07

Sectors that drive environmental change

7.0 Introduction

The previous chapters have examined recent developments in terms of the impacts of human activities on the environment, both directly, as in the case of polluting emissions to air or water, and indirectly through mechanisms such as climate change. Chapter 2 discussed the impacts that most directly affect human health, that is air quality, water, soil, and chemicals. Chapters 3 to 6 addressed the issues of climate change, biodiversity, the marine and coastal environment, and the sustainable production and consumption, all of which can affect ecosystems as well as humans.

While many individual improvements could be identified in different regions for different issues, the overall picture is not one of progress. To gain a better understanding of why this is the case, it is necessary to look in more depth at developments in the economic sectors that are driving the pressures on the environment.

There is political recognition (UNECE, 2003) that to achieve sustainable development and protect the environment it is necessary to include environmental requirements and objectives in the decision-making process within the different sectors of the economy.

However, while some efforts have been made to integrate environmental concerns into the policies dealing with the economic sectors mostly in the EU under the umbrella of the so-called Cardiff strategy, there is still a need for stronger recognition of the fact that socio-economic and environmental objectives are not in conflict with each other, but that rather the achievement of environmental objectives is an absolute precondition if the socio-economic goals are to be met in the long term. To put it another way, short-term economic benefits can turn into long-term losses, as is clearly illustrated in the recent Stern report on the cost of climate change (Stern, 2006), where the cost of inaction in the long run will be far greater than the cost of mitigation in a shorter term perspective. Reactions to the Stern report and recent policy developments in the EU linking competitiveness, energy security and the mitigation of climate change, show promise for the future.

It is also important to recognise that though socio-economic and environmental objectives can be pursued simultaneously through a carefully crafted integrated set of policies, it is also possible to choose pathways that meet some of the objectives but not others. For example, the use of domestic coal as the feedstock for the production of synthetic diesel for road transport, an option that is being explored in some parts of the world, would meet the objectives of competitiveness and energy security but not that of combating climate change. In another instance, it is possible to choose a pathway that would meet all three objectives but which could have major negative impacts on biodiversity or global food prices.

Therefore, systematic impact assessments of policies, a key element of the EU Better Regulation initiative (European Commission, 2005), has the potential to further the integration of environmental concerns into sectoral policies.

In an attempt to form an overview of these challenges, this chapter looks at four economic sectors that play a major role in society and have substantial impacts on the environment. Tracking developments in these sectors — energy, transport, agriculture and tourism — helps to understand the driving forces behind the changes in the environment that can be observed, and gives pointers as to where action should be taken to mitigate the negative effects of human activities on the environment. Indeed, without such action it is extremely unlikely that the goals of environmental protection and sustainable development will be met.

Together, the four sectors cover most of the main environmental issues that society faces. Energy provision transforms resources, is the main source of greenhouse gases, and is a major source of air pollution. The transport sector consumes land and energy (thus contributing to greenhouse gas emissions), is a major source of air pollution and noise and can have negative impacts on biodiversity. Agriculture uses land and water, contributes to greenhouse gas emissions, impacts on biodiversity (both in a positive and negative sense), and is a major source of water

pollution. Finally, tourism is a major driver behind the growth in transport, and impacts on water resources and sensitive areas such as mountainous regions and coastal zones.

In the period since Kiev, these four sectors have developed against a general backdrop of growing wealth across large parts of the pan-European region alongside relatively smooth political transitions and economic restructuring in most parts of EECCA sub-region (see also Chapter 1, Europe's environment in an age of transitions). In addition, the general trend towards liberalisation and geographical integration of markets following the removal or weakening of barriers to trade continued across the region, especially in the energy sector.

Developments in the rest of the world — for example in USA, China and India — are increasingly influencing the situation within Europe, again especially as regards the energy sector.

Finally, climate change — a consequence of human activity — is also beginning to impact on boundary conditions for decision-making in many sectors and also the resource base for sectoral activity, for example in the agriculture sector. Long-term economic investments need to take this into account.

The four sectors focused on here are not the only ones that need to be considered. Households and industry are also important sectors with respect to environmental impacts. They are not treated specifically here in Chapter 7, but many aspects of their activities are covered in other chapters. Households consume energy and resources and generate waste and are partially covered in Chapter 6 on the sustainable use of resources and waste. With the huge growth of the service industry, the industry sector is no longer a relatively homogeneous group of activities, and treating the sector as a whole has become meaningless. Furthermore, the role of the industrial sector as a major point source of air and water pollution has generally become less important, though still very significant in some regions. Overall, the major impacts of the industrial sector are now as a generator and consumer of energy and consumer of resources, and as a generator of transport, linked to the opening of markets and growing specialisation in Europe and worldwide. Industry is therefore covered by the other sections and chapters dealing with these issues.

7.1 Agriculture

Photo: Arable irrigated land, Croatia © George Buttner

Key messages

- The historic impact of agriculture on landscapes and biodiversity was positive, but modern, intensive agriculture is often a threat to biodiversity. Agriculture has a negative influence on the environment through its use and pollution of resources such as air, water and soil.
- Fertiliser input per hectare of agricultural land is declining from a high level in the EU-15 and EFTA-4. In the rest of the pan-European region it declined strongly after 1990, but is now increasing significantly in the EU-10. Nitrates from manure and chemical fertiliser application continue to pollute drinking water and cause eutrophication of coastal and marine waters.
- While pesticide use has remained constant or has declined in many countries, it still gives rise to significant environmental concerns. Pesticide concentrations above EU drinking water standards are found in several EU Member States, and significant pesticide concentrations in surface water bodies also occur in many EECCA countries. There has been no significant progress in dealing with the legacy of localised hot spots of pesticide contamination in SEE and EECCA.
- The area of irrigated land in southern EU-15 and SEE has increased, showing a continuing trend of agricultural intensification. Irrigation in southern and eastern EECCA countries is causing declines in water resources and quality, falling groundwater tables, salinisation and degradation of land as well as impacts on ecosystems.
- The production of bioenergy and, potentially, carbon sequestration in soils offer both new income opportunities to farmers and environmental benefits. However, the potential environmental pressures from energy cropping need to be well-managed to ensure overall environmental benefits.
- Reforms of the EU common agriculture policy have largely cut the link between farm income support and agricultural production and provide a wide range of environmental incentives. The policy framework in SEE and EECCA is less diverse and not so well resourced. There is a considerable untapped agricultural potential in many of these countries that may give rise to intensification as worldwide and national demand for food and bioenergy strengthens. Most of SEE and EECCA will require continued international support to achieve a better environmental management in the agricultural sector.

7.1.1 Introduction

Agriculture provides essential services to human society through the production of food and biomaterials, rural employment and the management of landscapes and biodiversity. At the same time, it exerts significant pressures on natural resources through the consumption of water, the use of chemical fertilisers and pesticides, its influence on soils and water quality, and its emissions of greenhouse gases (GHGs). Minimising the environmental pressures from agriculture while maximising its positive external outputs is a key challenge for societies throughout Europe and Central Asia.

Across Europe and Central Asia, the farming sector is affected by a growing polarisation between intensive commercial agriculture and low-income, less productive farming systems that are increasingly being abandoned. However, agriculture in the region still includes very diverse systems, ranging from large, highly intensive and specialised commercial holdings to subsistence farms mainly using traditional practices. Consequently, impacts on the environment vary in scale and intensity and may be positive or negative.

Agriculture policy, market trends which are increasingly global in their scope, technological development, and changing consumer preferences provide the framework within which farmers operate. The importance of these individual factors varies according to the integration of farming into wider markets, the political framework, available public resources, and farming conditions. In the EU, the common agricultural policy (CAP) has had a significant influence on farming decisions and now includes a wide range of rural development and agri-environmental policy instruments. In SEE and EECCA, the agri-environmental policy framework is less developed and lacks budgetary resources. This is creating additional challenges for governments in helping farmers to reduce agricultural pressures on the environment through, for example, access to environmental farm advice.

7.1.2 Economic and social trends in farming

During the past decades the main agricultural policy objective in all regions was to increase food production. Agricultural output increased significantly as a result of mechanisation, use of non-renewable inputs such as inorganic fertilisers and pesticides, installation of large-scale irrigation schemes, and cultivation of marginal land and technological developments, including crop and livestock breeding. However, this trend is only continuing in the more productive regions and/or where significant government resources continue to support intensive production systems. Some countries, including Spain and Romania, currently permit the use of certain genetically modified crops (GM crops). In spite of significant concerns over the use of genetically modified organisms (GMOs), this trend may become more widespread in the future. At this stage, however, it is difficult to assess the environmental implications of such crops in the wider region.

Farming systems and areas that have lower productivity or are a long way from the main markets have become economically marginalised or have already been abandoned. Such trends can be observed particularly in the rural areas of EECCA and SEE where political changes in the early 1990s led to a period of economic and market instability.

During the socialist era, government planning determined agricultural production, frequently without taking into account resource efficiencies or the suitability of production to the environment. The area of arable land was expanded at the expense of forests and grassland, increasing the pressure on remaining pastures. The development of large irrigation schemes, farm specialisation and investment in animal production were all associated with the push to increase output and resulted in a great reliance on fertiliser and pesticide input (EEA, 2003). While the collective farming system offered secure employment to a large part of the rural population, labour efficiency was frequently quite low.

The major political changes in the 1990s led to a significant restructuring of agricultural production,

often resulting in the privatisation of previously nationalised land — more so in the new EU-10 and SEE than in EECCA. Coupled with a strong decline in agricultural support and consumer purchasing power, this had severe economic consequences for rural areas. In particular, livestock production and the cultivation of less productive land declined strongly, as did agricultural incomes and employment (EEA, 2004a and Prishchepov *et al.*, 2006). The economic and social crisis of agriculture also resulted in a large drop in the consumption of fertilisers and pesticides, and loss of machinery and damage to such shared infrastructure as irrigation channels, rural roads and cooperative buildings. These effects can still be felt strongly in most countries of SEE and EECCA. However, rural poverty also leads to overexploitation of the local environment, e.g. via overgrazing, in parts of the region.

Agricultural trends in EU-15 show more continuity, with regional specialisation and intensification of production continuing through the 1990s (EEA, 2005c). This resulted in a considerable decrease in the number of people employed in agriculture and in farm holdings. Practical impacts at farm level include increased field sizes and livestock densities, shortening of crop rotations, and increased use of silage grass and maize as fodder crops. The abandonment of farms is not as significant in these countries, except in some mountain and Mediterranean areas. This relatively low level of abandonment is at least partially due to the significant budgetary support for EU agriculture, including targeted environmental measures.

7.1.3 Pressures on the environment

Agriculture uses and depends on natural resources: soil, water, fossil fuels and biological systems. This exerts pressures on the natural environment in the form of soil degradation, water depletion and pollution, air emissions, and damage to ecosystems. On the other hand, the long interaction of traditional farming practices with the environment has also shaped landscapes and habitats throughout the region. Consequently, both modern intensive agriculture and the abandonment of farming can have negative impacts on the environment.

Agricultural production across the continent continues to rely on such resources as inorganic fertilisers and pesticides (see indicators presented in Figures 7.1.1 and 7.1.2). However, there has been a decline in the use of these with a consequent reduction in pressure on the environment. Changes in farming methods, including integrated production and low-input or organic farming, can help to reduce agriculture's dependence on external chemical inputs. Organic farming has grown strongly in the last five years and, by 2004, covered about 3.5 % of the total agricultural area of EU-15 and EFTA. The development of certified organic farming in eastern Europe and Central Asia still lags significantly behind this figure although individual countries, for example Croatia, have made strong progress in recent years (see Figure 4.9 in Chapter 4, Biodiversity).

While agriculture can exert significant pressure on the environment, it is also itself subject to such negative environmental impacts as air pollution, soil contamination and urban development. Soil sealing for transport and housing infrastructure eliminates many thousands of hectares of agricultural land every year, in particular in western Europe (EEA, 2005c). Industrial pollution in EECCA, in particular the radioactive fallout from the Chernobyl nuclear accident, has made considerable areas of land unfit for agricultural production (for more detail please consult Section 2.4, Soil). Climate change will strongly affect agriculture, for example as a result of changes in rainfall patterns, shifts in growing seasons, and increasing maximum temperatures (more information on the impacts of climate change is presented in Chapter 3, Climate change).

Fertiliser and pesticide consumption

Diffuse losses from agriculture continue to be an important source of nitrate and phosphate pollution in European waters (EEA, 2005 b and c). For instance, about 40 % of the total nitrogen load in the Danube river and 50 % in the Baltic Sea come from farming (Behrend/EuroCat, 2004; EEA, 2005b). The chapters on water and the marine environment provide further detail on the effect of agricultural

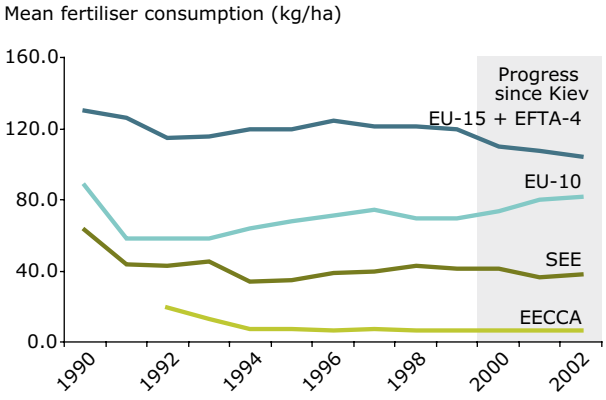
pollution on water quality. The most suitable indicator for tracking nutrient pressures from agriculture is the gross nutrient balance, but as relevant data are not available for most countries in the region, fertiliser consumption is used instead.

Figure 7.1.1 shows that fertiliser input per hectare of agricultural land generally decreases as one moves eastward from western Europe to the EECCA region. Since the mid-1990s fertiliser use has declined in EU-15 and EFTA whereas it is increasing significantly in the new EU Member States — about 17 % since 1999. After a significant decline around 1990, fertiliser consumption remained more or less stable in SEE and EECCA during the 1990s. Since 1999, however, reported data show a drop of nearly 10 % in SEE, whereas fertiliser use in EECCA appears to have increased by about 7 %. Projections of the global outlook in fertiliser consumption up to 2030 are presented in the annexes to this report.

While the decline in fertiliser use and livestock numbers in SEE and EECCA reduces current pollution problems, the treatment of fertilisers and manure still does not appear to be environmentally optimal (EEA, 2003). Furthermore, inorganic fertiliser consumption in the new EU Member States and many EECCA countries is expected to increase in response to new market opportunities and a change in the policy framework for the new EU Member States (EEA, 2005a). Therefore, the question of optimising fertiliser use and the treatment of organic manure requires further attention as the current fertiliser trend in the new EU Member States demonstrates.

Agricultural pesticide use can pollute drinking water, surface and groundwaters, and soils. Data on surface and groundwater bodies in several EU Member States show that pesticide concentrations above the EC maximum of 0.1 µg/l for a single pesticide (Drinking Water Directive 98/83/EC) can be found regularly (EEA, 2005c). Significant pesticide concentrations in surface water bodies can also be found in a range of EECCA countries (e.g. UNECE, 2000 and 2003). In addition, there is a

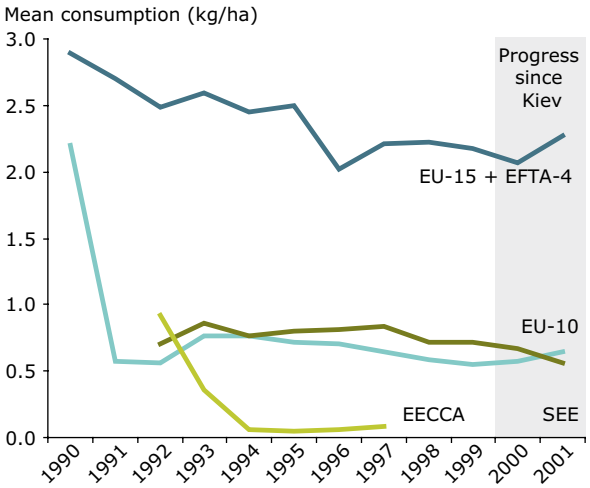
Figure 7.1.1 Fertiliser input per hectare of agricultural land



Note: EU-15 + EFTA-4: no data for LI; no data for BE, LU for 2000–2002.
EU-10: no data for SK, CZ for 1990–1992; no data for EE, LV, LT, SI for 1990–1991.
SEE: no data for BA for 1990-1994; no data for HR for 1990–1992; no data for MK for 1990–1992; no data for CS for 1990–1991.
EECCA countries: no data for 1990–1991.

Source: FAO.

Figure 7.1.2 Total pesticide consumption per hectare of agricultural land



Note: The baseline for calculating the consumption of pesticides per hectare was total agricultural land area (even though pesticides are not applied on all farmland).
Pesticides include the following categories: fungicides and bactericides, herbicides and insecticides. EU-15 + EFTA-4: no data for LU, IS, LI; data for BE available only from 1993 to 1999; no data for GR in 1990; data for IE available only from 1994 onward; no data for ES in 2001.
EU-10: no data for CY from 1998 to 2001; no data for CZ, MT, SK from 1990 to 1992; no data for EE, LT, SI for 1990–1991; no data for LV in 1990–1991 and 1999–2001; no data for PL in 1990.
SEE: no data for AL, BG, BA, HR; no data for MK in 1999–2001; no data for CS in 2001.
EECCA: insufficient or no data before 1992 and after 1997.

Source: FAO.

significant environmental legacy in both SEE and EECCA where localised hot spots of contamination are often associated with the storage and disposal of pesticides (see also Section 2.5, Hazardous chemicals).

The use of pesticides per hectare of agricultural land is much higher in western Europe than in the other country groupings analysed. However, some decrease in their use since 1990 could be observed. Combined with the use of less toxic ingredients this is likely to have reduced the general environmental pressures from pesticide applications although their use remains high in certain farming systems. In EECCA, EU-10, and probably also in SEE, pesticide use declined strongly after 1990 and remained low until 2001. The uneven use of pesticides across different farming systems needs to be taken into account when interpreting these figures. Irrigated farming generally relies on high to very high doses of pesticides per hectare, whereas they are generally not used, for example, in extensive grazing systems. Thus the average figures for many EECCA and SEE countries hide local or regional hot spots for pesticide use that can lead to significant environmental problems (see Section 2.4, Soil, and Box 7.1.1).

Organic farming and extensive pasture systems are the only farming approaches that can be economically viable without the use of synthetic pesticides. Consequently, there is a need to improve the efficiency and environmental management of pesticide use on most agricultural land throughout the regions covered in this report. New management practices, such as integrated crop management (ICM), enable a reduction in pesticide use if properly applied. However, ICM is estimated to cover only about 3 % of the utilised agricultural area in the EU (EEA, 2003) and requires professionally trained farmers. To further improve the handling of pesticides — and fertilisers — more targeted training and advice needs to be offered, particularly for newly established farmers in eastern Europe and Central Asia (OECD, 2007).

Box 7.1.1 Reducing dependence on pesticides

Pesticide use appears to have been decreasing throughout the region since 1990. This is due to a more efficient use of pesticides in western Europe and associated with severe economic restructuring of the agriculture sector in SEE and EECCA. However, new approaches to agricultural management also play a role: the increase in organic farming in north-western Europe and the use of integrated crop management (ICM) techniques in many pesticide-intensive farming systems. A recent report by the OECD suggests that the currently low use of pesticides in the EECCA region in particular could provide a window of opportunity for a more widespread introduction of the ICM approach. Uzbekistan, Turkmenistan and the Republic of Moldova are quoted as countries that have made particular progress in this area (OECD, 2007). Appropriate legislation for the handling and application of pesticides will also play an important role in reducing risks from pesticide use. In the EU, new legislation has been proposed to deal with this issue, see for example the Thematic Strategy on the Sustainable Use of Pesticides (COM(2006)327 final).

Developing environmental farm advice

The EEA has carried out a study on behalf of the European Commission on advisory approaches to supporting environmental farm management in the EU-25 (the CIFAS project). The project had two main goals:

a) to compile information on environmental cross-compliance standards as well as farm advisory tools and systems;
b) to enable an exchange of information between EU Member States and relevant stakeholders.

This supports the development of farm advisory systems at a Member State level for providing environmental farm management advice linked to cross-compliance. More information is available on the website of the CIFAS project: http://www.ewindows.eu.org/cifas.

The need for the CIFAS project shows that proper information and training is necessary to help EU farmers comply with legal standards. The potential benefit of environmental advice for farmers is likely to be even larger in SEE and EECCA where, in general, farmers have less knowledge of the environmental effects of different farm management techniques. Achieving the more efficient use of fertilisers, pesticides and water in these regions would be advantageous both from an environmental and an economic perspective (OECD, 2007).

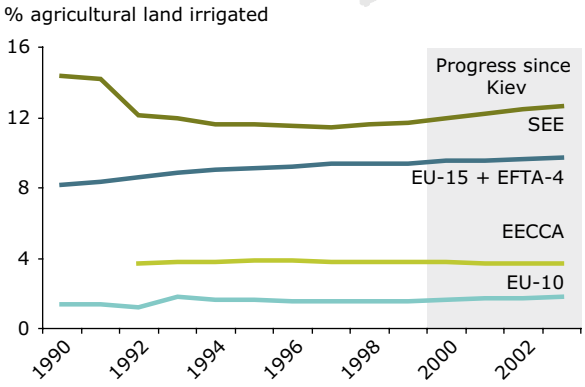
Trends in irrigation

The use of water for irrigation plays an important role in current agricultural production systems across Europe and has considerable economic importance — particularly in Mediterranean and EECCA countries where it is widely used to increase output. In arid and semi-arid regions, such as Central Asia, widespread irrigation not only helps to increase yields, but also widens the range of crops that can be grown. However, as described below (and in Sections 2.3, Inland waters, and 2.4, Soil), it can have strong environmental impacts.

Within EU-15 and EFTA, the scale and importance of irrigation is greatest in the Mediterranean countries, where irrigated areas have increased, most notably in France, Greece and Italy, indicating a continuing trend of agricultural intensification. While there was a decline in irrigation in SEE at the beginning of the 1990s, their total irrigated area is increasing again, influenced, in particular, by large-scale irrigation projects in Turkey — which shows an increase in irrigated area of about 17 % since 1999.

Irrigation is of particular economic importance in southern and eastern EECCA countries – the largest irrigated areas are found in southern Russia, Kazakhstan, Ukraine, Uzbekistan, Romania and Turkey. However, these countries are also characterised by strong environmental problems associated with irrigation, such as declining water resources and quality, falling groundwater tables, salinisation, and degradation of land as well as impacts on ecosystems (see Box 7.1.2).

Figure 7.1.3 Average irrigated land area as percent of agricultural land area (selected countries)



Note: Actual irrigation volumes are dependent not only on total irrigation area but also on irrigation efficiency in different regions.
EU-15 + EFTA-4: no data for IE, LI, IS; no data for BE, LU for 2000–2003.
EU-10: no data for SK, CZ for 1990–1992; no data for EE, LV, LT, SI for 1990–1991.
SEE: no data for BA, HR, MK, CS for 1990–1991.
EECCA: no data for 1990–1991.

Source: FAO.

Box 7.1.2 The impact of agricultural irrigation in Central Asia

About 75 % of all cropland — approximately 36 million hectares in total — in Central Asia was irrigated in 1999, supporting between 10 % and 40 % of countries' GDP. Although this share has since fallen, due to the development of other parts of the economy and the further decline of irrigation systems and associated drainage systems, irrigated agriculture is still the main economic backbone of many rural areas. A 2003 World Bank study estimates that irrigated agriculture can remain or become economically viable if appropriate investments in infrastructure are made. Such work is of utmost importance to improve very wasteful irrigation systems and practices and to avoid further, often irreversible, salinisation and desertification of important agricultural cropland. The introduction of user-driven water management systems, social equity in rural areas and the appropriate training of farmers are considered important complements to tackling infrastructural decay.

The short- and long-term environmental and health impacts of irrigation need to be taken into account when planning for the future. Most current drainage systems are in such a poor state that waterlogging and salinisation has strongly increased and even affects the foundations of rural villages. Insufficient drainage requires additional freshwater irrigation to remove salts from affected fields, leading to very high water demands. The returned salt-contaminated drainage water also contains pesticide and fertiliser residues, which can have a severe impact downstream, on rivers and wetlands. And the result of excessive water demands, including the death of the delta ecosystems of the Amu-Dar and Syr-Dar rivers and the drying up of the Aral Sea, are well documented. In spite of some initiatives, started in the 1990s, to improve environmental and water management in the Aral Sea catchment area, the environmental status of the Aral Sea and the surrounding area remains extremely serious.

Sources: The World Bank, 2003; WWF, 1999.

Two current factors for these negative impacts are the decline in state support and the lack of private capital for maintaining or improving the efficiency of current irrigation systems. Overall, irrigation has a particularly strong impact on environmental resources in Central Asia although its share in total land area there is smaller than in Mediterranean countries. According to recent estimates, salinisation affects nearly 50 % of the total irrigated area — 15 % of all arable land — in Central Asia (World Bank, 2003). Box 7.1.2 and the soil section provide further details on the environmental and economic costs of this issue.

Trends in livestock populations

Livestock is associated with both ends of the farming spectrum: intensive agricultural production with high pollution pressure, and extensive farming systems of high nature value. Livestock trends across the regions are thus worth investigating. The total numbers of cattle, pigs, sheep and goats in most of EU-10 and EECCA decreased by about 40–50 % during the 1990s. The numbers of cattle in EU-15 and SEE declined by about 10 % and 20 %, respectively, during the same period (see Figure 7.1.4). Between 2001 and 2005 cattle numbers continued to decline in WCE and EECCA, with the latter experiencing a drop of around 10 % since 2002 alone.

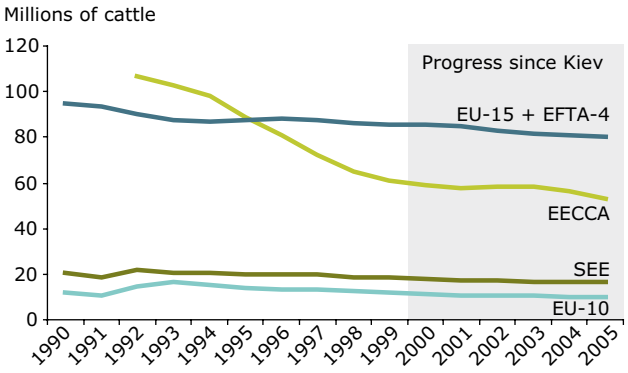
The environmental effects of changes in livestock farming are linked to the polarisation of farming between intensification in favourable regions and decline or abandonment of extensive systems in marginal areas. Traditional livestock grazing systems are often associated with high biodiversity richness and high nature value farmland. Consequently, both an intensification of livestock production through higher stocking densities or a shift to stable-based systems, and the abandonment of grazing practices lead to biodiversity loss (see Box 7.1.3 and Chapter 4, Biodiversity). It should be noted that rural poverty can lead to both abandonment process and overgrazing, depending on the level of economic decline and alternative income opportunities outside farming.

High livestock population densities, in particular in large fattening units, lead to a high risk of water pollution, which is exacerbated by inappropriate manure management. Both remaining production systems from before 1990 and new large-scale fattening units can give rise to localised hot spots of nutrient loading wherever they occur.

The environmental impact of high livestock concentrations is particularly large where it coincides with weaker policy standards and poor management of manure. This seems to be the case in Belarus and parts of Ukraine and the Russian Federation specialising in animal production (EEA, 2003). The contribution of livestock to gaseous emissions is also significant: 94 % of total EU-15 ammonia emissions and about 50 % of total methane emissions arise from animal husbandry (EEA, 2004b). This share is somewhat smaller in the other regions covered (see Chapter 3, Climate change).

Intensive livestock production can be found in all areas of the EU that have favourable production conditions — long grazing seasons, proximity to ports for fodder import, etc. Livestock densities in some parts of EU-15, for example along the North Sea coast and Brittany, are so high that they have led to significant impacts on groundwater quality and nutrient overloads in coastal waters

Figure 7.1.4 Trends in cattle numbers by country group



Note: Similar declining trends are reported for pigs, sheep and goats in most SEE and EECCA countries, while in EU there was little change in pig, sheep or goat numbers.
EU-10: no data for CZ and SK for 1990–1992; no data for EE, LV, LT, SI for 1990–1991.
SEE: no data for BA, HR, MK and CS for 1990–1991
EECCA countries: no data for 1990–1991

Source: FAO.

(EEA, 2005b). However, legislation and national programmes have sought to minimise this problem with some success. Extensive livestock production systems in marginal regions, for example mountain areas or Mediterranean countries, are generally in decline (EEA, 2005c). Rural development measures, such as 'less favoured area' payments or agri-environment schemes, support such high nature value livestock systems, but the general liberalisation of agricultural markets and the decoupling of farm support can weaken the financial basis for extensive livestock systems.

Traditional livestock systems were often already replaced by more intensive production types in SEE and EECCA countries during the Soviet period. At the same time de-collectivisation and the loss of livestock markets led to a strong decline of commercial livestock operations in many central and eastern European countries. This has eased nutrient pressures, but has also led to the decline in biodiversity and landscape diversity in eastern Europe (EEA, 2004a).

In parts of the EECCA region, however, privatisation and the severe economic problems led to a stronger emphasis on grazing livestock, in particular sheep, during the 1990s. At low stocking densities this can be favourable from an environmental perspective, but many EECCA countries now report serious soil erosion and desertification threats arising from overgrazing by sheep (Section 2.4, Soil; UNECE, 2000 and 2003). The latter often appears to be linked to basic survival strategies in rural areas but is not environmentally sustainable, since it destroys the very foundation of the affected ecosystems and ultimately of livestock production itself.

Box 7.1.3 Livestock farming and high nature value farmland in the Balkan region

Much of the Western Balkan region in south-eastern Europe is characterised by mountain areas, traditionally exploited for forestry and livestock grazing, together with some small-scale arable farming in river valleys. Given the strong physical limits to agricultural intensification, and the drastic political changes and conflicts in the region over the last century, livestock production has continuously declined, particularly so since 1990. Currently, therefore, mountain farming in nearly all Western Balkan countries can be considered as marginalised or abandoned. Where livestock is still kept there are often only one or two cows per household, and most farmers are 50 years old or more (EFNCP, 2005). This strongly limits the possibilities for commercial dairy operations even where opportunities for quality production exist. Sheep production is in a similar situation, with most sheep producers uncompetitive in comparison with lowland or foreign sheep flocks.

A workshop organised by UNEP and WWF, the global conservation organisation, on behalf of the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) investigated approaches to identifying high nature value (HNV) farmland in the Western Balkan region and discussed options for supporting HNV farming systems (WWF, 2006). This demonstrated that political awareness of the importance of extensive livestock systems for biological diversity is still low in the Balkan region, in particular among agricultural policy-makers.

Various options for supporting HNV farmland areas in Western Balkan countries, one of the objectives of the Kiev conference, were proposed, ranging from direct support to HNV farmers, maintaining traditional livestock breeds, and marketing initiatives to wider rural development measures in the areas concerned. Further progress in the identification and maintenance of HNV farming systems will depend on measures taken at national level, where possible with support from international programmes.

Photo: © Rolf Kuchling

Environmental trends and services linked to agriculture

Agriculture fulfils more functions for society than merely producing food and providing income to parts of the rural population. Relevant other functions include the maintenance of landscapes and habitats — environmental services — and rural tourism as well as carbon storage and bio-energy production — both important in the context of climate change. Some of these will not yet appear so relevant in EECCA, where the primary functions of food production and employment clearly have the greatest weight. It is important, however, to look beyond immediate needs and review options for additional income and public benefits in rural areas.

Climate change is a global environmental issue that will have a significant effect on agricultural production throughout the region (see Chapter 3, Climate change). Agriculture will need to respond to this challenge by adjusting production patterns. However, it can also be a mitigating factor: one strategy discussed to slow down climate change is that of carbon storage in agricultural soils or through afforestation. The quantitative values of this are difficult to estimate, but it appears very relevant in a situation where soil degradation and deforestation are environmental threats in themselves. In fact, past and ongoing soil erosion already causes significant losses of production and hence agricultural income in the affected regions (see Section 2.4, Soil). If one could arrest such trends and participate in global carbon markets at the same time, double benefits could result. The first initiatives of this nature are already taking place (World Bank, 2007). The second option that could contribute to counteracting climate change is the production of bio-energy on farmland, such as short rotation coppicing for heating purposes or the cultivation of oilseed rape for biodiesel production (see Box 7.1.4).

Agriculture's link to biodiversity is discussed in more detail in the relevant chapter but it is important to highlight that much of the

Box 7.1.4 The potential for bio-energy production

A recent EEA study analyses the 'environmentally compatible bio-energy potential in Europe' (see http://reports.eea.europa.eu/eea_report_2006_7/en).

In the study, EEA developed a number of environmental criteria for minimising additional environmental pressures from bio-energy production. Based on these criteria, the environmentally compatible bio-energy potential for the EU-25 was calculated up to 2030. The report found that the EU-25 could actually produce 190 million tonnes of oil equivalent (Mtoe) of bio-energy per year, in an environmentally viable fashion, by 2010. This could reach almost 300 Mtoe by 2030 — about 17 % of the total annual energy consumption of 1 815 Mtoe in the EU-25 in 2004.

However, it is important that the EU manages any proposed rise in the production of bio-energy crops in line with other Community policies and objectives aiming to protect biodiversity and soils and reduce waste. The report calls for the implementation of environmental guidelines at local, national and European levels to achieve this and lists a number of relevant agricultural policy instruments. There are also possibilities for synergies between the production of bio-energy crops and the environment. For example, innovative crops, such as perennial grasses as well as short rotation forestry, can combine high yields with relatively low environmental pressures. If managed appropriately, they could also add to the diversity of landscapes and help to reduce soil erosion.

Due to increasing internal demand, the EU is already importing biomass or biofuel. Some SEE and EECCA countries could benefit from this import demand as their production efficiency and capacity increases. However, the same environmental concerns, as well as opportunities, apply to bio-energy production in these countries as in the EU. Furthermore, the potential effect of worldwide bio-energy demands, in combination with increasing global food consumption, could lead to the additional conversion of forests and grasslands to arable land. This would have negative consequences for global biodiversity and soil resources and lead to significant greenhouse gas emissions in the conversion process (Petersen and Wiesenthal, 2007).

biodiversity in Europe is found on, or adjacent to, farmland and is therefore considerably affected by agricultural practices. Agricultural habitats support the largest number of bird species of any broad habitat category in Europe, including the greatest number of threatened species (Heath and Tucker, 1994). Species dependent on farmland are, however, threatened by changes in management practices, such as the times of sowing and harvesting of crops, intensification, abandonment, loss of field boundaries, conversion of grassland into arable land and a decline in habitat diversity due to increased mechanisation (Nagy, 2002; EEA, 2005c).

7.1.4 Policy response and outlook

Environmental legislation, agricultural policy measures, research and farm advice as well as consumer behaviour are the key mechanisms through which society can influence the shape and intensity of farming. Their relative effectiveness depends on the economic and social status of farmers and the strength of policy enforcement and budgetary resources. Any agri-environment strategy needs to take all these factors into account, while the EU has more policy tools and resources at its disposal than countries in SEE and EECCA.

The last reforms of the CAP — Agenda 2000 and the mid-term review in 2003 — have largely cut the link between farm income support and agricultural production. In addition, the range of agri-environment policy tools available to EU Member States has widened in the last reform of EU rural development policy. The CAP, therefore, can no longer be regarded as a major driver of agricultural intensification. The main challenge appears to be to secure enough funding for the rural development pillar of the CAP and to ensure the successful implementation of agri-environment measures at Member State level. This is a particular concern in the EU-10 and the Mediterranean Member States (EEA, 2004a and 2006).

EU farms are likely to continue to specialise and to grow in a bid to maintain income levels. Even with current and future reforms of the CAP it will thus be a challenge to achieve the objectives of EU environmental legislation such as the Water Framework, Nitrates, Birds and Habitats Directives, or of legislative proposals for the sustainable use of pesticides. Energy security and environmental goals in the transport sector have already established new obligations for EU Member States to increase biofuel production on agricultural land. Hence, the increasing bio-energy demands on agriculture in the EU — and beyond — will be an important factor in determining future agricultural land-use intensity. As farmers specialise and develop new products so their environmental management tasks will become more demanding. This raises the importance of environmental training and advice to implement environmental standards and minimise the future environmental effects of EU agriculture.

The main drivers of change in SEE and EECCA have been the fundamental political and economic changes of the 1990s, including privatisation and a strong reduction of agricultural support in most countries. Efforts to tackle environmental issues in agriculture need to take account of the socio-economic situation of farmers, their levels of training and the reduced capacity of government institutions to deliver major policy programmes. In addition, the lack of jobs and income, emigration from rural areas and low investment exacerbate farmland management problems in the region. Although an increased environmental awareness and recognition of the complexity of rural socio-economic problems are apparent, agri-environmental policy development is still at an early stage. This needs to be carried through to implementation if the often interlinked problems of rural poverty and environmental degradation are to be reduced. Further support from international financing institutions and EU donors will be helpful in this regard.

Improving agricultural efficiency, output and environmental management need to be tackled together. As many of the farmers have only recently acquired their farms, they often have less agricultural training than their EU counterparts. Further, machinery and equipment are frequently outdated and they lack capital for significant investment. So, just as in the EU, appropriate

advisory services to support environmental farm management and relevant training would be very beneficial.

There is a considerable unexploited agricultural potential in many EECCA countries that may give rise to intensification as worldwide and national food and bioenergy demand strengthens. One key aspect to take into account in preserving and expanding this production potential is the reduction of pressures on scarce water and soil resources. In this context, there is a need to equip farmers with the modern equipment and training they need to improve their resource efficiency and environmental management. This relates to large-scale water infrastructure, measures to reduce soil erosion and degradation, and the farm level management of manure, chemical fertilisers, and pesticides.

Most countries in SEE and EECCA will require continued support to integrate environmental considerations into the agricultural sector. Such support will help to develop an agri-environmental policy framework and to strengthen the extension services, particularly in the provision of agri-environmental advice and training materials. Financial incentives and support are also required to improve agricultural and environmental infrastructure. In doing this, the aim should be to minimise or avoid environmental costs and focus on agricultural production systems that can become economically viable without long-term state support.

This review has shown again that improved monitoring and data are needed for a thorough assessment of the impact of agriculture on the environment throughout the region. At EU level, the conceptual foundation for such a monitoring system has been laid but individual parts still require further development. Agricultural statistics and the associated environmental monitoring also require strengthening or rebuilding in SEE and EECCA.

7.2 Transport

Photo: © Pawel Kazmierczyk

Key messages

- Transport volumes are growing more or less in parallel with economies across the pan-European region. In EECCA, economic restructuring has led to a decrease in transport in some countries, but volumes are expected to increase along with the economy over the next few decades, leading to increasing environmental impacts.
- EECCA countries have a high share of rail transport. It is important to safeguard the competitive position of rail because of its good environmental performance. This requires coordination of industrial development and modernisation of the rail system.
- Developing competitive urban transport solutions is a way of fighting traffic congestion and air quality problems and improving transport safety. Public transport should therefore be a key priority along with safe walking and cycling. For public transport to become competitive, cities need to be planned and developed with public transport in mind. Allocation of space for the necessary infrastructure (rail lines, bus lanes, etc.) is of the utmost importance, as is zoning that ensures that activities are not spread out to an extent where only cars can serve them.
- Transport energy consumption and the resulting per capita CO_2 emissions in WCE continue to be two to four times higher than in SEE and EECCA.
- Energy consumption and greenhouse gas emissions from transport in SEE and WCE are growing rapidly along with the general growth in transport but also because of a further shift towards road transport. Progress in reducing CO_2 emissions from new cars is slowing and EU targets are unlikely to be met.
- Energy consumption and greenhouse gas emissions in EECCA have decreased, but less than transport volumes, indicating a reduction in average fuel efficiency.
- Emissions of air pollutants continue to cause problems for air quality, especially in cities, with road transport a significant contributor.
- Emissions per capita are expected to remain higher in EECCA and SEE than in WCE because of the larger share of older cars. The use of leaded fuel has been reduced, but several countries have not yet banned it; its continued use is an obstacle to the introduction of cleaner technology in the form of better exhaust gas treatment.
- Vehicle inspection is a way of ensuring that vehicles continue to meet the specifications they were designed for. There are indications from EECCA countries that this system requires further attention in the coming years.
- More than 106 000 people are killed in traffic accidents in Europe each year. In EECCA, the number killed increased by 22 % between 2000 and 2003, and accident rates (per passenger-km) in some EECCA countries are more than 15 times higher than in WCE.

- The limited information available suggests a gradual decay of the transport network in EECCA. The large increase in the motorway network in SEE and EU-10 has been accompanied by increased road freight and road energy consumption.
- Infrastructure investment with the European Bank for Reconstruction and Development (EBRD) involvement in EECCA has shifted towards road transport in recent years, and there are indications that this is resulting in accelerated growth in road transport, especially for freight. This is leading to increasing emissions and energy consumption.
- Problems related to traffic noise, land take and fragmentation by transport infrastructure, etc. also pose challenges, but at present the magnitude of these problems cannot be quantified. They are therefore not treated further in this chapter.

7.2.1 Introduction

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 shopping. A well-developed transport system is therefore an aspiration of all societies.

But transport in Europe as we know it today is not sustainable. Emissions of greenhouse gases are increasing as demand for passenger and freight transport offsets improvements due to better technology and stricter regulations. In the EU, for example, greenhouse gas emissions from transport could be 50 % higher by 2030 than they were in 2000. Despite technological improvements, emissions of air pollutants from road transport continue to have a major impact on health in cities, particularly in SEE and EECCA. In addition, the number of people killed each year in traffic accidents is rising in EECCA. The shift from environmentally friendly modes towards road and air is continuing, with air transport as the fastest growing mode. Infrastructure development remains dominated by roads.

The main driver behind these trends is economic growth, which continues to result in an increase in transport demand, which in turn causes further pressure on the environment. European societies are therefore faced with the challenge of reducing transport's irreversible damage to the environment and health, without losing the benefits to society and economies.

UNECE and WHO have set up a website with information that documents the link between transport health and environment in a pan-European context (www.thepep.org) as a tool to help countries develop strategies to address the issues. The problems are also highlighted in the EU Sixth Environment Action Programme (6EAP), under the issue of climate change, and in the EECCA Environment Strategy. 6EAP calls for structural changes in the transport sector to address transport demand, promote a shift to railways, waterways and public transport and improve transport efficiency. It also calls for the development of alternative fuels and appropriate engine technologies to offer higher efficiency and low or zero carbon emissions. 6EAP further calls attention to aviation emissions, which are expected to grow by almost 100 % from 1990 to 2010.

The EECCA Strategy notes that: *The continuing expansion of transport demand, heavily dominated by road transport, (further exaggerated by worn-out, high fuel-consuming and environmentally unfriendly vehicle fleet and transport infrastructure) raises serious concerns about the long-term sustainability of present mobility trends. Continuation of current transport trends in the region will aggravate environmental and health problems, particularly those related to air pollution, noise and land use*.'

It lists an extensive range of proposed actions:

- develop and implement national transport strategies for sustainable development that integrate health and environment considerations, drawing on international best practices;
- conduct, if appropriate, assessments with a view to integrating health and environmental considerations into transport policies and plans;
- provide incentives for environmentally sustainable transport, including public transport. Particular emphasis should be given to demand management;
- where appropriate, establish inter-ministerial coordination mechanisms, involving transport, environment, health and other relevant ministries;
- monitor the environmental impact of transport policy, e.g. using indicators developed by EU, the European Environment Agency (EEA) and the World Health Organization (WHO) and publish the results of this analysis;
- promote modernisation of transportation facilities, including use of less energy intensive transport modes;
- promote investments in the transport sector and infrastructure, including municipal transport; and
- implement transport strategies for sustainable development, reflecting specific regional, national and local conditions, to improve the affordability, efficiency and convenience of transportation as well as urban air quality and health and reduce greenhouse gas emissions, including through the development of better vehicle technologies that are more environmentally sound, affordable and socially acceptable.

This chapter reports progress towards these objectives. However, mobility is not just a matter of cars, planes and trains, but rather the ability to link activities in society. Ideally, an assessment should measure this linkage rather than just focus on transport volumes. However, such information is not yet widely available, so the following sections will focus on trends in transport but not its impact on societal development.

7.2.2 Transport volumes

In the EU Member States, discussions on transport policy have long been guided by the aim of decoupling transport volume growth from economic growth. Indicators (EEA, 2007) have clearly shown that progress has at best been limited. Freight transport has tended to grow slightly faster than the economy, and passenger transport slightly slower. In the recent mid-term review of the EU common transport policy (European Commission, 2006b), the European Commission abolished the target of decoupling and replaced it by 'disconnection of mobility from its negative impacts'. However, if 'disconnection' is taken to mean the disconnection of mobility from all environmental impacts, then there is in reality no difference because impacts such as increasing greenhouse gas emission, noise and landscape fragmentation are intimately tied to transport demand. But it remains to be seen how the concept will be interpreted in actual politics.

Freight transport

Freight transport volumes declined between 1993 and 2003 (Figure 7.2.1). The overall decrease, however, masks a strong decrease in the early 1990s followed by growth, then a small decrease after 1998 followed by renewed growth. The overall decrease is therefore more a reflection of the restructuring of the economy after the collapse of the Soviet Union than an indication of the future. Indeed, a study developed by IEA (Fulton, 2004) showed that road freight transport in EECCA is expected to grow 25 % faster than GDP, gradually slowing down to parallel GDP growth around 2020.

Freight transport intensity is closely linked to the type of economic activity in a country (see Box 7.2.1). The preference for specific modes is dictated partly by the economic structure and partly by the availability of and investment in infrastructure. If countries invest more in one specific mode, it is likely to grow faster. Freight transport intensity (not including sea transport and oil pipelines) in EECCA in 2000 was 1 360 tonne-km/USD 1 000 GDP, a decline of less than 1 % per year since 1993. In SEE, the intensity was only 235 and in WCE only 185. The EECCA figure covers large differences between countries. Kyrgyzstan and the Republic of Moldova have freight transport intensities of less

than 500 tonne-km/USD 1 000 GDP, while the freight intensity in Ukraine, the Russian Federation and Kazakhstan is around 1 500 tonne-km/USD 1 000 GDP. This reflects the differences in economic structures, with the latter countries having a large share of heavy industries and the former having little industry as well as being less integrated in the global economy. Development in these countries is therefore likely to result in a strong growth in freight transport (significantly higher than economic growth), while a more moderate growth is likely in the other countries (ECMT, 2006a).

Air freight transport is an exception to the decline in freight transport in EECCA in the 1990s. It showed a small growth, but from very low levels.

Box 7.2.1 Freight transport intensity

Freight transport intensity is defined as the total volume of freight transport divided by GDP. The unit is tonne-km/USD 1 000 GDP.

An economy based predominantly on industry will typically have a higher freight transport intensity than one with a higher share of services, because service activities tend to generate less transport. A more globalised economy will tend to have higher freight transport intensity than a more closed economy if the balance between sectors is the same.

Freight transport intensity thus measures the combined effect of two different factors.

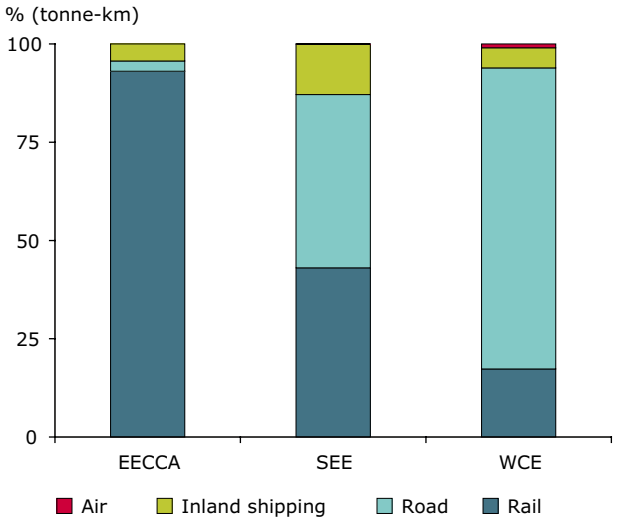
Rail transport is by far the most important means of transport in the region (Figure 7.2.2), and road transport only plays a limited role. In SEE, road and rail transport account for most transport movements, followed by inland shipping, mainly on the Danube river. Pipeline transport plays a limited role in the overall picture, but is economically

Figure 7.2.1 Average annual change in freight volumes in Europe, 1993 to 2003 (variable data coverage, see note)

Note: WCE data cover 1993–2003 and apply to EU-25 and Norway and Switzerland (excluding Luxembourg and Slovakia for air). SEE data cover 1993–2002 for rail (including Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Romania, Serbia and Montenegro, and Turkey), 1992–2000 for road (including Bulgaria, Croatia, Former Yugoslav Republic of Macedonia, Romania, Serbia and Montenegro, and Turkey), 1990–2000 for inland shipping (including Bulgaria and Croatia) and 1993–2000 for air transport (including Bulgaria, Croatia, Former Yugoslav Republic of Macedonia, Romania, and Turkey). EECCA data cover 1993–2000 for road (excluding Armenia, Tajikistan and Turkmenistan), 1993–2002 for rail (excluding Tajikistan, Turkmenistan and Uzbekistan), 1990–1998 for inland shipping (excluding Armenia, Azerbaijan, Georgia, Tajikistan and Uzbekistan) and 1993–2002 for air transport (excluding Armenia).
Newer data are available for a limited number of EECCA and SEE countries. These show similar trends as in the figure.

Sources: UNECE, 2006; ECMT, 2006a; EEA, 2007.

Figure 7.2.2 Modal shares of freight transport in Europe by region



Note: Oil pipelines not included. EECCA data cover Kazakhstan, Kyrgyzstan, the Republic of Moldova, the Russian Federation and Ukraine in 2000. SEE data cover Bulgaria, Croatia, Romania and Serbia and Montenegro in 2001. WCE data cover EU-25 and Norway and Switzerland in 2003.
Newer data are available for a limited number of EECCA and SEE countries. These show similar trends as in the figure.

Sources: UNECE, 2006; EEA, 2007.

important because of the role of pipelines in the export of oil and gas.

In WCE, road is by far the most important means of freight transport (EEA, 2007). With the opening up of the economies in EECCA, it is likely that an increased demand for flexibility will be translated into strong growth in road transport. From an environmental point of view, it is important to safeguard the competitive position of rail transport because of its better environmental performance than road. This requires coordination of industrial development and modernisation of the rail system.

Passenger transport

Passenger transport demand in EECCA has declined, due to the economic restructuring which has led to a decrease in GDP (Figure 7.2.3). The decline has affected all modes of transport.

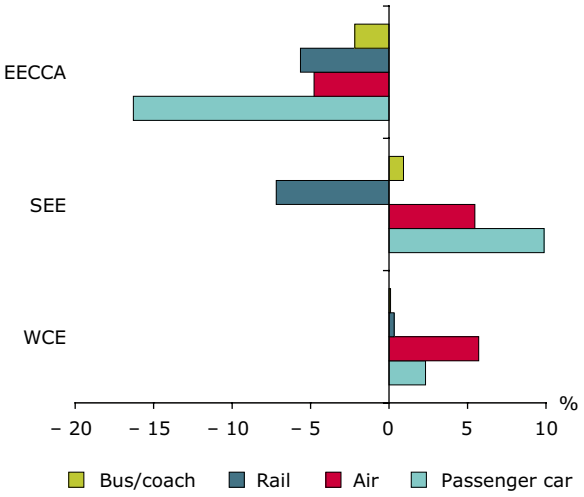
In the EECCA countries for which data are available, total motorised transport declined by 45 % between 1993 and 2000. The share of passenger car transport is very limited (under 1 %), but this figure does not include large countries such as the Russian Federation and Ukraine. The share of air transport increased slightly, from 11 to 14 %. Rail and bus/coach transport remain the most important means of transport (Figure 7.2.4).

Passenger transport volumes in SEE and WCE have grown, mainly as a result of increases in car and air transport. Volumes of other modes have remained constant or declined (EEA, 2007). Passenger car transport in SEE has grown strongly since 1990, at the expense of rail transport. This reflects increased incomes and a correlated preference for more flexible private car transport.

People in WCE travelled more than 12 000 km per capita each year (2000). The EECCA countries report only 800 km per capita, which is half the 1993 figure. Compared on a transport-per-GDP basis, the difference between the two regions is small. Car ownership levels in EECCA are typically around 50–75 per 1 000 people, compared with 468 in WCE (Figure 7.2.5). Car ownership has increased in most EECCA and SEE countries, except Georgia. The Russian Federation had 162 per 1 000 in 2003, which is on average three times higher than other EECCA countries. The EECCA average is greatly affected by the Russian Federation since 23 of the 27 million cars in the region are listed as Russian. The sharp decrease in passenger transport, simultaneously with a strong growth in car ownership, suggests that there could be significant under-reporting of travel distances. This is further underlined by changes in fuel consumption (Figure 7.2.7).

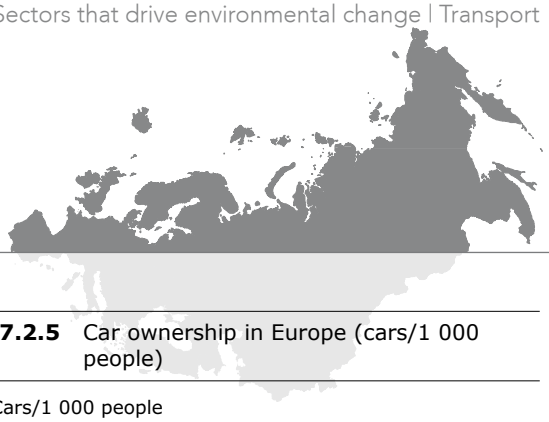
Private car transport still plays a limited role in most EECCA countries. Studies have shown that car ownership is strongly correlated with GDP. The passenger vehicle fleet is therefore expected to grow with the economy over the coming decades, with a corresponding increase in impacts on the environment (ECMT, 2006b).

Figure 7.2.3 Average annual changes in passenger transport demand in Europe between 1990 and 2004



Note: WCE data cover 1990–2002 and cover EU-15 and Czech Republic, Slovakia, Slovenia, Poland, Hungary, Norway and Switzerland. For air, WCE data cover 1993–2002 and cover EU-25 and Norway, Switzerland and Monaco. For bus/coach, WCE data cover 1993–2002. SEE data cover 2000–2004 for passenger car (including Serbia and Montenegro and Albania), 1995–2000 for bus coach (excluding Albania, Croatia and Turkey), 1993–2002 for rail and 1993–2002 for air (excluding Albania and Bosnia and Herzegovina and Serbia and Montenegro). EECCA data cover 1994–2000 for passenger car (including Kazakhstan, Kyrgyzstan, the Republic of Moldova and Uzbekistan), 1993–2001 for bus/coach (including Armenia, Kazakhstan, Kyrgyzstan, the Republic of Moldova, the Russian Federation and Uzbekistan), 1993–2002 for rail transport (excluding Tajikistan and Turkmenistan) and 1993–2002 for air (excluding Armenia).

Sources: UNECE, 2006; ECMT, 2006a; EEA, 2007.

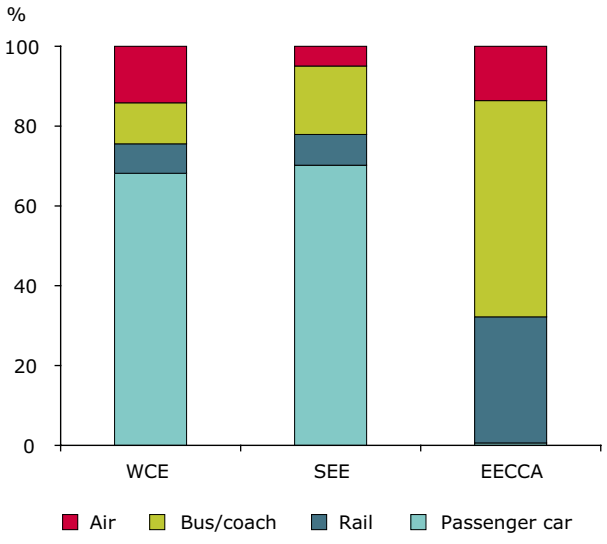


Infrastructure networks

The available data on transport infrastructure networks in EECCA is rather sketchy, but assessments by other organisations (e.g. ADB, 2006) indicate a gradual decay of the network. Decay does not necessarily mean abandonment but in many cases reflects reclassification of roads, with unpaved roads sometimes being removed from the official road network statistics. There has been a strong growth in the motorway network in SEE and the countries that joined EU in 2004, along with a strong increase in road transport movements. The length of the railway network was relatively constant during the 1990s. European Bank for Reconstruction and Development (EBRD) loans for transport to the EECCA region in recent years have mostly financed roads. This contrasts with the period before 2000 where rail and port projects dominated (Figure 7.2.6). EBRD's mission is to facilitate the transition of the formerly centrally planned economies in eastern Europe towards market-oriented policies and to promote private and entrepreneurial initiatives by loans (OECD, 2000). The increased focus in recent years on road transport is reflected in increased road energy consumption and, recently, increased road freight transport volumes, which suggest the start of a shift towards road transport. Thus, there are indications that investment priorities are not being guided by environmental considerations. However, because the data set for recent years is not yet complete, this is only a tentative conclusion.

In EU, the process of establishing the trans-European transport network is ongoing. In the recent list of priority projects agreed, around two-thirds are rail. In addition, the concept of 'motorways of the sea' has been introduced as a means of moving more freight from road to sea. The whole programme is, however, suffering from a funding shortage. In the financial outlook for the 2007–2013 period, the funding has been reduced to EUR 8 billion and the expansion of the networks is therefore expected to slow down. The funding shortage has, on the other hand, led to an increased interest in toll financing of infrastructure,

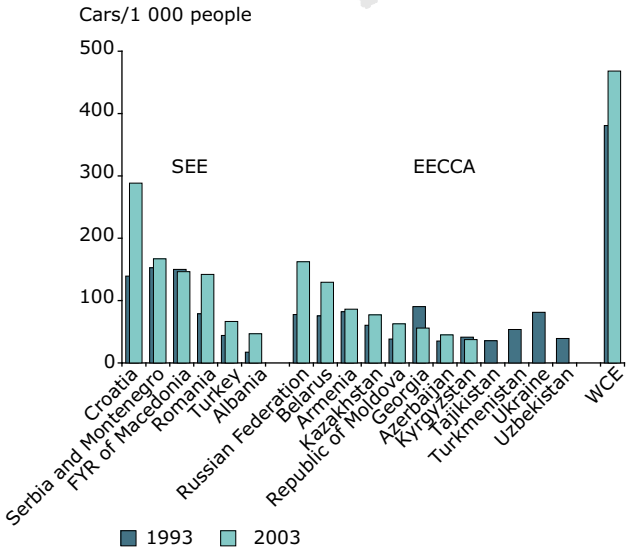
Figure 7.2.4 Modal shares in passenger transport in Europe



Note: WCE data cover EU-15 and Czech Republic, Slovakia, Slovenia, Poland, Hungary, Norway and Iceland and cover 2002. SEE data cover Albania and Serbia and Montenegro and are from 2000. EECCA data cover Kazakhstan, Kyrgyzstan, the Republic of Moldova and Uzbekistan and are from 2000.
During the review of the information it was suggested that the low share of passenger transport in EECCA may result from a different use of definitions with only passenger cars for hire (taxis and rental cars) included. It has not been possible to verify this claim.

Sources: UNECE, 2006; ECMT, 2006a; EEA, 2007.

Figure 7.2.5 Car ownership in Europe (cars/1 000 people)



Note: WCE car ownership in 2003 ranged from 252 (Slovakia) to 641 (Luxembourg). The number for Belarus is from 1998. Assuming continued growth since then would put the figure as high as for the Russian Federation. The number for Armenia is from 1997. The fleet size in that country was stable between 1993 and 1997.

Sources: UNECE, 2006; World Bank, 2005.

albeit mainly as a tool to finance road infrastructure. It is therefore likely that the funding shortage will result in a relatively faster expansion of the road networks compared with rail, which is not a good development from the point of view of the environment.

There have been some signs, however, that transport infrastructure planning, albeit at rather localised levels, is taking environmental (biodiversity) considerations into account (see Box 7.2.2).

7.2.3 Environmental impacts

Energy consumption and greenhouse gas emissions

Transport depends on fossil fuels, particularly oil products, which account for more than 98 % of energy consumption by the transport sector in WCE. Methane and propane gas, together with biofuels, are the most important alternatives. The strong reliance on fossil fuels means that emissions of greenhouse gases from transport are closely tied to transport demand. Greenhouse gas emission is extensively discussed in Chapter 3, Climate change, so only a short overview is presented here.

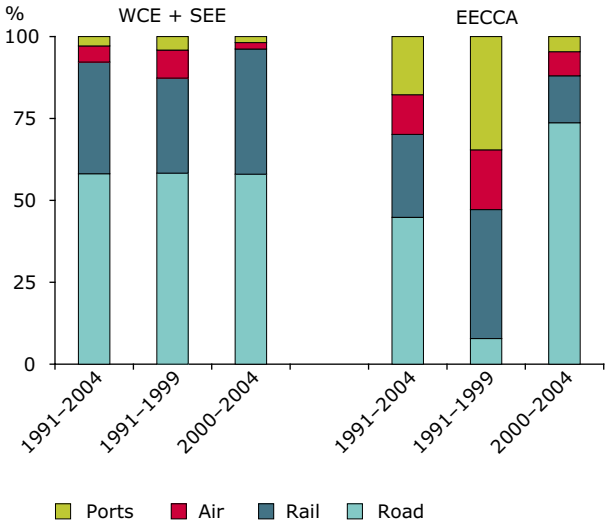
Energy consumption in the transport sector in EECCA fell by 14 % between 1993 and 2004. Over the same period, GDP grew by around 14 %, while transport volumes decreased strongly (data series are not complete so an exact figure cannot be given). This indicates that transport has become relatively less energy-efficient. In SEE, transport energy consumption grew by 39 %, reflecting a strong growth in GDP (42 %). In WCE, it increased by 23 % and GDP by 30 %.

WCE has the highest and fastest-growing transport energy consumption per capita (Figure 7.2.7). This is partly explained by the high passenger transport intensity and partly by energy consumption for freight transport. Even though the freight transport intensity in WCE is low, this is balanced by the much higher GDP. Transport energy consumption per capita is around 50 % lower in SEE and 75 % lower in EECCA. The main reason for this is the low levels of car ownership and air transport use in these regions.

Air pollution

Air pollution is a major problem in EECCA and the data show that road transport is a significant contributor (OECD, 2000; see also Section 2.2,

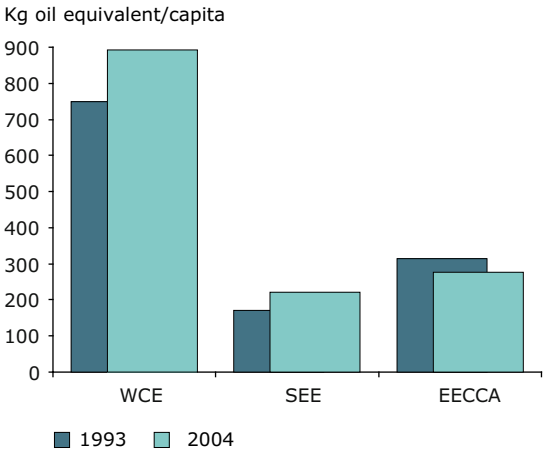
Figure 7.2.6 Distribution of EBRD loans over time in transport projects



Note: WCE + SEE do not include EU-15 in this graph.

Source: EBRD, 2005.

Figure 7.2.7 Transport energy consumption per capita by region 1993 and 2004



Note: Andorra, Liechtenstein, Monaco and San Marino not included.

Source: OECD/IEA, 2006.

Box 7.2.2 Towards environmentally friendly road construction through green corridor planning in Estonia

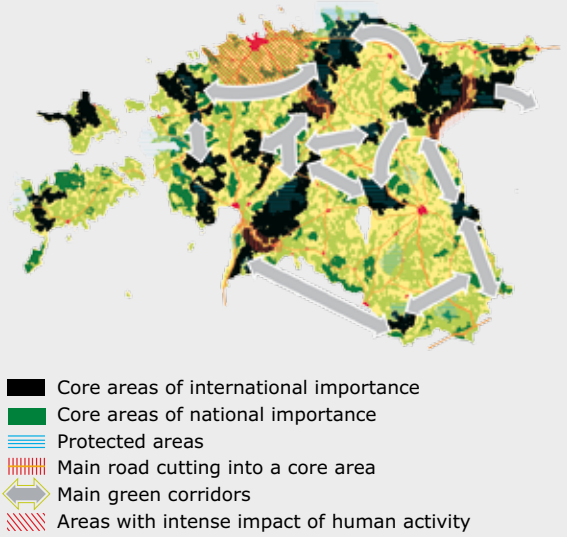
The setting up of a green network in Estonia at the governmental level and an evaluation of the spatial distribution of the largest migratory corridors for wildlife a few years ago gave a strong boost to much more environmentally friendly planning at the county level and a harmonisation of human and green infrastructures (see Map 7.2.1). The physical planning process has achieved a new environmental standard now that thematic planning of green corridors at the county level has been finalised in almost all counties. Although this is still causing many misunderstandings at the local government level because of the need to take county-level planning into account when making general plans for municipalities, green corridors, set up at the county level, are already providing a basis for balanced infrastructure design.

The Estonian Road Agency has recently completed some initial studies on sections of three main state roads around the capital Tallinn. The Tallinn-Narva road (T1), part of the Via-Baltica transport corridor, has four animal under-passes planned, designed, built and currently being monitored at the section between Tallinn and the Valgejõgi river, because this was called for by county-level green corridor planning. Similar studies have also already been done for the Tallinn-Tartu road section between Tallinn and Kose villages and for the Tallinn-Keila road, and there is similar planning for the Tallinn ring-road (also part of the Via-Baltica corridor) having one location even where the first 'eco-duct' is planned.

As general municipal planning around Tallinn is still very slow and weak, the county-level green corridors are already a good tool for ensuring that detailed municipal plans do not destroy or even affect the green areas. Environmental impact assessments (every road section subject to reconstruction should go through an EIA process) are making more and more use of county-level green corridor planning as it can provide clear information on the possible conflicts between roads and green corridors.

Source: L. Klein, Estonian Information Center, 2007.

Map 7.2.1 Estonia 2010 Green network



Source: Sepp *et al.*, 2001.

Air quality). In Kazakhstan, for example, the maximum allowed concentration of nitrogen dioxide and dust is exceeded in 20 cities (UNECE, 2003a). The health guidelines set by WHO are therefore not being met; the same is true for other EECCA countries (UNDP/World Bank, 2001).

Transport emissions are expected to remain higher in EECCA and SEE than in WCE because of the large share of older cars. For example, 40 % of the vehicles in Bulgaria and 50 % in the Former Yugoslav Republic of Macedonia are more than 20 years old, and the maintenance standards for these are low (OECD, 2000). The age distribution contrasts sharply with WCE where an average age of 6–8 years is more common (TREMOVE, 2006).

The use of leaded fuel has been reduced, but it is not yet banned in Former Yugoslav Republic of Macedonia, Bosnia and Herzegovina, Serbia, Montenegro, Georgia, Tajikistan and Turkmenistan (UNEP, 2007). In addition there are indications of a significant black market for leaded fuel in Central Asia. Emissions of lead may therefore still be significant, albeit decreasing. In addition to the direct effect on public health, lead makes catalytic converters, which is the single most effective pollution abatement technology, ineffective.

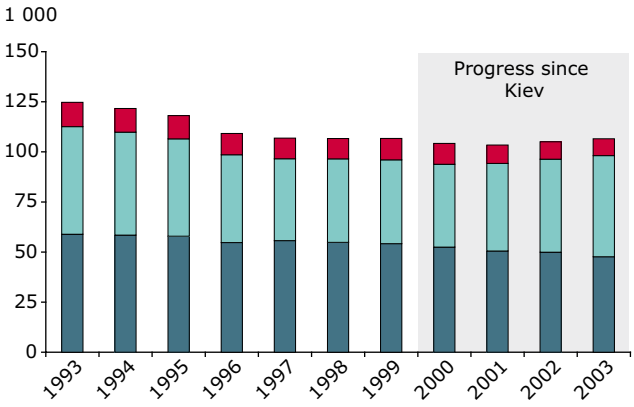
Leaded fuel therefore represents an obstacle to the introduction of cleaner technology in the form of better exhaust gas treatment.

Transport safety

More than 106 000 people are killed in transport accidents each year in the three regions together (Figure 7.2.8), and another 2 million are seriously injured. Fatality rates per capita in EECCA are around twice as high as in other regions (more than three times higher than in Sweden, which is the safest country) even though traffic levels are much lower (Figure 7.2.9).

Safety in EECCA has not improved over the past ten years, and the number of persons killed in accidents increased by 22 % between 2000 and 2003. In four countries for which more detailed data are available, accident rates per passenger–km are more than 15 times those in WCE. The Russian Federation is among the most dangerous countries in Europe as regards transport, with 37 000 people killed each year (see Box 7.2.3). The situation in EECCA is closely parallel to changes in energy consumption during the period, which indicates a close link between traffic levels and accident numbers. It is therefore possible that the risk per vehicle-km has remained constant, but is, however, still high compared with WCE and SEE.

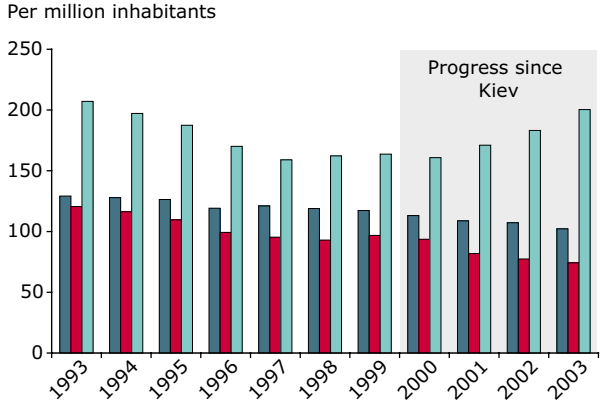
Figure 7.2.8 Total number of transport fatalities in Europe



Notes: Andorra, Liechtenstein, Monaco, San Marino, Serbia and Montenegro and Uzbekistan not included.

Source: UNECE, 2005.

Figure 7.2.9 Number of persons killed in transport accidents by region



Note: Andorra, Liechtenstein, Monaco, San Marino, Serbia and Montenegro and Uzbekistan not included.

Source: UNECE, 2005; World Bank, 2005.

7.2.4 Policy prospects

Greenhouse gas emission reduction

Transport energy consumption and emissions of greenhouse gases per capita are two to four times higher in WCE than in SEE and EECCA (Figure 7.2.7). The tools to address this issue can be grouped into technology measures, promoting change in user behaviour, modal balance policy and taxation measures.

The cornerstone of the technology measures in the EU is a voluntary commitment made by the car manufacturers (the 'ACEA agreement'), to ensure that average CO_2 emissions of new passenger cars sold in 2008/2009 will be reduced to no more than 140 g/km. This is a reduction of around 25 % over a ten-year period. Progress is being monitored annually and the latest monitoring report shows that progress is slowing; indeed, preliminary data for vehicle sales in 2005 show that progress has almost come to a halt (Figure 7.2.10). Thus, only half of the target reduction had been achieved by the end of 2005 and it appears unlikely that the industry will meet its own target unless increasing oil prices or changes to vehicle taxation force a change in user preferences away from relatively large cars.

Box 7.2.3 Road safety lessons from the Russian Federation to the other EECCA countries

In the Russian Federation, economically active groups aged 15–44 account for more than half of all road fatalities, and road traffic injury is the second largest cause of death among children and young people. Without effective action, road traffic deaths and disabling injuries are forecast to rise globally by 67 %, from ninth to third place in the global burden of disease. In the Russian Federation, the risk of being killed in traffic is ten times higher per vehicle than in Germany and the United Kingdom, and in recent years the situation has worsened again after a period of improvement. Almost half of those killed in traffic accidents in the Russian Federation are pedestrians.

The Russian government's aim is to double national GDP between 2003 and 2012. The country is in a phase where increase in GDP rapidly increases motorisation. As a consequence, car ownership may increase from 162 per 1 000 people in 2003 to 230–250 by 2012. The combination of weak performance goals and an intrinsically unsafe road system points to a growing road safety crisis, especially if the growth in car ownership is taken into account. Other EECCA countries have lower accident rates because of lower car ownership. However, growing incomes may increase passenger car mobility strongly. Early action is therefore needed on road safety in all EECCA countries.

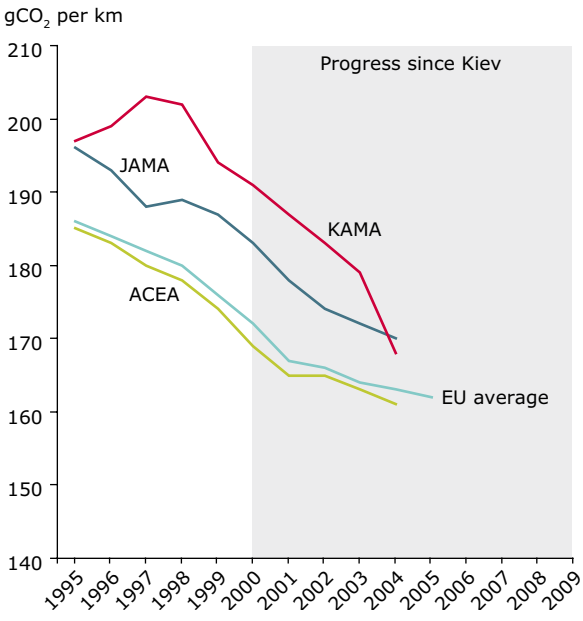
The European Conference of Ministers of Transport (ECMT) has published a peer review on road safety in the Russian Federation, which provides helpful elements for improving road safety. This covers both better legal measures including enforcement, etc. and technical measures related to vehicles and infrastructure.

Source: ECMT, 2006b.

The example of Denmark, which has one of the highest rates of vehicle tax in Europe, shows that user behaviour can be affected by the level of taxation. The annual circulation tax system was modified in 1997 to reflect the energy efficiency of vehicles. It now varies between EUR 22 and EUR 3 400, depending on energy efficiency. Between 1998 and 2005 this resulted in a reduction of 15 % of the average fuel consumption of new vehicles, compared with 10 % in the EU as a whole (Danmarks Statistik, 2005).

Countries such as Germany and the Netherlands are preparing to implement ecodriving campaigns in order to teach road users how to drive as efficiently as possible. Preliminary investigations have indicated a savings potential of up to 10 %, but large-scale field trials are still needed to establish whether this can be achieved and maintained. The tools include: correct tyre pressure and moderate acceleration and use of the appropriate gear, but the largest saving is achieved if at the same time vehicles are optimised for energy efficiency rather than speed and acceleration. Taxation measures could play a facilitating role in this (see Denmark's example above).

Figure 7.2.10 Average emissions of new passenger vehicles in EU-15 as reported under the 'ACEA agreement'



Note: The graph shows average emissions (solid lines) of new vehicles as reported by the three manufacturing organisations in Korea, Japan and Europe as well as the EU average. The EU average curve is extended with preliminary data for 2005.
ACEA is the European, KAMA the Korean and JAMA the Japanese automakers association.

Sources: European Commission, 2006a; TE, 2006.

For some years the EU had a policy on the modal balance of transport. The aim was to return the market share of rail to the higher level it had in 1998 and thereby exploit the better environmental performance of rail compared with other modes. The aim was not fully achieved but in the case of passenger transport a stabilisation of the market share of rail at a lower level was achieved. The rail freight sector is still losing market share to road transport. One of the policy tools has been investment in high-speed rail to enable competition with short- and medium-distance aviation. On some specific routes this has led to significant reductions in air traffic, but at the same time it has expanded the size of the 'commuter zone' around major cities. The real saving may therefore be smaller than originally expected. With the publication of the recent mid-term review of the common transport policy (European Commission, 2006b), the modal split target was reformulated into 'support modal shift where appropriate'. Because the term 'appropriate' is not clearly defined, it leaves a lot of room for interpretation. However, it is clear that the automatic preference for rail transport has been toned down.

Reducing transport volumes is a way of reducing emissions of greenhouse gases, but because of the close link between GDP and transport volumes, this is often assumed to be the route to economic hardship. There are nevertheless many planning options that aim to constrain traffic growth. For example, cities that spread out into suburbs are difficult to serve with public transport, whereas more compact cities can more easily provide a good level of service. The benefits of better planning can be significant, but only on a long time-scale and therefore of little help in meeting the Kyoto targets.

Finally, several EU Member States are working to adapt their taxation system more to environmental performance in general (e.g. the ecotax reform in Germany). The European Commission has recently proposed the development of a common charging methodology for infrastructure use (for all transport modes), based on environmental performance (European Commission, 2006b).

Reduction of vehicle emissions and improvement of air quality

Road transport has become more important in EECCA countries in recent years, and transport volumes on roads as well as the number of vehicles are projected to increase during the next decade. Without additional measures, the poor air quality situation will get worse, affecting both the environment and human health. The strategies that have been applied in WCE are gradually being applied in SEE and EECCA, albeit with some delay. These have focused on a total phase-out of leaded petrol, improvement of fuel quality, reduction of fuel sulphur content, introduction and strengthening of vehicle emission regulations and improved vehicle inspection and maintenance.

The phase-out of lead as an anti-knocking agent is continuing but is still not completed, and with an old vehicle fleet there may be reluctance to phase out lead completely, even though alternatives exist. Lead is also a problem because it ruins the effect of catalytic converters in cars. The introduction of new technology may therefore be hampered by the fuel market, but there is also anecdotal evidence of newer vehicles being sold without catalysts in order to reduce the price of the vehicle.

More advanced types of catalysts also require very low levels of sulphur in the fuel. The EU tightened the limit to 50 ppm in 2005 and will require a maximum of 10 ppm by 2009 (Table 7.2.1) and some countries, for example Germany, have withdrawn higher sulphur-content fuels from the market well ahead of the deadline. Some of the SEE countries are moving in the same direction, but there are large differences between countries.

Box 7.2.4 Biking in Belgrade

Bicycles offer the flexibility of a car without the emissions. They offer exercise for the user and require less space than cars. Bicycles are therefore starting to be seen as an element in planning for more sustainable transport in cities.

Bicycles carry less than 2 % of traffic in Belgrade at present, but as part of a master plan for urban development, the city has embarked on a programme to construct more bicycle paths. Initially new paths for recreational biking are prioritised. The long-term target is to achieve a modal share of 10 %.

Source: Mirko Radovanac, 2006.

EECCA and SEE have their own car industries. Therefore, WCE vehicle technology such as catalysts will not automatically trickle towards the east. However, the technology needed is widely available in WCE at low costs. Therefore, the introduction of emission regulation, an aim of the Kiev Strategy, may be a cost-effective way of reducing pollutant emissions from transport. There has been a move in recent years to take up some of the elements of EU emission regulations in the form of the EURO emission standards (Table 7.2.2).

The adoption of EURO vehicle emission norms by the Russian Federation and Ukraine will affect more than 70 % of the population of the EECCA region and an even larger share of the economy and vehicle fleet of the region. It will therefore affect other countries that have not introduced the standards, because most manufacturers will adhere to the new standard.

Inspection of the vehicle fleet is one of the ways of ensuring that vehicles on the road continue to meet both reasonable safety standards and the emission regulation they were once designed to meet. There is, however, evidence that the inspection systems in several EECCA countries are inadequate. However, because of the lack of a consistent data set, it is only possible to conclude that this should be an area of attention in the coming years.

Improvement of transport safety

Transport accidents represent a high cost to society both in direct economic costs and in more indirect social costs. With the safety situation worsening significantly in recent years in EECCA, transport

Table 7.2.1 Sulphur content in road transport fuels in SEE and EECCA countries

	Petrol	Diesel
	Sulphur content (ppm)	**Sulphur content (ppm)**
Albania	150 (imported)	350 (imported), 2 000 (national production)
Armenia	GOST standard	GOST standard
Azerbaijan	GOST standard	GOST standard
Belarus	500	350
Bosnia and Herzegovina	150	350
Croatia	EU directives	EU directives
Georgia	GOST standard	GOST standard
Kazakhstan	GOST standard	GOST standard
Kyrgyzstan	GOST standard	GOST standard
Montenegro	1 000	10 000
Republic of Moldova	GOST standard	GOST standard
Russian Federation	GOST standard	500
Serbia	2 000	350–10 000 (depending on grade)
Tajikistan	GOST standard	GOST standard
FYR of Macedonia	150	350
Turkey	150 (2007)	50 (2007)
Turkmenistan	GOST standard	GOST standard
Ukraine	GOST standard	GOST standard
Uzbekistan	GOST standard	GOST standard
GOST standard 2084/77 (petrol) + 305/82 (diesel)	1 000	2 000 and 5 000 grades
EU Directive 1999/32 + 2003/17	50 (10 in 2009)	50 (10 in 2009)

Sources: REC, 2005; UNEP, 2007.

Table 7.2.2 Adoption of EURO vehicle emission standards by non-EU countries

	EURO 1	EURO 2	EURO 3	EURO 4
EU–passenger cars/light commercial vehicles	1993/1993	1997/1997	2001/2002	2006/2007
Bulgaria				2007/2007
Romania				2006/2007
Turkey				2006/2007
Croatia		2000		
Albania		National limits for CO and HC		
FYR of Macedonia		National limits for CO		
Bosnia and Herzegovina		No regulation		
Serbia and Montenegro		No regulation		
Belarus		2002	2006	Q4-2006
Russian Federation		2006	2008	2010
Kazakhstan		Considering the introduction of EURO norms		
Ukraine (only on imported vehicles)		2005	2008	2010

Note: The above table is based on information received from contact points in the countries. In the case of Belarus it is not clear whether the information indicates an obligatory norm or simply the availability of vehicles that conform to the norm. There have been press reports that the introduction of norms in the Russian Federation will be delayed, but it has not been possible to get either confirmation or rejection of this. The recently-agreed EURO 5 norm is not included, since non-EU countries have not yet started to implement it.

Box 7.2.5 EURO vehicle emission standards

The vehicle emission norms used in the EU have been in effect since 1993 and regulate the emissions of CO, HC, NO_x and PM over a standardised drive cycle. All vehicle types must be tested in order to obtain a type approval. A tightening of NO_x and PM emission standards from 2010 has recently been agreed.

safety needs to be put high on the agenda, especially because car ownership and transport demand are expected to rise in the next decade as a result of GDP growth. Specific safety programmes aimed at public education, improving road infrastructure and vehicle safety, introduction of safety legislation, including on drink driving and speed observance, and increasing seat-belt use, can improve the safety situation. It is also important to ensure the observance of safety legislation through random controls.

The EU Member States have set themselves a target of halving the annual number of fatalities between 2000 and 2010. The policies used vary from country to country, but better enforcement of speed and alcohol limits are among the most effective elements, which have so far led to significant reductions in fatality rates in spite of strong growth in transport demand. Also the use of 'demerit points', where minor breaches of the traffic code (e.g. speed limits) are added up and may lead to revocation of the driving license, has been very effective. For example, Denmark introduced such a system in 2005 and this has contributed to the country almost meeting its 2012 traffic safety target six years ahead of schedule.

Internalisation of external and infrastructure costs

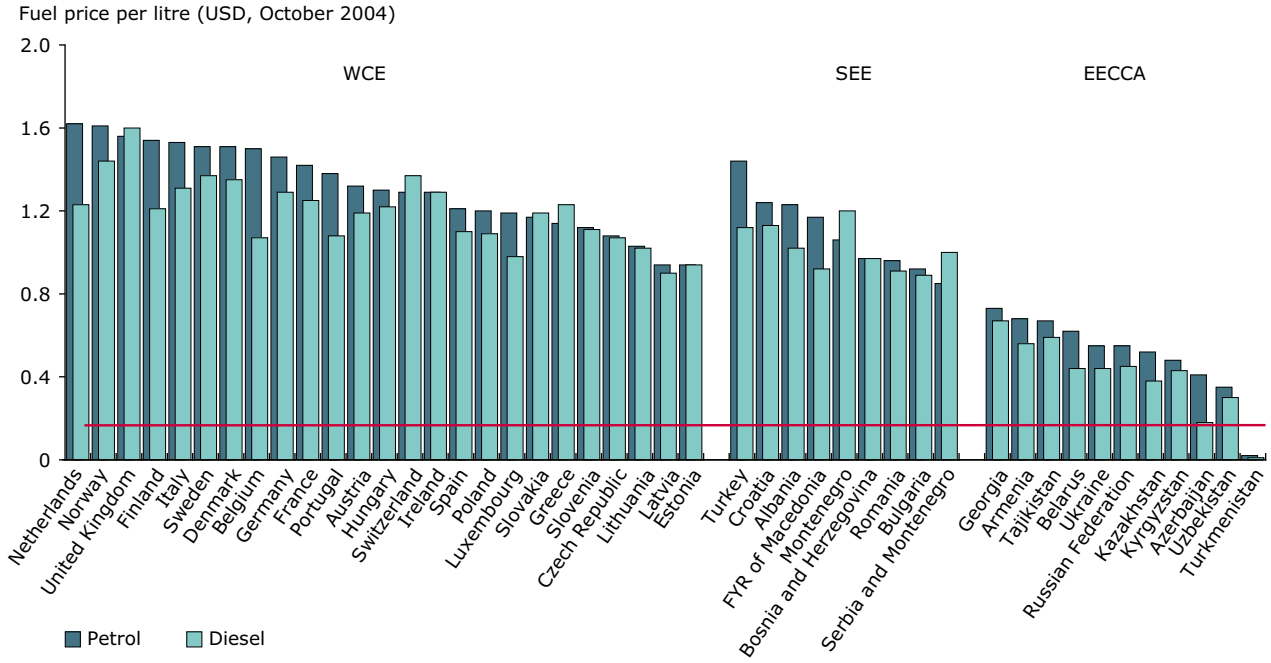
Effective internalisation policies require a package of instruments. Key priorities for most of the EECCA countries include the abolition of fuel subsidies and the introduction of self-financing for the transport system via fuel taxes, as proposed in the Kiev strategy. This could be followed by the introduction of toll charges and the restructuring of registration and circulation taxes. Currently, transport taxes are mostly of a fiscal nature and

their environmental impact is limited (OECD, 2003b).

In contrast to the principle of internalisation, diesel fuel in Azerbaijan and all fuel in Turkmenistan is sold at less than the world market price (price before taxes) and thus is subsidised (Figure 7.2.11). This subsidy was introduced for social reasons, but nevertheless has had the effect of making transport artificially cheap. In most EECCA countries, fuel prices are too low to cover the direct costs of road maintenance and construction. An increase in fuel taxation may therefore be needed to ensure self-financing of the transport sector and more efficient use of energy resources.

EEA has carried out a survey of transport subsidies in EU Member States and found that the most significant group of subsidies is free provision of infrastructure (EEA, 2007b). External costs of transport, which can also be seen as an indirect subsidy to transport, have been estimated by OECD. For the EECCA countries they found that the highest costs arise from accidents and air pollution (OECD, 2003). In Belarus, the external costs of transport in 1995 were 16 % of GDP, in Ukraine 17 % and in the Republic of Moldova 14 %. In SEE, external costs are typically around 10 % of GDP. In EU-15, the external costs in 2000 were estimated to be 7 % of GDP (INFRAS, 2004). This is lower than in EECCA mainly because of the better safety situation in WCE. Passenger transport produces the highest share of external costs, because of the high number of fatalities. The health and environmental impacts of transport can be expressed in monetary terms, by calculating the indirect monetary costs (value of suffering, health cost, lost output, etc.). The gap between external costs and variable charges is higher in EECCA than in WCE, not only because of the higher external costs but also because EECCA generally has lower charges (i.e. fuel taxes). Therefore, based on the general structure of external costs in EECCA and SEE, the OECD recommends improving road safety

Figure 7.2.11 Petrol and diesel fuel prices in Europe by region



Notes: The red line is the raw cost price for fuel (USD 0.27). Oil prices were at USD 43 per barrel on the date of measurement. Fuel prices increase by 3 cents per litre for each USD 5 increase in the oil price per barrel.

Source: GTZ, 2005.

and reducing air pollution as the main priorities, since these measures provide the greatest benefits to society (OECD, 2003).

Public transport systems such as tram and metro have a positive impact on both safety and air quality in cities and overall on the quality of life of urban dwellers. Developing competitive urban transport solutions is therefore an effective way of tackling traffic congestion and air quality problems and improving transport safety. For this reason, public transport should be a key priority, along with safe walking and cycling. Economic instruments may help to provide incentives to change transport behaviour. But for public transport to become competitive, cities need to be planned and developed with public transport in mind. Allocation of space for the necessary infrastructure (rail lines, bus lanes, etc.) is of the utmost importance, as is zoning which ensures that activities are not spread out in such a way that only cars and trucks can serve them.

7.3 Energy

Photo: Wind turbines, the Netherlands © Pawel Kazmierczyk

Key messages

- Since the Kiev conference, energy consumption and resulting greenhouse gas (GHG) emissions have been increasing in the pan-European region, despite energy efficiency improvements and an increased use of renewable energy in certain areas. This trend is expected to continue if no additional policies and measures are implemented. Developing and diffusing clean technologies and know-how across the pan-European region will go a long way towards ensuring a secure and competitive energy system at manageable costs and reduced impacts on the environment.

- Total energy consumption throughout the pan-European region is growing and remains dominated by fossil fuels. Despite large reductions in some air emissions in parts of Europe, the energy supply sector remains a major contributor to air pollution and greenhouse gas emissions. Current policies are unlikely to be sufficient to meet long-term climate change and air quality objectives.

- Energy markets in the three regions are closely linked. A significant share of natural gas and oil imports into WCE and SEE come from EECCA and this share is projected to rise substantially to 2030. This increased energy production will result in new environmental challenges in EECCA.

- A number of pan-European initiatives have been taken to develop common energy policy objectives, promote more sustainable energy production and consumption, and ensure stability of supply. To achieve a more sustainable energy system and at the same time meet the need for substantial investments in energy infrastructure, especially in EECCA and SEE, these initiatives should be further developed.

- To cover external costs, current consumer prices of electricity will have to increase substantially, especially in SEE and EECCA. Regulatory policies and economic instruments could be used to ensure continuing access to energy at reasonable prices.

- Improving energy efficiency, including minimising losses resulting from outdated industries and infrastructure, is central to limiting growth in energy demand and reducing energy-related environmental impacts while, at the same time, helps keeping prices at an affordable level. There remains substantial scope for improving energy efficiency in all sectors throughout the pan-European region.

- Increasing investments in renewable energy production installations in all regions remains a key tool to meeting environmental challenges and to improving security of supply.

- Planning new, long-term investments in energy systems must take possible future impacts of climate change into account.

7.3.1 Introduction

Continuing economic growth, in Europe as elsewhere, requires secure and affordable energy supplies. In EECCA, where economic restructuring led to falls in energy consumption during the 1990s, energy demand has been rising since 1998. Energy consumption has also been growing in SEE and WCE since the end of the 1990s. This growth has counteracted some progress in reducing emissions of air pollutants and greenhouse gases per unit of energy produced ([1]). Current policies and actions to increase the efficiency of energy production and use and switch to low or zero-carbon energy sources are being overwhelmed by growth in energy use.

There is a high level of interdependence between the energy systems in EECCA, SEE and WCE. Changes in energy policy or fuel mix in one region can impact strongly on another. For example, increased EU gas consumption might lead some EECCA countries to intensify their development of domestic alternatives such as coal, to release gas for export. The whole pan-European region is becoming increasingly dependent on imports of gas from the Russian Federation, but faces competition for oil and gas resources located in Russia and Central Asia from rapidly industrialising economies.

The growth in demand, combined with increasing dependence on energy imports, has led to concerns about energy security in all net importer countries. These concerns have been intensified by recent increases in fossil fuel prices.

At the same time, cleaner and more sustainable energy production and consumption is central to the European policy agenda. Energy supply remains dominated by fossil fuels, the main contributor to climate change. In addition, despite large reductions in some air emissions in parts of Europe, the energy supply sector, together with the transport sector (itself a major user of energy), remains a major contributor to air pollution.

The challenge to energy policy is thus to meet concerns about energy security and affordability at the same time as to reduce environmental impacts.

A number of policy initiatives are aimed at ensuring that energy supply and consumption and its environmental impacts are effectively managed. In particular, the EU Sixth Environment Action Programme, adopted in 2002 (covering not only the energy sector, but also other contributors to emissions and pollution such as industry), and the EECCA Environment Strategy adopted in May 2003, stress the importance of integrating environmental concerns into policies for the energy sector. The European Neighbourhood Policy aims to ensure policy alignment between the enlarged EU and neighbouring countries to the south and east ([2]).

Most recently, on 10 January 2007, the European Commission presented a comprehensive package of proposed policies and measures to establish a new Energy Policy for Europe to combat climate change and boost EU's energy security and competitiveness. The policy contains a series of ambitious targets for greenhouse gas emissions and aims to create a true internal market for energy and strengthen effective regulation. The international energy policy priorities in this package include building up energy relations with EU's neighbours, reducing the threat of possible disruptions of critical energy infrastructures beyond EU's borders, enhancing relations with Russia, and deepening dialogue and relations with the key energy producers and transit countries. The energy and climate-change proposals were endorsed at the Spring European Council 2007, and the Commission will come forward with legislation in light of those discussions.

In addition, the Kyoto Protocol, which entered into force in February 2005, has helped to focus efforts on improving energy efficiency, developing sustainable sources of energy and reducing the environmental impacts of energy production and use (see Chapter 3, Climate change).

([1]) In order to base the analyses in this section on a comprehensive and consistent set of data throughout the pan-European region, the source of data used is OECD/IEA. These data include a certain amount of calculations and may differ from real GHG emission data reported by individual countries.

([2]) The ENP restructures and refocuses EU relations with the new neighbouring countries to the east (Armenia, Azerbaijan, Belarus, Georgia, the Republic of Moldova and Ukraine) and to the south (the Euro-Mediterranean Partnership countries). The Russian Federation has a special status as a 'Strategic partner' in the ENP.

For all countries, improvements in energy efficiency may reduce dependence on imports and environmental impacts. The use of renewable energy is also an option for improving the security of supply, but remains a relatively high-cost one. A way forward is to introduce support for energy-saving measures, switch to less-polluting fuels, remove subsidies for indigenous fossil-fuel industries and promote pricing that recognises the external costs of energy production.

There may be trade-offs between these aspects of energy policies. For example, the use of indigenous coal may limit import dependence, but it remains the most polluting fuel in terms of emissions of greenhouse gases, air pollutants and the production of solid and liquid wastes. Natural gas has a lower carbon content than coal and very little sulphur, but it still contributes to carbon dioxide emissions from combustion and methane emissions from leaking pipes.

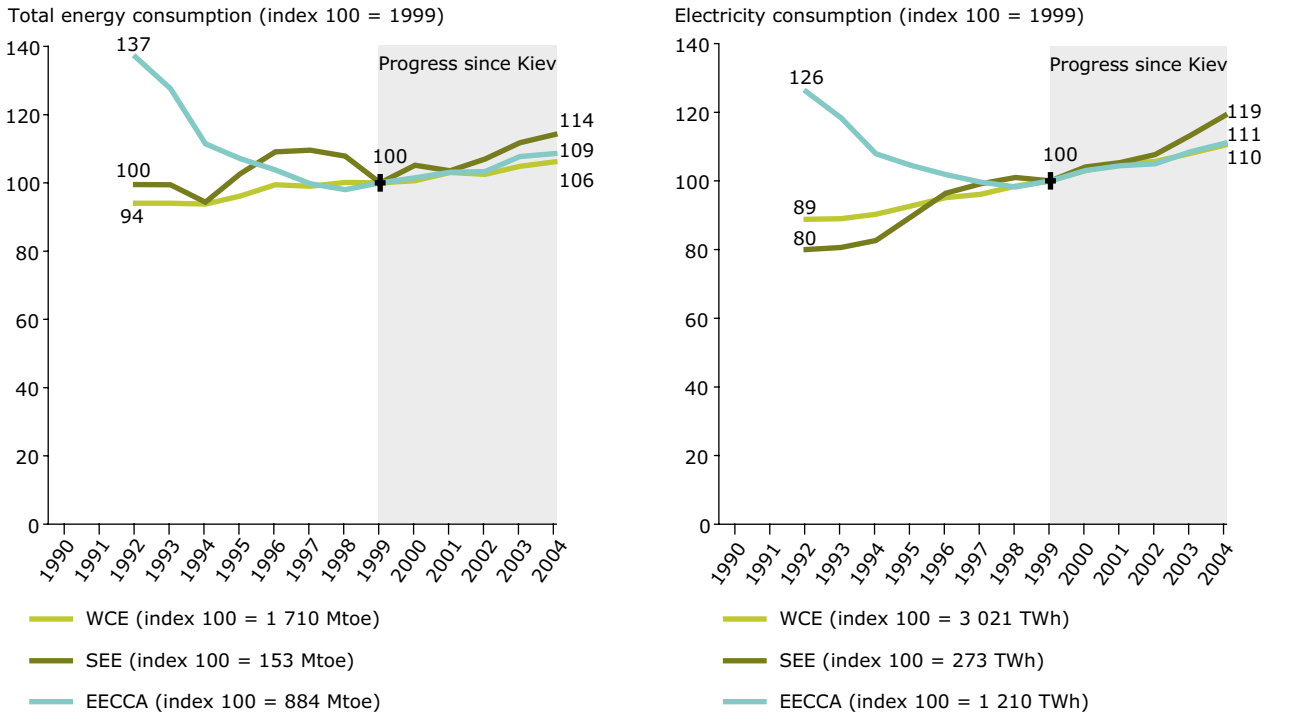
Finally, there is a continuing need to improve the quality and collection of energy and emissions data, especially in SEE and EECCA, in order to facilitate timely and accurate assessments for policy formulation.

7.3.2 Consumption and sources of energy

Total energy and electricity consumption

During the 1990s, total energy consumption in Europe decreased slightly, but it has been rising since 1999, with increases seen in all three regions (WCE, SEE and EECCA). This is in sharp contrast to the 1990s trend reported at Kiev (see Figure 7.3.1).

Figure 7.3.1 Total energy consumption and total electricity consumption



Note: Total energy consumption (also called total primary energy supply or gross inland energy consumption) represents the quantity of all energy necessary to satisfy inland consumption. Final energy consumption covers all energy supplied to the final consumer for all energy uses. It is usually disaggregated in the final end-use sectors: industry, transport, households, services and agriculture. The difference between total and final energy consumption is due mainly to losses in the conversion process, such as electricity generation, transport and distribution, and the part allocated to final non-energy consumption (e.g. feedstock used by the chemical industry). No data available for several countries in all three regions for 1990 and 1991.

Source: OECD/IEA, 2006a.

In EECCA, total energy consumption decreased significantly during the 1990s, largely as a result of political transition and economic restructuring, together with limited investment in efficiency measures. In spite of the rising trend since the end of the 1990s, in 2004 it was still approximately 20 % below 1992 levels. Consumption of energy per unit of GDP is still higher than in WCE.

In SEE, total energy consumption increased by 15 % over the period 1992–2004. Energy consumption per unit of GDP over that period decreased by 16 %, showing some decoupling of energy consumption from economic growth.

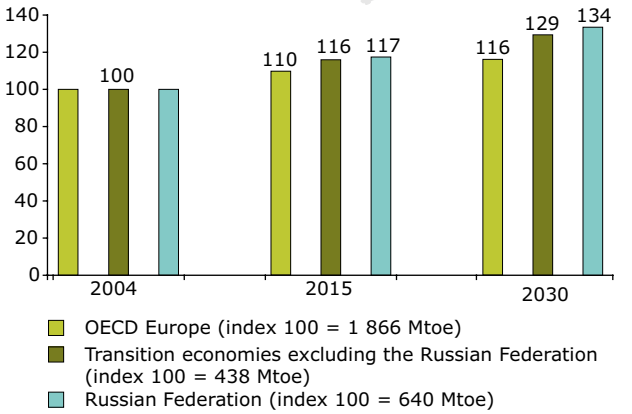
WCE has seen a steady growth in total energy consumption, with a 13 % increase between 1992 and 2004, lower than the growth in GDP, thereby demonstrating partial decoupling.

Electricity consumption and production has increased much more quickly than total energy consumption. Throughout the pan-European region, electricity consumption increased by 13 % during the period 1992–2004. Since the late 1990s, growth in electricity consumption in SEE has outpaced that in WCE: consumption increased by more than 49 %, and resulted in a more than doubling of gas-fired generation. In comparison, electricity consumption fell in EECCA and in 2004 was still 12 % below 1992 levels. The fall was accompanied by a steep decline in oil-fired generation. Total energy consumption and electricity consumption are now rising in all three regions.

In the coming years, total energy consumption is projected to increase steadily, with faster growth in SEE and EECCA than in WCE. This is despite some further decoupling of energy consumption from economic growth in all regions, reflecting the move to services. Action will thus be required to minimise the environmental impacts of increasing energy usage, through greater deployment of energy-efficiency measures and greater use of less-polluting energy sources (Figure 7.3.2).

Changes in the fuel mix for electricity generation, and investment requirements in new plants have opened up new opportunities to reduce both air

Figure 7.3.2 Total energy consumption, projections 2004–2030 (index 100 = 2004)



Source: OECD/IEA, 2006b.

pollutants and greenhouse gas emissions. But the rapid increase in electricity consumption gives some cause for concern due to the fact that, on average, around 2.5 to 3 units of fossil fuel are required to generate one unit of electricity. Further development of low-carbon options may help ensure that the current trend towards lower emissions per unit of electricity generation will continue.

Sources of energy

After a large decrease in the 1990s, reflecting a clear switch to less-polluting fuels, coal consumption in the pan-European region started to increase again and the reductions in GHG emissions reported in Kiev are now being reversed. Despite WCE coal import dependence of more than 50 %, coal use is projected to increase further as high oil and gas prices, and concerns over the security of oil and gas imports, drive a return to coal-fired electricity generation in all the three regions. This trend carries the risk of increasing associated environmental pressures. For example, Kazakhstan's dependence on coal as a major energy source is responsible for nearly half of air pollutants in Central Asia. Uzbekistan, also using large amounts of coal, accounts for almost one third of pollutant emissions. The introduction of clean coal technologies (see Box 7.3.1) could, however, help to limit additional pressures on the environment.

Box 7.3.1 Clean coal technologies

Clean coal technologies are being developed to mitigate the environmental pressures of coal combustion. A number of approaches can be used during refurbishment of existing plants, or their replacement, combined with the application of pollution abatement measures. Flue-gas treatment technologies can, for example, reduce 99 % of SO_2 emissions (desulphurisation systems), remove particulates (electrostatic precipitators) and reduce emissions of NO_x. NO_x emissions can also be controlled by primary measures, such as burner optimisation, air staging, flue-gas recirculation, and low NO_x burners. Coal can also be pre-treated to remove polluting mineral content. Coal gasification allows high levels of efficiency and lower emissions, although it is yet to be proven on a commercial scale. While technologies to reduce emissions of air pollutants are commercial and in widespread used in WCE, their use in EECCA and SEE is limited.

Coal combustion also releases substantial amounts of greenhouse gases. One of the most promising technologies to reduce these emissions is carbon capture and storage (CCS), where CO_2 is captured direct from the plant and stored deep underground, either in depleted oil and gas wells, or in aquifers. However, the technology has yet to be deployed on a commercial scale, and the environmental risks need to be further investigated. The technology is most likely to be used first in the EU-25 due to its initially high costs, but these are expected to fall if the technology is widely used. Its use in EECCA countries may be an important option for limiting greenhouse gas emissions, but will probably require foreign investment (e.g. through the Clean Development Mechanism).

Source: WCI, 2004.

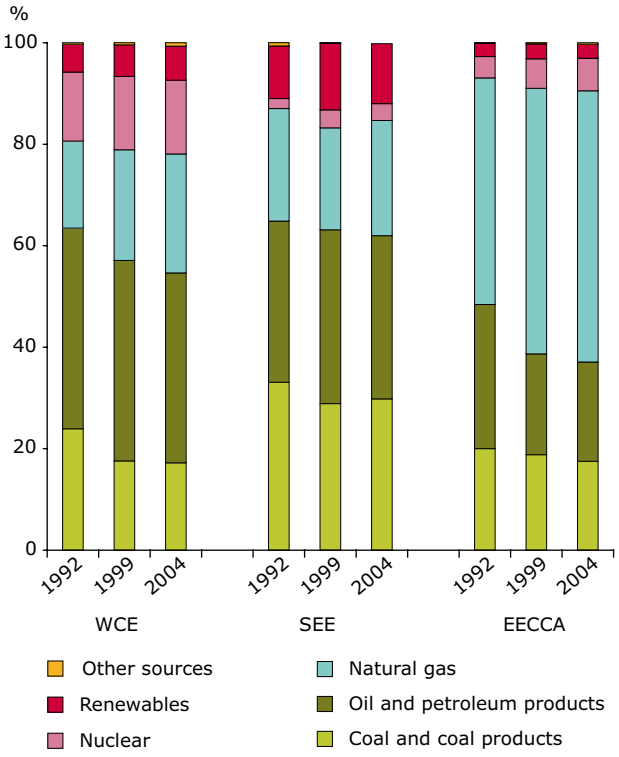
Oil consumption has been increasing over the whole region since the end of the 1990s. In WCE it remained fairly stable between 1999 and 2004, large increases in the transport sector being partially offset by a switch to other fuels in other sectors. In WCE, declines in North Sea oil production have been offset by increasing imports from the Russian Federation and the Caspian basin and the use of a number of new fields and supply routes. Oil consumption in the EECCA region has been increasing following the period of decline during economic restructuring in the late 1990s. Russian oil production in the late 1990s was little more than half its peak production during the first part of the 1990s, but rising global oil prices resulted in production increasing by more than 40 % between 2000 and 2005.

Gas consumption in the region grew significantly during the 1990s, both in absolute terms and as a share of total energy consumption. Natural gas became the fuel of choice for new power generation capacity in WCE at the expense of oil and coal. This was driven by relatively low gas prices and the lower environmental impacts of gas-fired electricity generation. Consumption of natural gas increased by 54 % in WCE and 18 % in SEE over the period 1992–2004. In contrast, consumption in EECCA fell by 5 %, due to the economic downturn of the early and mid-1990s. However, consumption of natural gas has also been constantly increasing during the last five years in the EECCA region. The Russian Federation produces approximately half of all the gas in the whole region and there are a number of other significant producer countries in the EECCA region, including Uzbekistan, Turkmenistan and Kazakhstan. The United Kingdom remains WCE's largest single gas market, followed by Germany and Italy. The largest percentage rise in gas demand within the EU has been seen in the Mediterranean countries, resulting from investment in gas transport infrastructure.

Consumption of nuclear power increased by 22 % overall between 1992 and 2004. A downward trend is expected in the EU over the coming years since several EU Member States have decided to phase out nuclear power and many existing plants will be decommissioned. This will not be offset by the fact that some other Member States have begun or plan to start the construction of new plants. The Russian Federation has published plans to build at least 20 new reactors.

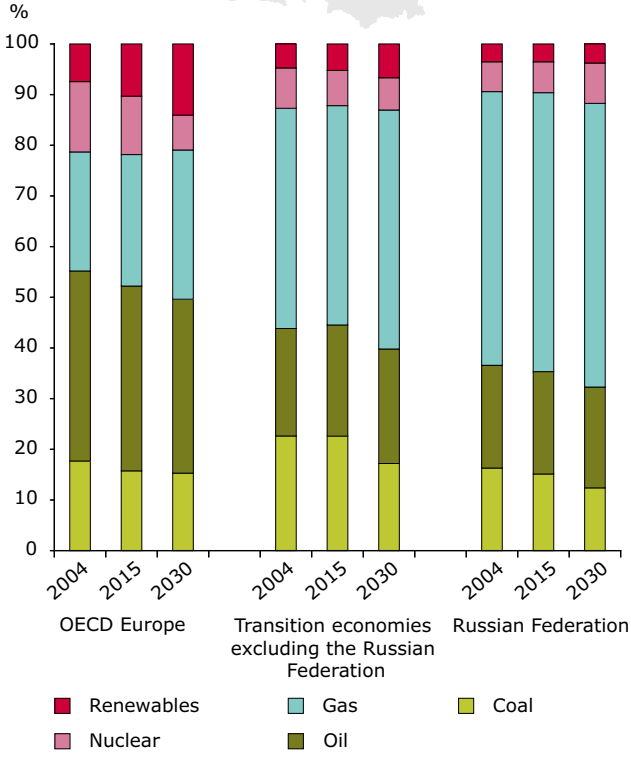
Renewable energy showed some growth in absolute terms, increasing by 11 % across the region between 1999 and 2004. Its relative overall share in total energy consumption has been stable since 1999 (Figure 7.3.5). The overall growth in renewable energy masked significant regional differences. In EECCA, 2004 consumption of renewable energy

Figure 7.3.3 Total energy consumption by fuel, 1992–2004



Source: OECD/IEA, 2006a.

Figure 7.3.4 Total energy consumption by fuel source, projections 2004–2030



Source: OECD/IEA, 2006b.

was only at 84 % of 1992 levels, due to a decrease in production from combustible renewable sources, primarily due to poor maintenance of existing plants. In SEE, renewable energy had increased by 31 % between 1992 and 2004, primarily from an increase in hydropower and combustible biomass, but energy production from biomass has been decreasing since 1999. The increase was greatest in WCE (39 %), mainly driven by a strong increase in biomass use for energy production and, to a lesser extent, to increased wind capacity. Installed wind capacity in WCE grew by approximately 600 % between 1997 and 2003 and 23 % in 2003 alone. This was largely due to the implementation of a number of fiscal and regulatory support measures, such as feed-in tariffs and obligations regarding share of renewable energy. The EU has set targets for both renewable energy and electricity of 12 % of total energy consumption and 21 % of electricity consumption, respectively, by 2010, but meeting these targets will require significant ongoing efforts ([3]).

Energy efficiency and intensity

Improving energy efficiency and minimising losses resulting from outdated industries and infrastructure is central to limiting growth in energy demand and reducing energy-related environmental impacts. The importance of energy efficiency has been recognised in a number of policy agreements in WCE, EECCA and SEE.

Figure 7.3.6 (left) shows that total energy consumption relative to GDP decreased between 1992 and 2004 in most countries in the pan European region. This can be explained by a combination of improvements in energy efficiency and structural and behavioural changes, such as

([3]) 10 January 2007 the European Commission presented a package on climate change and energy which included proposed new targets within the energy sector (see Section 7.3.1).

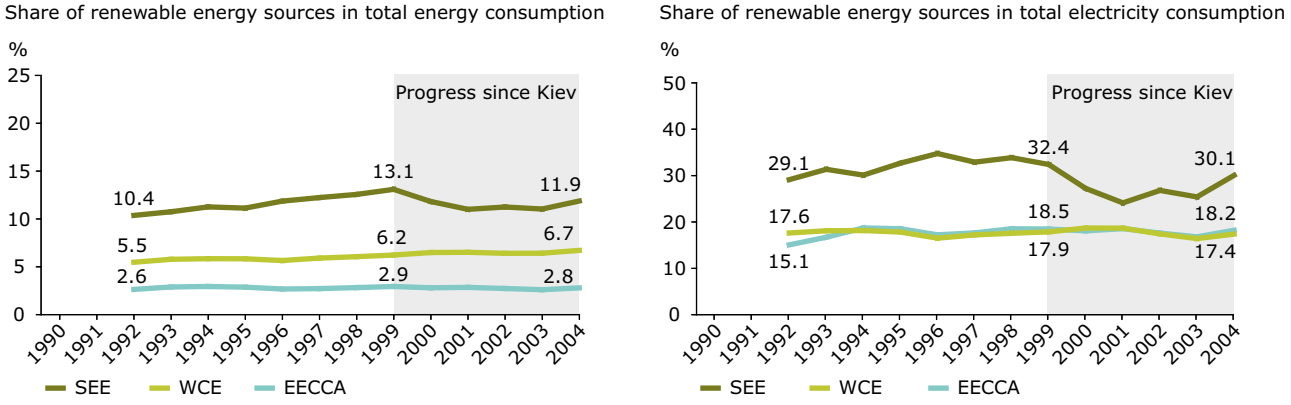
a shift away from energy-intensive industries and a change in household heating patterns. The larger decreases in energy intensity (relative to GDP) were in the EECCA countries, although levels in these countries generally remain much higher than in SEE and WCE.

Figure 7.3.6 (right) shows similar decreasing trends in energy intensity relative to population in almost all EECCA countries. In contrast, total energy consumption per capita in most WCE and SEE countries increased between 1992 and 2004, despite very different situations in the two regions: in WCE, increased demand has offset improvements in energy efficiency. Total energy consumption per capita has been increasing steadily since 1992 and is now higher than in the two other regions. Despite an increasing trend, total energy consumption per capita in SEE is still two to three times lower than in WCE and EECCA.

There has been some decoupling of energy consumption from economic growth in all regions. This has been most marked in SEE and EECCA, where there was a 24 % improvement in final energy consumption intensity ([4]) between 1992 and 2004. This improvement was due mainly to the closure of inefficient energy-intensive industries and the introduction of large-scale industrial energy efficiency programmes. Despite this converging trend, final energy intensity in EECCA is still around three times higher than in WCE. Reductions in energy intensity in WCE were influenced by the growth of the services sector at the expense of energy-intensive industries, as well as efficiency improvements. Nevertheless, efficiency improvements in WCE were counteracted by rising living standards and increased consumption. This has resulted in a larger number of households, lower occupancy levels and an increased use of household appliances as well as growing transport levels. Per-capita energy consumption has decreased in EECCA but increased in WCE and SEE.

Energy intensity is the ratio of energy consumption to another measure, such as GDP or population. It is not a measure of energy efficiency as it can be affected by structural and behavioural changes, such as a shift away from energy-intensive industries, or a change in household heating patterns. Improvements in **energy efficiency** signify the use of less input energy to provide the same level of energy service (e.g. less electricity via the use of a compact fluorescent light bulb or less primary energy used to produce one unit of electricity). Improvements in energy efficiency can be offset by increased demand. The goal is not just to improve energy efficiency or reduce energy intensity but to achieve **energy savings**, thus reducing energy consumption in absolute terms.

Figure 7.3.5 Shares of renewable energy sources in total energy consumption and in total electricity consumption, 1992–2004



Note: No data available for several countries in all three regions for years 1990 and 1991.

Source: OECD/IEA, 2006a.

([4]) An indicator of final energy consumption per unit of GDP output.

Figure 7.3.6 Change in total energy consumption intensity 1992–2004 (%)

Note: GDP used: purchasing power parities (PPP) in constant 2000 USD.
No data available for several countries in all three regions for 1990 and 1991.
No GDP data available for Serbia and Montenegro; 1994 data used for Bosnia and Herzegovina, 1993 data used for Azerbaijan.

Sources: OECD/IEA, 2006a; World Bank, 2007.

Substantial scope remains for improving energy efficiency in all regions. The energy intensity of GDP in SEE and EECCA countries is likely to continue to fall, although less slowly than in WCE. GDP growth in EECCA is projected to average 4.4 % per year from 2004 to 2025, whereas improvements in energy infrastructure are expected to keep the growth in energy demand to an average of 1.6 % per year.

The 'Energy Charter Protocol on Energy Efficiency and Related Environmental Aspects' (PEEREA) provides transition economies with a menu of good practices and a forum in which to share experiences and policy advice on energy efficiency. Particular attention is paid to such aspects of a national energy efficiency strategy as taxation, pricing policy in the energy sector, environment-related subsidies and other mechanisms for financing energy efficiency objectives. PEEREA's development is currently focused on a series of in-depth energy efficiency reviews, designed to produce specific recommendations for individual governments concerning ways of improving their national energy efficiency strategies. Promising options include increasing the efficiency of combined heat and power generation, replacing outdated energy infrastructures, and replacing old power plants. Other options include improving the energy efficiency of appliances and building insulation.

Significant investments were made to improve the efficiency of electricity generation plants in WCE and SEE between 1992 and 2004, particularly in refurbishment and new high-efficiency gas turbines with up to 45 % efficiency. In EECCA, however, efficiency during the same period fell from 37 % to 31 %, due to lack of investment. Large investments will be required to upgrade infrastructures in SEE and EECCA countries.

7.3.3 Environmental impacts of energy production/ consumption

The energy sector is the main contributor to total greenhouse gas emissions and generates other significant environmental impacts, such as emissions of other air pollutants (acidifying substances, ozone precursors and particulates), oil spills, and nuclear waste. Since 1992, emissions of air pollutants and, to a lesser extent, greenhouse gases from energy production and consumption have been reduced. This is due mainly to reduced use of coal (due both to fuel switching and to overall reductions in energy use in some countries) and, for air pollutants, the introduction of abatement measures in the electricity production and transport sectors. As a result, emissions of greenhouse gases and air pollutants per unit of total energy consumed and unit of electricity generated both decreased substantially throughout the pan-European region. However, the benefits of this were to a large extent offset by rising energy and electricity consumption.

Climate change

In 2004, energy-related greenhouse gas (GHG) emissions accounted for 80 % of total GHG emissions in the pan-European region, and 82 % of total emissions in EECCA (see Table 7.3.1). The energy-supply sector itself is the primary GHG emitting sector, representing 44 % of total GHG emissions in the pan-European region and 70 % in EECCA, due to important fugitive emissions.

Between 1999 and 2004, energy-related emissions have been increasing in all regions, although they decreased by 17 % between 1990 and 2004, with different developments in different regions (Figure 7.3.7).

In EECCA, energy-related emissions increased by 6 % between 1999 and 2004.

In WCE, energy-related emissions in 2004 were 4 % above the 1999 level with increases in the transport and energy supply sectors (+ 6 % and + 5 %, respectively). Between 1990 and 2004, the growth in emissions from transport increased by 26 %, offsetting the decline in all other sectors (energy supply, services and industry). This decline has been more substantial in central and eastern European countries due to restructuring or closure of heavily polluting and energy-intensive industries. There were also reductions in Germany due to economic restructuring in the new Länder, and in the United Kingdom due to a switch from coal to gas. Specific policies and measures contributed to further emission reductions.

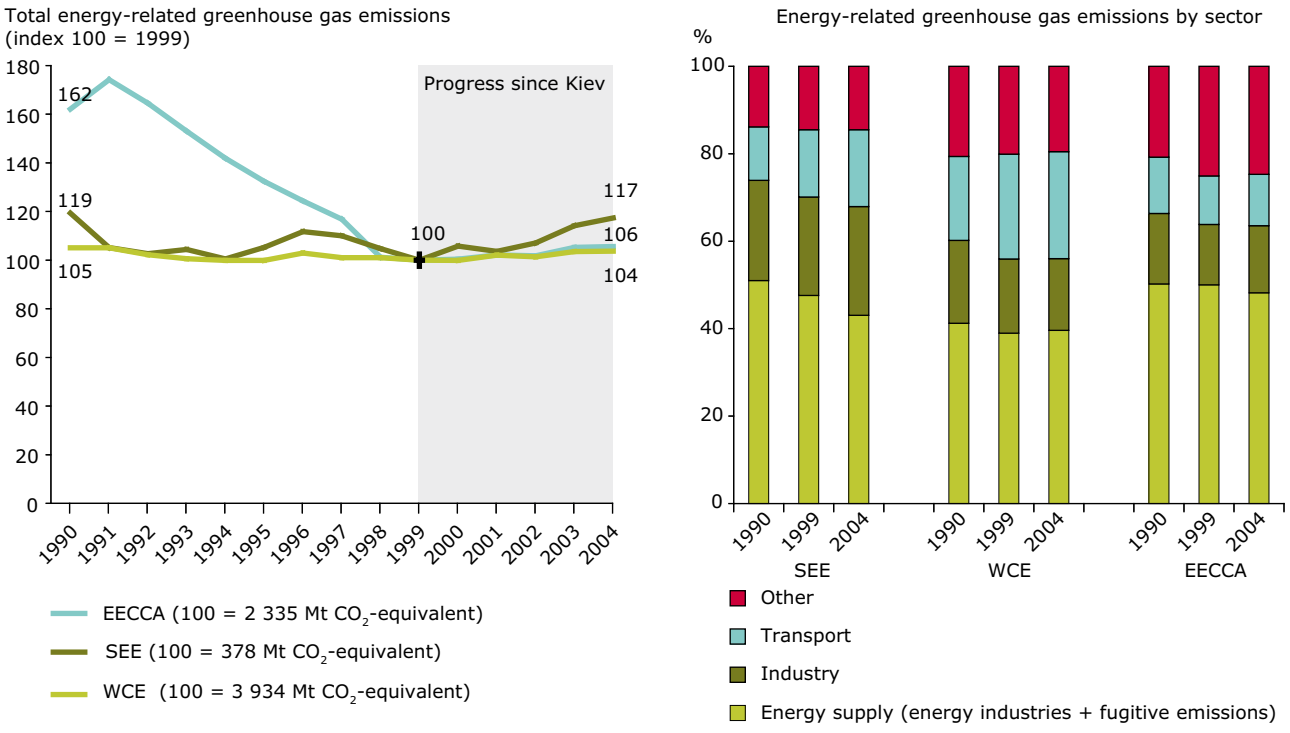
Table 7.3.1 Indicators: total greenhouse gas emissions in 2004, share of the energy sector and of the energy supply sub-sector in total greenhouse gas emissions

Pan-European region	Total GHG emissions in 2004 (million tonnes)	Share of the energy sector in total GHG emissions in 2004	Share of the energy-supply sector in total GHG emissions in 2004
WCE	5 091	80 %	32 %
EECCA	2 996	82 %	37 %
SEE	599	74 %	32 %
Total	8 686	80 %	32 %

Note: The energy sector is composed of the following sub-sectors: energy supply, energy consumption from industry, transport and other energy consuming activities. Emissions from energy supply consist of emissions from energy industries and fugitive emissions. The Russian Federation and Kazakhstan are not taken into account in the column 'share of the energy supply sector in total GHG emissions in 2004', since a detailed split of energy-related emissions is not available.

Source: EEA, 2007.

Figure 7.3.7 Total energy-related greenhouse gas emissions and share by sector, 1990–2004



Note: The figure showing the share by sub-sector of energy-related greenhouse gas emissions (right) does not take into account the Russian Federation and Kazakhstan, for which a detailed split of energy-related emissions are not available.

Source: EEA, 2007.

In SEE, energy-related emissions increased by more than 17 % between 1999 and 2004. This reflects a 34 % increase in emissions from transport and a 30 % increase in energy use by industry.

While transport contributes significantly to GHG emissions in WCE, where it accounts for 20 % of total emissions, second only to the energy supply sector, its role in SEE and EECCA is less important

(13 % of total GHG emissions in SEE and 9 % in EECCA([5])). However, transport growth is strongly correlated with economic development, and transport emissions have begun to increase with the recovery in the economies of these countries.

Methane emissions from the energy sector are a strong contributor to total energy-related GHG emissions and offer significant potential for reductions. While they represent 2 % and 5 % of the energy sector's greenhouse gas emissions in WCE and SEE respectively, they represent more than 10 % of energy-related GHG emissions in EECCA (Table 7.3.2). In this region, methane emissions from energy supply are very high compared with other sub sectors and other regions.

Air pollution

Emissions of air pollutants have declined substantially in WCE during the period 1992 2004, notably from the energy, industry and transport sectors. Much of this improvement was due to abatement techniques in large combustion plants (such as the introduction of flue-gas desulphurisation), fuel switching, and economic restructuring. Improvements to road transport vehicle emissions are being offset by increases in traffic (see also Section 2.2, Air quality, and Section 7.2, Transport).

Emissions of acidifying substances, particulates and ozone precursors are falling across the pan-European region. This is due mainly to a reduction in NO_X and SO_X emissions. In EECCA, NO_X emissions have fallen mainly as a result of reductions in energy demand rather than investment in abatement. It should be noted, though, that they have increased during the last five years. Significant further reductions are therefore required to improve air quality. There has been little or no progress in SEE. The UNECE Convention on Long-range Transboundary Air Pollution and its protocols require reduction of air pollutants, but many EECCA countries are still not party to all the protocols. Health problems related to air pollution continue to be of concern in a number of EECCA countries, such as the Russian Federation, Ukraine, Kazakhstan and Kyrgyzstan. National monitoring and assessment strategies were generally developed some decades ago, but funding is often limited.

Within EECCA, emissions from private cars and freight transport have become the dominant source of many air pollutants due to rapid growth of the vehicle fleet within the past decade. In addition, a large number of old vehicles with poor emission reduction technologies and frequent use of low-quality fuels have led to an increase in

Box 7.3.2 Focus: fugitive emissions

Fugitive emissions arise when gases are released from exploration, production, processing, transmission, storage and use of fuels. Gases may be released into the atmosphere in locations remote from gas transportation infrastructure and where there is no requirement for gas re-injection for pressure maintenance, and at oil refineries. The gases can be combusted (flared) or non-combusted (vented). Combustion is the preferable option since vented gas (predominantly methane) is an up to 21–23 times more potent greenhouse gas than flared gas (where methane is converted to CO_2). The Russian Federation is the world's fifth largest source of CO_2 emissions from gas flaring, although this represents only 3 % of total CO_2 emissions in Russia.

Leakage of gas from the pipeline network in EECCA has long been a concern, although the extent of this problem is lessening with increased investment. Analysis of gas emissions from Gazprom's gas export pipeline network between 2002 and 2004 concluded that methane emissions, mainly releases from valves, accounted for 0.7 % of the volume of gas exported. Methane leakage accounts for around one third of total emissions from transport, the remaining two thirds resulting from the burning of gas to power the turbines used for transmission and provide the electric power required for driving motors.

Source: Cenef, 2004.

([5]) This value does not take into account Russia and Kazakhstan, for which a detailed split of energy-related emissions are not available.

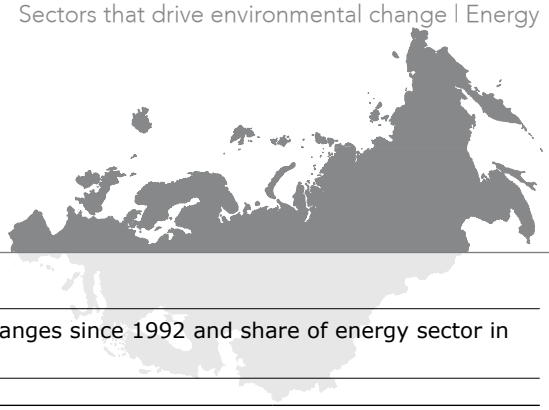


Table 7.3.2 Energy-related greenhouse gas emissions in 2004, changes since 1992 and share of energy sector in total greenhouse gas emissions

Region/ country	Total energy-related GHG emissions in 2004 (million tonnes)	Contribution of energy-related GHG emissions to pan-European energy-related GHG emissions in 2004	Share of CO_2 emissions in energy-related GHG emissions in 2004	Share of CH_4 emissions in energy-related GHG emissions in 2004
Pan-European region	6 990	100 %	94 %	5 %
WCE	4 080	58 %	96 %	2 %
EECCA	2 467	35 %	89 %	10 %
SEE	444	6 %	94 %	5 %
Russian Federation	1 754	25 %	89 %	11 %
Germany	828	12 %	97 %	2 %
United Kingdom	568	8 %	96 %	2 %
Italy	480	7 %	96 %	2 %
France	409	6 %	97 %	2 %
Spain	335	5 %	98 %	1 %
Poland	323	5 %	94 %	6 %
Ukraine	282	4 %	81 %	19 %
Other countries	2 011	29 %	96 %	3 %

Note: Other countries: countries that contribute individually less than 4 % to overall pan-European energy-related greenhouse gas emissions.

emissions of harmful air pollutants, particularly in urban centres. The elevated concentration of lead in ambient air in a number of EECCA countries is due mainly to the continuing use of leaded petrol. The implementation of ECE vehicle regulations and fuel standards in EECCA countries is in progress but an effective national enforcement regime is needed (for further information see Section 7.2, Transport).

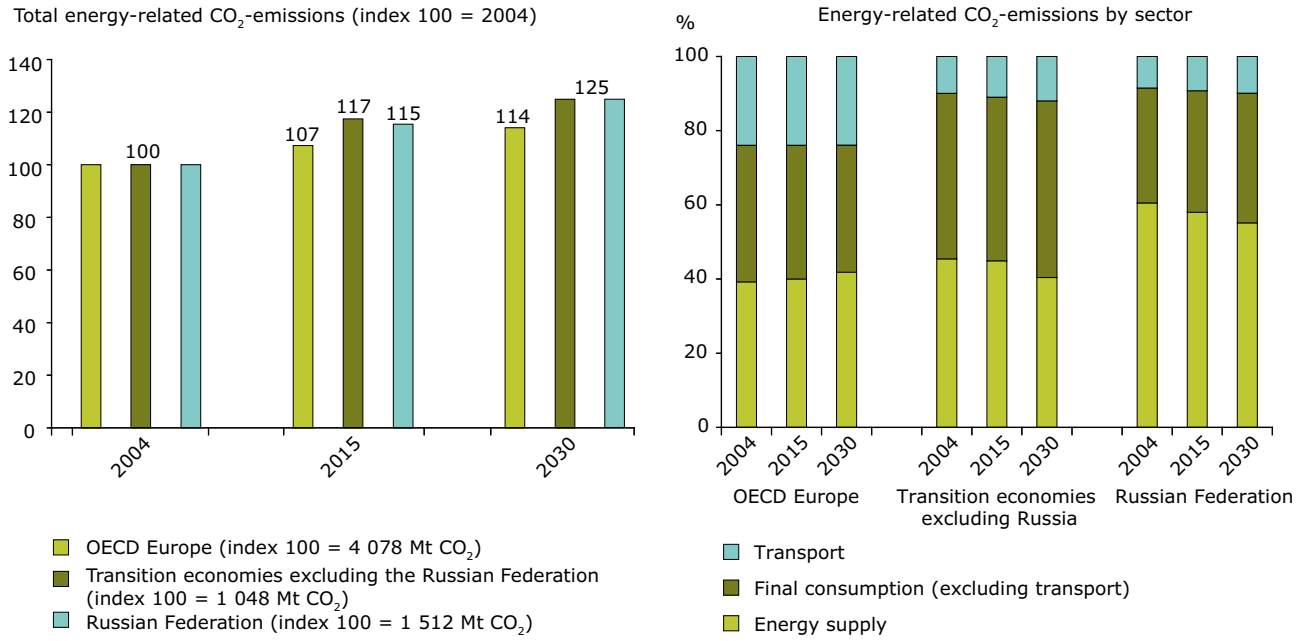
Land use and other environmental impacts

Although power plants occupy relatively small geographical areas, the associated mining, transportation and waste can have significant impacts on land. These differ in nature and intensity according to the activity and the fuel used. The extraction of oil and natural gas can destroy natural habitats for animals and plants. Waste products, such as wastewater sludge and residues, can cause land contamination if not properly disposed of.

Land use and other environmental impacts of energy production are much more prominent in EECCA than in EU. Examples include the rupturing of an oil pipeline in the Komi Republic and the network of leaking pipes and wellheads in the Caspian Sea. Raising environmental standards can impose costs on companies developing or upgrading existing fields. Future oil and gas projects, particularly in EECCA, are expected to be undertaken in increasingly remote areas (east Siberia and Kamchatka), where large industrial projects could have major environmental impacts. Transport of oil and gas can result in pipeline accidents and oil tanker spills. The important and increasing energy trade will affect energy transportation, and the associated environmental impacts could become an issue in the context of pipeline construction between EECCA and EU.

The storage and transport of radioactive waste from nuclear power production (e.g. spent fuel) and uranium mining may also exert environmental pressures. Tailings from historic mining operations represent a significant amount of low-level

Figure 7.3.8 Total energy-related CO_2 emissions and share by sector, projections 2004–2030



Source: OECD/IEA, 2006c.

radioactive waste in Europe. While uranium mining in WCE has decreased significantly since 1990, production continues in the Russian Federation, Ukraine and Kazakhstan.

There are increasing local measures to reduce the environmental impacts of energy. Environmental accounting and audits, and the internalisation of environmental costs are increasingly common. Recent examples include managing the impact of the Sakhalin II project on the grey whale population, and the rebuilding of the Turkmenbashi refinery to comply with ISO.

7.3.4 Energy and environment: policy prospects

There are a number of common policy challenges, centred on three core objectives: environmental sustainability, competitiveness, and security of supply. The challenges and priorities differ between regions. For example, EU regards security of supply as best met by effective and efficient energy markets, whereas Russia seeks security of demand and prefers long-term bilateral supply contracts. GHG emission reductions are a policy priority in EU, while local environmental impacts such as oil spills, mining waste, and methane leakage are considered more pressing issues in EECCA.

Interregional relations

Ensuring security of supply, creating market access, and managing the environmental impacts of energy are the central themes of energy relations between WCE, EECCA and SEE. Globally, EU is the largest importer and the second largest consumer of energy, and security of supply is a key economic and geopolitical factor. An increasing proportion of gas will be supplied from the Russian Federation, and competition for access to Russian energy exports is likely to intensify, with China and India projecting rapid increases in oil and gas demand. The 2001 EU Green Paper *Towards a European strategy for the security of energy supply* began to address this issue, and it has been developed more recently through the 2006 Green Paper, *A European Strategy for Sustainable, Competitive and Secure Energy for Europe*.

As well as maintaining strategic fuel stocks to reduce vulnerability to short-term supply constraints, EU aims to enhance strategic energy

Box 7.3.3 Case study: managing environmental impacts of the Baku-Tbilisi-Ceyhan (BTC) oil pipeline

The BTC pipeline was opened on 25 May 2005, connecting Azerbaijan's capital on the Caspian Sea to Turkey's east Mediterranean coast. The project was built partly to reduce pressures from energy transport, since up to 350 oil cargo tankers per year pass through the Bosporus and Dardanelles. The development of the Caspian basin pipeline route presented a number of environmental difficulties. Oil extraction from the former Soviet Union had left high levels of pollution in the Caspian Sea and the Kura river, with impacts on the numbers of sturgeon and caviar production, and further oil extraction may add to this problem. The pipeline route follows the boundary of the Borjomi-Kharagauli National Park, famous for its pristine wilderness, its spas and Borjomi mineral water, which makes up as much as 10 % of Georgia's export trade. Oil spills could have a catastrophic effect. Strict environmental monitoring and reporting standards have been introduced. The consortium has invested more than EUR 30 million in its environmental and community programmes to work with communities affected by the pipeline.

Source: British Petroleum, 2005.

partnerships with neighbouring countries. This is also a major element of the EU neighbourhood policy (COM(2004)373). So far, EU has signed individual partnership and cooperation agreements with most EECCA countries, the most important being the EU-Russia Energy Dialogue in 2000. The Energy Community Treaty entered into force on 1 July 2006, creating a legal framework for an integrated energy market and for promoting energy sustainability. There are also opportunities for the integration of energy and environmental issues, based on the EU Cardiff process ([6]) and the EECCA environmental strategy. In November 2006, the EU and the countries of the Black Sea and Caspian Sea regions agreed on a common energy strategy, based on four areas: converging of energy markets, enhancing energy security, supporting sustainable energy development, and attracting investment towards common projects ([7]).

Investing in energy infrastructure

The imminent need for investment in new energy infrastructures, especially in SEE and EECCA, to replace ageing plants, has created a window of opportunity to develop a more environmentally sustainable energy sector. This could encompass a better focus on energy efficiency and cleaner production, making use of the project-based mechanisms under the Kyoto Protocol, and ensuring that environmental costs are better internalised in investment planning decisions.

However, under liberalised markets, there has been a slowdown in energy infrastructure investment, as private companies lack the necessary long-term incentives and certainty to invest. On the other hand, a lack of investment carries some environmental risk, for example leakage from badly maintained pipelines. Energy investment requirements are subject to a wide range of uncertainties, such as rates of decline in oil and gas resources, cost-based pricing, export pipelines and sea terminals, and market reforms. Cumulative investment requirements for EU energy infrastructure are estimated to be in the range of USD 2 trillion until 2030 ([8]). In EU-10, SEE and EECCA, the prolonged downturn in electricity demand has provided a margin of spare generating capacity, but this margin will probably be eliminated by 2010. As a result, large investments in power generation will be required, especially in EECCA, over the next 20–25 years.

In the Russian Federation, investment requirements in energy infrastructure are estimated at being in the region of EUR 30 billion per year ([9]). Whereas Russia is increasingly able to finance its infrastructure investment from energy export revenues due to

([6]) See also http://ec.europa.eu/environment/integration/integration.htm.
([7]) 10 January 2007 the European Commission presented a package on Climate Change and Energy which included proposed new targets within the energy sector (see Section 7.3.1).
([8]) IEA — World Energy Investment Outlook (2003).
([9]) Russian Energy Strategy (2003).

higher oil and gas prices, it is very unlikely that current market and regulatory arrangements are capable of sustaining an efficient combunation of new generating capacity in other transition countries. Market incentives may be sufficient to underpin investment in small and flexible gas-fired units, but there is little prospect that new base-load plants will be constructed without some adjustments in the way that markets operate. Some form of public intervention in planning and financing new investment in power generation seems to be unavoidable. This may include centralised contracting of additional capacity through power purchase agreements or some form of capacity payments, and/or public-private partnerships to finance new plants.

Table 7.3.3 EU energy import dependence

	EU import dependence %	Imports from Russia, % of EU consumption, 2003	Imports from Russia, % of EU consumption, 2030
Oil	80	27	> 90
Natural gas	46	25	85

Source: European Commission, 2006.

Box 7.3.4 Energy import/export relationship between EECCA and WCE

After a period of relative security of indigenous supply, EU energy import dependence began to increase in the early 1990s and reached more than 50 % in 2004, as indigenous supplies began to decrease. The EU has developed a significant energy transport infrastructure with exporters in EECCA producer and SEE transit countries. The Russian Federation has retained control and influence over the pipeline and distribution system from Central Asia, although there is now potential access to Central Asian reserves through the BTC pipeline via Turkey and the Caspian basin which began operation in 2005.

The dependence of WCE and SEE on oil and gas from EECCA is set to rise substantially to 2030. Projected increases in energy consumption could significantly increase energy production and related environmental problems in EECCA. Work by the UN Special Programme for the Economies of Central Asia (SPECA) (funded by UNECE and the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)) has indicated the central role of oil and gas exports in the development of Central Asian economies. By early 2004, EECCA exports to the EU represented 45 % of all its energy exports (53 % of oil exports and 36 % of gas exports). Likewise, EU imports through the Russian pipeline system totalled 21 % of net oil imports (16 % of total EU consumption), and 41 % of net gas imports (19 % of total EU consumption). The European Commission Green Paper on Security of Energy Supply (2001 and 2006) indicate that EU energy dependence could climb to 70 % in 2030, with alternative resources, such as renewables, unlikely to offset the projected increase.

A number of regional energy dialogues have begun, including the EU Russia Energy Dialogue, and discussions with Kazakhstan and Turkmenistan. A number of countries, such as the Baltic states, Bulgaria, Croatia, Finland, Greece, Slovakia, and the Republic of Moldova, have a very high level of dependence on the Russian gas pipeline system. During winter 2005–2006, disputes with Gazprom over prices intensified, leading to supplies to Ukraine and the Republic of Moldova being cut off for some time. A similar situation arose in December 2006 due to a dispute between the Russian Federation and Belarus.

Russia is also dependent on these transit countries to supply large markets and is developing its international pipeline and transport infrastructure to bypass potentially difficult transit countries. Examples include the Baltic Pipeline System (oil) which reduces dependence on Latvia and Lithuania for exports through the Baltic Sea, and the Blue Stream Pipeline (gas) export route to Turkey avoiding Ukraine, Romania and Bulgaria. Close relationships have been forged between the Russian Federation and Uzbekistan, Kazakhstan and Turkmenistan, and Russia effectively controls pipeline access to western European markets.

Sources: European Commission, 2006; European Policy Centre, 2005.

Improving energy efficiency

Implementing strategies to improve energy efficiency remains a challenge for all regions. Energy efficiency also lacks a political lobby to match the energy supply sector when seeking state support, and national governments are more likely to invest in increasing supply than in reducing demand. Nonetheless, the Sixth Environment Action Programme provides specific targets for industry of at least 1 % annual improvement in energy efficiency, as foreseen in the EU Action Plan on energy efficiency. There remain significant opportunities for low-cost energy-efficiency improvements (the value of projects with a payback period of less than five years is estimated at EUR 5–10 billion) (UNECE, 2005).

Energy efficiency is of particular importance in SEE and EECCA. These regions provide significant opportunities for self-financing, low-cost improvements. Major investment is needed in power generation, transport, buildings, and industrial energy efficiency. Key policy instruments include taxation, pricing policy in the energy sector, and environment-related subsidies. However, SEE and EECCA countries suffer from a lower level of awareness among consumers, vendors, and policy makers than in WCE, and a lack of up-front capital to buy new energy-efficient equipment or undertake necessary retrofit measures. International donors and lenders have responded to this issue with innovative financing mechanisms.

Integrating environmental issues

To develop sustainable energy systems, environmental concerns must be integrated into the decision-making processes in the energy sector. Within the EU, the European Council, through the Cardiff process (1998), requires different Council formations to integrate environmental considerations into their respective activities. There is a need for this integration process to be further developed and fully implemented also in non-EU regions (European Commission, 2006a). The influence of future environmental impacts on energy supply — especially those of unavoidable climate change — must also be considered. An example of this is the siting of pipelines in areas of melting permafrost, where warming may lead to ground sinkage, disruption of transport of energy supplies, and pollution (see also Chapter 3, Climate change).

Developing renewable energy

Faced by increased energy costs and emission constraints, countries are aiming to create a low-carbon economy using fewer fossil fuels across industrial, transport and domestic sectors, and using more renewable energy sources to generate electricity, heating and cooling, and fuel transport. This will require an ambitious switch to wind (particularly offshore), biomass, hydro and solar power, wave and tidal technologies and biofuels. Current EU renewable targets remain challenging; high growth in onshore wind capacity is being offset by slower growth in biomass. SEE and EECCA have yet to set binding renewable energy targets, although policy measures are being introduced to support technology deployment (Worldwatch Institute, 2005). Although there is significant potential for renewables in the EECCA region, resources are concentrated in certain areas. The higher cost of renewable energy relative to cheap indigenous fossil fuels may mean that it is slower to develop in the medium term. Policy frameworks to promote renewable energy are in their infancy in SEE and EECCA, and the main growth in electricity production from renewable sources has come from the rehabilitation and construction of hydro plants. In designing policies for renewable energy, EECCA countries will need to consider links to other policy goals, such as managing CO_2 emissions, and how they might interact with the EU emissions trading scheme. Where the promotion of renewable energy is a critical component of delivering energy, the introduction of long-term renewable obligations or feed-in tariffs may be appropriate.

Energy market liberalisation and price reforms

Liberalisation of energy markets can have both negative and positive environmental impacts. During the 1990s, environmental impacts from the energy sector were reduced, as cheap natural gas became the fuel of choice for private investors. Working in the opposite direction, however, the price of energy products also decreased, which may have counteracted incentives to use less energy and thus have resulted in more energy-related environmental impacts.

Box 7.3.5 Case study: building energy-efficiency capacity in Serbia

The Serbian Energy Efficiency Agency (SEEA) in Belgrade faces a number of challenges common to many countries in the region. Serbia has a higher percentage of transport and distribution losses than the EU average. Investment is limited and infrastructure is deteriorating. Almost 70 % of Serbia's energy is consumed by the residential sector, as a result of poor-quality building stock. District heating is supplemented by electricity, draining resources in the winter months. Prices for electricity, district heating, oil and gas have increased substantially, causing major financial pressures on many consumers. Municipalities no longer receive the financial support they used to for the operation of district heating plants, schools and hospitals.

The Serbian Energy Efficiency Agency has been set up to identify, analyse and propose cost-effective and technically feasible policies and measures for the improvement of energy efficiency on both supply and demand side, encourage and promote activities aimed at energy savings, promote international energy efficiency standards and best-practice exchange, and provide incentives for the use of best available technologies. SEEA has had a number of successes since it was established in 2004. A number of energy-efficiency auditors have been trained, energy audits of industrial and municipal enterprises undertaken and energy-efficiency awareness campaigns implemented.

Source: SEEA, 2005.

Liberalisation has been introduced into EU energy markets and is an ongoing process in SEE and EECCA. The EU facilitates competition with funding to connect isolated networks and improve cross-border interconnections within the EU and with supplier countries. Some SEE and EECCA countries seek to provide subsidy support for their indigenous energy industries, either to protect poor populations from the full production costs of energy, or to maintain the security of indigenous supply. Direct energy subsidies (i.e. payments to producers or consumers) are being phased out in the EU, but are being replaced by indirect support, such as tax exemptions. There is some evidence to suggest that, in historic terms, renewable energy subsidies in EU-15 are relatively low in comparison with those for other forms of energy during periods of fuel transition and technology development. More mature fuels, such as natural gas, continue to benefit from the technological and industrial infrastructure built up during previous decades.

Current producer prices for electricity will have to be increased substantially in most SEE and EECCA countries in order to cover the cost of electricity from new plants. The median level of average end-user

Box 7.3.6 Household utility pricing and the fuel-poor — lessons from Armenia

A World Bank Study has analysed the impacts of replacing the block tariff for electricity in Armenia in favour of a higher single price of AMD 25 per kWh in an attempt to fully cover medium-term utility costs (including depreciation, debt service, and other capital costs) and reflect the high cost of supplying low-voltage electricity. It indicated that electricity consumption dropped on average by 17 % and that consumption of substitutes such as wood and natural gas increased, leading to potential environmental problems such as deforestation and increased air pollution. In addition, payment collection rates fell by 9 %, and consumer debts increased four-fold. The resulting utility revenue increase of about 6 % from sampled households was less than expected by the utilities. Relative to the non-poor, the poor cut consumption more, the percentage of households with debts was higher, and the average size of these debts increased more. Impacts on the urban poor were greater, due to the lack of access to low-cost substitutes. In response, the Armenian Government has implemented a reshaping of the social benefit payments system and is monitoring household pricing data more closely.

Note: Exchange rate 1 euro = 500 Armenian dram (AMD).

Source: Lampietti *et al.*, 2001.

prices across EECCA is about one-half of the level of about EUR 80 per MWh that would be required for full cost recovery. Some attempt has been made to raise gas prices on the domestic Russian market, and during negotiations between the Russian Federation and EU it was agreed that gas prices for domestic and industrial users would double by 2010.

However, liberalisation of energy markets and price rises may lead to fuel poverty and — as a rebound effect — to increased environmental pressures. Ensuring access to affordable energy at the household level is becoming a more significant issue for the EECCA region, because of rising prices and deterioration of the infrastructure. This is especially true for the urban poor, who have no alternative access to fuel. When domestic electricity tariffs are increased to reduce state support and reflect the full cost of supply, significant problems of affordability typically appear for the lowest decile of households. This is a primary concern in the Balkans (Croatia, Former Yugoslav Republic of Macedonia, and Serbia and Montenegro) and some EECCA countries.

7.4 Tourism

Photo: Son-Kul Lake, Kyrgyzstan © Kyrgyz Community Based Tourism Association

Key messages

- International tourist arrivals in the pan-European region continue to grow, as does the economic importance of the tourism industry in some traditional and new destination countries. Growth is particularly rapid in SEE and EECCA, but from a far lower level than in WCE, which remains the main tourist destination globally with 43 % of the world total arrivals.
- Tourism is still one of the main drivers of increased demand for transport, particularly the most environmentally damaging modes: private cars and, more critically, air transport. In Europe, in 2005, about 59 % of the tourists reached their destination by road and 34 % by air. Low-cost airlines are playing a significant role in increasing the mobility of visitors.
- Coasts, islands and mountains — and in general settings characterised by attractive natural resources — remain particularly sensitive to tourism development. Degradation, sometimes irreversible, has already occurred in some popular and mass destinations.
- Adaptation to climate change may increase the impacts of tourism on the environment. Reduction of areas with reliable snow coverage (66 % in the Alps, under the worst scenario) may result in higher pressures from winter tourism.
- The impact of tourism is projected to increase as a result of greater affluence, lifestyle and demographic change, and growing incomes. Tourism at peak periods overwhelms the carrying capacity of some destinations. Tourist behaviour remains a crucial factor for sustainability.
- Recent policy developments aim to increase the sustainability of tourism but there has been little progress with implementation. In particular, no compulsory targets have been set for the tourist industry.
- Formulation of effective policy measures requires reliable and harmonised statistical information. Efforts are still needed to improve the framework of statistical data collection on tourism.

7.4.1 Introduction

Tourist volumes throughout Europe are increasing. Tourism is often fragmented: its growth is concentrated in specific environments and destinations, creating localised pressures.

Tourism generally makes heavy calls on environmental resources. It contributes to the urbanisation of sensitive areas such as coasts and islands, increased water consumption and litter production, fragmentation of habitats, and loss of biodiversity. It is also one of the main drivers of increased demand for transport, particularly the most environmentally damaging modes.

However, tourism makes major contributions to economic development in many places throughout Europe. Inbound tourism expenditure in the pan-European region in 2005 was more than USD 338 billion. Tourism services also represent a significant resource within the marine industry (see Chapter 5, Marine and coastal environment). Moreover, tourism is an important factor in social development and cohesion; at the pan-European level the travel and tourism industry provided employment for an estimated 12 million people in 2006.

The challenge remains to develop and encourage patterns of tourism that do not jeopardise the benefits to tourists, the local and national economies, and the natural resources of the areas and countries visited. Sustainable tourism development is widely recognised as the way of fostering the economic and social viability of destinations.

Unfortunately, the pressures and impacts of tourism on the environment remain difficult to quantify and assess. Reasons include the complexity of the tourist industry — tourism encompasses a wide variety of enterprises which are integrated vertically and interact horizontally with several other sectors such as transport and energy — and the lack of updated and comparable statistics.

7.4.2 Policy progress since Kiev

Since Kiev, important progress has been made in promoting the 'sustainable development of tourism' (SDT).

Internationally, the role of tourism with regard to biological resources and the conservation of biodiversity has been addressed since 2004 within the Convention on Biological Diversity. This recognition, and other earlier international and UN statements (Box 7.4.1), provide a well-defined strategic framework for SDT, the need for which is now widely recognised.

At the regional level, there are several initiatives to foster SDT that are showing some progress:

- Mediterranean area: within the Mediterranean Action Plan context, a Mediterranean Strategy for Sustainable Development was adopted in 2005. One of its seven priority areas is the promotion of sustainable tourism through, for example, the supply of sustainable tourist facilities and improved governance.
- The Alps: within the framework of implementation of the Alpine Convention and its Protocols. The multi-annual work programme 2005–2010 identifies tourism as one of its key issues and sets specific measures and priorities for it.
- Baltic area: Baltic 21 Tourism, as part of Agenda 21 for the Baltic Sea Region. A wide networking project (Agora ([1])) focused on sustainable tourism initiatives, involving ten countries around the Baltic Sea, was launched in May 2005. By the end of 2006, Agora had created an extensive database of SDT projects, developed some theoretical work on tools and methodologies, and implemented pilot projects around the region.
- The Carpathians: the Framework Convention on the Protection and Sustainable Development of the Carpathians was adopted in 2003. This new regional agreement directly addresses sustainable tourism in Article 9 of the Convention. The first Conference of the Parties to the Convention in December 2006 approved the 2006–2008

([1]) Agora home page: http://www.yepat.uni-greifswald.de/agora/.

Box 7.4.1 Main international acknowledgments of sustainable development of tourism

- UN Commission on Sustainable Development (CSD), seventh session, 1999. Decision 7/3 on tourism and sustainable development.
- UNWTO Global Code of Ethics for Tourism, 1999. A comprehensive set of principles aimed at guiding relevant stakeholders in tourism development.
- Québec Declaration on Ecotourism, 2002. Emphasising the role of ecotourism in contributing to the sustainability of the tourism industry.
- World Summit on Sustainable Development, Johannesburg, 2002. Article 43 of the Plan of Implementation, on the promotion of sustainable tourism and necessary actions.
- Sustainable Tourism — Eliminating Poverty (ST-EP) Initiative, 2002. On the implementation of small-sized tourism projects in developing countries, aimed at creating and widely distributing economic resources.
- Convention on Biological Diversity (CBD), COP 7 Decision VII/14 on 'Biological diversity and tourism', 2004. Also adopting some voluntary guidelines 'to manage tourism activities in an ecological, economic and socially sustainable manner'.
- A Task Force on Sustainable Tourism was set up in 2006 within the framework of the Marrakech Process — an international initiative to foster the implementation of Chapter III of the Johannesburg Plan of Implementation. Its main objective is the implementation of actions promoting sustainable tourism and focusing on three main topics: the interaction of tourism with climate change, biodiversity, and protection of cultural and natural heritage.

work programme, in which several actions supporting sustainable tourism development are foreseen. A first assessment report will be released in 2007 ([2]).

With regard to protected areas, the Federation of Nature and National Parks of Europe (EUROPARC), with its pan-European network, has since 2001 been developing a European Charter for Sustainable Tourism in Protected Areas. Signatories to the Charter are committed to implementing sustainable tourism strategies within the protected areas. At the end of 2006, 36 parks, all located in WCE, had adopted the Charter.

According to the provisions of the Treaty on European Union, the EU has no direct competence for tourism policy. However, a number of Community policies and programmes either refer explicitly to tourism or influence the tourism sector.

A vision for European tourism was first set by the European Council in its Resolution of 21 May 2002. In November 2003, the Commission released a Communication on 'Basic orientations for the sustainability of European tourism' (European Commission, 2003). More significantly and recently, in March 2006, a further Commission Communication 'A renewed EU Tourism Policy: towards a stronger partnership for European Tourism' (European Commission, 2006a) suggested a framework for the development of the sector, also specifying supporting actions to promote its sustainability. Within this communication, tourism is considered as an important sector for tackling both growth and employment, the two main priorities set by the renewed Lisbon Strategy. A further key step in the process for promoting sustainable tourism will be the preparation of an Agenda 21 for European Tourism, to be finalised by 2007, broadly based on the reporting activity of the Tourism Sustainability Group launched in 2004.

Tourism is also closely linked to the preservation of biodiversity and thus plays a role in the renewed sustainable development strategy of the EU. The targets set by the Commission in its Communication on halting the loss of biodiversity

([2]) Carpathians Environment Outlook (KEO): http://www.grid.unep.ch/activities/assessment/KEO/KEO_RC.php.

by 2010 (European Commission, 2006b) include 'significant increase in proportion of tourism which is ecologically sustainable by 2010 and again by 2013'. Tourism remains a key sector for the maritime industry and thus a source of pressure on marine and coastal environments, as extensively highlighted in the recently adopted Green Paper on a Future Maritime Policy for the European Union (European Commission, 2006c). Tourism is also very relevant to the revised Bathing Water Directive adopted in 2006 and to the principles of Integrated Coastal Zone Management (ICZM) (see Chapter 5, Marine and coastal environment).

While the absence of a tourism strategy at the regional level in EECCA ([3]) and SEE is evident, there are indications that tourism development is actually guided in these regions, as in several other European countries, through national policies and strategies, targeting either the whole industry or some of its segments. Bulgaria, for example, has had a national ecotourism strategy since 2002 (UNWTO, 2006a); in 2005 the Slovak Republic adopted a tourism development strategy, widely underlying the concept of sustainability (until 2013); a State Programme for the Development of Tourism covering 2004–2009 was adopted in Tajikistan in December 2003 (UNECE, 2004); and a Sustainable Tourism Development Strategy 2003–2015 was approved in the Republic of Moldova in September 2003. In SEE, coastal zone management plans focusing on urbanisation pressures driven by houses and tourism infrastructure, as well as by nautical activities, are under development; UNDP has reported on the latest developments in tourism policies in the Balkans (UNDP, 2007).

At the policy level, progress in creating the necessary institutional and regulatory frameworks has been slow, although recent developments show that a positive change has occurred or is occurring as a result of conventions, framework agreements or, in the EU, preparation of an Agenda 21 for Tourism. But implementation is still lagging, being based only on the voluntary use by tourist enterprises/industry of some of the practical instruments available to partially monitor or control the impact of tourism on the environment (auditing schemes, certification). No compulsory targets for the tourist industry have been set.

7.4.3 The growth of the tourist industry

Economic importance of tourism

Tourism remains mainly a locally shaped activity, substantial at some destinations and marginal at others. At the pan-European level, the travel and tourism (T&T) industry contributes 3.37 % of total employment and 3.78 % of GDP (data extracted and elaborated from WTTC, 2006); the share of T&T GDP in total GDP may reach over 10 % in some countries (Table 7.4.1).

Table 7.4.1 Share of T&T GDP in total GDP

Country	T&T GDP share
Cyprus, Malta	Over 10 %
Croatia, Serbia and Montenegro	8–10 %
Austria, Greece, Iceland, Spain, Portugal, Switzerland	6–8 %
Bulgaria, France, Italy, Turkey	4–6 %
Albania, Bosnia and Herzegovina, Denmark, Estonia, Finland, Hungary, Netherlands, Slovenia, United Kingdom	3–4 %
All other countries	Below 3 %

Note: 2005 values. No data for Andorra, Monaco, San Marino, Liechtenstein, Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan and the Republic of Moldova.

Source: WTTC, 2006.

([3]) The EECCA Environment Strategy does not address tourism, only briefly mentioning this sector with regard to the integration of energy considerations.

Figure 7.4.1 shows the percentage contribution of T&T-generated GDP in total GDP in the three European country groupings. Tourism is still a marginal economic activity in EECCA ([4]), while it has grown in importance in SEE. On average, reliance on tourism in SEE is higher than in WCE, where tourism-generated GDP has on average decreased since the late 1990s.

In terms of absolute values, the most significant growth in GDP generated by the T&T industry since 2000 (almost 35 %) has been in SEE, with the highest increase in Serbia and Montenegro; the enlargement of the EU by ten new Member States in May 2004 generally increased the T&T GDP in these countries. EECCA also showed an increase since 2000 while WCE recorded a slight overall decrease (5.17 %), driven mainly by reductions in T&T-generated GDP in France, Italy, Germany and the United Kingdom.

Increasing international arrivals

In terms of volumes, measured by the number of international tourist arrivals (inbound tourism), the tourist industry at the global level continues to grow. Asia and the Pacific, followed by Africa, recorded the highest growth from 2000 to 2005, with annual growth rates of 7.1 % and 5.4 %, respectively (UNWTO, 2006c). Over the same period, growth has also occurred at the pan-European level, but at a different rate in the three main regions. WCE remains the main tourist destination, with more than 346 million international tourist arrivals in 2005, 43 % of the world total of 806 million. However, in percentage terms, the most significant increase has been in SEE and EECCA, in particular over the period 2000–2005 (Figure 7.4.2).

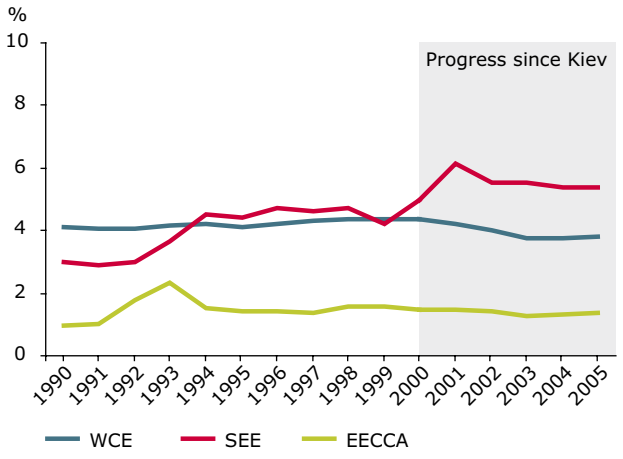
There have been slight changes in the number of arrivals in some destinations in recent years. Within WCE, arrivals at traditional destinations in the Mediterranean area such as Italy, Malta and to

The travel and tourism industry includes all products and services delivered to visitors, such as transport, accommodation, food and beverages, entertainment, recreation, etc. (WTTC).

Travel and tourism industry GDP and employment refer to traditional travel and tourism providers such as airlines, hotels, restaurants, car rental, etc. (WTTC).

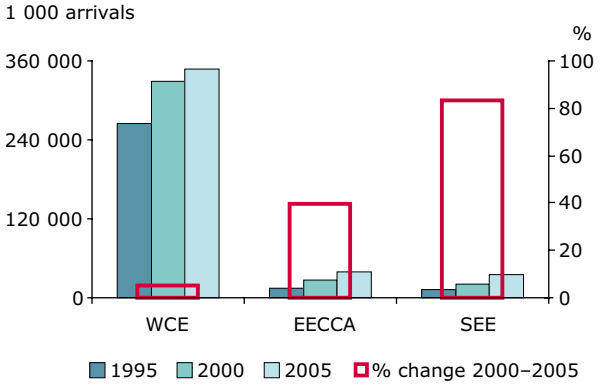
Visitors: any traveller engaged in tourism. Visitors can be distinguished as same-day visitors or tourists. A tourist is an overnight visitor, i.e. a visitor who stays at least one night in a collective or private accommodation in the place visited (UNWTO).

Figure 7.4.1 Travel and tourism GDP as percentage of national GDP



Source: WTTC, 2006; World Bank, 2006.

Figure 7.4.2 International tourist arrivals and percentage change



Source: UNWTO, 2006.

([4]) However, values are based on data from only three countries (the Russian Federation, Ukraine and Belarus).

a lesser extent France, show a small decline since 2000 (but regular growth is recorded in Spain), while several northern countries (Norway, Finland, Sweden, Iceland, the United Kingdom and Ireland) experienced increases. The highest increases in WCE were recorded in Latvia, Lithuania and Estonia. In SEE, arrivals in Turkey have more than doubled since 2000; significant growth was also recorded in Serbia and Montenegro, Bulgaria and Romania. Montenegro in particular, an independent republic since June 2006, is projected to become one of the fastest-growing travel and tourism destinations in the world, with an annualised real growth of 9 % up to 2014 in terms of T&T industry GDP, and 4.5 % in terms of employment (WTTC, 2004).

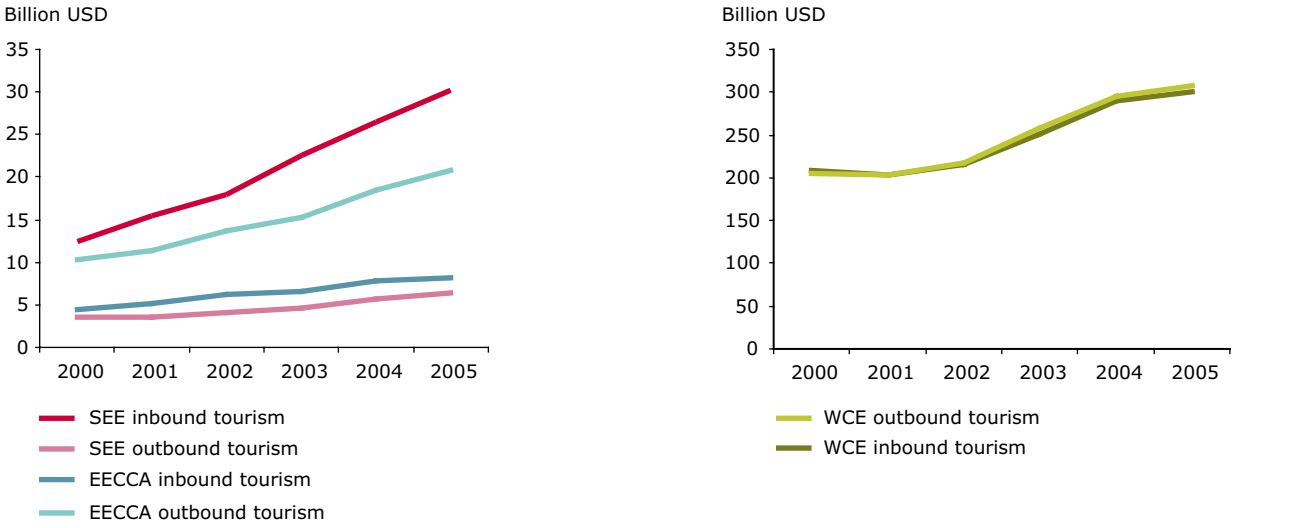
The emergence of new destinations is thus a well-confirmed trend both in WCE and in SEE. Within EECCA, substantial growth in arrivals was recorded in Kyrgyzstan, Armenia and Ukraine, the last of which had more than 15 million international arrivals in 2004, comparable to Turkey. It may reasonably be expected that these potential new destinations will become more attractive on the international market if they can successfully deal with the issues of stability and security. Reduction in the complexity of visa, border and customs procedures could also facilitate travelling to these countries.

Generally, domestic tourism is still important in WCE. In France, Germany and the United Kingdom, for example, there are far more overnight stays by residents of the country than by inbound tourists. Other countries, such as Austria, Cyprus, Greece, Ireland and Spain, rely more on inbound tourism. In SEE, inbound tourism, in terms of nights spent, is more than double compared to domestic tourism. Tourism still plays only a minor role in EECCA, especially in terms of international tourism, with domestic tourism prevailing.

Tourism expenditure is on the rise

EECCA countries show the lowest levels of inbound tourism expenditure, but their outbound tourism expenditure is much higher than in SEE, and increasing more rapidly: outbound tourism expenditure from EECCA countries doubled between 2000 and 2005 (Figure 7.4.3 left). The Russian Federation is the major contributor, increasing from USD 8.85 billion in 2000 to USD 17.8 billion in 2005: it is a remarkable driver of the growth of international tourism expenditure at the global level, and is expected to remain so, both in volume and in percentage growth (UNWTO, 2006b). Within the pan-European region, outbound tourism from the Russian Federation in 2005 was mainly to WCE (57 % of the total); destinations in other EECCA countries and SEE attracted 22 % and 21 % respectively of the

Figure 7.4.3 Tourism inbound and outbound expenditure — EECCA and SEE (left) and WCE (right)



Source: UNWTO, 2006.

total of Russian tourists. Inbound and outbound expenditures in WCE are ten times higher than in EECCA and SEE and show a similar growth pattern (Figure 7.4.3 right).

The growth of the tourism industry in Europe is expected to continue, but at an annual rate of 3 % (over the period 1995–2020), which is below the global growth rate of 4.1 %; over the same period, East Asia and the Pacific, South Asia, the Middle East and Africa are projected to have annual growth rates of over 5 %.

Preliminary figures for Europe indicate an increase of 17 million in international tourist arrivals in 2006, leading to 458 million arrivals, about 54 % of the world total. UNWTO projects that Europe will still be the top receiving region in 2020 with 717 million arrivals, or 45.9 % of the global market, with new destinations attracting more and more visitors (UNWTO, 2006c). The recent economic growth of EU 10, SEE and EECCA countries (see Chapter 1, Europe's environment in an age of transition) will continue to generate increasing tourist expenditure (see also Annex 3, International tourist arrivals indicator).

Inbound tourism: non-residents received by a destination country from the point of view of that destination.

Outbound tourism: residents travelling to another country from the country of origin.

Domestic tourism: residents of a given country travelling within that country.

Source: UNWTO, 2006.

7.4.4 Main drivers of environmental impacts and sensitive areas

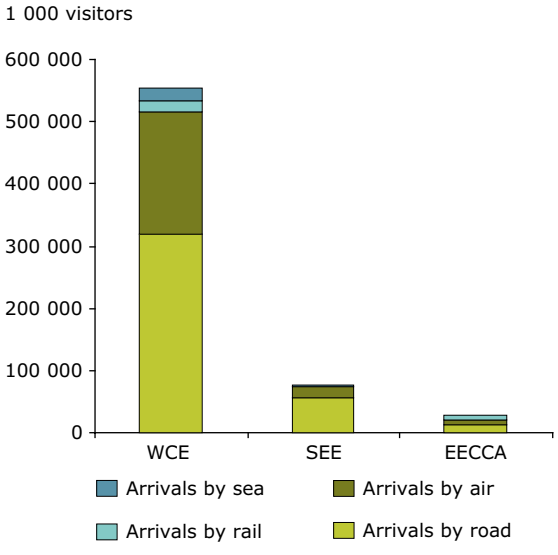
Pressure on the environment from tourism is closely linked to some of the characteristics of the industry. Firstly, access to the destination is crucial, making the development of transport and its related infrastructure an important precondition for the development of tourist activities. Secondly, tourism depends strongly on natural resources (which often determine the attractiveness of the destinations) and has to provide a wide range of services and facilities to visitors in order to access these resources. The intensity of these pressures also depends on consumer behaviour (demand side).

Tourist mobility: harmful practices still prevail

The most environmentally damaging modes, car and air, are still the preferred ways of travelling to destinations (EEA, 2003). Road travel is by far the dominant mode at the pan-European level, closely followed by air in WCE and SEE. Rail is still frequently used in EECCA (Figure 7.4.4).

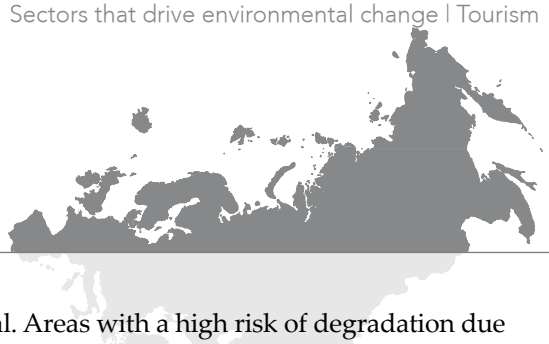
Access to tourist destinations needs to be managed on a wider scale than the individual locations, including at the trans-European level. For example, deregulation of the air transport system has widely encouraged the use of low-cost airlines, which in turn have sustained the growth of air transport and contributed to increasing the average distance travelled to a destination.

Figure 7.4.4 Arrivals of visitors by type of entrance



Note: Reference year is 2005 (2004 for some countries).

Source: UNWTO, 2006.



According to a recent market update (EUROCONTROL, 2006) covering 30 countries at the pan-European level, 16.3 % of all flights by May 2006 were by low-cost airlines. There are 50 low-cost carriers operating out of 22 countries. The United Kingdom is the biggest market with more than 32 % of flights operated by low-cost companies, followed by Ireland; traditional destinations such as Spain, Italy and France have market shares ranging between 10 and 20 %. There is no information on the total number of passengers carried by low-cost flights, but the 11 member airlines of the European Low Fares Association reported 106 million passengers for 2006, about 15 % of total air-transported passengers in 2005 to, from and within the EU-25 (Eurostat, 2007).

Marketing strategies, thus, do not always encourage environmentally sound behaviour, and their effects need to be counteracted by appropriate measures. The example of low-cost carriers is self-evident. Taking into account the increasing contribution of aviation to global climate change, the Commission has recently proposed legislation to include the aviation sector in the EU Emissions Trading Scheme (ETS). According to the Commission, this will not significantly affect tourism, but will generally affect the growth in demand which will inevitably have some effect on tourism, since it is expected that compliance costs will be passed on to passengers (European Commission, 2006d).

Other policy areas that interact with tourism, such as transport, energy and marine, remain key to tourism development. There is therefore a clear need to rationalise measures that affect tourism through better regulations and policy coordination. Both these requirements are acknowledged in the recent Communication of the Commission on a renewed European tourism policy (European Commission, 2006a).

Coasts, islands and mountains are still sensitive to current tourism development patterns

The tourism industry is often fragmented and locally shaped. Pressures can range from the local to the regional. Areas with a high risk of degradation due to the development of the tourism industry are often located in the most fragile environments such as islands, coasts and mountains. Environmental impacts range from land take to habitat fragmentation and biodiversity loss, over use of water and energy, and the need for additional waste and wastewater disposal facilities. Pressure on areas surrounding harbours is also common (Box 7.4.2).

In terms of water consumption, it is well known that tourists consume more than residents. In Majorca, for example, UNEP reports daily average water consumption of 440 litres by tourists, compared with 250 by residents in urban areas and 140 by residents in rural areas (UNEP, 2004). A recent benchmarking exercise for accommodation establishments (Hamele H., Eckardt S., 2006), based on data collected from a few hundred businesses in WCE ([5]), has calculated an average water consumption per overnight stay in a hotel of 394 litres, the benchmarking value being 213 litres ([6]); water consumption in a campsite was 174 litres per overnight stay, against a benchmarking value of 96 litres. Similar gaps between average and benchmarking values were recorded for energy consumption (77.2 kW/h per overnight stay in a hotel against a benchmark of 30.6) showing that lower consumption and thus lower pressures on local resources may be possible (see also Section 2.3, Inland waters).

Since the seaside is the favourite destination for most Europeans, coastal areas and islands are subject to significant pressures. Land take for tourism-related buildings and infrastructure (e.g. hotels, second homes, apartments, leisure and commercial activities and marinas) has historically occurred along the French Riviera and the Spanish coast (Costa del Sol and Costa Brava), sustained by the growth of a European middle class, but it has been occurring as a development model in other coastal areas such as Brittany, the south Baltic and around the Black Sea (EEA, 2006). Pressures of tourism on the coastlines are addressed in Chapter 5, especially in terms of land take by housing and Integrated Coastal Zone

([5]) Including data collected through two European cofinanced projects on monitoring, benchmarking and environmental management in tourism businesses: TourBench and SUTOUR.
([6]) Benchmarking values are defined as the average consumption of the 25 % best-performing businesses in terms of consumption.

Box 7.4.2 A new anchorage zone in Dubrovnik to control the impact of large cruisers

Ships have anchored in the channel in front of Lokrum and the Old Town of Dubrovnik since very ancient times. The size and numbers of vessels have changed over the years, but most recently the anchorage has been dominated by mega-cruisers, vastly bigger than all the other types of passenger cruiser (see photo).

These mega-cruisers have high-powered propulsion engines, generally resulting in more noise and air pollution. They also have a larger number of passengers and stay on anchorage for shorter periods, i.e. 5–10 hours. Because of the limited capacity of the city harbour, difficulties arise during the transfer of passengers from the cruisers to the city, and both the city and the surroundings are subject to concentrated pressures.

Photo: A cruiser anchored in front of Dubrovnik © Neven Jerković

Most cruisers anchor during the summer months: 19 % in July, 28 % in August and 21 % in September. The simultaneous anchoring of more than two ships, large cruisers in particular, creates a significant burden on the existing anchorage area. The 2005 records show that three ships anchored simultaneously 12 times and four ships anchored simultaneously once in the high season. The total number of passengers on anchorage in the maritime zone of the city in the peak season ranges from about four to five thousand.

As well as being a highly valuable coastal zone, the Old Town of Dubrovnik is protected as a UNESCO World Heritage site. These circumstances led to the need to evaluate and consider relocating the present anchorage area, which has now been moved 200 m further from the city, so that the larger cruisers cannot be seen from it. This has significantly reduced the impact on the environment and the feeling of overcrowding near the town.

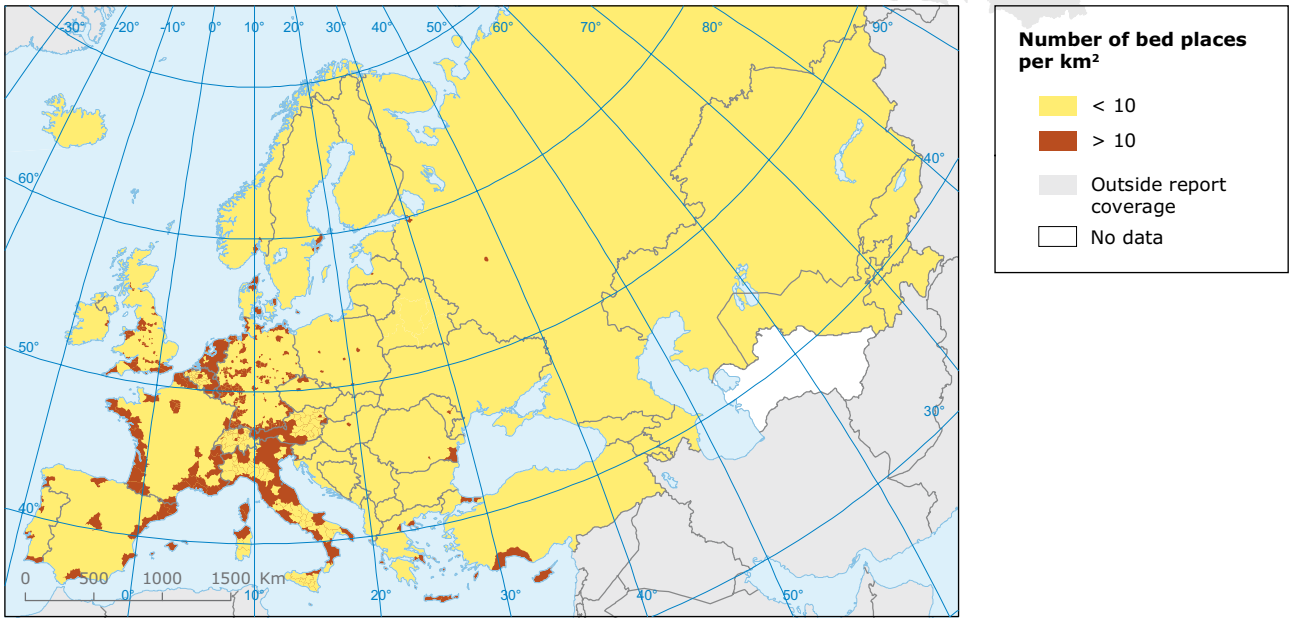
Source: University of Dubrovnik and Croatian Environment Agency, 2007.

Management considerations, while here the focus is on tourism intensity and density.

Coastal regions often account for the highest number of bed places; the number per inhabitant (tourism intensity, usually expressed per 100 inhabitants) is an indicator of accommodation capacity and highlights potential socio-economic pressures. In the EU-25, within the ten highest values are six island/coastal regions (COR, 2006): Balearic Islands, Spain (52.5 bed places per 100 inhabitants), Notio Aigaio, Greece (49), Corsica, France (42.3), Ionia Nisia, Greece (34.6), Algarve, Portugal (33.3) and Zeeland, the Netherlands (30.1). The other high values are in Alpine regions, such as Valle d'Aosta, Italy (44.2) and Tirol, Austria (38.4). Tourism density, on the other hand, defined as the number of tourist bed places per km², provides an indicator for the supply side of the tourism industry, and may help identify environmental pressures. The most-visited regions, which include the mass destinations, have high values of tourism density. They usually include the best known and most developed destinations, the main cities, small islands and coastal areas (COR, 2006). Map 7.4.1 shows evidence of the higher concentration of bed places in sub-regional and regional areas along the coasts, as well as in the Alps.

Tourism in mountain environments may also impact the landscape and threaten biodiversity. Box 7.4.3 provides an example of changes in landscapes and habitat fragmentation as well as decreases in the species richness of birds. Higher temperatures during the winter season can lead to human interventions. Among the most common

Map 7.4.1 Number of bed places per km² in the pan-European region



Note: Data are at the NUTS 3 level for most of the WCE countries, and Romania, Bulgaria and Turkey, at the regional or sub-regional level for the Russian Federation, Belarus, Ukraine, Georgia, the Republic of Moldova, and Kyrgyzstan, and at the national level for Andorra, Albania, Armenia, Azerbaijan, Bosnia and Herzegovina, Croatia, the Former Yugoslav Republic of Macedonia, Kazakhstan, Tajikistan, Uzbekistan, and Serbia and Montenegro. NUTS is the Nomenclature of Territorial Units in the EU to which Eurostat data refer.

Sources: Eurostat, 2006b; 2006c; UNWTO, 2006; National sources, 2007.

measures for making or maintaining snow cover are artificial snowmaking, grooming of ski slopes and repositioning of ski areas at higher altitudes; the use of chemical fertiliser (ammonium nitrate) is also common for the preparation of ski runs, especially during competition events. All these interventions have environmental impacts: snowmaking increases water and energy consumption, grooming reduces slope stability, and the repositioning of ski operations disturbs ecosystems (OECD, 2007). The OECD study also estimates that following recent climate warming events, a 1 °C increase in temperature will reduce the number of naturally reliable snow areas in the Alps from 609 now to 500, a 2 °C increase to 404, and a 4 °C increase to 202. Under these different scenarios, existing methods for maintaining snow cover will have to be intensified and the use of alternatives not yet specifically regulated, such as chemicals for ski runs, increased.

Main characteristics of tourism demand

Tourist behaviour influences the level of environmental impact of the tourism industry. This is particularly evident in the choice of transport mode to reach destinations. The most common and general trends of tourist behaviour in the EU-25 include: domestic trips are generally preferred to trips abroad; shorter trips are preferred to long ones; travelling is usually concentrated over specific periods of the year, mainly between July and September (Eurostat, 2006a). This seasonality, with large numbers of visitors concentrated over short periods of time (peaks), often causes stress at destinations, for example in terms of water shortages, or overwhelms the carrying capacity of destinations.

Tourist preferences, not necessarily driven by considerations of price, also influence the type and quality of what is on offer. Growing interest in natural and cultural heritage sites, for example, has led to the development of market segments such as natural tourism, agro-tourism, religious and cultural tourism. Development of ecotourism strategies is particularly evident in new emerging destinations where a balance between generation

Box 7.4.3 What is behind a ski resort, besides fun

The case study of Pilsko Mt area in the Carpathians (UNEP, 2006) shows how the structural patterns of local landscapes, characterised by extensive pastures and forests, may change to a more fragmented one, consisting of small patches of meadows and forests, following the establishment of ski resorts and related facilities. Such changes in landscape unavoidably lead to changes in species composition. Where the process is particularly advanced, as in some areas in the West Carpathians, species extinction may also occur. Deforestation has also been observed in the western part of Beskidy Mountains in the Czech Republic, Poland and the Slovak Republic, and mass summer tourism identified as one of the underpinning causes (UNEP, 2006).

The impact of ski resorts is a problem shared by the Alpine environment (the photo shows the preparation of a ski run on Monte Tamai, Friuli Venezia Giulia, Italy). Recent research (Rolando A. *et al.*, 2007) in the western Italian Alps has reported a decrease in bird species richness and diversity as well as in the abundance of grassland species on ski runs, compared with adjacent areas and natural areas not affected by ski-related development. The 2005–2010 multi-annual work programme of the Alpine Convention includes plans to extend the testing of the trials of 'Ski resort auditing — Guiding principles for ecological revaluation' to more countries and to define a set of environmentally sound requirements for the operation of ski resorts (Permanent Secretariat of the Alpine Convention, 2005).

Photo: Mt. Tamai, Friuli Venezia Giulia, Italy © Marco Lepre

of income from tourism, environmental protection and preservation of the cultural heritage is targeted. An example is presented in Box 7.4.4. Several similar initiatives promoting rural or green tourism exist in other EECCA countries such as the Republic of Moldova ([7]), Armenia ([8]) and Ukraine ([9]).

Finally, structural changes in the population, for example population ageing in WCE, and the emergence of stronger economies in SEE and EECCA, are likely to influence the development of the industry as a result of increasing expenditure potential, and to encourage the growth of different categories of travellers other than those, for example, mobilised by low-cost carriers. See also Chapter 6 for considerations of household expenditure trends and tourism.

7.4.5 Instruments and monitoring tools for tourism

The tools available for fostering the sustainable development of tourism at the national and local level include economic instruments such as ecotaxes and tourism-related taxes in general, and regulatory and planning tools (environmental impact assessments, zoning and land-use laws, building permits). Results so far have been mixed, with some failures and some success stories. An ecotax on tourist stays in hotels in the Balearic Islands, for example, was established in 2002 by the government and withdrawn the following year by the newly elected administration, after a vigorous public and political debate. In France, visitors have long been asked to pay a daily tourism tax, the amount of which is set by the local authorities and

([7]) UNDP project 'Sustainable Tourism Project': http://www.undp.md/focus_areas/projects/stories/tourism.shtml.
([8]) http://www.ecotourismarmenia.com/.
([9]) http://www.greentour.com.ua/en/union/.

Box 7.4.4 The ecotourism experience in Kyrgyzstan

Kyrgyzstan has high potential for tourism with its unique natural beauties, and is also part of the network of routes of the Great Silk Road. International tourism development started under the initiative of private tour operators and showed high annual growth rates (around 10–25 %). A community-based pilot action for the development of sustainable forms of tourism was launched in 2000 to enable local communities to benefit from this new income-generating activity. The project, supported by the Helvetas Swiss Association for International Cooperation, aimed to distribute some of the earnings generated by the tourism market to rural areas and people, without competing with tour operators but cooperating with them by means of framework agreements. The important feature of this initiative is that it is oriented towards the development of a sustainable ecotourism model.

The community-based tourism groups created within the project were formally organised into the Kyrgyz Community Based Tourism Association (KCBTA) in January 2003. An accreditation system was introduced in 2003/2004 covering accommodation (grouped according to quality), and guides and drivers. Codes of conduct for ecotourism organisations were also developed, based on nature and culture conservation principles. During the period 2000–2006, the number of tourists increased from 718 to 5 812. At the end of 2006 the association had 17 members involving more than 400 families. In 2004, total income generated for its members was more than USD 94 000 (an increase of 916 % compared to 2000), estimated to represent about 30–40 % of the family incomes.

Sources: Community Based Tourism Development in Kyrgyzstan, 2006; Development of rural regions of Kyrgyzstan through investments into community based tourism, 2005; KCBTA home page and yearly report 2006 http://www.cbtkyrgyzstan.kg/en/home_en.

Photo: Sary-Chelek Lake, Kyrgyzstan © Kyrgyz Community Based Tourism Association

varies from a few cents to more than EUR 1. A recent attempt related to land-use regulation is reported in the island of Sardinia, Italy, where a tax on second homes located within three kilometres of the coast and used for tourism purposes has been established since 2006; the tax ranges from EUR 900 to over EUR 3 000 per year, depending on the size of the house.

There has been some overall growth in operator-led networking and tourism initiatives, compilation of good practices and voluntary initiatives, and certification schemes such as eco-labelling, but the numbers remain small compared with the large number of enterprises in the tourism sector. Several of the certification schemes have a limited distribution and often overlap with each other; they therefore do not get enough visibility to become an effective marketing tool for the adopting enterprise. The most significant initiatives at the European and international level, specific to the tourism industry, are listed in Box 7.4.5. Although the various environmental schemes are generally not comparable with each other, participation by tourism enterprises in one or another remains an indicator of goodwill and commitment to the sustainable use of resources.

Progress has also been made in the sharing of information on sustainable patterns, the DestiNet portal and the visiteurope.com portal being two major examples of initiatives at the European

A Tourism Satellite Account is a statistical accountancy framework in the field of tourism; it measures goods and services according to international standard concepts, classifications and definitions which allow valid comparisons from country to country in a consistent manner.

Source: European Commission, 2007.

Box 7.4.5 Some acknowledged ecolabel schemes for tourism and environmental management systems and standards

The European Ecolabel for tourist accommodation services and campsite services. Established by the European Commission, this is certified by an independent organisation and is valid throughout Europe. It distinguishes enterprises that meet a set of mandatory criteria related to their environmental performance.

Blue Flag Initiative. Ecolabel for beaches and marinas meeting criteria related to water quality, environmental education and information, environmental management, and safety. In 2006 more than 3 200 beaches and marinas were awarded the Blue Flag. It encompasses 36 countries, of which 26 belong to the pan-European region.

Green Globe Label. Worldwide benchmarking and certification programme for the travel and tourism industry.

EMAS (Eco-Management and Audit Scheme). An EU voluntary instrument acknowledging organisations that work for the improvement of their environmental performance. It is not specific to the tourism industry.

ISO. Voluntary international standards developed on the basis of consensus among providers, consumers, governments and other relevant stakeholders. The ISO 14 000 series of environmental management standards may also apply to tourism and its related services.

level, both promoting the spread of information on sustainable tourism.

Several initiatives on indicators, designed to monitor the environmental and social impacts of tourism development, have been finalised in recent years, from the global (UNWTO, 2004, Indicators of Sustainable Development for Tourism Destinations) to the regional (Eurostat, 2006) and local level.

However, data availability remains crucial. At the EU level, the focus is on the update of Directive 95/57/EC 'on the collection of statistical information in the field of tourism' (European Council, 1995). This directive shows shortcomings in the definition of the supply side of the tourism industry and in the list of items for data collection, all factors that call for its review, also important in the light of the enlargement of the Community (Leidner R., 2006). Since 2002, the Commission has also promoted the establishment of Tourism Satellite Accounts (TSA) in the EU Member States through grant programmes but, with a few exceptions, this has not led to permanent results.