, it is a similar story. A public transport system from the Soviet period, which focused on large buses and electric public transport (trolleybuses, underground subway and trams), collapsed post-1990 due to financial constraints. While bus services have begun to recover, the use of the metro and trams continues to decline. This decline has also led to an increase in privately-owned services which use mini-buses and can be more flexible and frequent than the state system. However, similar concerns have been raised about the lack of regulation of the sector (Georgian Ministry of Environment and Natural Resources, 2006).

of Albania's national road network was considered to meet this standard and 68 % was judged to be poor. In Armenia, major roads of national and regional importance are in relatively good condition, while local roads tend to be in a much poorer state (Tsarukyan, 2006).

Compared to public transport, it is much easier to attract investment for roads. For example, plans to develop the Albanian international road network have succeeded in attracting financial support from international financial organisations, whereas it has proved difficult to attract similar support for upgrading Albania's railway system (UNECE, 2002a).

Some of the reasons for this lie in the importance of international trade, the geographical location of many of the countries, and the agenda of

the organisations financing such investments. Given the geographical position of SEE and EE in particular, the transport infrastructure of many of the countries in these regions is likely to become increasingly important to international freight companies for the purposes of transit, particularly where neighbours have joined the European Union. In Eastern Europe, Ukraine and Belarus also seem likely to experience an increase in the amount of transit traffic as trade increases between the Russian Federation and the EU.

#### 7.2.3 The impacts of transport

This section reviews some of the key environmental impacts originating in the transport sector, as well as one dramatic social aspect — road accidents. Transport depends on fossil fuels, particularly oil products, which account for more than 98 % of

energy consumption by the transport sector. Hence, emissions of air pollutants and greenhouse gases are the key impacts from the transport sector. Problems related to traffic noise, land take and fragmentation by transport infrastructure, or management of transport waste also pose challenges. However, at present the magnitude of these problems cannot be quantified, and they are therefore not treated in depth in this chapter.

#### *Transport's emissions of air pollutants and greenhouse gases*

Mechanised transport gives rise to pollution in a number of forms, including emissions of carbon dioxide; one of the main greenhouse gases associated with the combustion of fossil fuels. Other forms of pollution include exhaust gases and particulates that contribute to local and regional pollution, dust from tyres and brakes, noise etc. Local and regional air pollution have impacts on human health, e.g. emissions of particulates, emitted in large numbers from older diesel engines, have impacts on respiratory systems. Generally speaking, more modern vehicles tend to be less polluting than older ones owing to more sophisticated pollution control technology and the use of cleaner fuels. Well-utilised mass transit vehicles tend to produce less pollution on a passenger-kilometre basis, although older public transport vehicles are sometimes highly polluting on a vehicle-kilometre basis.

#### *Transport's impact on climate change*

One of the main impacts of rising transport levels, particularly the use of private transport, is increased fuel use and therefore increased emissions of carbon dioxide — the main greenhouse gas that causes climate change. In the EECCA countries the transport sector uses an increasingly large proportion of energy — averaging around 17 %. However, this is still much

**Table 7.3 Transport energy consumption per capita (tonnes of oil equivalent) in SEE and EECCA countries (2004)**

South Eastern Europe	0.27
Eastern Europe (excluding Russian Federation)	0.18
Russian Federation	0.66
Caucasus	0.13
Central Asia	0.16
Portugal (lowest in the EU-15)	0.71
Ireland	1.16

**Source:** EEA, 2007.

less than Western Europe's 30 % (Dimitrov, 2004). IEA figures (EEA, 2007) suggest that transport energy consumption per capita in SEE and EECCA countries is still significantly lower than typical values for the EU-15 (see Table 7.3).

The consumption of transport energy per capita declined in all the EECCA countries (except Azerbaijan and Uzbekistan) between 1995 and 2004. However, in SEE, there was a growth of at least 22 % in all countries for which there were data (excluding Serbia and Montenegro), including an approximate doubling in Croatia and Bosnia and a significantly higher growth still in Albania (at least 500 %).

#### *Air pollution*

Air pollution in the countries of SEE and EECCA is more and more of a problem, particularly in urban areas. To some extent, the situation improved in the 1990s, principally as a result of the decline of the economy in EECCA and the subsequent reduction in emissions from both industry and transport. However, the growth of road transport in recent years has seen urban air quality deteriorate once again.

#### **Box 7.4 Air quality in the cities of SEE and EECCA**

In Almaty reported ozone levels were more than four times higher than national and international standards, while fine dust was 1.25 times above international standards (Kok and de Koning, 2003). In the Russian Federation in 2002, average annual concentrations of air pollutants exceeded permissible levels in 201 Russian cities with over 60 % of the country's urban population (ECMT, 2005). In Yerevan in 2005 the permissible average annual levels of many pollutants were exceeded by significant amounts: dust (by 100 %), SO<sub>2</sub> (140 %), NO<sub>2</sub> (180 %), benzene (40 %), ozone (120 %) (Tsarukyan, 2006).

Not all capital cities in the region suffer from poor air quality. For example, air pollution in Minsk is considered to be low, as measured on an integrated pollution index used in many EECCA countries. The same cannot be said of other cities in Belarus — pollution levels in Vitebsk and Gomel are considered to be high (Narkevitch, 2006).

Pollution is exacerbated by vehicle age, poor vehicle maintenance, variable fuel quality, and the poor state of many of the roads (see Box 7.4).

### *End-of-life vehicles*

At the end of their useful life large numbers of vehicles are discarded. Some are left abandoned, others are cannibalised for parts, while a significant proportion is recycled.

Transport vehicles are an attractive proposition for recycling since vehicles tend to be made largely out of steel, and it is generally economical to recycle them even without special requirements to do so. However, other elements of more complex vehicles, such as passenger cars, can be more difficult to recycle. Modern construction methods, for example, the use of plastics, laminated compounds and other novel materials, can complicate these problems.

A recent report for the European Parliament (Fergusson, 2007) indicated that the non-metal components of cars present particular difficulties in implementing the End-of-Life Vehicles Directive in the 'newer' Member States or the EU, and will likely cause similar problems in SEE and EECCA countries. Here, there can be a trade-off between recyclability and the use of lighter materials to reduce fuel consumption. In addition, some toxic materials including heavy metals are used in vehicle construction and need to be disposed of with due care.

### *Impacts of transport infrastructure*

Transport infrastructure can also make significant demands upon non-renewable resources, especially in situations, such as those now occurring in some SEE and EECCA countries, where major new infrastructure is under construction. New infrastructure requires significant quantities of mineral resources, including concrete, aggregates, and steel. Roads, and to a lesser extent railways, can fragment natural habitats by acting as a significant barrier to the movement of small animals, while noise and other impacts of transport activities can disturb wild animals. In urban areas heavily-used new infrastructure can also have a negative impact on the mobility of people within cities. Transport infrastructure also takes land — a natural resource — that could be used for other

purposes. In urban areas, transport infrastructure in particular consumes a significant proportion of the available land. The competition for land with residential, commercial and recreational demands, as well as between transport modes, can be fierce. In this context, it is worth noting that roads require significantly more land area to provide the same capacity as railway lines, while air and water transport make far smaller demands upon land area.

### *Noise*

Transport noise is also recognised as a growing problem, but there is often little information on the extent and impact of noise. As a result, there are few examples of action taken specifically to reduce noise from transport. The problem of noise is made worse by similar factors that contribute to excessive emissions, i.e. the age of the vehicles and poor maintenance of vehicles and roads. For example, in Moscow 70 to 80 % of the population live in conditions of high noise pollution that cause discomfort, while in Yerevan at least 30 % of the population are exposed to noise levels that cause serious annoyance and sleep disturbance (Dimitrov, 2004).

### *Road accidents*

In 2004 there were 344 100 accidents resulting in 45 400 deaths on the roads of SEE and EECCA<sup>(2)</sup>. In recent years, these figures have been increasing again after a decline in the 1990s that saw both figures drop to around 80 % of 1990 levels by the end of the decade. While the number of accidents has increased to levels comparable to those of the early 1990s, the number of road deaths is still lower than it was in 1990. Indeed, in 2004 the number of deaths actually declined in the region, thanks largely to decreases in the Russian Federation and Ukraine, which together accounted for 91 % of the region's road deaths. In spite of the regional decrease, there were significant increases in road deaths in some countries, e.g. 21.2 % in Albania and 11.4 % in Croatia (ECMT, 2006a).

In terms of safety, roads in the Russian Federation are the most dangerous in Europe with around 240 deaths per million people in 2004, while Belarus had around 175 deaths per million people. Figures in other SEE and EECCA countries are lower and comparable to those in other European countries, e.g. Serbia and Montenegro had

<sup>(2)</sup> Figures cover the nine countries — Albania, Azerbaijan, Georgia, Croatia, Republic of Moldova, former Yugoslav Republic of Macedonia, Russian Federation, Serbia and Montenegro and Ukraine — for which comparable data were available.

approximately 120 road deaths per million people in 2004 (comparable to the figure in Spain), while the equivalent figure in Armenia was 75 (comparable to that of Germany) (ECMT, 2006a).

### 7.2.4 Other factors determining impacts of transport

Mobility is essential for the functioning of modern societies. It enables free movement of people, goods and services and offers possibilities for trade, living, leisure, learning and retail shopping. A well-developed transport system is the ambition of all societies. However, a number of technology-related factors determine how environmentally sustainable transport is in the SEE and EECCA countries.

From a socio-economic point of view, mobility patterns are becoming more unsustainable. Congestion makes urban areas less and less easily accessible, and leads to significant costs in terms of delivery delays and lost working hours. At the same time, declining public transport restricts the mobility of those who do not have a personal car.

#### *Ageing vehicle fleets*

Among the reasons for severe air quality problems in the major cities of EECCA countries are the age and engine technology of the vehicles. The current vehicle fleets in many EECCA countries consist of older

vehicles manufactured in the former Soviet Union, and of newer vehicles, many of them second-hand and imported from Germany and elsewhere (see Box 7.5). Vehicles produced in the former Soviet Union tend to use petrol and are not fitted with emission control systems, such as catalytic converters. So, from a technological perspective they are similar to those used in Western Europe and North America before the mid-1980s, when emissions standards significantly improved (Canadian International Development Agency, 2000).

#### *Cleaner fuels*

The use of cleaner fuels can reduce emissions from vehicles and therefore air pollution. As well as being a pollutant in its own right, the presence of lead in petrol inhibits the functioning of catalytic converters which help reduce other emissions. Hence, the phasing-out of leaded petrol has been a priority in many SEE and EECCA countries and has been achieved in many of them. Currently, leaded petrol has not been phased out in Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Montenegro and Serbia. A ban on leaded petrol in Bosnia and Herzegovina is scheduled for 1 January 2010 (PCFV, 2007). In EECCA Georgia, Tajikistan and Turkmenistan have not yet phased out leaded petrol (EAP Task Force Secretariat, 2006; PCFV, 2007). In many countries of the SEE region progress is being made to align fuel quality and emissions

#### **Box 7.5 Vehicles of SEE and EECCA: age and origins**

In Armenia the car fleet is old: 30 % are more than 20 years old and over 70 % of the cars imported into the country are second-hand. Ninety-five per cent of the existing car fleet were imported from the former Soviet Union or Russian Federation, but the origin of new imports is changing, with only half of the cars imported in 2004 manufactured in the Russian Federation (Tsarukyan, 2006).

In the Belarusian capital of Minsk, around 53 % of the buses are more than 10 years old, while in the country as a whole 86 % of the cars are over 10 years old (78 % in Minsk). As there is no domestic production in Belarus, vehicles are imported from elsewhere, mainly from the Russian Federation, but increasingly from Germany and other non-CIS countries (Narkevitch, 2006). In Kazakhstan most cars are second-hand and imported from Germany, although cars are also imported from Japan and South Korea (Abenova, 2006; Dimitrov, 2004).

In Georgia most vehicles are between 10 and 15 years old and imported second-hand cars from Western Europe, although the proportion of Soviet-made cars is still high (Georgian Ministry of Environment and Natural Resources, 2006). In Moldova most of the fleet was manufactured in the Soviet era, although in recent years many second-hand cars, which were often built in the 1980s, have been imported from elsewhere in Europe (Dimitrov, 2004).

In SEE the vast majority of newly registered cars in most countries are imported second-hand vehicles, e.g. 70 % of the cars in Bosnia and 96 % in Montenegro in 2003. Car fleets are often old: in 2003, 65 % of the passenger cars were over 16 years old in Montenegro (REC, 2006).

legislation with that of the EU, although progress is more advanced in some countries, particularly those that aim to accede to the EU. In many EECCA countries Russian fuel quality standards are used, and they are stricter than some of those previously applied in SEE, but are not as stringent as those of the EU (REC, 2006). In most countries petrol and diesel still dominate the transport market, but the use of alternative fuels is increasing in some countries (see Box 7.6).

Fuel smuggling and adulteration are quite common activities across Europe, and these can adversely affect fuel quality and vehicle emissions. The scale of such activities varies enormously from one country to another according to circumstances, and by its very nature is difficult to quantify.

#### **Vehicle maintenance**

Poor maintenance of vehicles also contributes to air pollution. In EECCA countries there is usually no systematic inspection of vehicles and authorities are often poorly equipped for measuring technical vehicle requirements and fuel quality. Where emission controls do exist, they are frequently based on outdated standards (Dimitrov, 2004), and the requirements are often not enforced rigorously. For example, an independent survey undertaken in 2002 in Almaty found that 46 % of the vehicles tested did not meet at least one aspect of the emissions standards (Kok and de Koning, 2003).

#### **Congestion**

Congestion in major SEE and EECCA cities is turning into a problem as a result of the increasing use of private motorised transport and the decline in the

#### **Box 7.6 Increasing use of alternative fuels**

The use of alternative fuels can contribute to improving local air quality through reducing emissions of certain pollutants. In Belarus while the use of compressed natural gas (CNG) still remains relatively low — less than 1 % of transport fuels — its use has quadrupled since 2000 (Narkevitch, 2006). In Armenia the use of CNG increased by 230 % between 2001 and 2005 and now accounts for 24 % of the market. This is due to the increased use of the fuel by minibuses, buses and light-duty trucks and has been stimulated by the fact that CNG costs about one-third of the price of petrol (Tsarukyan, 2006).

use of public transport. In many cases the problems are exacerbated by the fact that cities, especially the centres of cities such as Yerevan, Almaty and Tbilisi, were not designed to take the levels of traffic that they are now experiencing. The increasing number of minibuses and private taxis, which are replacing larger, publicly-operated buses, are adding to the congestion problems. Generally, however, there is as yet little congestion on interurban roads.

#### ***Reduced accessibility for those without access to private motorised transport***

The decline of public transport at the expense of private transport also reduces the potential mobility of those who previously relied on public transport and who do not have access to private cars. This reduced access to transport potentially reduces the ability of these people to have access to key services, jobs and education as well as personal travel. This has potentially adverse effects on them, from both an economic and a social perspective.

In general, the sustainable use of transport promotes walking and cycling wherever possible for short journeys and encourages most forms of public transport rather than private cars wherever it is sensible to do so. For freight, similarly, rail and water transport tend to be more resource-efficient than road transport. Consequently, where public transport facilities exist and where fixed infrastructure, such as railways or trams, are in place, it makes good sense to make maximum use of them. It has to be recognised, however that these modes are not suitable for all journeys, and that more affluent societies tend to demand greater flexibility in individual transport, at least for certain purposes. Significant differences in modes of transport in developed countries suggests that there is some possibility of influencing or challenging these trends, but coping with these changing demands and expectations represents a special challenge for transport policies in SEE and EECCA countries.

### **7.3 Policy initiatives**

A mixture of various policy instruments will have to be used to address effectively problems of sustainable consumption and production in transport.

In the context of efficiency and environmental impacts of transport, there is clearly a hierarchy of 'desirable' kinds of transport. The most energy-efficient and affordable modes are, of course, walking and cycling as they entail virtually no use of fossil fuels or other non-renewable resources, and are,

in this respect, the most desirable means of transport for short journeys. Some types of mechanised transport, most obviously water transport and to a lesser extent rail, are, generally speaking, significantly more energy-efficient than motorised road transport or aviation.

However, within each mode there is a considerable variation between the energy efficiency of different types of vehicles. For example, large public transport vehicles tend to be more energy-efficient per passenger kilometre than small individual vehicles, provided always that they are well utilised. Electric trains usually are appreciably more fuel-efficient than diesel trains, while diesel cars and trucks tend to be more efficient than petrol ones. There is an enormous variation between vehicles according to size, age, and type of construction. Newer vehicles tend to be more energy-efficient than older ones, but often this benefit is overshadowed by their greater size, weight or power, and they might actually use more fuel than the older cars.

Maximising the *efficiency of transport* use is also important for moving towards SCP. As noted above, there is a hierarchy of transport modes, based on their energy-efficiency. But utilisation rates are also important. For example, public transport vehicles do not make efficient use of resources if they carry few passengers. The passenger car is relatively efficient if it carries four or more passengers, but this is not usually the case.

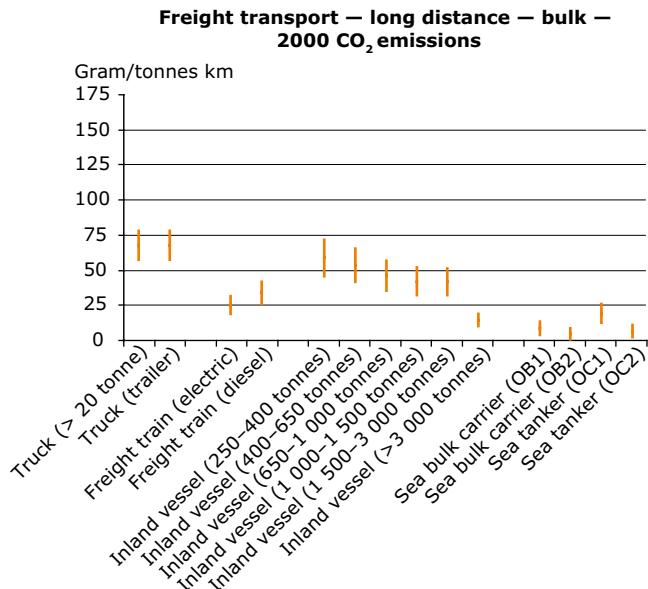
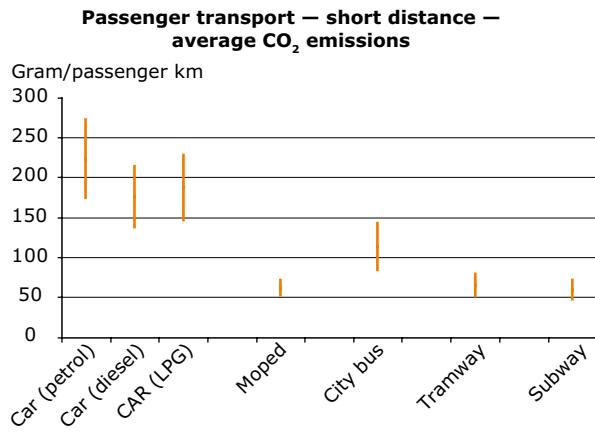
Efficient utilisation also implies patterns of transport that are themselves efficient. For instance, it makes little sense in resource terms to transport materials or goods over long distances when similar products are available locally, even if it makes economic sense to do so. Efficient passenger transport also implies land-use patterns that minimise the need to travel long distances for goods, services, jobs and the use of public transport. This includes maintaining densely-populated and thriving urban centres, well served by public transport, while avoiding urban sprawl and out-of-town developments.

This section looks in more detail at strategic programmes and policies in EECCA and SEE, infrastructure and traffic management, and the use of economic instruments and regulations.

### 7.3.1 Strategic programmes policies and planning

Many of the countries of SEE and EECCA have some kind of strategic plan for the environment, which includes an aspect often of direct relevance to transport. For several of the EECCA countries, the National Environmental Action Programme (NEAP), developed in the late 1990s, remains the most strategic environmental document, e.g. in Uzbekistan and the three countries of the Caucasus. For example, the Azeri NEAP, which dates from 1998, identifies five priority challenges, one of which is pollution from transport, while the 2000 Georgian NEAP also includes air pollution as one of its priorities (EAP Task Force Secretariat, 2006).

**Figure 7.9 CO<sub>2</sub> emissions in transport**



**Source:** Essen, H. van, et al., 2003.

In other countries, policies that address some of transport's adverse environmental impacts, e.g. air pollution, are set out in more strategic environmental documents, such as the Moldovan 2002 Environmental Policy Concept and the Ukrainian Government Policy on Environmental Protection, Use of Natural Resources and Environmental Safety (from 1998), both of which include the integration of environmental concerns into the transport sector. Elsewhere, e.g. in Tajikistan and Georgia, environmental issues are identified as priorities in national Poverty Reduction Strategies. More recent strategic documents tend to make a more explicit reference to climate change issues, in addition to those of air quality. For example, climate change is one of the main priorities of the Belarus National Action Plan on the Rational Use of Natural Resources and Environmental Protection for 2006–2010, and mitigating climate change is explicitly part of the Kazakh Environmental Safety Concept for 2004–2015 and Environmental Protection Programme for 2005–2007 (OECD, 2007).

Many EECCA countries have also set up procedures or processes to improve the integration of environmental concerns into transport policies. For example, in some countries, transport and environment issues are discussed in inter-ministerial working groups and the relevant ministries have regular contacts. In around half of the EECCA countries transport ministry staff have received environmental training and there is a specialised unit in the transport ministry to deal with environmental issues (EAP Task Force Secretariat, 2006).

By no means do all of the SEE and EECCA countries have a transport strategy. Where these do exist, they tend to focus on infrastructure development rather than on other aspects of transport policies. Often they have an environmental dimension or at least a recognition of the environmental impacts of transport, but the focus is often on developing infrastructure to support economic development in order to integrate national infrastructure with that of other countries. In a number of EECCA countries the latest transport strategy has been subject to some form of environmental assessment (e.g. in Kyrgyzstan, Tajikistan and Uzbekistan), while the transport strategies of Azerbaijan, Belarus, Moldova, Kyrgyzstan and Tajikistan have environmental targets.

The potential of spatial planning to benefit the environment is noted in many strategic plans, e.g. Kazakhstan's Environmental Protection Programme for 2005–2007. In many SEE countries there are spatial plans, which take into consideration transport

issues, such as the Croatian spatial planning strategy of 1997. In Montenegro the national Spatial Plan for 2020 sets out strategic considerations on accessibility and travel generation, while the Transport Development Plan complements the Spatial Plan and considers the more detailed issues. Transport plans include provisions on reducing congestion and encouraging public transport use for both passenger and freight travel.

However, transport concerns are still not integrated as well as they might be into spatial planning policies, and this is vital given that land-use patterns have such a fundamental effect in determining the shape of transport demand. In the SEE countries the need for better urban and regional planning has been recognised in both Serbia and the former Yugoslav Republic of Macedonia (UNECE, 2002c and 2002b). In this context insufficient use is often made of strategic environmental assessment. The countries of SEE and EECCA are also beginning to experience some of the same development pressures that are already common in the EU — for example, urban sprawl, out-of-town shopping facilities and other features that undermine the provision of sustainable transport systems.

### 7.3.2 *Investment in infrastructure and traffic management*

There is recognition both by national governments and institutions that action is needed to develop the transport infrastructure of SEE and EECCA countries. As discussed above, however, larger international projects, particularly roads, often prove more attractive for potential investments than for more local infrastructure. Many countries are attempting to put more investment into local infrastructure, particularly in urban areas.

In Belarus expenditure on urban public transport has been significantly increased in recent years. Other countries, e.g. Albania and Armenia, are also committing funds to public transport infrastructure. In Croatia the development of inter-modal freight terminals is supported by the national transport development strategy, and a range of subsidies for rail freight, from direct grants to reduced tariffs, is provided. The Montenegrin national transport strategy also backs the development of inter-modality and the integration of transport chains, while in Belarus, there are plans to increase freight efficiency by improving logistics.

The economic situation of the countries limits the amount of money that can be devoted to such expenditures, especially on the local networks.

Furthermore, the increased use of road transport in most countries, and the resulting congestion and air quality problems, create additional problems that require solutions and increase competition for the already limited transport budget.

Many countries are also beginning to recognise the importance of improved traffic management. For many cities, e.g. Minsk, Belgrade and Skopje, the first step is the diversion of through traffic to city ring roads in order to alleviate congestion problems in city centres. In some cities, e.g. Tbilisi and Almaty, restrictions are placed on the use of main roads by freight traffic in order to alleviate congestion. In Minsk there are plans to improve traffic management by introducing one-way systems, creating favourable conditions for the development of public transport and the metro, particularly during the rush hour, and restricting freight traffic in the centre. The development of urban public transport is to be supported in the former Yugoslav Republic of Macedonia through investment, priority measures, such as dedicated bus lanes and a parking policy, as well as by improved traffic management and control. In Moscow, the START project has improved the coordination of traffic lights and the traffic flow in the city, in this way increasing the capacity of the network by an estimated 10 to 12 % (Dimitrov, 2004).

### 7.3.3 Economic instruments

A number of the strategic policy documents cited in Section 7.3.1 identify the reform of economic instruments as one way of integrating environmental concerns into sectoral policy. For

example, the reform of economic instruments is identified as an area of environmental action in the Georgian Economic Development and Poverty Reduction Strategy (from 2000). The 1998 Armenian NEAP and the Kazakh Environmental Protection Programme for 2005–2007 also both mention improving environmental management through the use of economic instruments (EAP Task Force Secretariat, 2006). The recognition of the need to determine prices in a fair manner is also a feature of the transport development strategy in Montenegro. However, the potential use of taxation to encourage environmentally less damaging behaviour is far from being fully exploited and in some cases works against the encouragement of more environmentally-friendly behaviour.

Dimitrov (2004) noted that the use of economic instruments in EECCA countries to influence demand and modal share is limited, although fuel fees have sometimes been differentiated between leaded and unleaded petrol. The World Bank mentions that the level of 'cost recovery' for infrastructure in SEE is poor (World Bank, 2004). In the absence of road pricing the report makes its assessment on the basis of annual vehicle fees and fuel fees, and emphasises that these are significantly lower than the equivalent charges in the EU.

In some countries taxes on transport fuels have increased in recent years, e.g. in Belarus, where they have at least trebled since 2003. In other countries, for example, Kyrgyzstan and Armenia, taxes on transport fuels have declined in recent

#### Box 7.7 Import tax differentiation

In Belarus import taxes for older cars are relatively high (EUR 2 per cc for cars more than 14 years old; EUR 0.75 per cc for cars more than 10 years old) to discourage their import. The import taxes for older vehicles were increased in 2005. These represented an increase of 25 % on previous levels for cars that were more than 10 years old and a trebling of taxes for cars more than 14 years old. The import tax rates on newer cars (i.e. those less than 3 years old) are higher than those on cars between three and ten years old in order to increase tax revenue. Additionally, within the two newer age groups, there is a slight differentiation in favour of cars with smaller engines, as the rates increase for cars larger than 1 500 cc and then again for cars larger than 2 500 cc for all cars less than ten years old (Narkevitch, 2006).

Similarly, in Armenia a draft law is currently being considered, which would differentiate the charges, or environmental payments, payable on imported vehicles according to their vehicle type, fuel used and the presence (or not) of a catalytic converter (Tsarukyan, 2006). In the former Yugoslav Republic of Macedonia custom duties of 10 % apply to new vehicles compared to a duty of 13.3 % for second-hand vehicles (REC, 2006).

In Georgia, on the other hand, the import tax on newer light duty vehicles is higher than that on older vehicles. The annual vehicle tax is differentiated in the same way: it is based on age and engine capacity and it decreases for older vehicles (Georgian Ministry of Environment and Natural Resources, 2006).

### Box 7.8 The use of economic instruments

Kazakhstan's annual car taxation system has some positive elements from an environmental perspective. Its annual car taxes are based on engine capacity (measured in cc), which is a reasonable proxy for a car's carbon dioxide emissions and age: the higher the engine capacity the higher the tax — e.g. the tax for a vehicle of 2000 cc is around 150 % more than that for a car of 1 000 cc. However, for cars of the same engine capacity, newer cars (e.g. one less than 6 years old) are generally taxed at levels twice those of older cars produced outside the EECCA. The taxation level on older cars that are produced in the EECCA is even lower — for the same engine capacity — than the tax for older non-EECCA produced cars. Taxes on lorries are based on weight and age — the tax on a vehicle less than seven years old is around twice that of an older vehicle of the same weight (Abenova, 2006).

Other countries have been considering adopting higher taxes on cars that pollute more. For example, Albania has considered increasing taxes for second-hand cars. In the former Yugoslav Republic of Macedonia fiscal incentives, such as tax and custom discounts for new vehicles (cars, buses and commercial vehicles), have also been considered to encourage the purchase of more fuel-efficient vehicles (ECMT, 2006b). In Armenia the use of funds raised from environmental charges, such as that on imported cars noted above, will go towards financing environmental projects, such as the development of electric transport and support for non-motorised modes (Tsarukyan, 2006).

years (OECD, 2007). Since many cars used in the countries of the region are imported, import taxes have a significant influence on the make-up of the car fleet (see Box 7.7). Ownership taxes, which decline with the age of the vehicle, are a feature of the tax systems in other countries. There are also other more innovative uses of economic instruments (see Box 7.8).

However, the use of economic instruments to influence transport demand is still very limited. In Croatia tolls are in place on the country's motorways, but these have been introduced in order to recover the costs of the construction of the roads, rather than for the purposes of managing demand (Green Action, 2005).

#### 7.3.4 Regulation

As noted above, leaded petrol has been phased out in many SEE and EECCA countries. Where leaded petrol is still in use, there are plans to phase it out soon in the coming years. Fuel quality and vehicle emission standards exist in most EECCA countries. In Kazakhstan local vehicle emission standards are in place, whereas in Ukraine Euro II standards have been applied since 2006 and Belarus is planning to introduce Euro II/III standards. In many countries there are also plans to improve vehicle emission and fuel quality standards, out of a recognition that vehicle emissions contribute significantly to worsening air pollution problems. In Belarus, for instance, the Sectoral (transport) Programme on Environmental Protection for

2006–2010 foresees the improvement of emission standards to bring them up to international standards. In many SEE countries EU vehicle emission and fuel quality standards are motivated by hopes of eventual accession to the EU.

Most EECCA and SEE countries have vehicle inspection programmes in place which consist of annual tests, and often random roadside checks. Vehicle inspection programmes in many countries are not as effective as they might be, e.g. in Albania, Serbia, Montenegro and Bosnia, but efforts are being made to improve inspections and enforcement (UNECE, 2002a; 2002b; and 2004).

### Box 7.9 Renewing the Belarussian state fleet

In Belarus the transport ministry has been taking a variety of actions to save energy and the fuel consumed by its 15 000 vehicles (trucks, buses, taxis and boats) including reducing the idling time of road vehicles, maximising truck capacity, using gas as a fuel, replacing older vehicles and enforcing vehicle emission standards through annual and random roadside checks. It is anticipated that additional measures will be introduced to encourage or restrict the import of older, more polluting cars. Consideration is also being given to retrofitting existing cars with catalytic converters, and importing more cars with already fitted converters (Narkevitch, 2006).

In some countries there is an active policy of replacing older vehicles, particularly in publicly-owned fleets, with newer less environmentally damaging vehicles (see Box 7.9).

Bans on older vehicles, or vehicles without certain technological features, have also been put in place. In an effort to reduce emissions from cars, from 1 January 2007, Armenia banned the import of cars without catalytic converters. Laws are also being introduced to create air quality monitoring points and to introduce revised emission standards for vehicles. The intention is to introduce EU standards gradually (Tsarukyan, 2006). Legislation is currently being developed in Montenegro to address the problems arising from the import and use of second-hand vehicles, while in the former Yugoslav Republic of Macedonia and Serbia the import of second-hand cars more than six years old is banned. In many EECCA countries, e.g. in Kazakhstan, there are no restrictions on the import and use of older cars.

## 7.4 Conclusions

Given the diversity of countries covered in this report, it is difficult to generalise about transport solutions in the SEE and EECCA regions. Many SEE countries aspire to join the EU, while the economies of the Central Asian Republics are still linked to other countries of the former Soviet Union. However, it is possible to identify some common issues, barriers and opportunities that exist — at least to some extent — in most countries of the region.

### 7.4.1 Common issues

The transport sectors of the SEE and EECCA countries have reflected the economies of these countries for the last 20 years: gradual increases to 1990, then a sharp decline in the early and mid-1990s, followed by a recovery. In some countries transport, especially freight transport, has now recovered to above 1990 levels. The recovery of the transport sector has been fuelled by an increase in private road use, both for freight and passenger transport. Public transport has not been able to benefit from the increased demand in many countries, as a result of relatively poor levels of infrastructure, rolling stock and services, and due to a decline in investment in the 1990s. Investments have not risen to anything approaching pre-1990 levels, so the decline in infrastructure and service quality has not been reversed.

Car ownership and use are increasing in many countries. Even though the levels are still significantly below those of Western Europe, many cities in SEE and EECCA are suffering from congestion and air pollution, resulting from the increased use of automobiles. Consequently, municipal authorities are faced with local transport problems caused by increased car use and a decline in the use of public transport. In the absence of firm policy action, growing car traffic can literally crowd out public transport, while at the same time reducing demand for its services. This can lead to a downward spiral in what were in most cases historically very good levels of public transport availability.

The policy decisions taken in response to these problems are often not implemented in an integrated manner and are undertaken by different institutions. The fact that the problems caused by increased car travel are evident in cities has often led municipal authorities to channel limited resources into developing infrastructure for private transport, e.g. roads and car parks. Given the limited space for transport development in often-compact city centres, the result is that new roads and parking spaces are frequently replacing well-developed public transport networks, as well as urban green space, in order to meet the demand for car use. This investment in road infrastructure is further boosting car use to the detriment of the softer transport modes — walking and cycling — and of urban green spaces (Dimitrov, 2004). Worsening air pollution, particularly in urban areas, is exacerbated by an old vehicle stock, poorly maintained vehicles and poor testing systems. In addition, poor enforcement, e.g. with respect to fuel quality and the roadworthiness of vehicles, makes the problem worse.

### 7.4.2 Common barriers

Some of the principal barriers to a more sustainable transport system are financial. There are competing demands at national, regional and local levels for often limited financial resources. This has consequences both for the type of infrastructure that is constructed and where it is constructed. For example, investments in larger, inter-urban road projects are often more attractive to investors than smaller, local, public transport schemes or investment in infrastructure for the softer modes of cycling and walking. Even reliable statistics on walking, cycling and public transport use are often unavailable, reflecting the lack of priority or resources allocated to these modes.

In addition to financial barriers, there can be other obstacles to the maintenance of an integrated transport system. Public institutions may have been weakened by reduced funding, restructuring or the departure of key staff, and the privatisation of public transport services can reduce the ability of public authorities to control the quality or levels of the services provided.

In delivering freight services, private operators can often offer a more flexible and cheaper service than traditional rail transporters. These rail operators are often not sufficiently flexible to meet changing demands for their services. The rail infrastructure itself, having been designed in many cases around the needs of a centrally planned economy, is often poorly set up for dealing with new trade flows, for instance, from Eastern to Western Europe and vice versa. In contrast, a small road freight carrier with just one truck or a small fleet can offer a door-to-door service anywhere in Europe relatively cheaply and with a minimum of bureaucracy.

The vehicle stock is also in need of renewal. While some state and city authorities are investing in newer, cleaner vehicles, the economic situation of the general population means that they hold on to older, higher polluting cars. Furthermore, for those seeking to buy cars, when these are purchased, they tend to be older second-hand vehicles that pollute more and are imported from abroad. Financial restrictions, coupled with a lack of technical expertise, also mean that vehicles are frequently poorly maintained, and that emissions controls and fuel quality checks are either poorly or rarely performed.

While there is recognition of the problems of the supply side of transport, and measures are being taken to address this wherever possible, less attention is still being paid to the demand side. Institutional structures that might deliver a more integrated and coordinated approach are being developed, but are often still in their early stages and still do not exist at all administrative levels. The knowledge and understanding of the role of policy instruments, particularly the potential impact of economic instruments, are developing, but not appreciated as widely as they might be (ECMT, 2005). The lack of attention paid to the demand side of transport is reflected in a lack of public awareness of the issues. This situation is not helped by the fact that few non-governmental organisations are working on transport policy and contributing to an increased awareness of the problems.

At strategic level, a real vision of a future transport system in which both demand and supply considerations are taken into account is often lacking. In the shorter-term the regulatory framework is not developing as fast as the situation on the ground, where the regulation of the increasing number of privately-owned public transport operators is currently weak (ECMT, 2005).

#### *7.4.3 Opportunities for the sustainable consumption of transport*

On average, mobility in SEE and EECCA countries is not yet anywhere near that of Western Europe. In SEE the situation is closer to Western Europe, with the proportion of public transport used for both freight and passenger transport on the decline, while car ownership and use increases. In EECCA countries the proportion of travel undertaken on public transport is still relatively high, although the use of private road transport is increasing. The problems associated with an increasing use of cars, e.g. urban air pollution and congestion, are being experienced in many cities of the region from Zagreb in the west to Almaty in the east. In view of the relatively low level of car ownership and use, there is the potential for the countries of the region to make the consumption of the increased mobility that will no doubt accompany the economic revival as sustainable as possible. In terms of policies, the key to this is ensuring that the retention, development and improvement of public transport and demand measures are not neglected by, and are indeed integrated into, the evolving policy framework. However, for this to happen, institutional capacity needs to be increased and policy frameworks need to be developed.

Within these frameworks, concerted action will be needed to influence individual behaviour both directly and indirectly. A range of policy instruments such as pricing can be used to reinforce sustainable behaviour, but this should be reinforced by demand management and a wide range of measures to improve public awareness and information regarding the environmental impacts of transport.

Regarding freight transport, the freight intensity in the SEE and EECCA countries is likely to be much higher than it is in the older EU member states (e.g. EEA, 2002). That is to say, it is likely that at present it takes significantly more freight movements to generate a given amount of GDP in these countries than it does in the more developed economies. So, as these economies themselves

develop, a combination of greater efficiency and economic restructuring may lead to improvements in freight intensity.

### *A coordinated, integrated strategic approach*

At strategic level, therefore, where national or city-wide transport strategies are being developed, these need to contain a long-term vision of the transport system of the country or city, with a view to managing the increasing demands for mobility that will accompany economic recovery (e.g. ECMT, 2005). Where such transport strategies do not exist, they should be developed to ensure that new problems, e.g. climate change, are integrated into transport policies. On the supply side, the provision of infrastructure must recognise the potential benefits of public transport services to the sustainable consumption of transport and ensure that this is maintained and developed in coordination with the provision of infrastructure for private road transport. New road construction must also take into account the needs of pedestrians and cyclists, both in urban and rural areas. The key to this is a better integration of transport considerations into urban planning and broader spatial development. It is also important to recognise that investment in transport infrastructure, for private and public transport, will increase the capacity of the transport network and thus increase transport use and potentially the adverse environmental and social impacts of transport. Hence, parallel measures must be taken to mitigate potential adverse effects.

The implementation of such transport strategies will require the existence of supportive institutional and administrative structures to ensure that policies are integrated and coordinated, vertically and horizontally, well implemented and resourced, and well enforced. Better statistics will also be needed to help to monitor transport trends and the impact of policy interventions. There needs to be a better understanding among policy-makers of the links between transport, environment and health. In this context the ongoing work around the development of the UNECE/WHO-led pan European Programme on Transport, Health and the Environment (also known as the PEP) <sup>(3)</sup> could be a valuable resource and opportunity (e.g. Dimitrov, 2004). More use could also be made of policy assessments, whether they are integrated environmental and health impact assessments or strategic environmental assessments, to ensure that policies and programmes do take

wider environmental and health considerations into account (e.g. ECMT, 2005).

The importance of public support for policies, especially those aimed at managing transport demand, should not be overlooked. The awareness of the public, in relation to the links between transport, the environment and health, also needs to be increased through better communication of the issues and the potential solutions. One means of doing this is through the measurement and dissemination, by press and internet, of air quality monitoring information accompanied by a clear explanation of the potential adverse impacts on health. This will help build public support for the necessary measures to improve air quality (e.g. Kok and de Koning, 2003). This requires air quality monitoring networks to be adequately financed. In the longer term similar action could be taken concerning noise.

### *Maximising the potential for public transport*

Public transport receives significantly less investment than it did in the centrally-planned economies of the 1980s. To make matters worse, it now has to compete for limited financial resources with the increasing demand for an expanded infrastructure for private transport. However, public transport has a potentially significant role to play in the sustainable use of transport. This potential should be maximised by integrating the development of the public transport infrastructure within the development of the wider transport system — in other words, ensuring that the development of the public transport infrastructure is complementary to the infrastructure for private transport.

The first step in this process is simply to preserve the public transport systems that still exist and to ensure that these are sufficiently funded to retain existing and to attract new users. The development of a public transport infrastructure should then be considered as an integral part of a general transport plan, so that it is developed to complement the road network, rather than be replaced by it. In the longer-term public transport operations must be put on a more sustainable basis, from the financial and administrative points of view, with reforms to ensure that services can be maintained, developed and delivered well into the future.

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<sup>(3)</sup> For more details see <http://www.thepep.org/en/welcome.htm>.

Traffic management is also a tool that can be used to support public transport. Priority measures, including dedicated lanes and traffic light settings, can favour trams and buses over private transport. Computerised traffic management systems can likewise help to improve traffic flow and to ease congestion. The recent proliferation of privately-owned buses is potentially complementary to the state-owned public transport systems, although concerns about the safety of these privately-owned buses will need to be addressed. Finally, in order to ensure that environmental considerations are taken into account in the construction of infrastructures, wider, better and more consistent use of environmental impact assessments is essential.

### *Influencing demand*

Demand can be influenced by a range of different measures — from encouraging the use of more sustainable modes of transport ('carrots') to discouraging the use of more environmentally-damaging modes of transport ('sticks'). Again, the maintenance and development of public transport services is crucial to providing the capacity and quality of services to attract people to use public transport and therefore maximise its contribution to the sustainable consumption of transport. In this context, it is not just the quality of the infrastructure that is important, but the services, including the quality of the vehicles and ticketing systems (e.g. Dimitrov, 2004).

On the other hand, private car transport remains relatively cheap to use as the costs of the numerous environmental impacts listed in this chapter have not been fully internalised. Meeting these costs through higher fuel prices or some form of road fees could also be an important component of traffic demand management.

While developing urban transport systems, it is important neither to forget nor to neglect the potential that the use of the softer modes have in the sustainable consumption of transport. The needs of pedestrians and cyclists should also be taken into account when developing transport systems, particularly those in urban areas (e.g. ECMT, 2005).

### *Greening the vehicle fleet*

Finally, in order that transport consumption be handled more sustainably, it is important to ensure that the adverse environmental impact of the

vehicles that are used be minimised as much as possible. In this respect measures need to be put in place to improve the environmental performance of the vehicle fleet.

Much of the vehicle fleet in SEE and EECCA countries is relatively old and therefore the fleet is in need of renewal. Given that many countries in the region have little or no domestic vehicle production, policies focusing on controlling the characteristics of the vehicles imported into the country can be a useful tool to improve the environmental performance of the vehicle fleet. This should, of course, be supported by national legislation, establishing emissions standards for newly registered vehicles, that effectively require certain technologies, i.e. catalytic converters, to be fitted in newly-registered cars. Bans on the import and registration of older vehicles or vehicles without catalytic converters might be considered. Where there is domestic production of vehicles, emission standards should be introduced that require the use of more advanced technologies. Emission standards for domestically-produced and imported vehicles should be regularly updated, and eventually brought into line with stricter international standards, to ensure that the adverse environmental and health impact of new vehicles is minimised.

Fiscal instruments could be used to influence the type of car that is imported. For instance, import taxes could be differentiated to encourage the import of smaller, newer and less polluting vehicles. Annual road taxes could also be differentiated to encourage the purchase and use of such vehicles. Tax reductions for older vehicles should be phased out. Active policies involving scrapping incentives could also be put in place to phase out and then to ban the use of the oldest, most polluting vehicles. Consideration, of course, would have to be given to the potential economic and social implications of such a measure, but these could be addressed by phasing in the policy, communicating it to the public well in advance, and providing incentives towards the purchase of newer, less polluting vehicles.

It is important to ensure that vehicles, once in use, maintain their environmental performance. So, regular inspections of passenger and freight vehicles, including their emissions performance, need to be carried out, and where such programmes are already in place, properly enforced. These programmes and their enforcement have to be adequately funded and be undertaken by personnel with sufficient technical expertise.

Where vehicles fail such tests, it is fundamentally important that the required remedial action be undertaken or the vehicle have its licence withdrawn (e.g. Kok and de Koning, 2003). Given the poor quality of much of the vehicle fleet in some countries, a phased introduction of these requirements, allowing some time for remedial action to be implemented for those vehicles that narrowly fail to meet the requirements, might be a useful way forward. Once operational, inspection standards could be tightened so that the average performance of the vehicle fleet continues to improve over time.

Finally, the quality of the fuel used in the transport sector is also extremely important to the environmental performance of the vehicle fleet. Fuel quality can be improved in the same way as vehicle technology: by regulating the content of imported or domestically-produced fuel; by banning the use of lead and reducing the sulphur content of fuels; by using fiscal instruments to encourage the use of cleaner or alternative fuels; by differentiating fuel duties in favour of cleaner fuels; and by regularly testing fuel to ensure its quality.

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# 8 Waste



Location of city studies covered in this chapter

## Facts and figures

- Total waste generation per capita in EECCA countries is high compared with other regions in the world. It is estimated at 14 tonnes per year compared with 4 tonnes in the EU. Per capita waste generation in 2004 ranged from 285 kg in Azerbaijan to over 18 tonnes in the Russian Federation.
- A substantial part of waste generated in the EECCA countries is hazardous. Between 400 and 500 million tonnes of hazardous waste are generated in the EECCA countries every year, constituting 12–18 % of total waste generation.
- The average rate of generation of municipal waste per capita in the EECCA and SEE countries is between 250 and 280 kilograms per year, and is lower than the average level of 550 kg per capita in EU.
- Limited progress has been achieved in recent years in reuse or recovery of resources in municipal waste. The situation is somewhat better for industrial waste.
- Almost none of the landfills operated in the EECCA and SEE countries have an installation for landfill gas collection. Methane collection reduces greenhouse gas emissions and has a considerable value under the Kyoto protocol. The economic returns generated could offset investments in methane collection and finance additional improvements in landfill operations or other waste management initiatives.
- In many cases municipal waste management systems have to undergo major modifications. Lessons could be learned from the experiences in the EU concerning more SCP-oriented waste management.

## 8.1 Introduction

Waste is generated by almost all economic activities: extraction of resources, production and manufacturing activities, distribution and transport, consumption or even management of the waste itself.

Waste has many impacts on the environment, including pollution of air, surface water bodies and groundwater. Moreover, valuable space is taken up by landfills and poor waste management causes risks to public health. Waste generation and disposal represent a loss of natural resources. Therefore, sound management of waste can

protect public health and the environment while at the same time reducing the demand for natural resources.

Better management of waste — by ensuring higher standards at waste facilities, more effective waste prevention initiatives and increasing reuse or recovery of resources in waste — can result in a considerable reduction of direct emissions into the environment. In addition, it also safeguards renewable and non-renewable resources. Reducing the amounts of waste generated across all economic activities, including production and consumption phases requires a holistic approach for which SCP is particularly suitable.

## Objectives and approach

This chapter focuses primarily on the environmental pillar of sustainability. Economic and social issues related to waste remain an important concern and are also addressed where appropriate. The objectives of this chapter include:

- 1 Describing past trends and the present situation with respect to the generation and management of waste in the EECCA and SEE regions.
- 2 Assessing the status of municipal and hazardous waste management to present successes and failures of current practice and identify the main driving forces of development of waste management at the municipal level. Four major cities in SEE and EECCA are used as examples.
- 3 Determining the commonalities and differences among the countries which are currently making progress in waste management, and identifying opportunities for benchmarking and mutual learning.

Policies used in waste management — including waste prevention initiatives — are reviewed to demonstrate the opportunities that arise from the use of resources contained in waste, thus contributing to SCP.

Data used in this chapter are mainly drawn from a UN-led waste reporting study conducted in 2006, and complemented where appropriate with data from 'state of environment' reports published by individual countries. In general, information is presented at regional level, supplemented by more detailed examples at country level. However, it should be noted that the availability, quality and comparability of waste data are generally poor, and it has proved difficult to compile time series. Accurate data on the composition of industrial and manufacturing wastes were especially scarce.

The city studies were conducted for this report by local experts. They outline the situation and policy initiatives on waste in Belgrade (Serbia), Bishkek (Kyrgyzstan), Dnipropetrovsk (Ukraine) and Tbilisi (Georgia). These studies were carried out during the second half of 2006.

Radioactive waste is not dealt with in the chapter since its analysis demands a completely different approach.

## 8.2 Trends and the current situation

### 8.2.1 Legacy in waste management

In the centrally-planned economy of the former Soviet Union, waste management did not sit high on policy agenda. The Soviet Union generated large amounts of waste but failed to manage them in an appropriate manner. Significant amounts of radioactive waste, chemical weapons, toxic missile fuel and other hazardous waste were stored in mines and at industrial and military facilities. Almost all municipal waste was disposed of at poorly managed landfills or in city dumps which lacked basic sanitary and environmental provisions. Public awareness of waste issues was low, and there was no attempt to describe the cost of waste (Cherp and Mnatsakanian, 2003).

At the same time there were some positive aspects of the Soviet system with respect to waste management. Firstly, the generation of household and municipal waste and, especially, packaging waste was much lower than in most developed countries. Secondly, the rates of car ownership, and consequently the number of end-of-life waste vehicles, were also much lower. Thirdly, systems were in operation to recycle paper and ferrous metals as well as reuse glass bottles. Many materials were also reused and recycled in households.

The quantities of waste generated in EECCA decreased somewhat during the 1990s, although this was largely a result of the economic crisis rather than of an improved policy approach. Many of the existing reuse and recycling systems stopped functioning. Since the recycling industries no longer received sufficient quantities of materials and were not competitive in the newly opened international marketplace, many of these companies went out of business. After the break-up of the Soviet Union large amounts of waste no longer had 'an owner' and many industrial and military sites were abandoned with large stockpiles of hazardous waste.

Due to the economic recession and increasing decentralisation, most municipal waste management equipment has not been replaced since the early 1990s. The development of waste management strategies and regulations, and the progress made in municipal waste planning have all been slow. Waste was not — and is still not — regarded as a significant threat to the environment and human health, nor is it perceived as a potential source of valuable resources.

In most SEE countries existing waste management systems were negatively affected by the break-up of the former Yugoslavia and the civil war that followed. Poorly operated or abandoned mining sites and associated processing activities (e.g. heavy metals and cyanide) have caused severe water pollution (UNEP, 2006c). Significant quantities of waste are dumped at illegal sites, and the existing capacity of legal landfills is not sufficient to handle the growing quantities of waste. The technical standards for landfills are not in compliance with international norms, and hazardous substances leach to soil and groundwater. A growth in migration from rural to urban areas is expected to lead to the increased generation of municipal waste in large cities. However, in general, the collection rate of municipal waste is low. Most rural areas do not have waste collection at all, and as these areas are often depopulated, it is relatively expensive to introduce waste collection schemes.

A further challenge has been the slow development of institutional capacities and the lack of adequate legislation and policies to manage waste and recover resources from it. Specific waste management and hazardous waste plans have yet to be approved in most countries. The level of environmental awareness concerning waste among citizens of the SEE countries is considered very low (REC, 2003; UNEP, 2006c).

The remainder of this section reviews past trends and the current situation using available statistics and information from the last ten years. However, as mentioned earlier, the availability of data on waste generation and management in the EECCA and the SEE countries is limited, and coverage was especially poor during the 1990s.

### 8.2.2 Total waste generation

Total waste generation per capita in EECCA is 14 tonnes per year, which is relatively high compared with other regions in the world (e.g. 4 tonnes in the EU). Such high waste generation reflects the fact that the industrial sector in EECCA is dominated by raw material extraction and processing, which generate large quantities of waste. As shown in Box 8.1 and Table 8.1, the mining and metallurgy sectors are

**Table 8.1 Waste generation by source in the Russian Federation (2004)**

Type of industry	% of total waste generation
Coal	56
Non-ferrous metallurgy	18
Ferrous metallurgy	16
Chemical industry	5
Power generation	2
Municipal waste	1–2
Construction materials	1
Food	0.61
Other industries including gas and oil producing and processing	< 1

**Source:** SOE Russia, 2004.

the main contributors to total waste generation in the EECCA and SEE countries

Figure 8.1 shows trends in total waste generation for five EECCA countries since 1995. Waste generation has risen in the period 1995–2004 in all countries except Moldova (¹), with the increase ranging from 22 % in Ukraine to 94 % in Azerbaijan. Figure 8.1 also includes information on the growth of GDP, showing a clear correlation between economic growth and rising waste generation.

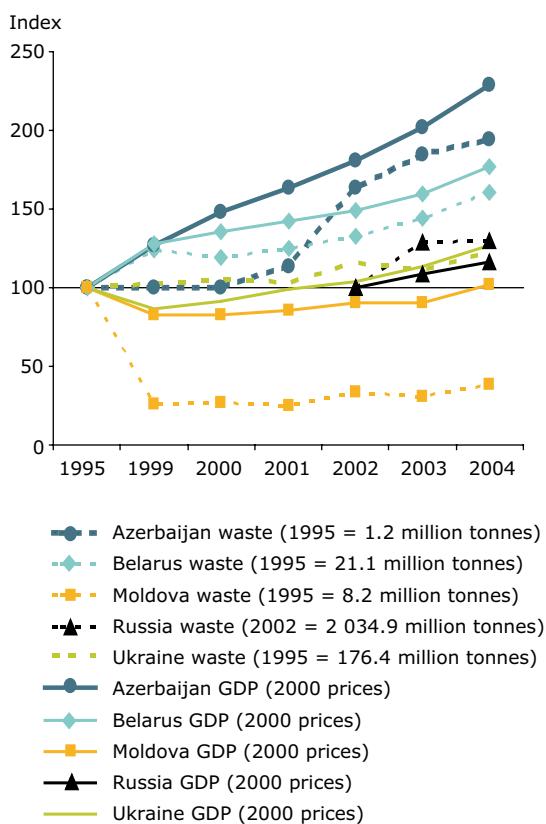
Due to poor data availability it was difficult to estimate total waste generation in the SEE countries, especially during the 1990s. In Croatia total waste generation increased from about 4 million tonnes in the late 1990s to 10.6 million tonnes in 2004. In Serbia waste generation rose from a very low level of less than 1 million tonnes in 2002 to about 9 million tonnes in 2005 (Note: the very low registered level is probably the result of poor data quality).

The high share of the mining and metallurgy sectors in total waste generation is illustrated in Table 8.1, which presents waste generation by sector in the Russian Federation in 2004.

There are large differences in waste generation between individual EECCA countries. Per capita

(¹) The decline in Moldova between 1995 and 1999 is explained by the lack of data from Transnistria. This break-away region, where all industry is located and which declared independence in the first half of the 1990s, ceased to report information to the Moldovan government.

**Figure 8.1 Total waste generation and GDP in the EECCA countries (1995–2004)**



**Note:** Reference year (index) was 1995 = 100 and GDP in 2000 constant prices.

**Sources:** UN survey, 2006; SOE Russia, 2004; World Bank, 2006.

**Table 8.2 Total waste generation in kilo per capita (2002–2004)**

Country	2002	2003	2004
Russian Federation	13 908	17 987	18 053
Kazakhstan	9 183	9 537	9 834
Ukraine	4 098	3 950	4 419
Belarus	2 799	3 038	3 408
Republic of Moldova	642	594	738
Azerbaijan	243	274	285
EU-15 + EFTA	3 475	3 374	3 349
NMS-10	3 289	3 380	3 548

**Note:** The figures for Kazakhstan include only hazardous waste generation.

**Sources:** UN survey 2006, SOE Russia, 2004, ETC/RWM extrapolations. UNECE, 2000; Kazakhstan MEP, 2006a; Eurostat, 2007.

waste generation in 2004 ranged from 285 kg in Azerbaijan to over 18 tonnes in the Russian Federation (Table 8.2). The Russian Federation and Kazakhstan have very high waste generation levels due to extensive mining and processing activities; they are followed by Ukraine and Belarus. Meanwhile, Moldova and Azerbaijan show quite low average figures. This may be partially the result of poor statistics on waste, but it could also reflect the fact that a huge sectors of industry closed down following the break-up of the Soviet Union.

### Box 8.1 Coal mining and waste generation

In Ukraine coal extraction and metallurgy account for about 90 % of total waste generation. Extraction of coal, the largest single source of waste, generates almost as much solid waste as the amount of the extracted coal. In addition to solid waste, coal extraction generates large amounts of gases and wastewater. According to recent estimates for underground mining (Myronchuk, 2006), production of 1 000 tonnes of usable coal results in the generation of:

- 800 tonnes of mining waste
- 1.5–9 thousand m<sup>3</sup> of mining waters
- 50–570 thousand m<sup>3</sup> of methane
- 7.5–15 thousand m<sup>3</sup> of carbonic gas
- 5.5 thousand m<sup>3</sup> of oxides
- 120 tonnes of coal dust

Open pit (surface) mining of coal and underground coal mining differ in terms of the types and amounts of waste generated. Surface mining generates more solid waste, whereas underground mining generates more liquid wastes.

### 8.2.3 Hazardous waste

Hazardous waste contains substances which, even in small quantities, can be irritant, toxic, inflammable or otherwise harmful. So, proper collection and handling of hazardous waste is crucial for protecting the environment and public health.

#### Generation of hazardous waste

Between 400 and 500 million tonnes of hazardous waste are generated in the EECCA countries every year, constituting between 12 % and 18 % of total. In the EU-25, by comparison, hazardous waste accounts for approximately 3 % of total waste generation.

One of the reasons behind the high rate of hazardous waste generation in the EECCA countries is the structure of their economies, which contain many pollution-intensive industries and lack appropriate clean-up technologies (see Chapter 4). When comparing the EECCA figures with those of other countries, it is important to keep in mind that the definition of hazardous wastes is also quite broad in EECCA.

Most EECCA countries use a waste classification system based on the former Soviet system dating back to the early 1990s. The classification of waste is based on the hazardous nature of the compounds and the content of the dangerous substances. Wastes are classified according to different hazard classes, and not simply as 'hazardous' or 'non-hazardous' as in most of EU Member States. The classification rules used in EECCA

usually divide wastes into four, sometimes five, hazard classes, where hazardous class V waste is considered to be 'practically' non-hazardous. Most hazardous class IV and some hazardous class III wastes in EECCA would be considered non-hazardous in the EU and OECD Member States. For instance, mixed municipal waste is often classified as Class IV hazardous waste, and Russian Federation regulations permit the disposal of some hazardous class III and most hazardous class IV waste in municipal solid waste landfills.

Generation of hazardous waste has increased in the EECCA countries over the last ten years (Table 8.3). Total EECCA figures on hazardous waste are now 25 % above 1995 levels, but hazardous waste generation is very unevenly distributed among the individual countries and shows a strong fluctuation over time. Countries with significant activities in the mining, extraction and heavy manufacturing industries also generate the highest levels of hazardous waste.

Kazakhstan in particular generates significant amounts of hazardous waste per capita, ten times higher than those of the Russian Federation and Ukraine. Of the hazardous waste in Kazakhstan, 55 % comes from the mining industry and approximately 40 % from the processing industries, namely the metallurgical and chemical sector. Even though 98–99 % of the hazardous waste in Kazakhstan belongs to class IV hazardous waste, the hazardous waste problems are still enormous. 15.3 million tonnes of lead waste; 3.4 million tonnes of asbestos waste and 5 000 tonnes of arsenic waste were generated in 2003 (Kazakhstan MEP, 2006b).

**Table 8.3 Total hazardous waste generation per capita in selected EECCA countries**

Kilo per capita	1995	1999	2000	2001	2002	2003	2004
Armenia	0.3	0.3	0.6	0.5	0.4	0.1	0.2
Azerbaijan	4	2	3	2	1	3	1
Belarus	89	73	72	98	116	118	155
Kazakhstan	4 562	5 909	6 682	8 628	9 183	9 537	9 834
Kyrgyzstan	1 030	1 303	1 313	1 299	1 339	1 306	1 294
Republic of Moldova	0.6	0.4	0.6	0.5	0.5	0.5	0.2
Russian Federation	563	731	866	948	1 420	1 964	981
Ukraine	2 517	1 733	1 608	1 546	1 562	1 606	1 292
EECCA	1 184	1 208	1 308	1 461	1 784	2 143	1 502

**Sources:** UN survey 2006; SOE Russia, 2004; ETC/RWM extrapolations; UNECE, 2000; Kazakhstan MEP, 2006a; World Bank, 2006.

Meanwhile, Moldova and Azerbaijan reported hardly any hazardous waste generation at all, although it is not clear whether this represents reality or is a reflection of deficient waste reporting systems.

Table 8.4 shows a breakdown of hazardous waste by the different hazard classes in five EECCA countries, based on information available for various periods between 1995 and 2004. Except for Armenia, most of the hazardous waste generated in the five EECCA countries belongs to the less harmful class IV.

Little data are available for hazardous waste generation in the SEE countries for the past ten years (Table 8.5).

The growth in hazardous waste generation in Serbia is the result of increasing waste from mining activities. Lead, zinc and copper ores are mined in significant quantities in Serbia and lignite is the main energy source (Serbia MME, 2002). In the former Yugoslav Republic of Macedonia 98 % of hazardous waste originates from mining. Meanwhile, it seems

that the low figures on hazardous waste in Albania, Bosnia and Herzegovina and Croatia are due to the fact that hazardous waste from industrial activities (including mining) is not reported. In recent years the former Yugoslav Republic of Macedonia and Serbia have established systems for better registration (Table 8.5).

In addition to generating large amounts of waste, many of the mining and extraction sites in the SEE region are considered 'environmental hotspots'. In a recent survey UNEP identified more than 180 major problematic sites (UNEP, 2006c).

#### *Management of hazardous waste*

Hazardous waste generated and accumulated during the Soviet period caused problems that still persist today in many EECCA countries. Limited attention was paid at that time to the environment and health, and various hazardous wastes were stored under inappropriate conditions. After the break-up of the Soviet Union much of this waste was abandoned with no legal successor to take responsibility for it,

**Table 8.4 Generation of hazardous waste in selected EECCA countries, in percent, by class of hazard**

	Years included	Class I	Class II	Class III	Class IV
Armenia	1999–2003	0	69–83	9–100	4 to –22
Belarus	2002–2003	0	0–1	5 to –7	93–94
Kazakhstan	1995, 1999	0	0	0 to –1	98–99
Russian Federation	2002–2004	0	1	2 to –9	90–97
Ukraine	1995, 1999, 2004	0	0	2 to –3	96–97

**Sources:** SOE Russia, 2004; SOE Belarus, 2004; UNECE, 1999; UNECE, 2000; UNECE, 2005; UNECE, 2006; Kazakhstan MEP, 2006a; UNITAR, 2006.

**Table 8.5 Hazardous waste generation in SEE, total amount in tonnes, and kilograms per capita (1999–2005)**

SEE	1999	2000	2001	2002	2003	2004	2005	Average kilograms per capita
Albania	34 600							11
Bosnia and Herzegovina				34 000*				9
Croatia	9 422	25 999	58 285	47 443	48 141	42 293		2–13
FYR of Macedonia							4 630 064	2 276
Serbia				208 000	253 000	486 000	858 000	26–105

**Note:** \* The figures include hazardous waste except industrial hazardous waste. The low figures for Croatia result from the fact that many companies do not report data. A rough estimation is that in total 200 000 tonnes hazardous waste are generated per year (Croatia, 2007). In 2005 the figure for the former Yugoslav Republic of Macedonia was 4.63 million tonnes.

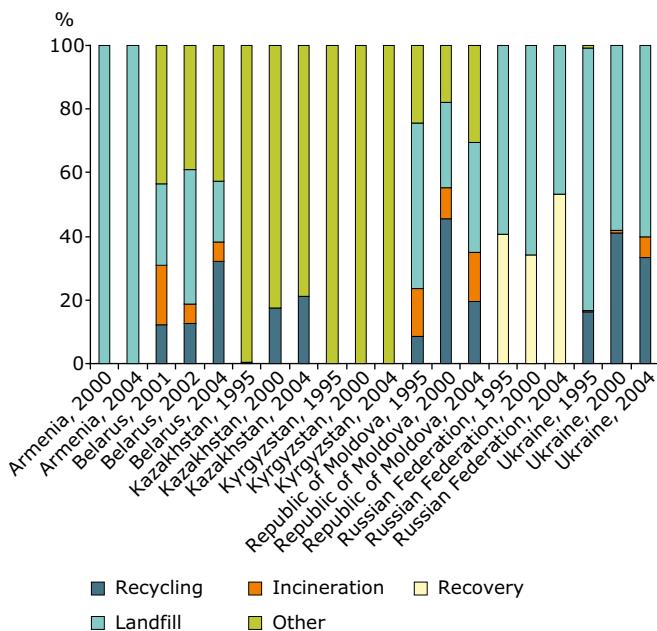
**Sources:** UN survey, 2006; REC, 2006.

and often the qualified technical staff migrated to other countries. The smaller EECCA countries in particular have a limited capacity for dealing with this problem.

Ensuring proper management of hazardous waste remains a big challenge for the EECCA countries and only a small proportion of it is recycled or treated properly. Most of the hazardous waste currently generated in EECCA countries is landfilled or stored (category 'other' in Figure 8.2) on mining and industrial sites. It is estimated that in Kazakhstan 6.7 billion tonnes of hazardous waste has already been accumulated, and the quantities continue to grow (Kazakhstan MEP, 2006b).

Evidence suggests recycling and recovery of hazardous waste started to increase after 2000. In the Russian Federation and Ukraine, the countries with the largest generation of hazardous waste, between 30 % and 50 % of hazardous waste is now reported as recovered or recycled. This could in part be explained by the implementation of the Basel Convention and the Stockholm Convention (see Section 8.3.3).

**Figure 8.2 Hazardous waste treatment/disposal in selected EECCA countries**



**Note:** The Russian Federation data only include figures for recovery and not for recycling and incineration. The category 'other' covers different kinds of disposal activities, i.e. not recovery treatment. Release into water bodies and permanent storage are included here.

**Sources:** UN survey, 2006; UNEP, 2006a.

In SEE countries, management of hazardous wastes also remains a challenge. Major problems include:

- continuing operation of unregulated facilities which pose a direct risk to the environment;
- hazardous waste lingering in several sites which need clean-up prior to future land restoration;
- poorly developed hazardous waste disposal and recovery technologies, offering few alternatives to landfilling;
- lack of regional facilities for the disposal of hazardous waste (landfills and incinerators) which comply with modern technical standards;
- poor economic performance and low production levels in many industrial enterprises hinder the construction of the necessary treatment and disposal facilities;
- inadequate hazardous waste legislation;
- lack of sufficient and reliable information on quantities, composition and characteristics of waste (REC, 2003).

By 2006, there was no sign of improvement in hazardous waste treatment facilities (REC, 2006). However, some progress had been made in developing strategies and legislation on hazardous waste. As with the EECCA countries, some of this progress could be seen as a consequence of international obligations under the Basel and Stockholm Conventions. For example, the former Yugoslav Republic of Macedonia submitted an implementation plan of the Stockholm Convention on persistent organic pollutants, while Albania implemented the amendments of the Basel Convention. The effort to join the EU has been a driving force in Croatia which transposed EU hazardous directives, implemented the European Waste Catalogue List and set up a hazardous waste charge system. Finally, Serbia adopted laws on the handling of hazardous waste products and established an Environment Protection Agency.

#### 8.2.4 Industrial and manufacturing waste

Currently, the accumulation of industrial waste continues in much of the EECCA and SEE regions. This is a combination of new waste produced

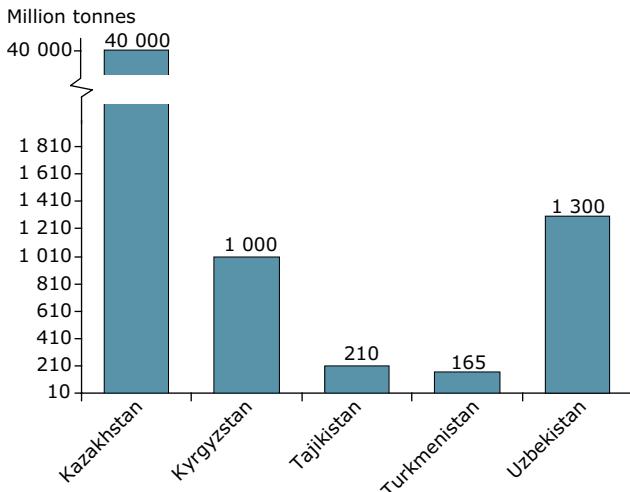
in ongoing industrial activities and the waste accumulated as a legacy of the past (see Figure 8.3).

In Kazakhstan, the amount of already accumulated industrial waste has been estimated at 40 billion tonnes (Figure 8.4). In addition, 4 billion tonnes of industrial wastes are generated annually, of which only 280 million tonnes (7 %) are recovered or reused. This clearly demonstrates the need and the existing potential for improving waste management systems.

Recycling in the EECCA and SEE countries tends to be focused on industrial waste, driven by economic factors. In the Russian Federation, for example, the recycling of waste is mainly carried out with non-ferrous metals and ferrous metals (SOE Russian, 2004). The potential for greater recycling of industrial waste seems high; the Russian Council of Scrap Dealers predicts a rise in the recycling of scrap metal from 28 million tonnes in 2004 to 40 million tonnes over the next five to eight years (Waste Tech Conference, 2005).

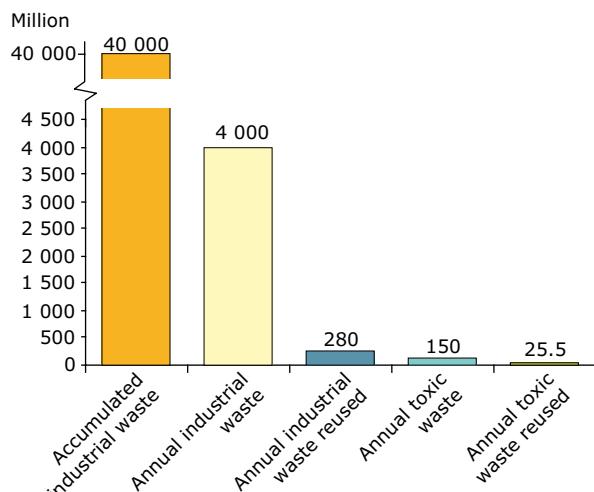
Nevertheless, much still remains to be done. In Ukraine, for example, only 10 % of all steel and coal waste is recovered. The technology for recovering steel-making and coal waste exists and is already commonly used in the EU, North America, India and Japan. However, this technology is only in operation in one facility in Ukraine, and the most common way of dealing with steel-making and coal waste is accumulation in landfills. The main obstacles to improving this situation are the outdated approach to waste management and

**Figure 8.3** Accumulated volume of industrial wastes in five Central Asian countries



Source: UNEP, 2006b.

**Figure 8.4** Industrial waste generation and accumulation in Kazakhstan



Source: UNEP, 2006b.

a lack of investment in advanced technologies (Myronchuk, 2006).

Strong economic incentives alone can only go so far in driving forward improved industrial waste management. They must be supported by a well-designed regulatory and institutional framework. For example, industrial waste management problems in Central Asian countries are made more complicated by the non-rational use of minerals, insufficient access to specialised technologies, and the absence of waste management facilities. Existing waste management systems in Central Asian countries are considered 'unmanageable and ineffective' (UNEP, 2006b).

Significant investments will be necessary to improve industry's environmental performance and reduce both the generation of industrial waste and landfilling. In the EECCA and SEE countries, the main challenge is to provide economic incentives, implement an appropriate regulatory framework and enforce it.

## 8.2.5 Municipal waste

### Trends in generation and composition

The average rate of generation of municipal waste per capita of 250–280 kg per year in the EECCA and SEE countries is still much lower than the average level in the EU of 550 kg per capita. At present, municipal waste constitutes a minor part (between 2 % and 5 %) of the total waste generated in most

EECCA countries. This is due to the high generation of waste in mining and extraction. In 2004, the eight EECCA countries included in Figure 8.5 generated a total of approximately 66 million tonnes of municipal waste. The growth of municipal waste generation in the EECCA countries has been high since the late 1990s, and in several countries it has reached 8 to 10 % annually. The annual average increase in the eight EECCA countries as a group was 4 % for the period 1995–2004.

In the SEE countries, total municipal waste generation was approximately 7 million tonnes in 2004. The share of municipal waste in total waste is larger than in EECCA, accounting for between 10 % and 20 %. The amount of municipal waste generated in the SEE countries increased by 3 % in the period from 1999 to 2005. On the per capita basis, it was comparable to the levels in the EECCA countries.

The rising quantities of municipal waste are a problem exacerbated by existing shortcomings of the collection systems. In many countries little or no investment has been made since 1990 to upgrade municipal waste management systems. But in recent years there have been emerging examples of major cities in some EECCA countries, such as Tashkent

in Uzbekistan and Tbilisi in Georgia, making the necessary investments in new waste bins, collection trucks and transfer stations.

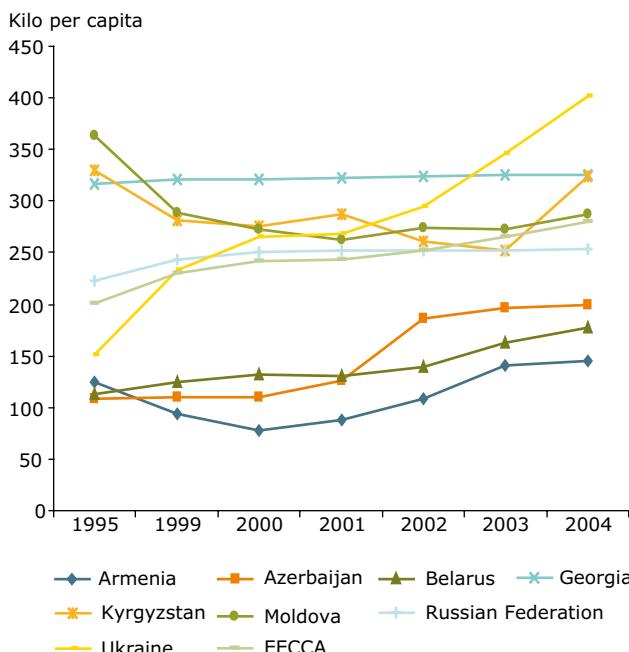
Experts often note that the composition of municipal waste is changing, and that there is an increasing share of plastic waste. For example, in Tbilisi, the amount of plastic waste (measured in volume) has increased considerably in the last 10–15 years. However, the data are generally quite patchy. From the reported national statistics measured in tonnes, it is not possible to assess conclusively whether the amount of plastics in municipal waste is indeed increasing. Meanwhile, the share of paper and cardboard is reasonably high even though it varies a great deal from country to country (Figure 8.7). The high proportion of paper and cardboard suggests a major potential for recycling.

The composition of household waste typically varies quite strongly by season (see Box 8.2).

#### Use of resources in municipal waste

Very limited progress has been made in the reuse or recovery of resources in municipal waste over

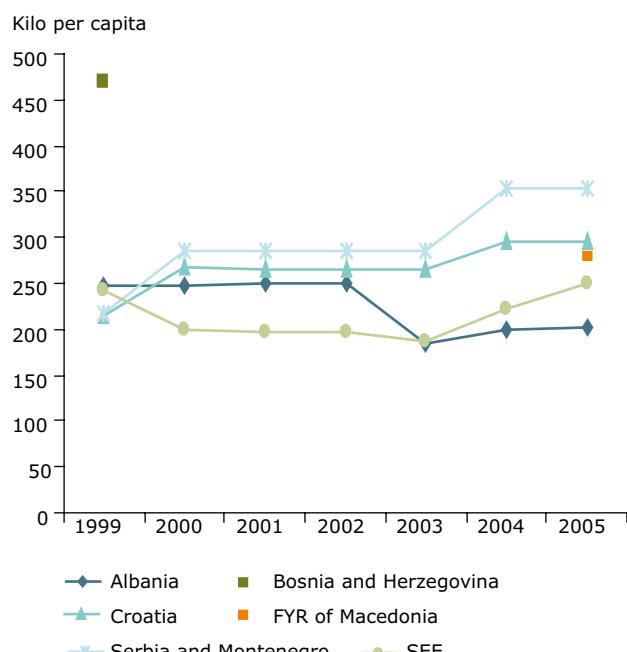
**Figure 8.5 Municipal waste generation in kilograms per capita in the EECCA countries (1995–2004)**



**Note:** Georgia has reported the same total MSW amount for the entire period.

**Sources:** UN survey, 2006; UNSD, 2004; SOE Russia, 2004; ETC/RWM extrapolation and calculation.

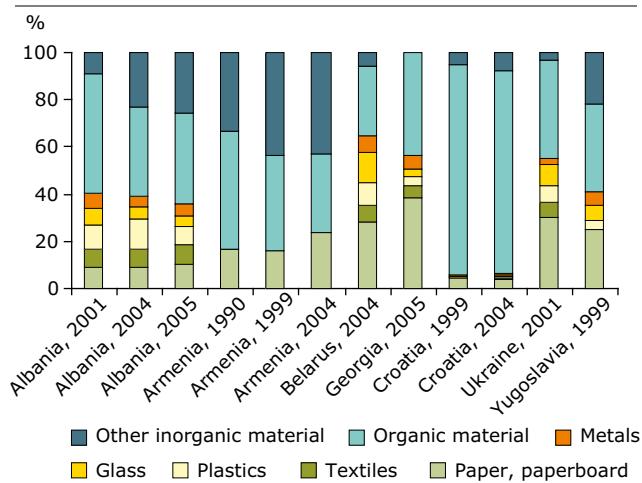
**Figure 8.6 Municipal waste generation in kilograms per capita in the SEE countries (1999–2005)**



**Note:** For Bosnia and Herzegovina figures are only reported for 1999; for the former Yugoslav Republic of Macedonia only for 2005.

**Sources:** UN survey, 2006 and ETC/RWM extrapolations.

**Figure 8.7 Municipal waste composition in selected EECCA and SEE countries**



**Note:** Some of the figures cover only larger cities. For example, Kiev represents Ukraine and Belgrade represents Yugoslavia.

**Sources:** UN survey 2006; COWI, 2004; Linzner, 2004.

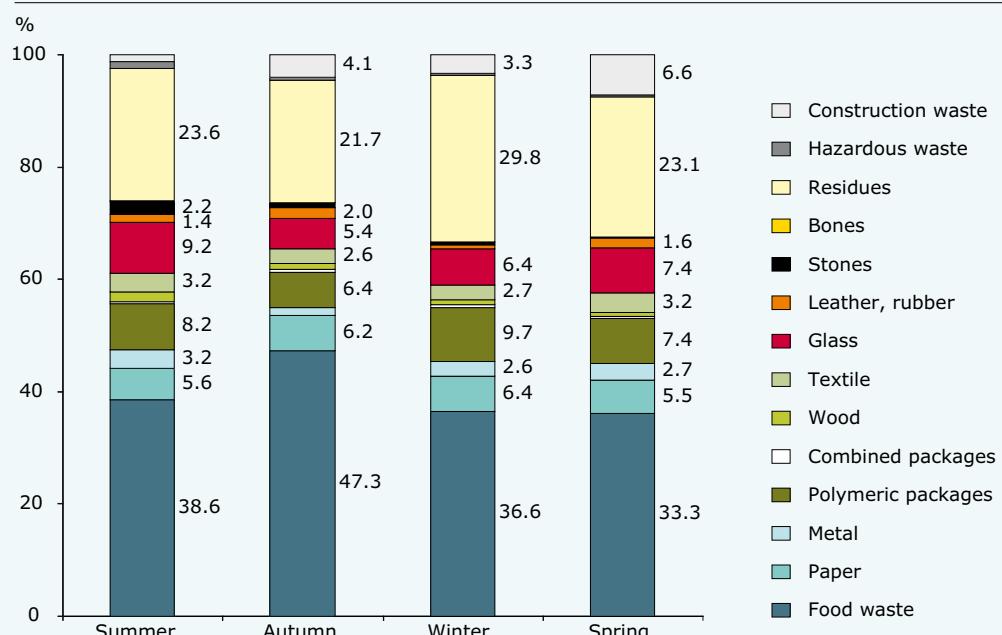
the last few years, according to data reported to the UN (UN survey, 2006). In general, resources from municipal waste are not utilised. From a SCP perspective, there is a loss in economic resources when almost all municipal waste ends up in a landfill (which is the case throughout the SEE and EECCA countries). In addition, there is a higher risk of environmental pollution, including the release of climate change gases (Box 8.3).

As shown in Figures 8.7 and 8.8, municipal waste in EECCA and SEE countries contains large amounts of potentially reusable or recyclable materials such as organic waste, paper, plastic and metals. In the Russian Federation it is estimated that only 3 % to 4 % of municipal waste is reprocessed or recycled (Gonopolsky, 2006). Often the only 'permanent' recycling of municipal waste is conducted informally by waste scavengers who separate the waste either in the waste bins or at landfill sites.

#### Box. 8.2 Seasonal changes in waste composition in Donetsk, Ukraine

More detailed studies have been made on the composition of household waste in the city of Donetsk in Ukraine, which has a population of approx. 1.5 million. Figure 8.8 shows how the composition of household waste varies with the season. The share of food waste is higher during the summer and autumn seasons than during the rest of the year due to the consumption of more vegetables at this time of year. The high share of residuals in the wintertime may be due to residues of heating, such as ash from the burning of coal. These seasonal changes in waste composition might determine how large a capacity is necessary in the waste management system to deal with the different waste streams.

**Figure 8.8 Seasonal changes in the composition of household waste in the region of Donetsk**



**Source:** TACIS, 2002.

**Box 8.3 Landfilling of municipal waste in the context of SCP**

Landfill is by far the most common (between 90 % and 100 %) method of disposal of municipal waste in EECCA and SEE countries. However, almost all landfills in the region are outdated and do not conform to modern standards. Inspections have shown that 92 % of approved municipal waste landfills do not meet sanitary norms (UNEP, 2006a). Collection and management of landfill gases, which also contain the potent greenhouse gas methane, is rare, leading to a high risk of fires and explosions. Moreover, the growth in municipal waste generation is expected to cause a substantial rise in greenhouse gas emissions in the coming years because of the significant share of organic matter in municipal waste. Finally, leachate is generally not collected nor treated, posing a constant risk of pollution of soil and water sources, including drinking water. In some countries new legislation has been introduced which requires permits for landfilling of municipal solid waste. However, older landfills, established in the Soviet time, are normally exempt from environmental permits. This is, for example, the case in Georgia (Antadze and Gugushvili, 2006).

Recycling of some municipal waste streams, such as plastics and electric and electronic equipment, as well as incineration with energy recovery, require quite advanced technical capacity and considerable financial resources. Overall, however, the lack of recycling of municipal waste does not seem to be primarily caused by the lack of recycling capacity, at least not when it comes to more traditional recyclable waste such as glass, paper and cardboard (Gonopolsky, 2006). On the contrary, in some countries the existing recycling facilities need a much greater supply of recyclable waste. The shortages are caused by limited domestic supply and by the high demand for many recyclable waste materials from international markets.

The insufficient recycling of municipal waste should be seen primarily as the result of the low

priority given by governments and municipalities to implementation, combined with a low level of environmental public awareness (Antadze and Gugushvili, 2006). Nevertheless, the following three cases illustrate exceptions to the general picture (Boxes 8.4, 8.5 and 8.6).

The use of recycled municipal plastic waste in a new product often requires the sorting and separation of waste plastic into different plastic types. Thus, recycling of plastic can be more difficult than for other waste materials such as glass and paper. However, innovative technologies are being developed which can make use of mixed plastics waste (Box 8.6)

Finally, from an environmental point of view it is important to collect hazardous municipal waste

**Box 8.4 Municipal waste management in Moscow, and potential for recycling and reuse**

In Moscow 27 % of municipal waste is reprocessed or recycled. Moscow City Hall has issued regulations designed to increase recycling levels of municipal waste to 40 %.

In the Russian Federation the annual generation of packaging waste per capita is 50 kg, while in the EU-15 the average figure is about 175 kg. Certain types of packaging waste in Moscow already have quite high recycling rates, for example, a 90 % rate of recycling for aluminium packaging waste. On the other hand, recycling of plastic waste packaging is low, at about 5 %. This is the case despite the fact that the potential for plastic recycling in the Russian Federation, and especially in the Moscow region, is high. The greatest share of plastic packaging used in the Russian Federation consists of PET bottles which are simpler to recycle than other plastic wastes, since they are quite homogeneous and easy to clean (Gonopolsky, 2006).

It is worth noting that reuse systems are not usually counted as part of a recycling system. In the Russian Federation, for example, 60–70 % of glass packaging consists of bottles that can be returned to special collection sites for a refund; this system has existed since Soviet days. By contrast, in the EU and especially in the EU-15, much of the glass packaging waste is one-way packaging which goes into a melting process and thus contributes to a high recycling rate (Gonopolsky, 2006). When comparing recycling rates it is therefore important to know whether a country with a low recycling rate has a high reuse rate.

### Box 8.5 Introduction of a successful packaging policy in Croatia

About 1.7 billion beverage units are sold each year in Croatia, with an ever-increasing part of the containers made of aluminium and PET. Even though these packaging materials are easily recyclable, more and more of this waste ends up in landfills and creates litter problems in parks, streets and the countryside.

In January 2006, the Croatian Government introduced an Ordinance on Packaging and Packaging Waste as a means of implementing the EU Packaging Directive. The Ordinance came after an amendment to the Waste Act was passed in 2004, and a waste strategy was prepared in 2005. The policy instruments used included introduction of the full-cost recovery mechanism for waste beverage containers. The 'polluters' are obliged to pay a contribution to a specialised fund whenever a beverage product is placed on the market. The payment consists of three kinds of fees:

- i) A disposal fee for every unit, according to the packaging material used (about EUR 0.015/unit). The fee covers the expenses for managing the packaging waste, including collection, storage and transportation to the recovery location.
- ii) A returnable fee (deposit) is collected to encourage final consumers to return the empty packaging (EUR 0.07/unit). This fee has a temporary character for the producer since it is reimbursed following the sale of the product.
- iii) A 'stimulating' fee which should encourage the producers to use reusable packaging. This fee is paid by those producers who have not reached national targets for the use of returnable packaging.

In 2006 the target rate for use of returnable packaging was 10 % for all kinds of beverages, except for beer where the target was 65 %. The target was scheduled to increase progressively over the coming years and reach 60 % for all beverages in 2013, except for beer where the target is 90 %.

Until October 2006, approximately 650 million units had been returned, equivalent to 73 000 tonnes of packaging waste, according to the estimates of the Croatian Ministry of Environment. This included 14 000 tonnes of PET, 57 000 tonnes of glass and 1 400 tonnes of aluminium and steel. By way of comparison, in 2005 the amounts collected were 2 000 tonnes of PET and 14 000 tonnes of glass. So, the results of the ordinance have been exceptional. Furthermore, the litter problem has been significantly reduced. In addition, around 1 500 new jobs have been created to ensure the collection, storage, transportation and recycling of packaging waste. In October 2006, the Directorate for Environmental Protection of Serbia proposed to introduce the same deposit-refund system.

**Source:** MOE Croatia, 2006.

### Box 8.6 Roof-tiles in Ukraine made from plastic waste

'When the Soviet Union collapsed in the early 1990s, many heavy industries in Ukraine closed down, resulting in increasing unemployment and poverty. Housing was a particular problem, with many existing houses roofed with crumbling sheets of asbestos. Since then the transition to a market economy has increased incomes and fuelled demand for new and better housing. A joint venture company, Britannica JV, responded to this demand by making roof tiles from recycled plastic. To avoid the costs of sorting plastic waste, researchers in Ukraine developed a process for large-scale manufacture of good quality plastic from mixed plastics waste. The new product is strong, light, durable and fully waterproof — ideal for roof tiles. At the same time the venture is helping to ease pressure on landfills. The tiles are already in use throughout Ukraine. The UK is expected to start imports as soon as building regulation approval is obtained' (GEO Year Book, 2006). The contents of the tiles are 70 % sand and 30 % plastic (Britanica, 2007).

separately, in order to prevent hazardous waste from ending up in landfills together with the rest of municipal waste. However, it would appear that at

present there are no separate collection systems in operation in EECCA and SEE.

### 8.2.6 Waste management in four selected cities in the EECCA and SEE countries

In order to obtain more detailed information about trends, opportunities and barriers to better waste management in the EECCA and SEE countries, four major city studies on municipal waste practices were conducted for this report. The selected cities were: Belgrade, Dnipropetrovsk and Tbilisi (populations: 1.1–1.3 million) and Bishkek (population: 800 000). Three of the four cities are capitals, and represent the four country groups used in this report: Eastern Europe, Caucasus, Central Asia and SEE.

The city studies focused primarily on municipal waste and hazardous waste. A good part of the information was provided by local NGOs who have assisted UNEP-EEA by gathering key data and information. The NGOs have also conducted surveys and interviews with local administration

representatives. Similar to data collection at national level, it has proven difficult to obtain data at city level. However, it has been possible for all four cities to provide the most relevant data at least for some years (Tables 8.6 and 8.7).

Table 8.6. shows that the composition of municipal waste by weight is fairly similar in Belgrade, Bishkek and Dnipropetrovsk. In case of Tbilisi, the figures show the development from 1989 to 2003 based on volume of wastes. Even though the calculation methods used for 1989 and 2003 may differ, the figures indicate that plastic waste has increased considerably over the last 10–15 years in Tbilisi, which reflects increasing use of plastic packaging.

Table 8.6 and 8.7 indicate that the four cities face many similar problems despite their different location and socio-economic situation (Box 8.7).

**Table 8.6 Composition of municipal waste in four cities (indicated in %)**

	Belgrade (based on weight)	Bishkek (based on weight)	Dnipropetrovsk (based on weight)	Tbilisi, 1989 (based on volume)	Tbilisi, 2003 (based on volume)
Food waste	32	32	30	42	19
Paper and cardboard	27	26	19	34	19
Plastics	6	7	3	2	26
Glass	6	2	5	4	3
Metals	3			5	3
Ferrous metals			4		
Wood		2	3		
Textile		5		5	6
Litter		11			
Residues				8	24
Others	26	15	36		

**Sources:** Antadze and Gugushvili, 2006; Gvozdenovic and Scekic, 2006, Lytvynenko, 2006 and Peshenuk, 2006.

**Table 8.7 Waste characteristics of four cities in the EECCA and SEE countries**

Characteristics of four large cities in the EECCA and SEE countries	Belgrade 1999-2000	Belgrade 2005-2006	Bishkek 1999	Bishkek 2006	Dnipro-petrovsk 1999	Dnipro-petrovsk 2006	Tbilisi 2000	Tbilisi 2005-2006
Population in 1 000	1 272		611	780	1 113	1 054	1 098	1 103
Number of households	588 674	495 649					248 855	
Collection of MSW in 1 000 m <sup>3</sup>			597	853			1 600	1 095
Collection of MSW in 1 000 tonnes	360 679	467 204	149	213	316	310	315	216
Collection of MSW in kilo per capita	284	367	244	273	284	294	287	196
Percentage of population with MSW collection		84	No data	No data	No data	No data	100	100
Kilo per m <sup>3</sup>			250	250			197	197
Separate collection of hazardous waste	None	None	None	None	No data	No data	None	None
Number of trucks collecting MSW operating with compacting facilities	105	114	0	0	No data	No data	0	68
Number of trucks collecting MSW operating without compacting facilities	0	0	201	63	321	308	231	250
% of collected MSW sent to landfill		100	100	100	No data	No data	100	100
% of collected MSW sent to recycling, normally based on 'waste scavengers' at the landfill site		< 1		< 1	No data	No data	0	0
% of collected MSW sent to incineration	0	0	0	0	36	33	0	0
Fee paid by household per year in euro	2.8	2.8	No data	No data	No data	No data	4.3	4.3
Number of bins/containers within the collection area	18 400	31 000	4 646	5 962	No data	No data	2 000	9 538
Number of landfills	2	1	1	1	1	1	3	2
Number of landfills with methane collection	0	0	0	0	0	0	0	0
Number of landfills in which methane collection is planned and financed under the mechanism in the Kyoto protocol				1		1		2
Number of illegal landfills	Few hundreds	Few hundreds	No data	No data	1	1		
Gate fee per tonne/m <sup>3</sup> MSW delivered	No data	No data	No data	No data	No data	No data	0	1
Municipal waste strategy prepared	None	None	None	None	None	Yes	None	None

**Sources:** Antadze and Gugushvili, 2006; Gvozdenovic and Scekic, 2006; Lytvynenko, 2006; Peshenuk, 2006.

**Box 8.7 Comparison of the current waste situation in Belgrade, Bishkek, Dnipropetrovsk and Tbilisi**

As demonstrated by Table 8.7 and Table 8.8 and other information from the city studies, waste management in the four cities shares some common characteristics:

- With the exception of Tbilisi, generation of municipal waste per capita increased in the last five to seven years, especially in Belgrade and Bishkek. The declining figures for Tbilisi are likely to be the result of incorrect reporting, since the number of inhabitants remained almost unchanged during this period.
- None of the four cities implemented separate collection of hazardous waste.
- All cities aside from Dnipropetrovsk have increased the number of waste bins and containers in the collection area during the last five to seven years.
- The situation differs concerning the number and quality of collection trucks, but in general it seems that the quality of the service has improved. In Belgrade two-thirds of all trucks are more than 12 years old, but all have a compacting facility. Additional new trucks have been acquired in recent years. In Tbilisi, a large part of the collection fleet was renewed in 2006 and the new trucks have compactor units. By contrast, in Bishkek no trucks have compactors and the number of collection vehicles declined between 2002 and 2005.
- In three of the cities all municipal waste is usually sent to landfills. Dnipropetrovsk has an incineration plant, where one-third of municipal waste is treated.
- Very limited amounts of recyclables are separated, normally by waste scavengers. It is estimated that the amount of separated waste is below 1 % of the landfilled quantities.
- The composition of waste in the four cities shows a large potential for sorting out recyclable materials, especially organic waste, paper and cardboard, but also plastics, textiles and metals. In Tbilisi, plastic is now a more significant waste component, reflecting the fact that plastic has become the predominant packaging for beverages.
- None of the existing landfills lives up to modern standards and at the moment none is equipped with a landfill gas collection system. However, methane collection is now planned for landfills in Bishkek, Dnipropetrovsk and Tbilisi, financed through the mechanisms of the Kyoto Protocol.
- Ensuring funding for collection, recycling and disposal of municipal waste is a major problem in Bishkek, and it appears that the market for providing waste collection and disposal services is not economically attractive. Belgrade has received substantial foreign donations (e.g. new trucks and machines), and there are some indications that the public utility company will be reformed and partly privatised.
- In Tbilisi, significant municipal investments have been made in the last few years to improve waste management infrastructure. However, the currently used tariffs are based on old Soviet calculation methods and need to be revised to reflect the changes in service costs. No information is available about tariffs and investments in Dnipropetrovsk, but at national level expenditure on waste management has increased considerably over the last two years.

**Sources:** Antadze and Gugushvili, 2006; Gvozdenovic and Scekic, 2006; Lytvynenko, 2006 and Peshenuk, 2006.

### 8.3 Policy initiatives and innovative approaches

#### 8.3.1 National waste policies or strategies

Most SEE and EECCA countries have established national waste management policies or strategies. However, it is difficult to evaluate the level of their implementation in individual countries. It appears that many EECCA and SEE countries have developed waste strategies and regulations mainly in those areas where international obligations and responsibilities already exist. As shown in Table 8.8 below, legislation and initiatives on waste management tend to be directed towards waste in general, and include specific legislation covering industrial waste. With regard to industrial waste, it remains unclear whether the initiatives also cover mining wastes. Only a handful of countries have regulations or strategies concerning municipal waste, including its recycling.

Most countries maintain that they have put measures in place to encourage waste prevention, minimisation and recycling. It is, however, hard to judge from the replies to the questionnaires the extent to which these measures have been carried out or whether they will only constitute objectives or strategy declarations. Examples of specific measures include:

- The Government of Kyrgyzstan in 2005 adopted a special programme for implementing a law on production and consumption waste covering the period 2005–2011. The main purpose of the programme is to develop and implement a set of measures aimed at reducing waste generation, increasing the rate of recycling, providing environmentally-safe landfills and disposal of waste, conducting timely reclamation and maintenance of closed-down municipal waste dumps, and reducing the costs of pollution remediation.
- Armenia has adopted a waste law which includes economic instruments to stimulate waste treatment and recycling.
- Croatia has set specific targets for waste prevention, separate collection of waste, and recovery and recycling. Producer responsibility was introduced for various waste streams in 2006 (Croatia EA, 2007).

Based on the city studies and the report 'Assessment Reports on Priority Ecological Issues in Central Asia' (UNEP, 2006b), the level of implementation of legislation and the effort made by authorities to enforce them are rather low. Instruments to enforce the laws, regulations and strategies are not available in many of the countries. Several countries

**Table 8.8 Replies on waste management issues from a UNEP policy questionnaire (2)**

Waste	Sustainable consumption and production: policies, strategies and initiatives															
	Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Croatia	FYR of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Republic of Moldova	Montenegro	Russian Federation	Serbia	Tajikistan	Turkmenistan	Ukraine
Regulations/strategies on waste	+		+	+		+	+	+				+		+	+	+
Regulations/strategies on industrial waste	+			+		+	+	+	+	+			+		+	
Regulations/strategies on municipal waste							**		+							+
Measures encouraging waste prevention, minimisation and recycling	+			+	+	**	+	+	+	+		+	+		+	+
Initiatives on sustainable waste management	+				+		+	+	+			+		+	+	+

**Note:** \* In preparation; \*\* In the near future the law on waste management (when adopted) will outline instruments to encourage waste prevention, minimisation and recycling (UNEP questionnaire, 2006). Blue means no response received.

(2) Table 8.8 is based on an extensive UNEP policy questionnaire sent to all the SEE and EECCA countries in October 2006. The questionnaire covers issues such as Sustainable Consumption and Production: Policies, Strategies and Initiatives and Sector Specific Policy and Legal Issues (food production and consumption, building/housing, transport, waste and sustainable public procurement). It should be noted that not all countries have replied to the questionnaire.

have formulated waste management plans and programmes. However, the general lack of resources and of inter-agency coordination as well as the absence of analysis of socioeconomic and ecological problems related to waste are commonly cited as representing significant barriers to implementation. Some countries also stress the lack of economic incentives as a barrier to implementing waste management in municipalities.

While not shown in Table 8.8, feedback from the survey included the dates of development of policies and strategies. It showed a period of intensive activity during the mid-1990s, when many countries developed waste management policies and strategies, followed by a very slow period until 2004. From 2004 onwards, and especially in 2005 and 2006, many countries began to develop new waste strategies.

### 8.3.2 *Municipality as a key player in waste management*

One issue explored in the city studies was whether the progress made in waste management was driven by national policies or city initiatives.

In all four cities common problems were identified (see Box 8.8) concerning the organisation of the waste sector:

- Planning problems and the absence of a strategy for waste and local management schemes. By the autumn of 2006 none of the cities had developed a strategy for municipal waste management.
- Administrative problems, including funding problems, poor cooperation and coordination between the involved authorities, and a weak control and enforcement system.
- Unsustainable waste management methods, including: unsanitary landfills with frequent fires and leakages and no methane collection; illegal landfills and fly tipping; lack of waste recycling and waste prevention schemes; delays in waste collection, littered streets and overfilled containers.
- Low public interest in environmental issues even though, in the case of waste, economic and environmental interests often converge for the public.

The city studies also showed, however, that various positive initiatives have been taking place at municipal level despite a lack of waste management

regulation or strategy at either national, regional or municipal level.

In the case of Belgrade, slow progress has been linked to the situation at national level. Better cooperation between national agencies involved in waste management has to be achieved, and coordination is also needed between the waste initiatives at the state and municipal levels. Finally, the states of Serbia and Montenegro separated in May 2006, and such fundamental changes at national level will have a major impact at municipal level (Gvozdenovic and Scekic, 2006).

In Bishkek a municipal programme was approved in 2006 to implement the Law on Production and Consumption Waste. Progress was mostly driven by initiatives taken at national level. In 2005 the government adopted a package of programmes on waste management including the state programme on waste management to implement the law 'On Industrial and Residential Wastes'. Initiatives concerning Bishkek's municipal waste strategy are still only at the planning stage. Since almost half of the population in Kyrgyzstan lives below the poverty line, it seems that effective handling of municipal waste in the city of Bishkek will depend on international donor support or on income from selling the CO<sub>2</sub> quota under the Kyoto Protocol (Peshenuk, 2006).

In Dnipropetrovsk, a strategy and programme for municipal waste was passed in December 2006. Covering the period 2007–2011, the strategy aims to support comprehensive waste collection, including sorting and recycling of waste as well as increasing the standards for landfills. Both collection of waste and the disposal activities have been outsourced, and significant investments made in new equipment such as waste bins and waste collection trucks. In the case of Dnipropetrovsk strong action was taken by NGOs and the political and administrative sector to develop a municipal waste strategy for 2007–2011. The initiatives taken were in line with the national strategic waste management programme, even though only a few decisions have been made until now to implement national principles at municipal level. In this respect the city of Dnipropetrovsk has been a front-runner.

In Tbilisi, the municipal authorities have given priority to waste management issues in recent years due to the critical sanitary situation in the city. In 2006, the city doubled the total budget for waste management to improve waste collection. Responsibilities for waste collection and disposal activities were centralised, although actual services

### **Box 8.8 Waste policy and initiatives in Belgrade, Bishkek, Dnipropetrovsk and Tbilisi**

#### **Belgrade (Serbia)**

Waste-related initiatives exist at both local and state levels. However, better coordination is needed during the development stage of new plans and activities in order to avoid overlap or contradictory action. This mostly concerns local and state institutions, such as ministries and municipalities. The involvement of stakeholders in decision-making processes and in drafting laws and strategies is very low.

#### **Bishkek (Kyrgyzstan)**

Despite the fact that regulations include general provisions for municipal waste management, there is still a lack of well-developed organisational structure and funding for their enforcement. Moreover, no economic incentives are used in municipal waste management. Lack of detailed regulation on municipal waste, and the fact that several agencies have authority for municipal waste management leads to conflicts in regulation, enforcement and monitoring.

However, a municipal programme was approved in 2006 in Bishkek to implement the law on production and consumption of waste. The main goals of the waste management programme were to increase the proportion of waste which is properly managed, including separate collection or sorting. The Draft General Layout of Bishkek Plan seeks to establish waste recycling stations in each district, thus helping to reduce the amounts of waste going to landfills and to increase waste recycling. Moreover, the introduction of economic incentives will promote waste recycling and separation in homes.

#### **Dnipropetrovsk (Ukraine)**

Strategic programmes on waste management have been adopted at national level, but little action has been taken to enforce them at municipal level. The legislation and municipal programmes lack initiatives to promote future activities.

In mid-2006 a joint initiative to develop a complex programme called 'Behaviour with Waste in the City of Dnipropetrovsk for 2007–2011' was launched. The Programme is trying to create conditions that support comprehensive waste collection, transport, sorting, recycling, utilisation, and landfills. It also sets strategic goals for the period until 2011.

#### **Tbilisi (Georgia)**

Currently, there is neither legislation on municipal waste management nor a strategy document in Georgia that highlights the priorities for development within this field at national level, although legislation exists which addresses some waste management-related issues. Communication between the various state agencies involved in waste management needs to be improved, and closer cooperation is required to achieve success, especially among local and state institutions.

In recent years municipal waste management has been placed high up on the agenda of the Tbilisi municipal authorities. Two important initiatives have been taken: a specialised municipal agency — City Cleaning Service — was established to centralise waste management in Tbilisi and significant municipal investments were made to improve waste management infrastructure.

**Sources:** Antadze and Gugushvili, 2006; Gvozdenovic and Scekic, 2006; Lytvynenko, 2006 and Peshenuk, 2006.

to collect waste have been outsourced to a greater degree. Even though the initiative does not at present provide for better landfill and recovery facilities, or for the development of a municipal waste strategy as such, it nonetheless shows that the action initiated at municipal level can address the pressing institutional and management issues. (Antadze and Gugushvili, 2006).

The examples of Dnipropetrovsk and Tbilisi, which put waste management issues high on their municipal agenda, could give positive signals and inspiration to other countries. Benchmarking could be initiated among cities, especially where the systems for waste management are similar. Usually, the main differences tend to be in the legislation and regulations and not in organisational or technical

matters. However, the main issue at this point is to secure interest and support at political level, and get the local authorities and state agencies to work together to achieve the necessary modernisation and improvements (Antadze and Gugushvili, 2006).

### 8.3.3 Implementation of the Basel and Stockholm Conventions

Two international environmental conventions have provided countries with a strong stimulus to address some waste-related issues: the Basel convention on hazardous waste, and the Stockholm convention on POPs.

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes

and their Disposal was adopted in 1989 in response to concerns about toxic waste from industrialised countries being dumped in developing and transition countries. In 1994, the Parties to the Convention agreed to an immediate ban on the export from OECD to non-OECD countries of hazardous waste intended for final disposal. This was followed by an amendment (31 December 1997) banning the export of hazardous waste intended for recovery and recycling. During its first decade, the Convention's principal focus was to set up controls of transboundary movement of hazardous wastes and the development of criteria for environmentally sound management of the wastes. More recently, the work of the Convention has emphasised full implementation of treaty commitments and minimisation of hazardous waste generation.

**Table 8.9 Implementation of Basel and Stockholm Conventions**

Assessment of progress in introduction of principles of the Basel Convention and the Stockholm Convention	The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal						The Stockholm Convention on Persistent Organic Pollutants (POPs)		
	Party to the Basel Convention	National ban on import of hazardous waste for disposal	National ban on import of hazardous waste for recovery	Strategies/policies for reduction of hazardous waste generation	Disposal facilities available	Recovery facilities available	Party to the Stockholm Convention	Deadline for submission of national implementation plan	Data on national implementation plan were submitted
<b>EECCA</b>									
Armenia	+	+	Partly*	+	+	./.	+	17.05.2006	29.04.2006
Azerbaijan	+	+	Partly*	+	+	./.	+	17.05.2006	
Belarus	+	+	Partly*	+	+	+	+	17.05.2006	17.01.2007
Georgia	+	+	+	./.	+	./.	+	01.01.2006	
Kazakhstan	+							+	
Kyrgyzstan	+	Partly*	Partly*	./.	+	./.	+	12.03.2009	
Republic of Moldova	+	+	+	+	+	+	+	06.07.2006	25.08.2005
Russian Federation	+	+	+	+				./.	
Tajikistan	./.						+	08.05.2009	
Turkmenistan	+							./.	
Ukraine	+	Partly*	./.	+	+	+		./.	
Uzbekistan	+	./.	./.	./.	+	+		./.	
<b>SEE</b>									
Albania	+	+	+	+	+	./.	+	02.02.2007	12.02.2007
Bosnia and Herzegovina	+	+	+	./.	./.	./.		./.	
Croatia	+	+	+	U.P.	+	./.	+	30.04.2009	
FYR of Macedonia	+	+	./.	U.P.	+	+	+	25.08.2006	02.09.2005
Serbia	+	+	Partly*	+	(./.)	./.		./.	
Montenegro	./.							./.	

**Note:** Partly: These countries have clear restrictions on the import of hazardous waste for disposal/recovery. However, in certain circumstances exceptions are made in these countries.  
U.P. = Under preparation; blue colour = no reporting.

**Sources:** Basel Convention, 2005 and Stockholm Convention, 2007. Based on country reports to the Secretariat of the Basel Convention (information available December 2005); information from the Secretariat of the Stockholm Convention on POPs (information available June 2007) and (UNDP Kazakhstan, 2007).

The Stockholm Convention on Persistent Organic Pollutants (POPs) was adopted in 2001 in response to the urgent need for global action to protect human health and the environment from 'POPs'. These chemicals are highly toxic and persistent; they bio-accumulate and move over long distances in the environment. The Convention seeks the elimination or restriction of production and use of all intentionally produced POPs (i.e. industrial chemicals and pesticides).

All EECCA and SEE countries except Tajikistan are party to the Basel Convention.

Nine countries are party to the Stockholm Convention (Table 8.9). In addition, Albania, Armenia, Bosnia and Herzegovina, the Republic of Moldova and the former Yugoslav Republic of Macedonia have submitted national implementation plans of the Stockholm Convention. All five plans have been developed with the support of the United Nations.

These international conventions seem to have motivated the EECCA and SEE countries to initiate and develop strategies, legislation and action plans regarding management of hazardous waste and chemicals, including pesticides. Much of this work was made possible through donor-funded programs and international aid.

#### 8.4 Opportunities for improving waste management

Even though the situation in each individual EECCA and SEE country has its own characteristics, some similarities and differences in waste problems are highlighted in Table 8.10.

As shown, all EECCA and SEE countries would benefit from improvements in their waste management systems, both in the development of policies and the actual management of the waste. Some areas requiring attention include:

**Table 8.10 Overview of similarities and differences in waste management**

Similarities	Differences
• All EECCA and SEE countries currently face problems with proper collection, treatment and disposal of waste.	• Some EECCA and SEE countries have in recent years made improvements in collecting data on generation and treatment of waste.
• Contrary to the situation in the EU, regulations and legal requirements have not resulted in significant improvements in waste management in the SEE and EECCA regions.	• Several countries have in recent years initiated activities to implement EU standards for waste facilities (e.g. Croatia and Ukraine).
• While some progress has been made in addressing hazardous and radioactive waste and certain industrial wastes, there has been no significant improvement in the municipal waste sector over the last 10–15 years. Most municipal waste is disposed of in landfills which do not meet even the lowest environmental standards.	• In addition to formulating framework waste strategies, several countries are now developing more detailed action plans and legislation for waste.
• The development of waste strategies and legislation, and their implementation have mainly progressed in those areas where countries have international obligations or responsibilities, for example, the Basel and Stockholm Conventions. Much of this work was carried out through donor-funded programs.	• Some countries have been subject to attempts to ship hazardous waste illegally.
• Under the centrally planned economy there was a tradition and a functioning system of recycling and reuse of waste. Today, recycling is mainly driven by economic incentives, and therefore has focused on industrial waste and not on municipal waste, where recycling and recovery is more complicated. At the same time, some existing recycling facilities face a shortage of recyclable waste necessary for their operation.	• A few countries have successfully introduced deposits on one-way packaging.
• In general, there is a lack of data (and lack of related data collection systems) on generation and treatment of waste, including municipal waste.	
• Due to the financial difficulties which many municipalities face, simple but important routine tasks such as municipal waste collection often do not function reliably. In most cases, the service costs are not covered by the payments.	
• While reuse of bottles still exists in many EECCA countries, single-use disposable packaging is increasingly taking over.	
• Development and implementation of waste strategies and action plans still seem to depend largely on external assistance.	

- improving collection of data and information about the amounts and composition of waste;
- development and implementation of waste strategies and related legislation. This could include defining preferred treatment options for different waste streams, setting up goals for recycling, ensuring proper standards for disposal and recovery facilities;
- better enforcement of standards and regulations;
- reviewing the waste tariff system to implement the polluter-pays-principle and providing stronger financial incentives for better waste management and waste prevention;
- raising public awareness of waste issues and providing the mechanism for public involvement in waste management decisions;
- strengthening political commitment and coordination between the different authorities at national, regional and city levels.

Experience has shown that even if framework waste strategies are not yet in place, certain necessary elements have already been developed and various initiatives taken to improve waste management. Specifically:

- Some progress has been made in waste data collection, notably in Belarus, Croatia, the Russian Federation and Ukraine. Such information is a first and necessary step for developing both short-term and long-term waste strategies. Providing this information requires close cooperation between different authorities. At national level this would be between the environmental authorities and, for example, the statistics office; at the city level, between the waste management services and the financial, legal or policy departments.
- Hazardous waste strategies and chemical protection plans have already been developed or are being developed in many of the countries as a result of obligations under international treaties. While such strategies are often developed with the assistance of international organizations or donor programs, some examples presented in this chapter show that it is possible to initiate waste strategy development regardless of the source of financing.

- Vast amounts of waste in the EECCA and SEE countries are generated in resource mining and processing activities. Strategies for prevention and proper management of these kinds of waste, including recycling and resource recovery, can considerably reduce the amount of waste generated and its environmental impacts.
- When a country succeeds in combining economic incentives with legislative requirements, it is possible to manage effectively certain types of waste. The success of a packaging policy in Croatia is a good example of how a political goal, combined with the introduction of a deposit-refund system, can achieve excellent results.
- Functioning systems for reuse of packaging were in place in the former Soviet Union. To prevent the closing down of those reuse systems in the EECCA countries (due to the introduction of one-way packaging), ways need to be found to maintain or modernise them.
- In many municipalities in EECCA and SEE countries, only limited or minimal investments in waste management were made in the 1990s. The systems to collect waste need to be modernised, including waste bins and collection trucks. Recently, investments in new equipment have been made, for example, in Dnipropetrovsk (Ukraine), Tashkent (Uzbekistan) (EEA, 2007) and Tbilisi (Georgia). When such major investments are required, options should be considered not only to invest in new bins and trucks with compacting facilities, but also to include recycling and utilisation of the waste resources, e.g. waste bins for the separation of waste at source or trucks which are able to transport separately various recyclable waste materials in addition to collecting mixed waste.
- Municipal waste in the EECCA and SEE countries includes significant quantities of paper, cardboard and PET plastics. These kinds of waste have a measurable economic value and could be separated out and diverted away from landfills. This is especially relevant given that some existing recycling facilities (for example, those recycling waste paper) do not receive enough waste material necessary for their operations.
- Almost none of the landfills operated in the EECCA and SEE countries have methane collection or other higher-standard

environmental technologies. Much biodegradable waste was landfilled in the past (Note: this situation is expected to continue in the near future), and the potential for collecting methane from landfills is there. In Bishkek (Kyrgyzstan) and in Yerevan (Armenia) methane gas collection projects have already been approved (EEA, 2007). In Dnipropetrovsk (Ukraine) and Tbilisi (Georgia) collection of methane is planned. Methane collection reduces greenhouse gas emissions and has a considerable value under the Kyoto protocol. The economic returns generated could offset investments in methane collection and finance additional improvements in landfill operations or other waste management initiatives.

- Municipal waste in the EECCA and SEE countries contains much organic and food waste. When sorted and collected separately, this category of waste could be used to produce energy through the generation of biogas or for the production

of compost. Box 8.9 shows some of the achieved results and potential in the the former Yugoslav Republic of Macedonia and Moldova.

- Few incinerators exist in the EECCA and SEE countries, and almost none recovers energy to produce heat or electricity. Moreover, in those cities where incinerators do exist, their capacity is often under exploited. In addition to ensuring that operational incinerators meet high environmental standards, waste management systems should ensure that only the fraction of municipal waste unsuitable for recycling is sent for incineration. The non-combustible part should be sent to landfills.
- Instead of keeping responsibility for waste management with many different and overlapping authorities, it would be more effective to centralise the authority for at least some of the waste activities. This can be carried out at both national and city level, as was shown

#### Box 8.9 Organic waste – options for more sustainable management of municipal waste

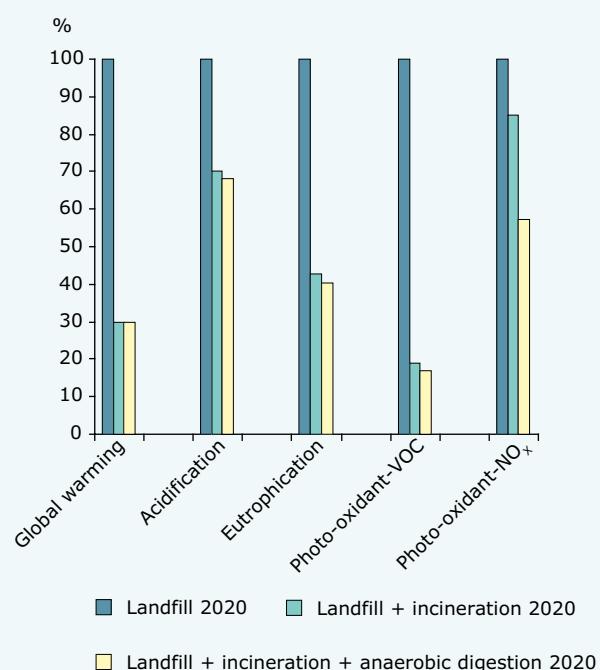
Municipal waste in the EECCA and SEE countries contains significant amounts of organic waste which today is landfilled. Such organic waste results in the generation of the landfill gases and leads to dangerous and unsustainable methane emissions affecting climate change. Available policy options include prevention of the organic waste and utilisation of those resources in the municipal waste.

In the former Yugoslav Republic of Macedonia, a waste prevention model based on home composting was initiated in five municipalities in 2005. The objectives were: a) to kick-start source selection and backyard composting of organic waste in order to minimise the amounts of organic waste sent to landfills; b) to produce compost of good quality; and c) to use that compost as a fertiliser and soil conditioner (ETC/RWM-Wastebase, 2007).

In Chisinau, Moldova, it was estimated that if only 25 % of the organic municipal waste was separated and subjected to biological treatment (anaerobic digestion), in combination with incineration with energy recovery of 65 % of the municipal waste, this would result in a significant reduction of the environmental impact. By the year 2020, five categories of impacts could be reduced by between 30 % and 80 % compared to the policy of pursuing landfilling of nearly 100 % (Figure 8.9).

**Source:** Gavrilita, 2006. The values stated in figure 8.9 are related to the highest value within each impact category, i.e. if the global warming impact of landfilling is equal to 100 % in 2020 then the value is only 30 % for the two other scenarios.

**Figure 8.9 Selected environmental impacts in 2020 from the use of various options for municipal waste management in Chisinau, Moldova**



by the experience of Tbilisi where collection and disposal of waste were coordinated in one unit.

- Benefits can also be gained from regional cooperation. A recent UNEP report recommended creating '... a single regional scheme of waste management for Central Asia Countries' (UNEP, 2006b).

## **8.5 Conclusions**

The challenges of introducing effective and sustainable waste management in the EECCA and SEE countries are enormous. Available information shows that little improvement has been achieved in waste management over the last five to seven years:

- generation of all types of wastes, including hazardous waste, is increasing;
- proper collection systems of waste are lacking and there is no separate collection of municipal hazardous waste;
- although some industrial waste is recycled, most waste is landfilled on sites of low technological standards;
- progress has been limited in work on waste strategies, action plans and relevant legislation. However, since 2005 several countries have begun to develop new waste strategies;
- despite some improvements in the availability of waste data, collection and processing of data on waste generation and management need further improvement;
- price mechanisms used in waste management are still not effective in creating incentives for waste prevention.

However, there are also some positive signs. Concerning municipal waste, some improvements began emerging in 2006, especially at municipal as well as, in some cases, provincial level. As regards policy development, preparation of a new generation of waste strategies and legislation is under way although the results of these improvements are yet to be seen.

General improvements at national and city levels will require a step-wise approach and a long-term horizon. Individual countries in the EECCA and SEE regions have very different starting points

concerning existing waste management systems. However, there are also opportunities to draw from country experience to avoid common problems.

In many cases municipal waste management systems have to undergo major modifications, or even be completely rebuilt. Here, lessons could be learned from the experience within the EU concerning more SCP-oriented waste management. Initially, the policy goal at the EU was to ensure proper collection of mixed waste and to assure safe landfilling. The approach was subsequently adjusted to separate recyclable waste fractions from the mixed waste; firstly, to increase recycling or resource recovery from wastes, and then to limit landfilling to non-recyclable wastes only. The EECCA and SEE countries could draw on this experience, gaining both environmental and economic benefits in the process.

Many of the following considerations could prove useful in the effort to modernise waste management both at national and municipal level in EECCA and SEE.

### ***Short term recommendations (1–5 years)***

Efforts could focus on:

- improving data gathering and information collection, to provide the basis for development of waste policies at national and local levels;
- developing waste strategies which set short, medium and long-term goals, and which differentiate approaches for industrial and municipal waste;
- improving coordination and cooperation between the different authorities dealing with waste at national, regional and municipal level. This should include more clear division of tasks and allocation of responsibilities to avoid overlaps;
- demonstrating that waste is often a valuable raw material with a measurable economic value (including building and demolition waste), and increasing awareness among industries about recycling opportunities and technical options;
- better regulation of waste from industry, with management options reflecting an integrated pollution prevention and control approach, and improving enforcement and control systems;

- modernising existing systems for municipal waste management with a view to:
  - providing a sufficient number of waste bins and ensure regular collection of waste;
  - implementing separation of waste at source, to collect those waste fractions which can easily be reused or recycled;
  - introduce collection trucks with compacting facility and, if possible, with the ability to collect separately different kinds of recyclable waste materials;
  - improving the efficiency of street cleaning;
  - revising the tariff system for waste collection and disposal, to improve payment collection rates and better link the fees with the actual waste generation;
  - ensure regular collection of data on the quantity and composition of municipal waste and use the results in planning;
  - introduce weighbridges at a minimum at the landfills, to collect data on the amounts of waste and to give a better basis for the calculation of disposal fees;
  - separately collect and safely dispose of medical and hazardous waste;
  - carry out better audits and inspections of the existing waste management facilities.
- making the most urgently needed improvements to ensure that the waste is landfilled in a proper way, to minimise illegal waste dumping, and to assure minimum technical standards for safe landfilling. The financing mechanisms under the Kyoto protocol (e.g. methane collection) could be used to cover part of the expenses;
- raising public awareness about waste issues and about concrete actions they can take;
- setting up legal requirements for the management of packaging wastes (for example, a deposit-refund system for beverage containers) and strengthening reuse of packaging;
- putting in place economic and legislative incentives to encourage reuse and recycling.

#### ***Medium term recommendations (6–10 years)***

In addition to implementing the adopted waste strategies, waste management policies could aim at improving the situation through:

- achieving better cooperation between the public waste sector and the private sector. This could be achieved, for instance, by creating joint public

and private companies, and making provisions for private companies to invest in and operate the waste management sector;

- stopping completely the illegal landfilling and dumping of waste;
- ensuring that all new landfills are constructed in compliance with modern environmental standards. EU standards could provide a guidance in this respect;
- wider introduction of separate collection of certain recyclables in households and businesses;
- implementing more advanced recycling schemes and technologies for certain waste types, such as electrical and electronic waste; and
- ensuring that new and existing incinerators comply with high technical standards, such as those used in the European Union.

Regardless of whether the activities are to be implemented in the short or medium term, it is necessary to start planning their implementation today.

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## 9 Way forward

### Impact of socio-economic changes on SCP policies

Most EECCA and SEE economies have been experiencing rapid economic growth since the beginning of the decade, following the economic decline of the 1990s. In a number of countries GDP now exceeds pre-transition levels. The key forces which have shaped those economies since the mid-1990s are economic transformation, privatisation, foreign investment, and increasing globalisation.

All these changes are taking place against an international backdrop of a shift in environmental policy away from end-of-pipe pollution control towards more proactive approaches that aim to achieve more sustainable consumption and production patterns. The common challenge for all countries is to break the link between economic growth and environmental impacts from production and consumption, resource use and waste generation.

Individual countries in the region face very different SCP policy challenges from the challenges facing Western Europe. The majority of the population in Western Europe, and increasingly in Central Europe, has access to reasonable levels of income and can afford to meet significantly more than their basic needs. SCP policy and action will, more and more, need to target consumer behaviour and the levels of consumption of impact-intensive goods and services. In contrast, in much of SEE and EECCA there is a clear need to address social sustainability issues.

The benefits of economic growth have not been distributed evenly across society, and the gap between rich and poor is growing. Significant sections of the population still live in poverty and many people, particularly in rural areas, do not have reliable access to basic needs such as clean water, energy for the home, and adequate nutrition levels. At the same time, there is a small but growing urban middle class in EECCA and SEE countries who are rapidly adopting Western consumption patterns.

Average household consumption per capita, in purchasing power parity, has now exceeded 1990 levels in all sub-regions except Central Asia. Levels of consumption in EECCA and SEE countries, while growing rapidly, remain significantly lower than in Western Europe. However, energy intensities (i.e. energy consumption per unit output) of industry, transport, community services and buildings, in particular in EECCA countries, are generally much higher. Countries also experience more localised environmental problems such as inappropriate management and regulation of waste, industry, urban transport and agricultural development.

Looking to the future, environmental pressures may grow with increasing wealth. Rapid changes in lifestyle, particularly in urban areas, are already noticeable. This can be seen in increasing ownership of private cars, the growing quantity and variety of available imported goods, and in the increasing quantities of waste generated. At the same time public services, including public transport, district heating and waste and recycling systems established under a central planning system, have significantly deteriorated and declined.

With household expenditure accounting for more than half of the GDP, individual consumers are potentially a powerful economic player in EECCA and SEE, but they tend not to be very active in applying pressure for more sustainable products and services. Public awareness and the level of public pressure for more SCP policies are rather low, and this situation will need to be addressed in the future.

There is a need for policies to give consumers an incentive to move towards more sustainable patterns of consumption. National SCP initiatives should focus on economic growth and social change which improve the quality of life, and not only concentrate on the increasing level of individual consumption, with the related negative environmental impacts.

Simultaneously, much of the SCP policy and action in EECCA and SEE will need to target the production side with a view to reducing impact

intensities and to improving efficiency of production and resource use. On a positive note, the on-going economic and social restructuring offers a unique opportunity to establish more resource-efficient, safe and sustainable production patterns.

### SCP challenges in specific sectors

Even though economic and environmental benefits from improved eco-efficiency in industry are substantial, such initiatives have not been undertaken consistently. There are emerging signs that decoupling between industrial output and pollution and resource use has taken place in some areas, but the efficiency of use resources and energy is still low in most EECCA and SEE countries. While services are the most rapidly growing economic sector across most of the region, industrial output is also increasing in almost all countries, with growth exceeding that of services in a number of countries. Moreover, this growth is largely based on pollution-intensive, resource-extracting and processing industries.

Current car ownership levels remain relatively low but are increasing rapidly in a number of countries, particularly in urban areas. Traffic congestion is on the increase in urban areas, leading to health, environmental and social problems. At the same time, public transport, which is potentially more sustainable, is in decline, partly due to dilapidated infrastructure and partly due to the withdrawal of subsidies. Integration of social, health and environmental considerations into spatial planning, and re-investment in existing collective transport infrastructure, are urgently required if EECCA and SEE countries are to avoid the large-scale transport problems plaguing Western European countries.

The dramatic changes in agricultural management and ownership, and increased exposure to global competition, caused a sharp reduction in food production during the early to mid 1990s. Economic recovery has seen this partially reversed, although in most countries food production remains lower now than pre-transition. Access to food and efforts to reduce malnutrition have improved in recent years, but these issues still remain significant problems in a number of countries. Economic transition brought with it much reduced inputs of artificial fertilisers, energy and pesticides with corresponding reductions in environmental pressures. Nevertheless, the environmental legacy of centrally-planned, high-input agriculture remains and the lack of appropriate management of irrigation, soils and manure from livestock continue

to create localised environmental problems. Opening of the markets and globalisation of trade may lead to a return to more intensive agriculture in the future with negative environmental consequences. Imports and exports of food to and from EECCA and SEE countries are also increasing rapidly, and that leads to growing pressures from the transport of food.

Buildings are responsible for a third of total energy consumption across both regions. Residential energy consumption is particularly high in Eastern Europe and parts of Central Asia. This is partly explained by cold climates, but other important causes include widespread but inefficient district heating, inefficient distribution systems, and the low thermal efficiency of buildings. Low energy prices and the absence of economic incentives and apartment level controls do not encourage householders to reduce heat consumption. Water consumption in buildings is high across both SEE and EECCA, especially in cities where distribution losses are high.

Proper treatment of waste remains a problem, especially for municipal and hazardous wastes. Furthermore, given the current construction boom in some countries, quantities of construction and demolition waste will increase. End-of-life (obsolete) vehicles, waste electronics, household appliances and packaging waste are also set to increase. Some of the challenges that SEE and EECCA countries face include improving waste management systems, introducing proper waste treatment and disposal techniques, making use of more waste resources, and reducing and preventing waste at source.

### Existing opportunities for SCP initiatives

There are many promising opportunities for SEE and EECCA to 'leapfrog' and avoid some of the consumption-related problems common in Western Europe. Taking advantage of those opportunities will require a political commitment to develop appropriate policies and establish regulatory frameworks, economic incentives, and implementation mechanisms. On a positive note, some elements of the legacy of the past have a major potential to support a society with more sustainable production and consumption patterns. These include:

- the widespread development of district heating systems, railway infrastructure, or reuse and recycling systems. All these systems need significant investment and upgrading to realise their sustainability potential. For example, heating systems require modernisation to

eliminate losses and inefficiencies and could be fed by combined heat and power or waste heat from industry;

- there is a well established tradition of using public transport. Even though the rates of car ownership are increasing, opportunities remain for satisfying the public's demand for mobility through extensive collective transport networks;

- various business opportunities exist for more SCP-oriented practices. Current low use of synthetic fertilisers and pesticides in agriculture, along with the availability of agricultural workers, creates good opportunities for organic farming and the export of organic food products to Western Europe. There is a high potential for economic and environmental benefits through recycling and reuse of industrial and municipal waste.
- significant potential exists for increasing energy efficiency in industry, household, and public sectors, again with both economic and environmental benefits. In the building sector the current construction boom offers a huge chance to improve the thermal efficiency of new building stock. This, and the task of retrofitting the dominant existing stock of low-efficiency multi-apartment buildings, would significantly reduce environmental pressures and bring considerable social benefits.

Finally, policy efforts should not focus only on the technical 'fix'. Experience from Western countries shows that technological improvements and efficiency gains are not sufficient on their own and need to be supported by measures, both economic and information-based, aimed at influencing consumer behaviour. Without this, technological and efficiency gains risk being undermined by increased consumption resulting from reduced prices (known as the rebound effect).

The environmental and social benefits that can be gained by increasing the public's awareness of SCP issues and empowering them to act should not be underestimated. With respect to housing and community services, significant reductions in heat and water consumption can be gained by installing apartment-level controls and metering, starting payments by use, and providing householders with information on how they can reduce costs. Similarly, consumers in a number of countries have expressed preferences for local high quality food grown with reduced inputs of pesticides.

This potential market for local organic food can be harnessed by developing national certification systems, supporting organic farmers and spreading awareness of organic labels and the advantages of this agricultural system.

## Remaining challenges

Despite the great variety among the 18 countries covered in this report, many problems that they face in designing and implementing SCP are similar. Often, those problems could have similar solutions, applicable and transferable to many other countries. Priority areas for SCP will differ from one country to another, but the following challenges seem to be commonplace in most countries:

- Lack of reliable data on pollution and resources use, industrial emissions, or environmental impacts of consumption are major obstacles to the development of targeted and effective policies and goals. Even in those sporadic cases where data exist on a local level, no efforts have been made for the systematic collection of data and the use of the information for more effective policy-making.
- Existing institutional settings do not favour planning and implementation of SCP. Better coordination is needed among the various institutions responsible for environmental protection and sectoral policies. It is also essential to improve institutional capacity to achieve more sustainable production and consumption.
- There is room for dramatic improvement in environmental management in enterprises. In some countries, where environmental legislation is being tightened and enforcement is getting stricter, improvements in industry have already occurred. In most cases, however, more effort is needed to improve compliance with environmental legislation.
- Integrating sectoral policies and environmental concerns is still a distant goal. For example, spatial planning and municipal management are still not well coordinated with environmental and SCP considerations, although they could be used to good effect in energy supply, building, transport and waste management. This is also the case for agriculture. While some countries are beginning to develop agricultural strategies integrating environmental, social and economic interests, most countries have not

yet begun this process. There is also a lack of agro-environmental advice for farmers.

- Some policy tools for SCP are in place but in a piecemeal fashion. Various relevant strategies and programmes (e.g. energy efficiency programs, waste strategies, etc.) have been established, but their implementation has still to follow. Policy action should build SCP considerations into these strategies and programmes.
- In the light of the variety of situations in all the countries, it is necessary to develop - in partnership with a wide range of stakeholders – national SCP strategies or plans reflecting a country's specific priorities, and with concrete actions to carry them out.
- Despite their effectiveness, limited economic incentives and technical tools are in place to stimulate government, businesses and private consumers to reduce the environmental pressures they exert. Policy tools already exist

in many countries to promote energy efficiency, public transport, or waste recycling. More effort will be needed to support implementation.

- Consumer behaviour is one of the crucial factors for SCP, and more efforts must be made to raise public awareness of environmental issues and of the potential economic gains from more SCP. Information should be provided (e.g. labelling) which will enable consumers to make informed choices and to influence governmental policies.

A key opportunity for addressing these challenges in many SEE and EECCA countries lies in regional cooperation. This is in some cases facilitated by common languages, but first and foremost, by the fact that countries often face similar problems.

Many successful initiatives have been implemented at local level, in such areas as energy efficiency for buildings, transport sectors, municipal waste management. Quite a few of the lessons learned are applicable – and successes potentially replicable – throughout the SEE and EECCA regions.

# Annex 1 Responses to the questionnaire survey on policies on sustainable consumption and production

Sustainable consumption and production: policies, strategies and initiatives <sup>(1)</sup>																		
	Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Croatia	FYR of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Republic of Moldova	Montenegro	Romania <sup>(2)</sup>	Russia	Serbia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
<b>Policies, strategies and initiatives</b>																		
Is SCP addressed in the SD, economic and social development policies?	+	+	-	+	+	+	+	-	+	-	+	+	+	+	-	+	+	
Are there any policies, strategies or initiatives that apply an Integrated Product Policy approach	+	-	+	-	+	+	+	-	+	-	+	-	-	-	+	+		
Consumer policies	Health and safety requirements	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	+	
	Provision of environmental information to consumers	+	+	+	-	+	-	+	-	+	-	+	-	+	+	+		
	Opportunity to provide input into the development of policies that could affect them	-	-	+	-	+	+	+	-	+	-	+	+	+				
	Other	-	-	-	-	+	-	+	-	-	-	-	-	-	-	-		
Economic instruments	Pollution fees and charges	**	+	+	-	+	+	+	+	+	+	+	+	+	+	+	+	
	Energy taxation	-	-	-	-	+	-	+	-	+	+	+	-	-	-	+		
	Differential taxation	-	-	-	-	+	-	+	-	+	-	-	-	-	+	-		
	Emissions trading system	**	-	-	+	+	+	+	-	+	+	-	-	+	-	+		
	Preferential tariffs and trade policies	+	-	-	-	+	+	+	-	+	-	-	-	-	-	+		
	Others	+	***	-	+	-	+	-	+	-	+	+	-	+	+	+		
Information tools	Education, awareness raising and public information	-	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
	Eco-labels	-	-	+	-	-	-	-	-	+	-	+	-	-	-	+		
	Consumer information	-	-	+	-	+	-	+	-	+	+	-	-	+	+			
	Pollutant emission register	+	-	+	+	+	-	+	-	+	+	+	+	+	+			
	Reporting on corporate environmental and social performance	+	-	-	-	+	+	+	-	-	+	+	-	-	-			
Information on cleaner production initiatives (available/not available)		+	+	+	+	+	+	+	+	+	+	-	+	+	+			
<b>Sector specific policy and legal issues</b>																		
Food production and consumption	Policies and strategies	Food and food safety	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
		Animal nutrition	-	-	+	+	+	-	+	-	+	+	-	+				
		Labeling and nutrition	+	+	+	-	+	-	+	-	+	+	+	+	+			
		Chemical safety	-	-	+	+	+	-	+	-	+	+	-	+				
		Biosafety	-	+	+	+	+	-	+	-	+	+	-	+				
		Food/feed controls	-	-	-	-	+	-	+	-	+	+	-	+				
	Restrictions on fertilisers and pesticides in agriculture		+	+	+	+	+	+	-	+	+	+	-	+	+			
	Measures for promoting sustainable food production and organic products		+	+	+	+	-	-	+	+	+	-	-	-	+			
	Information on food production and consumption initiatives		+		+	*	+	*	+	+	+	*	+	*	+			

<sup>(1)</sup> Azerbaijan and the former Yugoslav Republic of Macedonia did not respond to the Questionnaire whereas responses from Belarus, Russia, Serbia, Turkmenistan and Ukraine are incomplete.

<sup>(2)</sup> A response to the Questionnaire from Romania was received in November 2006 before Romania joined the EU.

Sustainable consumption and production: policies, strategies and initiatives <sup>(1)</sup>																		
	Armenia	Azerbaijan	Belarus	Bosnia and Herzegovina	Croatia	FYR of Macedonia	Georgia	Kazakhstan	Kyrgyzstan	Moldova	Montenegro	Romania <sup>(2)</sup>	Russia	Serbia	Tajikistan	Turkmenistan	Ukraine	Uzbekistan
Building/Housing	Requirements of minimum thermal efficiency level	+	-	+		+	+	+	+	-	+	+	-	-	-	+		
	% targets for improvement of thermal efficiency	****			20 %	25 %	*	*										
	Regulation of building demolition waste	+	-	*	-	-	-	+	-	+	-	-	-	-	-	-		
	Regulation of toxic substances in construction materials	+	-		+	+	-	+	*	+	+	-	-	-	-	+		
	Provisions on building/housing in energy conservation policies	+	-	+	-	+	+	+	+	+	+	-	-	-	-	+		
	Information on energy efficiency, etc.	+	+	+	+	+	**	+	+	+	+	+	-	-	-	+		
	Transport strategy/plan	-		+	-	+	-	+	+	+	+	-	-	-	-	+		
	Transport issues in spatial planning policies	+		+	-	+	+	+	+	+	+	+	-	-	-	+		
Transport	Transport policies and programs	Reduction of traffic congestion	+		-	**	+	+	+	+	+	**	+	+	+	+		
	Reduction of air pollution in urban areas	+		-	-	+	-	+	-	+	+	**	+	+	+	+		
	Encouraging public transport use	+		+	-	-	-	+	+	+	-	**				+		
	Encouraging rail instead of road for freight	-		+	-	-	-	-	+	+	-	**				+		
	Discouraging passenger car	+		-	-	-	-	-	-	+	-	**	+	**	+	**		
	Encouraging cycling/walking	+		-	-	-	-	-	-	+	-	**						
	Transport regulations	Emission standards	+	-	+	-	+	+	+	-	+	+	+	+	+	+		
	Fuel quality standards	+	+	+	+	+	+	+	+	-	+	+	-	+	+	+		
Waste	Restriction on movement of goods vehicles	-	-	-	+	+	+	+	-	+	+	-	+	+	+	+		
	Restriction on import/use of used cars	+		+	+	-	-	-	+	-	+	-	-	-	-	+		
	Improving fuel efficiency of passenger cars	+		-	+	-	-	-	+	-	+	-	-	-	-	+		
	Inter-modal freight transport/rail/inland waterways transport	-		-	+	-	-	-	+	+	+	+	-	-	-	+		
	Information on transport initiatives	+		+		+	-	+	+	+	+	-	-	-	-	+		
	Regulations on hazardous, industrial and municipal waste	+		+	+	+	+	+	+	+	+	-	+	+	+	+		
	Number of landfills with methane collection	1	1	1	2	0	2 ***	0	1	18		0	0	16	0			
	Measures encouraging waste prevention, minimisation and recycling	+		+	+	***	+	-	+	+	+	+	+	-	+	+		
SPP	Initiatives on sustainable waste management	+		+	+		+	+	+	+	+	+	+	+	+	+		
	Volume of procurement in 2005 % public tender	+	****		**					**		-	-	*				

**Notes:****Armenia**

- \* In 1993 Armenia introduced pollution fees on air emissions, water discharges, industrial and consumption solid waste.
- \*\* Armenia ratified the Kyoto Protocol with a reservation for Annex I and therefore does not participate in the mechanism of emissions trading. However Armenia participates in the Kyoto Protocol Clean Development Mechanism.
- \*\*\* There are measures aimed at the direct return of environmental incomes to fund local environmental projects. It is the only procedure of the direct income return that has been imposed by the Law on Target Use of Pollution Fees by the Companies,

<sup>(1)</sup> Azerbaijan and the former Yugoslav Republic of Macedonia did not respond to the Questionnaire whereas responses from Belarus, Russia, Serbia, Turkmenistan and Ukraine are incomplete.

<sup>(2)</sup> A response to the Questionnaire from Romania was received in November 2006 before Romania joined the EU.

15 May 2001. Under this law pollution payments of 14 companies are to be given to the local communities, the smallest administrative unit in the country, where the polluting companies operate. In 2005 there were several projects that have been financed under this mechanism, including the renovation of the sewage system, improvement of solid waste collection, developing the health system in three communes for the total amount of 21 000 USD. In 2006 there are projects in two communities for the amount of 65 000 USD.

\*\*\*\* The heat emission factor can vary within allowable values depending on the minimum and maximum requirements for thermo-physical parameters, construction materials and building structures.

\*\*\*\*\* 184 bln drames/26 %.

### **Croatia**

\* Guidelines for improving building demolition waste management are provided in the Waste Management Strategy of Republic of Croatia (Chapter 4.2.2).

\*\* EUR 4 464 939 102/EUR 3 580 702 736.

### **Georgia**

\* See previous questions.

\*\* Appropriate activities are currently undertaken by the Ministry of Economic Development of Georgia to determine basic directions for transport development.

\*\*\* The draft law on waste management outlines the instruments that encourage waste prevention, minimisation and recycling.

### **Kazakhstan**

\* Local executive authorities determine the percentage on a case-by-case basis depending on climate conditions.

### **Kyrgyzstan**

\* Existing policy instruments addressing thermal efficiency do not specify the percentage by which the thermal efficiency is to be improved.

\*\* The activities undertaken under National Energy Programme until 2005 aim at 50 % reduction of natural gas import and phasing out of coal and oil import from Karaganda (Kazakhstan). It is expected that a coal-mining site Kara-Keche and oil refinery facilities will be developed.

\*\*\* Under construction.

### **Moldova**

\* Strategic documents listed in paragraph 3.1 of the questionnaire, including national legislation, also contribute to sustainable food production and consumption.

### **Montenegro**

\* There is no specific regime to regulate toxic substances in construction building. However according to Article 10 of law on construction building, 'construction product must fulfil all obligations in terms of stability, protection of fire and explosion, sanitary and health protection, security use of building, protection of noise, safety of energy, etc.'

\*\* According to Article 21 of Law on environment, Ministry of Tourism and Environmental Protection is responsible for the preparation of a Monitoring Programme. Different environmental institutions implement this programme under a public tender.

### **Romania**

\* There are few approaches related to the flexibility of measures for putting into the practice IPP, such as fees, standards applicable to products, labelling and environmental management systems (ISO 14001, EMAS), which influence the impact of the products on environment. In 2007 the Directive 2005/32/EC establishing a framework for setting of eco-designs requirements for energy — using products and amending Council Directive 92/42/EEC and Directives 96/57/EC and 2000/55/EC of European Parliament and of the Council will be incorporated into national legislation. Romania is preparing a Roadmap for the implementation of the Environmental Technology Action Plan (ETAP).

### **Tajikistan**

\* In Tajikistan there is no system of monitoring and evaluation regarding nutrition of the population.

\*\* The National Transportation Strategy of Tajikistan until 2009 and the road infrastructure strategy are currently under development.

### **Ukraine**

\* As of December 2006 approximately 3 023 million tons of grains was purchased for the sub-regional needs against 2 008 million tons of grain that was purchased in 2005. The State Reserve Committee was contracted to purchase 400 thousand tons of grain and it purchased 37.5 thousand tons. In 2005 326.23 thousand tons was purchased by this time. The Agricultural Fund was contracted to purchase 400 thousand tons and it purchased 170.1 thousand tons of grain. Out of total amount of grain to purchase, 152.2 thousand tons was purchased for the total amount of 116.9 million grivna. The state-owned corporation Bread of Ukraine purchased 83.6 thousand tons of grain instead of 63 thousand of tons as envisaged. In 2005 270.2 thousand of tons of grain was purchased.

### **Uzbekistan**

\* Pollution fees are applicable since 2003. Companies undertaking self-financed environmental activities are eligible to the 30 % VAT exemption. Companies responsible for community facilities benefit from preferential tariffs for water emissions (0.2 kg/tariff rate).

\*\* Uzbekistan developed and tested a model of equipment for compressed natural gas passenger cars and trucks. As of 1 January 2006, the number of cars using gas was 61 600 and within 9 months of 2006 1 700 cars were shifted to gas. In October 2000 leaded fuel production was 7.6 % of the total amount of fuel production. It is expected that leaded fuel production will be ceased by 2008.

\*\*\* Uzbekistan developed an inventory of waste disposal and recycling sites. As of 1 October 2006 there are 171 solid waste sites, 13 tailings dams, 14 slag collection sites and 13 dangerous waste landfills.

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