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Household consumption and the environment

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1. 'Consumption and the environment in Europe — trends and futures', published by the Danish EPA (Laurie Michaelis, University of Oxford, and Sylvia Lorek, SERI, 2004).
2. 'Driving forces behind household consumption' (Michael van Lieshout and Nicole Rijkens-Klomp, ICIS/Pantopicon, and Peter Kristensen, NERI, 2004).
3. 'Household consumption of food and drinks' (Peter Kristensen, 2004).
4. 'Housing' (Nicole Rijkens-Klomp and Michael van Lieshout, 2004).
5. 'Tourism' (Nicole Rijkens-Klomp, Michael van Lieshout and Bas Amelung (ICIS), 2004).
6. 'Household water use' (Peter Kristensen, 2004).
7. 'Waste and resources' (Mette Skovgaaard *et al.*, European Topic Centre on Waste and Material Flows, 2005).
8. 'Household consumption in the new Member States' (Helen Poltimäe *et al.*, Estonian Institute for Sustainable Development, SEI-Tallinn, 2005).
9. 'Uncertainty analysis related to the future of household consumption and the environment', Nicole Rijkens-Klomp and Michael van Lieshout, ICIS/Pantopicon, 2005).

Summary

Providing input for European policy-making

Renewed policy focus on sustainable consumption and production

Ten years after the Rio conference, the agreement at the 2002 World Summit on Sustainable Development in Johannesburg to develop *a framework of programmes on sustainable consumption and production* (SCP) marked a renewed global policy-focus.

Reflecting this renewed focus, SCP EU policy-making is now on the agenda. The European Council at its meeting in March 2003 agreed to 'timely elaboration at both international and EU level of the 10-year framework of programmes on SCP, on which the EU should take the lead' (European Council, 2003). In September 2004, the Commissioner for the Environment, Stavros Dimas, speaking to the European Parliament said that one of his four priorities during his term in office would be 'to find the path to more sustainable patterns of production and consumption' (European Commission, 2004a).

Millions of households in Europe are major contributors to environmental problems

In spite of the renewed policy-focus on SCP, growth in European household consumption is a major cause of increased environmental pressures. Household consumption forms an important part of the production-consumption chain as it is the consumer who makes the final choice about which goods and services s/he consumes. Although the environmental impact of each household is relatively small compared with that of production acitivities, millions of households in Europe are major contributors to environmental problems such as climate change, air pollution, water pollution, land use and waste (Organisation for Economic Co-operation and Development (OECD), 2002a).

This report analyses the environmental effects and environmental sustainability of household consumption in Europe. It builds and expands on the work done by OECD (OECD, 2002a; 2002b) and the United Nations Environment Programme (UNEP) on sustainable consumption (UNEP, 2001; 2003; 2004; 2005) and applies this analysis to Europe. The report provides substantial and analytical input to European policy processes on SCP. It also provides information and analysis for informed (conscious) consumers and citizens of EEA member countries.

Food consumption, housing, personal travel and tourism

By analysing research and reports carried out by researchers and international organisations (see for example Michaelis and Lorek, 2004; OECD, 2002a; Worldwatch Institute, 2004; and IPTS/ESTO 2005), we have identified four major consumption categories that form part of our total consumption expenditure and for which the environmental effects are either great or increasing rapidly. These are consumption of food and drink; housing; personal travel and mobility; and tourism.

Negative environmental effects of European consumption in other regions of the world

The negative environmental effects of our consumption not only occur in Europe, but also in other regions of the world, mainly as a result of resource extraction, production, processing and transportation in other regions because of the goods we consume in Europe and our personal travel and tourist activities.

We are increasingly using resources from abroad for consumption in Europe

EEA studies show that we are increasingly using resources extracted from abroad for consumption in Europe. Resource extraction in Europe has decreased, while imports of resources, especially fossil fuels and metals, have increased. In fact the environmental pressures from resource extraction in other regions of the world is increasing due to European consumption (EEA, 2005b). The total amounts of resource consumption vary considerably between countries, ranging from less than 10 tonnes per person per year in Turkey and

Romania to approximately 40 tonnes in Finland and Iceland. For the EU-25, direct material consumption amounts to 16.5 tonnes per person per year on average (EEA, 2005b).

The ecological footprint of the average citizen in EU-25 is on the increase

EEA studies show that the ecological footprint of the average resident of the EU-25 plus Switzerland was 4.9 global ha in 2002 and is on the increase. However, this average disguises great disparity between countries. Average footprints of EU citizens in 2001 included 3.8 global ha per person in Italy, 4.8 in Germany, 5.8 in France and 7.0 in Sweden (WWF, 2004). In comparison, the global average was estimated at 2.2 global ha per person. In 2002, EU-25 contained 7 % of the world's population and its consumption generated 17 % of the world's ecological footprint.

Understanding consumption behaviour

European household consumption has grown continuously alongside GDP in past decades, but has also changed in its form.

Household consumption expenditure in the EU-15 between 1990 and 2002 increased by almost one third to more than 12 000 EUR per person per year on average. Expenditure on recreation, culture and dining-out increased by 30 %, transport and communication by 33 % and health by 56 %. Household consumption expenditure by the new Member States in 2002 averaged approximately 2 400 EUR per capita — approximately one fifth of that in the EU-15 (Eurostat, 2005). Expenditure by the new Member States increased by around one third between 1995 and 2002. The share of recreation, culture and dining-out increased by more than 50 % while that of health more than doubled. Projections show a doubling of total household consumption (in terms of expenditure) in the EU-25 by 2030 (EEA, 2005f).

Understanding consumption patterns is about understanding human behaviour

Understanding changes in household consumption patterns is about understanding human behaviour — why we consume, what drives us to behave the way we do and buy specific products and services. Our patterns of consumption are not easy to map as they are shaped and re-shaped by an array of interdependent social, cultural, political and economic changes in Europe and the world.

Economic and social factors drive consumption

Economic and social factors drive household consumption. Income grows year by year, globalisation gives us access to goods from all over the world and we have recently experienced major systemic technological breakthroughs, such as the internet and mobile phones. The projected economic growth of 2.4 % per year in the EU-25 between 2000 and 2030 would be accompanied by a similar growth in consumption (EEA, 2005d).

Households are becoming smaller and are tending to use more energy and water, generating more waste per person. The average number of persons per household in the EU-15 has fallen from 2.8 in 1980 to 2.4 today. The average in the new Member States is 2.5. At the same time Europe's population is ageing and this will undoubtedly change our consumption patterns. For example, expenditure on personal travel and health is likely to increase, as is the purchase of second homes.

Needs, abilities and opportunities shape individual choice

Understanding consumption patterns also means understanding how individuals make choices. At an individual level our consumption patterns are shaped by our needs, abilities and opportunities. Consumption patterns are also shaped by a desire to identify with groups that define themselves in

a variety of ways. An important factor that shapes our opportunity to consume is the goods and services supplied by the producers and how these are advertised. Recently, we have seen signs that advertising and targeted marketing have become more advanced — for example through product placement in films — perhaps influencing both our needs and opportunities more than we are aware.

Food and drink consumption

Food and drink consumption is the first major consumption category analysed in this report (Chapter 3).

Food and drink: the consumer's choice matters

The share of total European household expenditure on food and drink has declined with rising incomes. Currently, it ranges from 10 % to 35 % of total household consumption expenditure in European countries, with the smallest shares in the EU-15 Member States and larger shares in new Member States. The share of European citizens' expenditure on food is projected to continue decreasing

The most significant environmental impact related to food consumption comes from food production and processing

About one third of households' total environmental impact can be related to food and drink consumption (Danish EPA, 2002). The most significant environmental impact related to food consumption comes from food production and processing in Europe and in other regions of the world. These include the effect of emissions from livestock, agriculture and industry on water, soil and air; overuse of fish resources and increased transport of food; and waste from production processes, in particular organic and packaging waste. Packaging waste in the EU-15 continues to grow and amounts to more than 160 kg per person per year. More than two thirds of packaging waste is related to the consumption of food (INCPEN, 2001).

Direct negative environmental effects of food and drink consumption (from travelling to the shops, storing, cooking and generating waste) are fewer than the indirect effects but these are generally on the increase.

Sustainable food-consumption policy can be seen as part of a life-cycle strategy that addresses environmental effects at different points of the food chain. Regulatory, economic, technology-supporting and information action can be used to influence production and consumption patterns.

Labelling is an effective example of a policy measure

Labelling of environment-friendly food products, such as organic food, is an effective example of a policy measure that helps consumers to take informed decisions about what to buy — and thereby should enable more sustainable food consumption.

Housing

Housing is the second major consumption category analysed in this report (Chapter 4). It represents approximately 25 % of total consumption expenditure in Europe and includes the consumption of energy and water, and the generation of waste.

Housing: from basic shelter to multiple electronic appliances

Many homes are becoming more luxurious with multiple electronic appliances. We build larger homes for fewer people and use more energy in our homes, both for heating and electricity. Space heating is still by far the largest household energy end-use in the EU (70 %). The total amount of energy used for space heating continues to grow, due mainly to the increase in the number of households and the size of the average dwelling. (Enerdata, 2004).

Households contribute to high levels of emissions of greenhouse gases

We also buy increasing numbers of TVs, DVDs, PCs, laptops, mobile phones and stereos. Already by the end of 2001 the number of mobile phones had reached 73 per 100 people in the EU-15, compared with an average of almost 50 in the new Member States (United Nations Development Programme (UNDP), 2004). Due to changes in fashion, reduced durability of goods and low prices (compared with the cost of repairs), we replace our electronic and communications tools and household appliances (washing machines, dishwashers, ovens, microwaves, refrigerators, freezers and air-conditioners) more often. As a result of increased energy use for heating and appliances, and even though the energy and resource-efficiency of each appliance is improving, households are contributing to high levels of greenhouse gas emissions, and generating increasing amounts of waste. In fact households' shares of total energy consumption has increased in the past ten years in almost all the EU-15 countries and in some new Member States. Households contributed 10 % of CO_2 emissions in the EU-15 in 2002. A shift to renewable energy has balanced the increase in energy use and therefore CO_2 emissions from households remained stable between 1990 and 2002, only fluctuating with outdoor temperatures in winter (EEA, 2004d).

EEA projections show a continuing increase in the various waste streams from housing activities

EEA projections show a continuing increase in the various waste streams from housing activities, including municipal, construction and demolition, packaging and electronic waste. However, all waste streams are expected to increase slightly more slowly than GDP, which represents a slight relative decoupling of waste amounts from GDP growth (EEA, 2005f).

Water use per person in households decreased

In contrast to energy use and waste generation, household water use per person has decreased in all regions of Europe in the past decade. Domestic water use in the northern EU-15 and EFTA countries is expected to stabilise and then slowly decrease (by 18 % between 2000 and 2030). In the southern EU-15 countries domestic water use is projected to increase slightly and then stabilise. Projections for the new Member States are uncertain, but domestic water use could increase by as much as 74 % by 2030 (EEA, 2005f).

Studies of policy effectiveness (see for example EEA, 2005a; OECD, 2001a) show that a mix of legal, market-based, information, educational and other tools can reduce the environmental impact of consumption related to housing. Options for promoting more efficient and environment-friendly technologies are of particular importance.

The EU regulation on energy labelling has effectively shifted consumer buying behaviour towards the purchase of more energy and water-efficient large household appliances.

Water pricing is an example of an effective measure

The use of water pricing to make the price of water reflect its true cost is an example of a measure that has effectively reduced water consumption in households in some European countries.

Personal travel and mobility

Personal travel and mobility is the third major consumption category analysed in this report (Chapter 5).

Personal travel and mobility: moving faster, further and more often

Personal travel by European citizens is mainly for commuting to and from work, school and leisure activities, and for shopping or visiting family or friends. The share of transport in household expenditure in Europe has remained more or less constant over time (14 %), but varies between countries, for example from almost 15 % in France to less than 8 % in Estonia (Eurostat, 2005).

Net increases of about 20 % in greenhouse gas emissions from transport over the past decade

In the period 1995 to 2002, and looking at the EU-25 as a whole, a slight relative decoupling between the growth of passenger transport and the growth of economy can be observed: passenger transport demand increased by some 15 %, while GDP (in constant prices) increased by almost 18 % (Eurostat, 2005). Cars have generally become more energy-efficient but the growth in transport demand and the increased use of heavy and relatively fuel-inefficient cars has outweighed these improvements. This has resulted in a net increase of about 20 % in greenhouse gas emissions from transport over the past decade (EEA, 2004). The growing trend to use high fuel-consuming sport utility vehicles is contributing to this.

Emissions of air pollutants from passenger transport by road are currently falling

Emissions of air pollutants from passenger transport by road, however, are currently falling. This is due mainly to technological improvements, such as catalytic converters and other technical measures needed to meet EU standards. These outweigh growth in personal travel. As a result, emissions of particulates (PM_{10}), acidifying substances (NO_X, NMVOCs) and ozone precursors (SO_X, NO_X, NH_3) have decreased in the past decade.

Despite a temporary decline following 11 September 2001 and the SARS epidemic in 2002, aviation is currently growing significantly faster than the economy. This rapid growth is projected to continue. Greenhouse gas emissions from air travel have increased rapidly in recent decades, reflecting the strong increase in air traffic. This trend is expected to continue.

Expansion of transport infrastructure is resulting in the fragmentation of natural habitats thus affecting biodiversity. Noise is also a concern.

The London congestion charge is an example of an effective policy measure

There are many and varied policy options for reducing the negative environmental effects of transport. Road pricing, traffic-calming schemes, better provision for pedestrians and cyclists, public transport investment, telecommunications, car sharing, etc. have all been put in place in various parts of Europe; some with success. It is a challenge to implement a mix of actions across Europe, including in particular legal and regulatory tools, information and other instruments, spatial and urban planning, and public transport. The London congestion charge is an example of a policy measure that has already proved to be effective in reducing environmental pressures.

Tourism

Tourism is the fourth and final major consumption category analysed in this report (Chapter 6).

Tourism: consuming elsewhere — and getting there

Tourism in Europe is growing by about 3.8 % per year. Approximately 60 % of all international tourist arrivals are in Europe, mostly in the Mediterranean region. A recent and growing European trend is the purchase of second homes for holiday and/or weekend use. Many are in highly environmentally sensitive areas, on coastal zones and in skiing areas.

On the other hand, second homes may prevent citizens from travelling much further for tourism and leisure or from buying other goods and services, and thereby avoid putting even greater pressure on the environment.

Tourism's negative environmental effects are increasing rapidly

As a result of the increase in tourism, its negative environmental effects are also increasing rapidly. In particular, tourism is leading to a growth in greenhouse gas and other harmful emissions, especially from air and car travel to destinations, the consumption of more energy and water, increased land use and generation of waste at destinations.

Because of the rapidly increasing number of tourist arrivals by air and the longer distances to destinations, emissions from air transport of tourists to their destinations are taking an increasing share of total greenhouse gas emissions. Also, because emissions from air transport are at higher altitudes, their potential impact on climate change is more severe.

At destinations, especially those with more luxurious accommodation, tourists consume large amounts of water, energy and natural space. Consumption of water and energy is particularly high during peak seasons.

In order to minimise the environmental effects of tourism and thereby improve its sustainability, a variety of options are available including market-based, information and other instruments. A mix of options could address both the demand and the supply side.

There are only a few examples of policy measures that have been effective

There are only a few examples of policy measures that have been effective in reducing the environmental pressures from tourism, and they tend to target impact on destinations, but not that caused by travel to destinations. Effective policies to reduce pressures from tourist travel have yet to be seen. The use of market-based instruments (for example targeting tourist travel) or labelling are promising policy options.

Some environmental pressures are increasing as European consumption growth outweighs efficiency gains

Eco-efficiency improvements are being outweighed by consumption growth

Analysis in this report focusing on the consumption of food and drink, housing, personal transport and tourism has shown that technological improvements and breakthroughs have resulted in improved efficiency in production and consumption, in terms of the use of resources such as energy and water, waste generation and reduced pollution. But while efficiency is improving, growth in the total levels of consumption of goods and services has been so high that in many cases it has outweighed these technological improvements. Total household consumption expenditure in the EU-15 increased by almost a third from 1990 to 2002. While the energy efficiency of heating systems and electronic appliances has improved considerably, we live in larger homes and buy and use an increasing number of electronic appliances. As a result, CO_2 emissions from households have remained stable (see Chapter 4). Also despite increased resource efficiency, the amounts of waste generated from households continue to increase (see Chapter 4). Finally, in spite of improvements in energy efficiency, greenhouse gas emissions from personal travel by road and air, including for tourism, continue to increase (see Chapters 5 and 6). Projections by the EEA and others show that many environmental pressures are expected to continue to grow over the next 25 years if no further action is taken (EEA, 2005d; OECD, 2001a).

Bending the trend

Because the factors that determine consumption and production patterns are complex, interrelated and not always fully understood, *bending the trend* to make European consumption more environment-friendly and sustainable is a difficult challenge. Also as consumption behaviour varies greatly across Europe it is difficult to identify efficient actions to transform behaviour in a sustainable way.

A common challenge

Attaining more sustainable consumption and production is first and foremost a common challenge where all parties, including public authorities, business and consumers come together to take responsibility and action. While the role of public authorities is to provide the framework within which business and consumers can operate (using legal, market-based, information and other tools), businesses face the challenge of producing goods and services that are sustainable in their entire life-cycle. The challenge for consumers is to consume sustainable goods and services in so far as these are known, made available, and affordable. and for which the environmental effects are either great or increasing rapidly. These are consumption of food and drink; housing; personal travel and mobility; and tourism.

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1 Setting the scene

Key messages

A renewed policy focus on sustainable consumption and production (SCP) can be observed, both at the global level and in Europe.

With an aim to provide input for European policy-making, this report analyses the environmental effects of household consumption in Europe. We have identified four consumption categories that form a major part of our total consumption expenditure and for which the environmental effects are either large or increasing rapidly. These are consumption of food and drink; housing; personal travel and mobility; and tourism.

The negative environmental effects of our consumption do not only occur in Europe, but also in other regions of the world, mainly as a result of resource extraction, production, processing and transportation of the goods we consume in Europe, and as a result of our personal travel and tourist activities.

Attaining more sustainable consumption and production patterns is a common challenge that involves all actors, including public authorities at all levels, business and consumers.

1.1 Providing input to European policy-making

Renewed policy focus on sustainable consumption and production

The first global-political agreement on the need for sustainable consumption was Chapter 4 of Agenda 21, the UN Conference on Environment and Development report agreed in Rio de Janeiro in 1992. It stressed that 'action is needed to promote patterns of consumption and production that reduce environmental stress and will meet the basic needs of humanity' (UN, 1992). Ten years after the Rio conference, the agreement to develop 'a framework of programmes on sustainable consumption and production (SCP)' at the World Summit on Sustainable Development in Johannesburg in 2002 (UN, 2002) marked a renewed global policy focus. Both in Rio and in Johannesburg, it was stressed that industrialised countries should take the lead.

Reflecting this renewed policy-focus, SCP is now on the agenda in EU policy-making. The Lisbon Strategy (EC, 2000), the Sustainable Development Strategy (EC, 2001) and the sixth environmental action programme (including its thematic strategies) provide the broad framework for promoting SCP. The European Council at its meeting in March 2003 agreed to 'timely elaboration at both international and EU level of the 10-year framework of programmes on SCP on which the EU should take the lead' (European Council, 2003). On 29 September 2004, the Commissioner for the Environment, Stavros Dimas, speaking to the European Parliament said that one of his four priorities during his term in office would be 'to find the path to more sustainable patterns of production and consumption' (European Commission, 2004a). At Ostend, November 2004, the European Commission, in cooperation with UNEP and the Belgian Federal Government, held a European regional stakeholder meeting on SCP (UNEP, European Commission and the Federal Government of Belgium, 2004). Also on a national level in Europe, a number of countries have developed strategies for sustainable development, in which sustainable consumption is included. Within these countries, local Agenda 21 initiatives often include sustainable consumption activities.

Defining household consumption

Household consumption is the consumption of goods and services by households. It includes the selection, purchase, use, maintenance, repair and disposal of any product or service. However, it does not include consumption by the public sector or intermediate consumption of products and services in the productive sector (OECD, 2002a).

European households affect the environment in their day-to-day choices

In spite of the renewed policy-focus on SCP, growth in European household consumption is still a major cause for the increase of many environmental pressures (see Glossary for definition of environmental pressures). Household consumption forms an important part of the production-consumption chain as it is consumers who make the final choice of which goods and services to consume. European households affect the environment through their day-to-day choices of which goods and services to buy and how to use them. However, we also affect the environment through our choices of where to live, where to work, how to use leisure time and how to travel. Such choices are made within certain boundaries conditioned by historical developments and past policy decisions, for example on urban planning, transport infrastructure and available housing. Even though the environmental pressures caused by each household are small compared with those caused by production activities, the combination of millions of European households is a major contributor to environmental problems such as climate change, air pollution, water pollution, land use and waste generation (OECD, 2002a).

This report analyses the environmental effects of household consumption in Europe

With an aim to provide input for European policy-making related to sustainable consumption, this report analyses the environmental effects see Glossary for definition of environmental effects) and the environmental sustainability of household consumption in Europe. It builds and expands on work done by OECD (OECD, 2002a; 2002b) and UNEP on sustainable consumption (UNEP, 2001; 2003; 2004; 2005a) and applies this analysis specifically to Europe.

It looks mainly at the direct negative effects of household consumption, including the environmental pressures caused by activities in the household, pressures from travel both at home and abroad and pressures caused by European tourists. The indirect environmental effects of household consumption in terms of the pressures caused by the extraction of resources, agricultural and industrial activities and the processing and transportation of the goods and services that we eventually consume are described briefly in each chapter, but are not covered in detail. As the production-consumption process is a complex interrelated chain, it is not always easy to distinguish between the direct and the indirect environmental effects of consumption.

In analysing the environmental effects of household consumption, we examine its environmental sustainability. We recognise that sustainable consumption requires economic and social, as well as environmental sustainability. However, looking in detail at the economic and social effects of consumption in Europe is outside the scope of this report. Therefore, we do not analyse issues such as the financing of household consumption, distribution, family structures, employment or health effects related to household consumption. We do, however, analyse the economic and social forces driving household consumption (see Chapter 2).

Defining sustainable consumption

Sustainable consumption is the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the life cycle, so as not to jeopardise the needs of future generations (Norwegian Ministry of Environment 1994 and 1995; UN-CSD 1995).

This report covers the 31 member countries of the EEA, which are the EU-25 countries plus Bulgaria, Iceland, Liechtenstein, Norway, Romania and Turkey. In practice, however, covering all these countries is often not possible due to lack of data for non-EU-15 countries. The report looks mainly at the period from 1990 to the present and into the future (to 2030), but sometimes goes further back when this brings added value to the analysis. Data sources are indicated in the text, figures and graphs, but are mostly from the EEA, Eurostat and the OECD.

Focus on four major categories of consumption: food and drink, housing, personal travel and mobility, and tourism

By analysing research and reports carried out by researchers and international organisations (see for example Michaelis and Lorek, 2004; OECD, 2002a; Worldwatch Institute, 2004; and IPTS/ESTO, 2005), we have identified four major categories that form a major part of our total consumption expenditure and for which the environmental effects are either great or increasing rapidly. These are consumption of food and drink; housing; personal travel and mobility; and tourism.

In its 2002 report *Towards sustainable household consumption* the OECD identified food; tourism travel; energy, water and waste generation as the areas of consumption where the environmental impacts are the greatest (OECD, 2002a). Michaelis and Lorek (2004) identified food; housing and transport as the consumption categories responsible for the greatest environmental impacts in Europe. Most recently, the Institute for Prospective Technological Studies (IPTS) and the European Science and Technology Observatory (ESTO) identified transport, food production, heating and construction as the product categories that cause the highest environmental impact (IPTS/ESTO, 2005).

The first category, **consumption of food and drink**, represents on average 16 % of total consumption expenditure per person in the EU-15 countries, and 27 % in the new Member States. The environmental effects of food consumption are large compared with those of other consumption activities, especially the indirect effects from production, processing and transportation of the food consumed by Europeans (see Chapter 3).

The second category, **housing**, which includes the use of energy and water and the generation of waste, represents on average 27 % of total consumption expenditure per person in the EU-15 countries, and 24 % in the new Member States. Across Europe, energy use for heating and electronic appliances is increasing. Generation of waste is also increasing, but water use is decreasing (see Chapter 4).

The third category, **personal transport and mobility**, represents on average approximately 14 % of total consumption expenditure per person in both the EU-15 and the new Member States. Personal transport by both air and road is continuing to increase across Europe. As a result, greenhouse gas emissions from personal transport are growing. Due to technological improvements, emissions of air pollutants from personal transport by road are falling (see Chapter 5).

The fourth category, **tourism**, is a rapidly growing sector of the EU economy. Air and car travel to and from destinations generates growth in greenhouse gases and other harmful emissions. At destinations, tourists'consumption of water and energy and waste generation are increasing (see Chapter 6).

Many environmental pressures are increasing because consumption growth outweighs technological gains

Analysis by the EEA, the OECD and others shows that in industrialised countries the general trend is an increase in environmental pressures because consumption growth is outweighing the gains made through improvements in technology (EEA, 2003a; 2004a; OECD, 2001a; OECD, 2002a; Michaelis and Lorek, 2004). This is the case for many industrialised countries, especially in emissions of greenhouse gases from personal

transport and tourism, and the generation of waste from household activities, including municipal, construction and demolition, and packaging waste.

In this report, we will analyse the extent to which household consumption growth is outweighing efficiency gains and how this results in increasing pressures on the environment for each of the four consumption categories.

1.2 Negative environmental effects of European consumption in other regions of the world

The negative impact of consumption does not only occur in Europe

The negative environmental effects of our consumption do not only occur in Europe, but also in other regions of the world. This is mainly a result of resource extraction, production, processing and transportation of the goods we consume in Europe carried out in other regions, but also of our personal travel and tourist activities. This report does not analyse in detail the environmental pressures in other regions of the world that result from our consumption, as this would be very comprehensive and almost impossible to carry out. However, some general issues with regard to effects in other regions are presented here.

One study shows that the majority (65 %) of air emissions from Norwegian consumption come from imports (Peters and Hertwich, 2004). A study for Slovakia similarly shows that the majority of CO_2 emissions (52 %) from household consumption in Slovakia come from production in other countries (Korytarova and Hubacek, 2005).

Increasing use of resources extracted in other regions of the world

EEA studies show that there is an increased use of resources extracted abroad for consumption in Europe. Resource extraction in Europe has decreased, while imports of resources, especially fossil fuels and metals, have increased. In fact, environmental pressures from resource extraction in other regions of the world are growing as a result of European consumption (EEA, 2005b). The total amounts of resource (material) consumption vary considerably between European countries, ranging from less than 10 tonnes per person per year in Turkey and Romania to approximately 40 tonnes in Finland and Iceland. For the EU-25, direct material consumption amounts to an average of 16.5 tonnes per person per year (EEA, 2005b) (see Glossary for a definition of the concept).

Recognising that the ecological footprint is only one of many environmental indices, EEA studies show that the ecological footprint of the average resident of the EU-25 plus Switzerland was 4.9 global ha in 2002 and is on the increase (see Glossary for a definition of the concept). However, this average disguises great disparity between countries. Average footprints of EU citizens in 2001 included 3.8 global ha per person in Italy, 4.8 in Germany, 5.8 in France and 7.0 in Sweden (World Wide Fund For Nature, WWF, 2004). In comparison, the global average footprint was 2.2 global ha per person. In 2002, the EU-25 contained 7 % of the world's population and it's consumption was responsible for generating 17 % of the world's ecological footprint. The EU-25 generates a footprint more than twice the size of its own biocapacity.

1.3 Bending the trend

The financial costs of dealing with the current pressures are already high

The financial costs of dealing with the current pressures on the environment from consumption and production are relatively large. For example, water pollution control costs are 0.8 % of GDP in several EU Member States (EEA, 2005a). Studies show that pollution prevention, for example by changing consumer behaviour, is often far more cost-effective than end-of-pipe measures or measures to clean up afterwards (OECD, 2001a; EEA, 2005a).

Examples of effective sustainable consumption actions

There are a number of actions that have contributed to more sustainable consumption patterns. A report by the European Commission provides an inventory of policies at national and EU level (EC, 2004b), summarised in the Annex to this report. However, since many environmental pressures from European consumption are increasing, more could be done to implement sustainable consumption. This report provides results for evaluations of policy effectiveness for selected policies by the EEA and others. It also outlines possible actions that could help 'to bend the trend and attain a more sustainable consumption in Europe.

Attaining sustainable consumption is a challenge involving all actors

Attaining more SCP patterns is a common challenge that involves all actors, including public authorities at all levels, business and consumers. To promote SCP, technology may bring us a step forward in terms of efficiency both in production and consumption, but there is also a range of potentially effective legislative, economic, information, educational and other options available.

Photo: © Frédéric Cirou/PhotoAlto.

2 Understanding consumption behaviour

Key messages

Consumption patterns in Europe are completely different to those fifty years ago. Transport, communication, tourism and leisure have emerged as major components of household consumption. In the future, we can expect rapid consumption growth, especially in the new Member States and accession countries, as they gradually reach the consumption levels of the EU-15.

Understanding changes in household consumption patterns is about understanding human behaviour — why we consume, what drives us to behave the way we do and buy specific products and services. Our patterns of consumption are not easy to map since they are shaped and re-shaped by an array of interdependent social, cultural, political and economic changes in Europe and the world.

Important changes in the factors that drive our consumption include growing incomes, globalisation of the economy, technological breakthroughs such as the internet and mobile phones, decreasing household sizes and an ageing population.

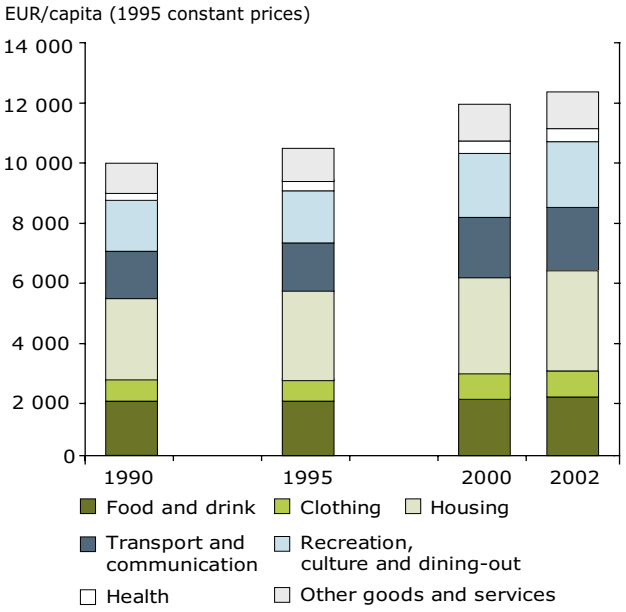
2.1 Mapping European consumption patterns

Today, consumption patterns throughout Europe are very different from those of fifty years ago. Transport, communication, tourism and leisure have emerged as major components of household consumption. At the same time, increased incomes mean that spending on basic goods such as food, clothing and energy has fallen to approximately a quarter of total consumer spending.

Consumption expenditure in the EU-15 has increased by almost one third

Household consumption expenditure in the EU-15 Member States between 1990 and 2002 increased by almost one third to more than 12 000 EUR per person on average. It ranges from less than 7 000 EUR in Portugal to more than 16 000 EUR in France. Expenditure on basic needs such as food and drink, clothing and housing all increased, but less than total expenditure. Expenditure on recreation, culture and dining-out increased by 30 %, by 33 % on transport and communications and by 56 % on health.

Figure 2.1 Household expenditure per capita in EU-15 Member States



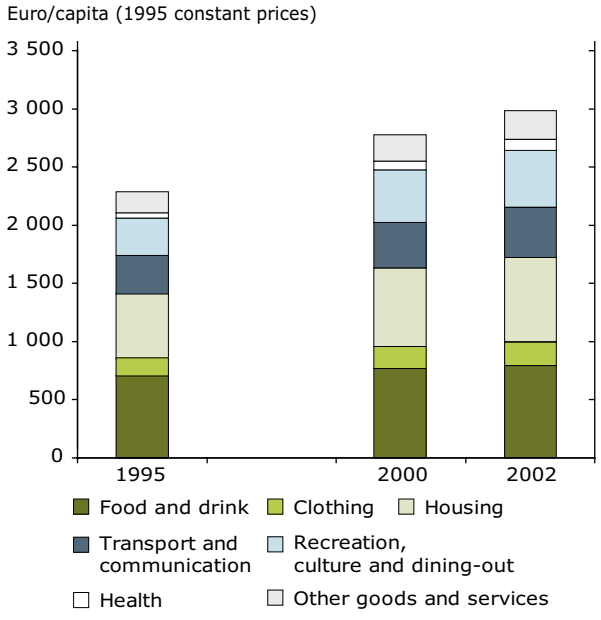
Note: Data for ten EU-15 Member States: Austria, Denmark, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and the United Kingdom (1995 Euro constant prices).

Source: Eurostat, 2005.

Consumption expenditure in the new Member States averaged only about one fifth of that in the EU-15

Household consumption expenditure in the ten new Member States in 2002 averaged approximately 2 400 EUR per capita — approximately one fifth of that of the EU-15 (Eurostat, 2005). But this disguises great disparity between for example Slovenia with more than 5 000 EUR per capita and the Baltic countries and Slovakia with less than 2 000 EUR per capita. The share of expenditure on basic goods such as food and drink, clothing and housing is higher than in the EU-15. Expenditure increased by around one third between 1995 and 2002. The shares of recreation, culture and dining-out increased by more than 50 %, while that of health more than doubled.

Figure 2.2 Household expenditure per capita in five new Member States



Note: Average data for five new Member States: Estonia, Cyprus, Latvia, Slovenia, Slovakia (1995 Euro constant prices). 1998 data for the remaining five NMS show the same overall picture.

Source: Eurostat, 2005.

Projections show a doubling in total household consumption (in terms of expenditure) in the EU-25 by 2030 (EEA, 2005f). In particular, we can expect rapid growth in the new Member States and accession countries as they gradually reach the consumption levels of the EU-15.

Better standards of living

The standard of living of the average citizen in the EU-15 and in the EFTA countries (Iceland, Liechtenstein, Norway and Switzerland) has undoubtedly benefited from the growth in consumption and the wide variety of goods and services a modern economy has to offer. Many Europeans live in better, more convenient and larger houses than previously. They have access to a greater quantity and variety of food from all over the world. They can buy large cars, travel to foreign countries, and the large majority of Europeans have unprecedented access to health, social and education services. Reflecting our improved standards of living, life expectancy at birth increased by approximately 8 years between 1960 and today for the average European. Life expectancy in EU-25 is currently at 74.8 years for men and 81.9 years for women (Eurostat, 2005).

Citizens of the new Member States and some of the countries seeking accession to the EU have also, on average, reached higher standards of living but have only benefited from about 10 years of rapid consumption growth, and still consume far less than the average EU-15 consumer of most goods (see Figures 2.1 and 2.2). Consumption in many of these countries could reach EU-15 levels in the not so distant future. However, millions of Europeans, both in the new Member States and in the EU-15 are still living in poverty, are unemployed or partly excluded from our consumption society.

2.2 Main factors that shape our consumption patterns

In the past decade we have seen major developments that have changed how and what we consume. Our patterns of consumption are not easy to map since they are shaped and re-shaped by an

array of interdependent social, cultural, political and economic changes in Europe and the world. The main developments that have affected consumption patterns include economic growth, globalisation and the opening of markets, individualisation, new technology such as the internet, targeted marketing and advertising, smaller households and an ageing population.

Understanding consumption is understanding human behaviour

Understanding changes in consumption patterns is about understanding human behaviour — why people consume, what drives us to behave the way we do and buy specific products and services. The basis of consumption is that we all have human needs. We need to satisfy our basic needs for food and shelter, but we need also to feel free, relaxed, secure, have and defend, belong (i.e. social status), be different, discover, etc. (Lieshout, Rijkens-Klomp and Kristensen, 2004). The extent to which needs evolve autonomously or are driven by their surroundings is not clear. Business and public authorities develop products and services that enable us to meet some of our needs. However, not all these opportunities are available to everyone. Depending on our income, where we live, our age and amount of spare time, we have differing degrees of freedom to choose from the opportunities available, forcing us to make choices. This interaction of needs, opportunities and abilities (Gatersleben and Vlek, 1998) helps to explain the complexity of our consumption behaviour. Consumption patterns are also shaped by identification with groups that define themselves in a variety of ways (Moisander, 1998).

From a sociological perspective one can identify different groups or consumer cultures which are each characterised by particular behavioural characteristics. Depending on our approach, we can distinguish, for example, between consumers seeking experiences, efficiency, pleasure or compassion (Style Vision, 2005). We can also find differences between traditional, cosmopolitan, natural and isolated consumers, and 'hermits' (Dake and Thompson, 1999). In order to understand consumption behaviour, it is important to address what drives the behaviour of various groups or cultures of consumers.

Consumption behaviour is hard to tackle

As consumption behaviour varies so much among the European population it is hard to target and identify efficient action, transforming behaviour in a sustainable way. Lock-in situations (for example use of car where public transport is unavailable or inefficient) make the problem even more difficult to address, but are also relevant in understanding human behaviour (Jackson, 2005).

Economic and household consumption growth are closely linked

Economic and household consumption growth are closely linked and have followed similar patterns. In other words, as we become wealthier we also in most cases consume more. The projected economic growth of 2.4 % per year in the EU-25 between 2000 and 2030 would be accompanied by similar growth in consumption (EEA, 2005d).

The removal of trade barriers across the world and the process of globalisation and liberalisation of markets have given European consumers access to many products from all over the world at all times. In particular, the development of EU's internal market, with the introduction of the Euro, has made trade between European countries easier. Consumers in the EU have gained access to more goods and services in a larger and more competitive market (Lieshout Rijkens-Klomp and Kristensen, 2004).

Technological developments have had a strong impact on levels of consumption and efficiency

Technological breakthroughs and development have undoubtedly increased the eco-efficiency of production and the energy efficiency of consumer appliances. Examples include catalytic converters, which have reduced car emissions, and the lower energy consumption of kitchen appliances. Technological breakthroughs have also given us unprecedented access to goods

— the most obvious example being the exponential growth in the number of mobile phones in use in Europe. Subscriptions to mobile phones in EU-25 countries increased from 5 per hundred inhabitants in 1996 to 80 in 2003 (Eurostat, 2005). Another recent technological development with potentially large effects on consumption is the breakthrough of the internet and access to on-line shopping. However, due to the so-called rebound effect (see box in Section 4.1) technological improvements sometimes result in increased consumption and environmental pressures. For example, direct fuel injection is often used to increase car performance rather than to achieve the same performance with less fuel use.

As a result of continuing technological development and industries operating in a more competitive market prices have generally increased at a slower rate than income and have sometimes even dropped during recent decades.

There have been major changes in the demographic factors that shape consumption

There have also been major changes in the demographic factors that shape our consumption. When ten countries joined the EU in 2004, its population increased to more than 450 million. The EU-25 population is projected to increase by only 1 % by 2030 (EEA, 2005d), which is not by itself expected to have a significant effect on consumption.

The average number of people per household has fallen

All over Europe there is a tendency towards smaller households thus leading to an increase in the total number of households. The average number of people per household in the EU-15 has fallen from 2.8 in 1980 to 2.4 today (Eurostat, 2005). The average in the new Member States is 2.5. An increase in the number of single person households and single parent households partially explain this change. The number of one person households in relation to the total number of households varies from under 15 % in Spain and Malta to approximately 40 % in Sweden and Norway. The general picture is that in northern Europe the number of one-person households is relatively high, while it is generally much lower in Southern Europe and in most new Member States. There is also a big difference in the share of households with five or more people. In Ireland, Malta and Poland the share is between 15 and 20 %, compared with approximately 5 % in Denmark, Germany and Sweden (Skovgaard *et al.*, 2005). Reductions in the average size of households have major implications for consumption. Smaller households generally use more space, energy and water, and generate more waste per person.

Europe is characterised by an ageing population

The ageing of Europe's population also has significant implications for consumption patterns. In the EU-25 countries the old age dependency ratio (the number of people aged 60 or over divided by the population aged 20 to 59) increased from 30 % in the 1960s to 39 % today (Eurostat, 2005). People aged 65 years and over represent 16 % of the total population while those below 15 represent 17 %. By 2010 these ratios will become 18 % and 16 % respectively. The most rapid increase will occur in the share of the people aged over 80, which will rise by almost 50 % over the next 15 years (EC, 2003b). The share of people aged 65 or over is projected to increase from 15 to 25 % for the period 2000-2030 in the EU-15 and from 10 to 22 % in the new Member States (EEA, 2005d).

Older people tend to consume differently as they generally have different needs and, for example, different financial and physical capacities. For example, some older people buy second homes or move permanently to mountain or coastal areas, which are particularly vulnerable in terms of environmental pressures. Moreover, fewer young people having to support a greater number of old people may affect consumption levels as a whole. A study in the United Kingdom showed that the proportion of household expenditure that goes on food, drink and transport rises with age (UK Office for National Statistics, 2002).

Cultural and sociological changes have contributed to changing consumption behaviour

Finally, cultural and sociological changes have contributed to our changing patterns of consumption. Consumers are often locked into particular consumption patterns due to a complex mixture of institutional, social and psychological factors (Jackson, 2005) Society and social values have changed remarkably in recent decades. One of the main forces has been individualisation, stimulating self expression, the importance of believing in the individual, and the desire for ownership and personal freedom (Michaelis and Lorek, 2004; Lieshout, Rijkens-Klomp and Kristensen, 2004). This has had a huge impact on the way we consume: by consuming we can express ourselves through the goods and services that we choose and we can enjoy the feeling of personal freedom (travel, having a car, etc.). Schor (1998) finds that consumption is driven as much by the desire to belong to a group as by the desire for status. Thus, a large car enables parents to participate in a group of people who drive each other's children to school. Participation in such social groups may require particular standards of dress, and reciprocity such as inviting others to restaurant meals.

Advertising and marketing directly affect our knowledge and perception of the wide range of available products and services. For example, Dickinson (1998) finds that dialogues within households about the choice of food draw extensively on arguments and narratives from the media. This also often contributes to changing consumer behaviour by creating a sense that buying a certain product or service will make us happier, improve our status in society, the way we look, or enable us to avoid risks we had not previously imagined. The role of advertising and marketing has increased tremendously in recent decades through various lines of communication including the internet, commercial breaks in television programmes and, most recently, product placement in films.

A related major influence on consumption behaviour comes from lifestyles and fashions that are also driven by culture and current trends. People often dress, buy goods and adopt certain lifestyles in line with the latest fashions. This may result in their technical lifetime outlasting fashion trends. People often buy new clothes or new mobile phones sooner than actually needed because of changing fashion trends.

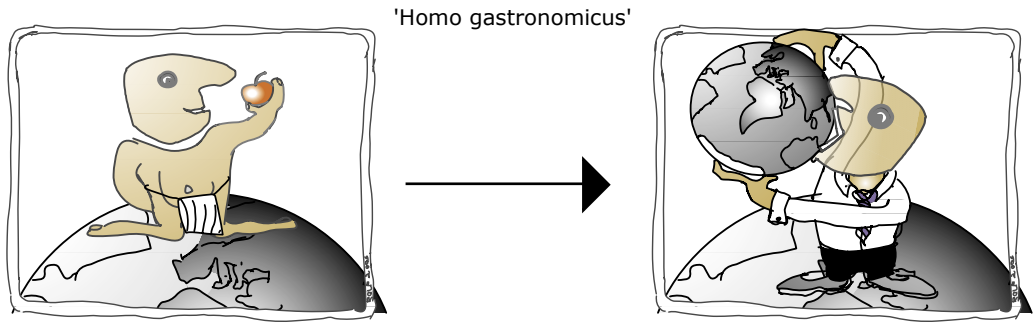
3 Food and drink consumption behaviour: the consumer's choice matters

Key messages

Our eating and drinking habits leads to significant environmental pressures, often indirectly through agricultural production, processing and transportation of the food we consume.

Direct negative environmental effects of food and drink consumption (travelling to the shops, storing, cooking and generating waste) are less in magnitude than the indirect effects but these are on the increase.

Labelling of sustainable food products, such as organic food, is an effective example of a policy measure that helps consumers to make informed decisions about what to buy, and thereby enables more sustainable consumption. However, organic food is often rather expensive for many Europeans.



3.1 Why Europe should care about sustainable food and drink consumption behaviour

In recent decades there have only been minor changes to the total amount of food we consume: in the EU this increased from 735 kg per person in 1970 to 770 kg in 2000 (an increase of less than 5 %). However, there have been marked changes in the composition of our diets (see Figure 3.1) and the way food is produced and sold. European consumer demands for different food products have mainly been driven by growth in incomes, demographic shifts, and lifestyle changes.

Every stage of the production consumption chain — from growing crops, raising livestock or fisheries to transportation and storage, manufacturing, distribution, purchasing and consumption, and dealing with wastes — has environmental effects (UNEP, 2005b; Kristensen, 2004a). Consumer diet choices can significantly influence use of resources and environmental effects of production, retail and distribution phases. For example consumers can choose to consume more organic food, adopt a less meat-intensive diet or choose local fruit and vegetables of the season.

One of the main factors that affect food consumption patterns is our ability to purchase food. Europeans have generally become wealthier and food prices have increased less than income and in some cases have fallen, partly due to agricultural subsidies in Europe. As the consumer become wealthier and the basic demand for a well-balanced diet is met, he or she tends to demand an increasing number of *quality products* (luxury or organic food or pre-prepared individual meals).

The share of household food expenditure has declined and there have been marked changes in what we eat

The share of total European household expenditure on food has declined steadily with rising incomes. Currently, it ranges from 10 % to 35 % of total household consumption expenditure, with the smallest shares in the EU-15 Member States and larger shares in new Member States. The changes in food consumption patterns have important implications for the environment. During the past 30 years there have been marked changes in the consumption of different food types (Figure 3.1). Per capita consumption of potatoes, milk and bovine (red) meat has declined significantly, while that of fruit and vegetables, pork and poultry meat, fish and seafood, and cheese has increased. The average EU-15 citizen eats twice as much fruit, red meat, fish, seafood and cheese as an eastern European citizen. Thus, our diets are very different from those of our parents or grandparents. For example, in winter we can still buy fresh grapes from Chile or oranges from Australia in our local supermarkets, and just about any other food all year long. Similarly, the time spent on food preparation has changed dramatically. Many Europeans buy pre-cut vegetables, frozen dinners, and eat more frequently at restaurants or in cafeterias at work or in school.

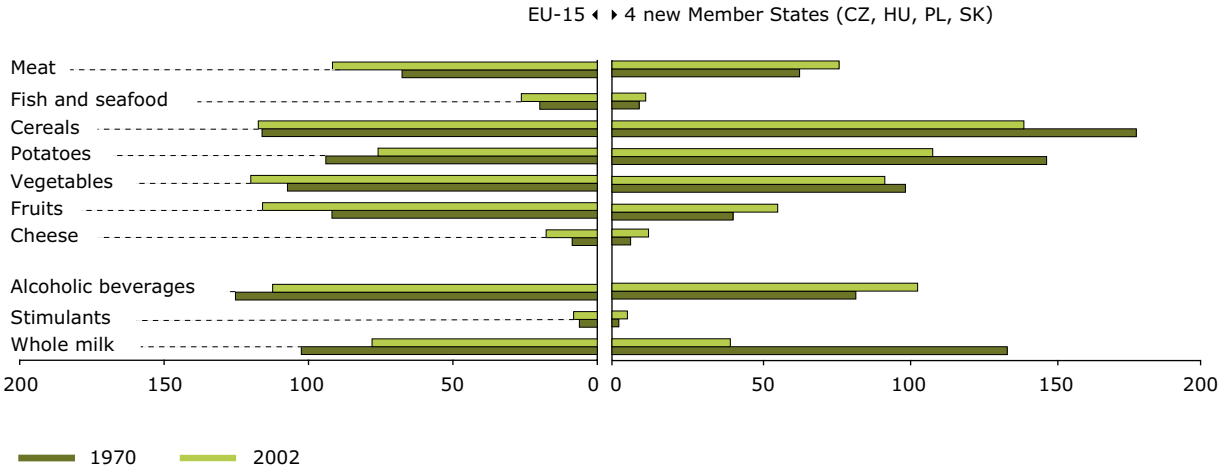
Recent food safety problems have put stronger focus on food safety and health

Recent food safety problems such as BSE (mad cow disease), pig pest, avian flu and salmonella, and also soft drink contamination, have led to a stronger focus on food-safety and health. The BSE outbreak was a major reason for the reduction in the consumption of bovine (red) meat. Citizen debates in Europe on GMOs have shown that people are concerned about the risks.

Convenience has become a major factor in driving food choice

With adults often working outside the home, receiving higher incomes and having less free time, convenience has become a major factor in determining food choice. The freezer, refrigerator and in many cases the microwave, have become standard household appliances, allowing people to rely on pre-prepared foods that require minimum planning and preparation time in the home. These appliances

Figure 3.1 Consumption of major food and drink categories (kg/l per person per year)



Source: FAO, 2005.

result in increased energy use and waste generation. The microwave, however, is generally much more energy-efficient than the traditional oven.

The consumption of bottled water per person increased in all European countries during the 1990s, and in many countries began slowly to replace the drinking of tap water. In some countries (Czech Republic, Ireland, Norway and United Kingdom) this consumption more than tripled. But there is a marked difference between countries, with around 20 l consumed per person per year in the north and much higher quantities of more than 100 l per person in the south. The environmental effects of mineral water consumption include the effects of transporting the water over long distances and the amount of packaging waste generated (Kristensen, 2004a).

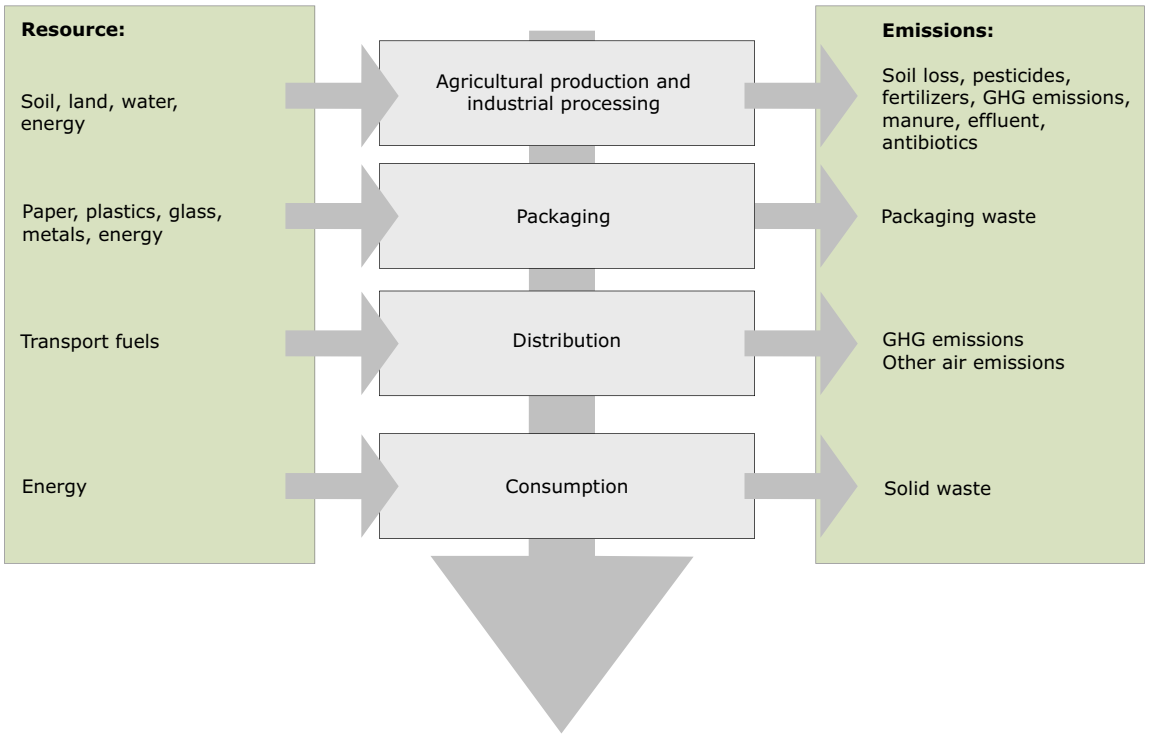
Our eating and drinking patterns lead to significant environmental pressures

Our eating and drinking patterns lead to significant environmental pressures. Approximately one third of households' total environmental impact can be related to food and drink consumption (Danish EPA, 2002). This estimate is based on life-cycle analysis and includes data of the indirect effects of production and the direct effects of consumption.

The most significant impact comes from production and processing

The most significant environmental impact related to food consumption comes from food production and processing in Europe and in other regions of the world. These include the effects of emissions from livestock,

Figure 3.2 Environmental effects of food and drink consumption



Source: Adapted from UNEP, 2005b.

agriculture and industry on water, soil and air; overuse of fish resources and increased transport of food; but also waste from production processes, in particular organic and packaging waste. Consumers can influence trends in these areas in their choice of diet and in their food-demands.

Life-cycle assessment is a useful tool for examining environmental impacts

Life-cycle assessment, which considers all the steps in production and consumption processes, is a useful tool in examining the environmental impacts of the entire food production-consumption chain.

Direct environmental effects are less than indirect effects

The direct environmental effects of household food consumption are less in magnitude than the indirect effects and and are generally related to energy used for activities such as travel for shopping, refrigeration and freezing, cooking and dishwashing. Water consumption and waste generation are also important. Water use for household consumption is only about 15 % of total water use in Europe, agriculture takes up one third of total water use. Personal transport by car for shopping results in energy use, greenhouse gas emissions and air pollution.

Greenhouse gas emissions of different meals

A Swedish study compared four different meals with the same energy and protein content in terms of their GHG emissions (Carlsson-Kanyama *et al*., 2003). It found life-cycle emissions ranging from 190 g CO_2 equivalent for a vegetarian meal with local ingredients, to 1 800 g for a meal containing meat with most ingredients imported. However, some vegetarian meals may have higher life-cycle GHG emissions than meals including meat if the vegetarian ingredients are transported over long distances or include high emissions in production.

Facts and figures

- On average, a person in the EU-15 eats around 91 kg of meat, 26 kg of fish and seafood, more than 300 kg of cereals, vegetables and fruit and 80 kg of potatoes each year. In new Member States, an average person eats less meat and fish than in EU-15, but more cereals (FAO, 2005).
- In the 1960s an average European grocery had 2 000 product lines. A modern supermarket has more than 15 000 (INCPEN, 2003).
- The new Member States still have a much higher share of total expenditure on food and drink (30 %) than the EU-15 (10–15 % in 2000).
- Food-related activities such as refrigeration, cooking and cleaning account for 7–12 % of household energy use (OECD, 2001b).
- The European market for organic food in 2003 is estimated at 10 to 11 billion Euros. While this is less than 2 % of the overall EU food market, it accounts for almost half of the global organic food market (Michaelis and Lorek, 2004).
- Packaging waste in the EU-15 amounts to more than 160 kg per person per year. More than two thirds of packaging waste is related to the consumption of food (INCPEN, 2001).

A shift towards the purchase of fresh food all year round from all over the world and of pre-prepared and convenient food has resulted in large streams of packaging waste, on average 160 kg per person per year in EU-15 (EEA, 2005c).

3.2 Emerging trends

Environmental pressure from food consumption may increase if we continue to demand more luxury foods such as lobster and caviar or to consume more fresh foods imported from long distances, e.g. out-

of-season vegetables or fruits transported by plane. But the environmental impact could be lowered if our food choices were to reflect more environmental preferences such as organically-grown or local, seasonal foods (Kristensen, 2004a).

We will spend relatively less on food

The share of citizens' total expenditure on food is projected to continue decreasing. Total food consumption expenditure in the EU-15 is projected to increase by 17 % between 2000 and 2020, while in the same period total household expenditure could increase by 57 % (EEA, 2005d). Consumption of drinks, fish, dairy products and meat is expected to increase more than total food expenditure, while that of bread, cereals, fats and oils is likely to increase to a lesser extent (EEA, 2005d).

Continued globalisation of food supply could mean that new food-safety risks emerge, previously controlled risks could be re-introduced, and contaminated food could be spread across greater geographical distances. In the future, there is likely to be greater focus on food safety concerns such as microbial pathogens, pesticides and other toxic residues, food additives, and diseases that can be transmitted from animals to humans through food, such as tuberculosis, BSE and avian flu (USDA, 2003). The new EU Food Safety Agency could play a prominent role in this context.

Current trends regarding variety, prepared food and convenience are expected to continue. Driven by globalisation and increased trade, the number of more 'exotic' foods could increase. The demand for pre-prepared and processed food could continue to rise, driven partly by the trend to individualism, smaller households and more double-income households (Kristensen, 2004a; Blisard *et al.*/USDA, 2002).

Packaging waste volumes are likely to increase

EEA projections show that packaging waste volumes are likely to continue to increase by about 50 % between 2000 and 2020 in the EU-15 (EEA, 2005d). This is at a slightly slower rate than GDP.

But what if?

The emerging trends seem obvious. A smaller share of household expenditure spent on food and drink. Globalisation can lead to pressures on the safety of food supply and the market of pre-prepared food and the amounts of packaging waste is increasing. Nevertheless, the future is anything but certain, and it is important to recognise uncertainties related to the future.

For example what if in the longer-term genetically modified food will become available to and accepted by large groups of European consumers? Would this imply less organic food consumption and/or strong counter-trends of other groups of consumers that reject genetically modified food and prefer locally grown organic food? Perhaps the environmental burden of food consumption would decrease due to less and more efficient use of water and fertilisers respectively, or might it result in large environmental impacts yet unknown?

Or what if in the ageing of the European population the majority of consumers stay with their current food consumption patterns as they get older? Or what if the elderly prefer pre-prepared food and food from other parts of the world? Might the environmental effects from food consumption increase even more than expected? Or what if health-stimulating food products (such as pills or drinks) partly replace 'traditional' food products? Perhaps then some of the environmental effects, such as those related to waste, will be less than expected?

3.3 Bending the trend

Changes in both consumption and production are important to ensure more sustainable food consumption patterns in Europe. Although the majority of environmental pressures related to food are from production, this section focuses on actions that influence consumption directly. Individual consumers can contribute to reducing environmental pressures by changing their food consumption patterns to products with a lower

environmental impact. At the same time, public authorities can provide incentives to produce food products with a lower environmental impact (e.g. eco-efficiency in production and processing, organic and local food, eco-labels). They can also internalise environmental costs related to the whole food chain (e.g. the full costs of heated greenhouse production and food transport), remove environmentally harmful subsidies (for example through the common agricultural policy) and provide consumers with clear and accurate information on the environmental effects of food consumption through environmental labels and information campaigns.

Sustainable food consumption policy can be seen as part of a life-cycle strategy

Sustainable food consumption policy can be seen as part of a life-cycle strategy that addresses environmental effects at different points of the food chain. Regulatory, economic, technology-supporting and information actions can be used to influence production and consumption patterns.

By choosing food products with a low environmental impact (e.g. locally grown fruits and vegetables rather than off-season fruits and vegetables transported over long distances) consumers can achieve a reduction in the indirect environmental impacts of their food consumption.

To influence the direct effects of consumption, actions can be taken to target the activities that cause these effects, namely personal transport to the supermarket, buying and using new and larger refrigerators and freezers to enable storing, cooking in ovens and microwaves and dishwashing.

Consumers can reduce the direct negative environmental effects of their food consumption

Consumers can reduce the direct negative environmental effects of their food consumption, in such ways as biking to the local grocery store, buying smaller amounts which need less refrigeration and freezing, using energy-friendly kitchen appliances, using less water for dishwashing and drinking water from the tap (if clean and tasty) rather than bottled water or soft drinks.

Economic growth and rising incomes will probably result in consumers spending extra money on quality, diversity and convenience, rather than quantity. Increased demand for quality may result in purchases of more environment-damaging food, e.g. off-season vegetables and fruits transported by plane. On the other hand the quality aspect may be displayed in food choices that reflect environmental protection (e.g. organic, local or

Effectiveness example: EEA pilot study on packaging waste management systems in five countries

More than two-thirds of packaging waste is related to the consumption of food (INCPEN, 2001).

An EEA study evaluated the effectiveness of packaging waste management systems in selected EU countries (Austria, Denmark, Ireland, Italy and the United Kingdom) in the context of the packaging waste directive, which includes an overall objective of preventing the generation of packaging waste, and quantitative targets that require countries to achieve a minimum of 25 % recycling and 50 % recovery (recycling plus incineration with energy recovery) by 2001. Amendments to the directive in 2004 set more ambitious and material-specific targets for 2008.

The study concluded that although almost all EU-15 countries had met the 2001 recycling and recovery targets of the directive, they did not meet the waste-prevention objective. Ten of the EU-15 countries increased packaging waste quantities between 1997 and 2001, and the latest data for 2002 shows that total amounts in EU-15 are still increasing. It would generally be more efficient and better for the environment to both focus on waste management through recycling and recovery and to prevent its actual generation.

Source: EEA, 2005c.

Effectiveness example: labelling of organic food

Organic food is one of the fastest growing areas within food and drink sales in Europe as a whole. However, the market share of organic produce is no more than 1–2 %. Across the EEA member countries, the area of organic farming increased by around 75 % between 1997 and 2000, from 2.4 to 4.4 million ha. The growth in demand for organic food over the past decade has, in part, been triggered by food scares and the desire to buy high quality, healthy food produced in a way that protects the environment and safeguards animal welfare. It is interesting that countries where organic products are sold via supermarket chains are generally also those where the organic market share is highest.

On average, Denmark and Austria had by far the highest share of organic food within its total food products in 2000, with 6 % and 5 % respectively, followed by Switzerland, Finland and Sweden with around 3 %, and Germany with 2.2 %. The lowest shares were recorded in Spain, Greece and Ireland, all with less than 0.4 %.

Considerable protection for both consumers and producers has been achieved through the EU regulations on organic production. The regulations have been implemented in all EU countries since 1993. Most countries have had their own national standards and logos for organic products for some years, and the European Commission decided on a logo for such products in December 1999.

Labelling of sustainable food products — such as organic food — is an effective example of a policy measure that helps consumers to make informed decisions about what to buy, and thereby enables more sustainable consumption. However, organic food is often rather expensive for many Europeans.

Sources: Hamm *et al.*, 2003; Kristensen, 2004a.

GMO-free food) or animal welfare. Certain actions can promote such a shift to less environment-damaging consumption patterns.

Labels can provide information on environmental effects

The ability and willingness of individual consumers to change their food consumption patterns to products with lower environmental impacts depends on the availability of the necessary information, the availability of such foods in stores and the price. Labels that give information on product origins and the environmental and energy intensity embodied within could serve to raise awareness.

Other actions that can influence consumer behaviour include influencing prices through the use of market-based instruments, refund systems, education, and advertising and marketing campaigns.

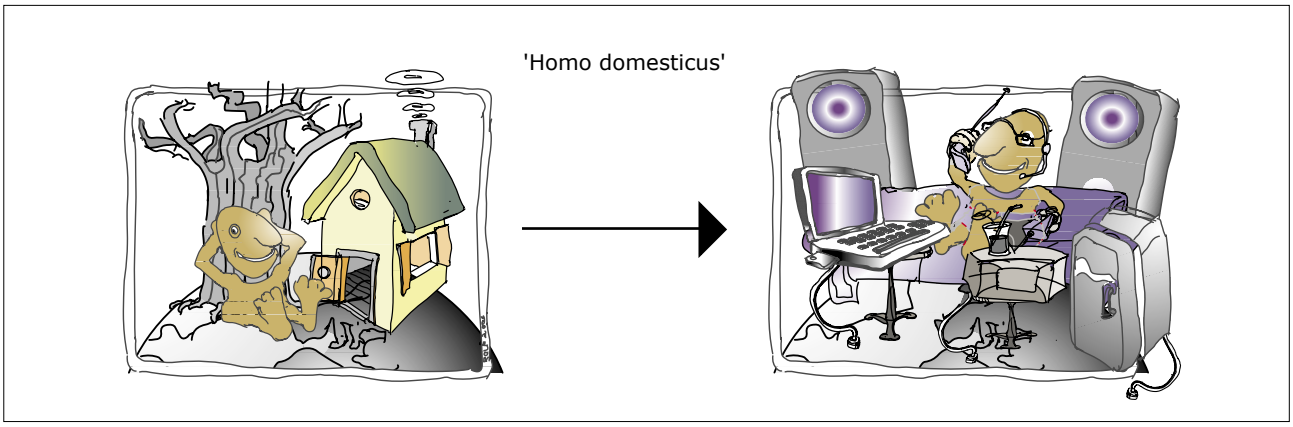
4 Housing: from basic shelter to homes with multiple electronic appliances

Key messages

Many houses and apartments now have multiple electronic appliances and are more luxurious. We build larger homes for fewer people and use more energy in our homes. We also buy increasing numbers of electronic goods like TVs, DVDs, PCs, laptops, mobile phones, stereos and various kitchen appliances, and replace these more frequently. As a result, even though the energy and resource-efficiency of each unit is improving, households continue to contribute the same share of greenhouse gas emissions and generate increasing amounts of waste.

The EU regulation on energy labelling has effectively shifted consumer buying behaviour towards the purchase of more energy- and water-efficient large household appliances.

The use of water pricing to make the price reflect its true cost is an example of a measure that has been effective in reducing household water consumption in some countries.



4.1 Why Europe should care about sustainable housing

The growth in number and the reduction in average household size have, in general, increased the environmental burden of our housing activities. The increased land and other resources needed for new dwellings has been reinforced by the demand for more space per person. Despite improved efficiency, the total amount of energy used for heating is still increasing due to a rise in the number of households (Rijkens-Klomp and Lieshout, 2004).

Also, households have access to a new range of electronic and communications appliances. Although these have become more energy-efficient, the increase in their number has outweighed efficiency gains. Technological development, fashion, and relatively low prices have all contributed to shorter life-cycles of many electronic appliances (Rijkens-Klomp and Lieshout, 2004). This has contributed to higher quantities of waste. Household water consumption, however, has shown positive trends, mainly as a result of water pricing and the use of metering in many European countries.

The construction of new houses and apartment buildings and the replacement of existing houses with new and larger houses have put additional pressures on the use of natural resources such as sand, wood, and especially on land use. In some European countries; there are tendencies towards a decrease in the potential technical and design life-cycle of a home.

Energy efficiency of housing increased

The general quality of new housing has, however, improved considerably. In particular, energy efficiency has increased, mainly as a result of the use of improved insulation and energy-efficient heating appliances in recent decades (Rijkens-Klomp and Lieshout, 2004).

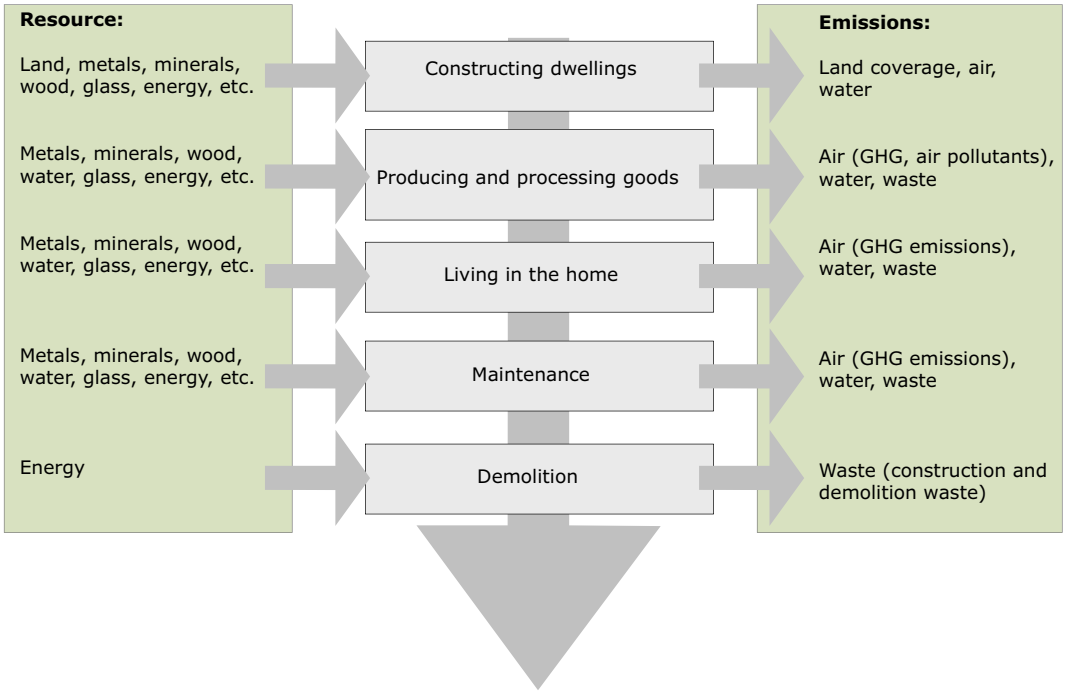
Heating is still by far the largest household use of energy in the EU (70 %). Also, the total level of energy used for home heating continues to grow, due mainly to the increase in the number of households and the size of the average dwelling (Enerdata, 2004).

Number of powered appliances has increased rapidly

The number of powered appliances (including communication devices, electronics, lighting and kitchen appliances) in homes has increased rapidly in recent decades. This has created additional pressures on the environment in terms of energy and water use and waste generation. Examples include washing machines, dishwashers, microwaves, refrigerators and freezers, and audio-visual appliances such as televisions, DVD players, mobile phones and personal computers. The latest trend has been the replacement of colour TVs with plasma screens and the introduction of Mp3 players.

However, penetration patterns of powered appliances vary across Europe with generally higher penetration in the EU-15 than in the new Member States. For example, by the end of 2001 the number of mobile phones reached 73 per 100 people in the EU-15, compared with an average of almost 50 in the new Member States (UNDP, 2004). These countries

Figure 4.1 Environmental effects of housing activities



are, however, catching up rather quickly. As in the EU-15, 95–100 % of households in the new Member States have a colour TV, and the average level of internet access in seven new Member States increased from 8.6 % in 2000 to 26.6 % in 2003/2004 (Poltimäe *et al.*, 2005).

Growth in numbers outweighs eco-efficiency improvements

Improvements in the eco-efficiency of many powered goods have been offset by their growth in number. For example, the energy efficiency of kitchen appliances has improved by a factor of 2 to 3 over recent decades, but total energy use has increased because households now have more appliances.

The share of households in total energy consumption has increased

Overall, the share of household energy consumption in total energy consumption has increased over the past ten years in almost all the EU-15 countries and in some new Member States (EEA, 2004d). The average annual household energy consumption per 100 inhabitants is still much lower in the new Member States (492 tonnes of oil equivalent) than in the EU-15 (716.5 toe) (Eurostat, 2005). Household energy consumption depends on factors such as number and size, the age of the dwellings, fuel consumption for heating and hot water, and outdoor temperatures.

The increasing share of households in total energy consumption has not, however, resulted in higher greenhouse gas (GHG) emissions. Due to the continued change from coal to gas and renewable energy sources, emissions of GHGs have remained fairly constant over the past ten years, only fluctuating with winter temperatures (EEA, 2002; EEA, 2004d).

The changes in household consumption related to housing have also resulted in more waste, especially construction and demolition, municipal, packaging and electronic waste.

The 'rebound effect'

The rebound effect refers to the situation where the volume of consumption outweighs any gains made through the improved efficiency of the products. For example, despite improvements in the energy efficiency of the average new electronic appliance (for example a TV, DVD-player or personal computer), the total energy use by electronic appliances in the average home increases because the number of electronic appliances in each household increases. For example, many European households now have two or three TVs and personal computers.

The rebound effect can be measured by the difference between the projected and actual reductions in environmental pressures. The increase in consumption, which limits the potential reduction directly and indirectly, can be caused partly by an increase in the use of goods due to their higher efficiency. For example, improved home insulation, which is projected to reduce heat losses by 50 %, will not necessarily result in a 50 % reduction in energy consumption, because households of insulated homes may find that they can afford to keep their homes warmer. The average energy consumption per unit for large appliances such as washing machines, dishwashers and cold appliances such as refrigerators and freezers fell by 21 % between 1990 and 2002, but total energy consumption fell by just 2 %, mainly as a result of the increasing number of appliances.

Sources: DEFRA (2003), ODYSSEE (2002).

Quantities of municipal waste have increased

For example, the amounts of municipal waste (of which on average two-thirds comes from households, see Glossary) increased in most of the EU-15 and the new Member States during the past decade, more or less in line with GDP growth. Growth in municipal waste generation per capita between 1990 and 2001 was more modest in the new Member States (10 %) than in EU-15 (30 %) (ETC/RWM, 2005; OECD, 2004; 2005).

Electronic waste

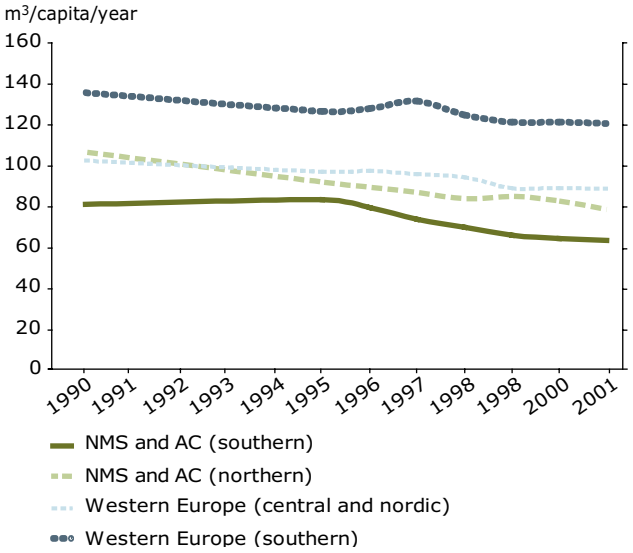
An average personal computer in Europe remains in use for three years. Together with cameras, cellular phones, notebook computers, TVs and many other small electronic devices, they result in around 5.5–7 million tonnes of electronic equipment waste per year, increasing by 3–5 % per year. The overall composition of electronic equipment scrap is characterised by a high metal content (more than 50 %); plastics account for about 20 % and glass just under 10 %.

Disposal of electronic waste presents serious hazards associated with carcinogenic substances, which can be leached to soil and groundwater over the medium and long term. Uncontrolled landfilling can also release contaminants over time. Incineration or co-incineration of electronic equipment waste, with no prior treatment or sophisticated flue gas purification, poses a major risk of generating and dispersing contaminants and toxic substances.

The EU waste electrical and electronic equipment directive, which aims to tackle these problems in Member States, came into force in 2003.

Source: Michaelis and Lorek, 2004.

Figure 4.2 Trends in urban water use



Notes: NMS and AC (southern): Turkey, Cyprus, Malta.
NMS and AC (northern): Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Slovenia.
Western Europe (central and nordic): Austria, Belgium-Luxembourg, Denmark, Germany, Netherlands, United Kingdom, Finland, Sweden, Ireland, Iceland, Norway, Switzerland.
Western Europe (southern): France, Greece, Italy, Portugal, Spain.

Sources: Kristensen, 2004b; Eurostat, 2005.

Water use per person in households decreased in all regions of Europe

Water use by households is approximately 15 % of total water use in Europe (EEA, 2003b). In contrast to energy use and waste generation, water use per person in European households has decreased in all regions of Europe over the past decade (Kristensen, 2004b). Water use is lower in the new Member States and the central and northern EU-15 countries than in the southern EU-15 countries (Figure 4.2). Most of the water is still used for flushing toilets, bathing, showering, running washing machines and dishwashing. The proportion of water used for cooking and drinking, compared with the other uses, is minimal. Use of metering and pricing of water are important factors that lead to less water use.

Water quality is of concern

Water quality, as well as water use, is also of concern. To reduce the environmental burden, wastewater from households needs treatment before it is discharged to open waters. Recent decades have seen a leap forward in the development of sewage treatment plants all over Europe, but with large regional differences (Kristensen, 2004b).

Facts and figures

- Households are one of the largest final energy users in the EU, accounting for 26.2 % of total energy consumption in 2001 (compared with 27.7 % for industrial use) (Eurostat, 2005).
- Space heating is by far the largest energy end-use in households in the EU-15 (70 %), followed by water heating (14 %) and electric appliances and lighting (12 %) (Enerdata, 2004).
- Dwellings built in 2002 on average consume 24 % less energy per m^2 than those built in 1990 (Enerdata, 2004).
- The European Commission projects a growth in household energy use in both the EU-15 and the New Member States over the next 30 years, ending up 20 % higher in 2030 (Mantzos *et al.*, 2003).
- Household water consumption in Europe ranges from on average 216 litres per person per day in new Member States to 247 litres in northern EU-15 Member States and 329 litres in southern EU-15 Member States (ETC/Water, 2005).
- The average amount of municipal waste generated in the EU-15 increased from 482 kg per person per year in 1995 to 577 kg in 2003. Amounts in new Member States are considerably lower (less than 350 kg per person on average) (ETC/RWM, 2005). On average, two-thirds of municipal waste is from households (EEA, 2000).

4.2 Emerging trends

The decreasing trend in household size and the consequent increase in the number of households, and amount of land that dwellings occupy, is expected to continue. Continuing improvements in eco-efficiency may eventually have a strong impact on the amount of energy needed to meet our desire for comfort and longer hours spent at home. Nevertheless, we are likely to be even more dependent on electronic appliances in the future. Despite their improved efficiency, growth in the number of appliances is still expected to outweigh any efficiency gains. Demand for electronic goods, the use of packaging and the quantities of waste are expected to keep on increasing. The use of water in households is expected to to stabilise or decrease across Europe.

Homes become more multifunctional and convenient

Our houses and apartments will remain a place of shelter, but will increasingly evolve into a centre of convenience, becoming increasingly 'wireless' and the place from where we shop and work (Rijkens-Klomp and Lieshout, 2004).

The homes we live in are likely to become 'smarter'. Technology breakthroughs could result in household duties such as cooking, washing and cleaning becoming even more streamlined and computer-aided, giving improved control over heating and electricity use. Nevertheless, many of these activities will use energy in terms of electricity, so it is highly probable that total energy demand will still continue to increase, despite many appliances becoming more energy-efficient (Rijkens-Klomp and Lieshout, 2004).

More and smaller households will cause higher pressures

The decrease in household size, and consequently the increase in the number of households is expected to continue in most European countries. This will eventually result in more houses and apartments, and will generally contribute to more use of energy and water and more waste overall. Energy use and waste generation are both expected to increase, but domestic water use may stabilise or decrease further due to water pricing and other measures in place.

EEA projections of water use by households show different trends in different regions

EEA projections of water use by households show different trends in different regions. Domestic water use by households in the northern EU-15 and EFTA countries is expected to stabilise and then slowly decrease (by 18 % between 2000 and 2030) as the efficiency of water use continues

to improve. In the southern EU-15 countries, water use by the domestic sector is projected to increase slightly, then stabilise for the same reasons as northern Europe. Projections for the new Member States are more uncertain, but domestic water use could increase by as much as 74 % by 2030 (EEA, 2005d).

EEA projections show the amounts of all waste streams from households increasing

EEA projections on waste show a continuing increase in the various waste streams from housing activities, including household, construction and demolition, packaging and electronic waste, although all waste streams are expected to increase more slowly than GDP. This represents a relative decoupling from GDP growth (EEA, 2005d).

Municipal waste generation is projected by the EEA to continue to increase in the next 25 years. In the EU-15, amounts are expected to increase by as much as 30 % while in the new Member States amounts could increase slightly less, by 20 % in the same period. (EEA, 2005d).

Standby mode leads to additional energy consumption

Studies indicate that between 3 and 13 % of residential electricity use in OECD countries can be attributed to standby power consumption. A significant number of electronic appliances spend most of their lives in standby mode. In some cases, standby energy use is several times the active energy use over the lifetime of the appliance. The most notable example of this is the VCR, which on average consumes 19 times more electricity in total in standby mode than while actively recording or playing. The energy use by standby mode is projected to increase substantially with the growing number of electronic devices and the trend to home and office networks.

Source: International Energy Agency, 2001.

But what if?

The emerging housing trends describe a continued growth in the environmental burden from housing activities, especially due to a growing housing stock and the purchase and use of electronic appliances. Because of efficiency gains and pricing mechanisms, water use is stabilising or even decreasing. But the future is anything but certain, and it is important to recognise this in relation to the future.

For example what if large groups of Europeans look for alternative ways of living together, trying to compensate for the social losses in the current era of individualisation? They may increasingly share goods and services. Perhaps the efficiency gains would outweigh the growth in consumption? Perhaps the use of energy per person would decrease? Or what if the current individualisation trend continues?

Or what if our homes become computer-aided to a much larger extent? Perhaps our lights will switch on when luminosity falls below a certain limit. 'Smart' food may decrease our total energy use to prepare a meal. Such technological changes could perhaps result in even more efficient use of energy, and reduce the total electricity consumption in the house. Or perhaps it would increase the energy use because the increase in the number of appliances outweighs the energy efficiency improvements?

4.3 Bending the trend

Various options to reduce the environmental burden of our household activities are available, e.g. the development of new building standards, labelling of electric appliances, and implementation of water pricing. Yet despite these, the environmental effects from housing activities are still increasing. To alter this trend actions need to focus on the whole life-cycle of the products consumed. Increasingly, however, the use phase has become a dominant concern, an area in which producers, consumers and policy makers all share responsibility.

There are many options for improving the sustainability of consumption related to housing activities, but it is beyond the scope of this report to present a comprehensive set of options.

A mix of tools can reduce environmental impacts from housing activities

However, studies of the effectiveness of the existing policies (see for example EEA, 2005a; OECD, 2001a) show that a mix of legal, market-based, information and educational and other tools can reduce the environmental impacts of consumption related to housing. Options to promote more efficient and environment-friendly technologies are of particular importance.

Overall, consumption related to housing is expected to increase whereas the 'life-time' of products continue to fall, particularly those of electronic and communication goods. It will therefore be important to produce goods with less material content and environmental impact, that are more energy-efficient in use and generate less waste. Actions that support technological development, for example in building materials, may help to ensure that improvements in resource efficiency outweigh the environmental effects of increased consumption.

EU and national legislation with regard to the environmental impacts of housing activities have not always been fully effective. For example the waste-prevention objectives of the EU directives have been unable to prevent the increases in amounts of municipal and packaging waste. Quantitative waste prevention targets may be considered in combination with other measures.

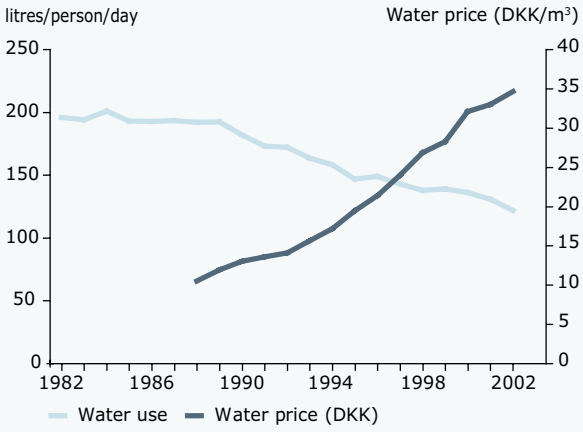
Getting the prices right can be considered

Further use of market-based instruments to 'get the prices right' for various goods consumed by households can also be considered. These include taxes and levies on goods with significant environmental impacts, for example on plastic bags or wastewater, and on resources that are scarce in certain parts of Europe, for example freshwater.

Policy effectiveness example: water pricing

Most EU countries are progressing towards water-pricing systems as required by the water framework directive. In a number of countries, increasing the price of water has already been shown to be an effective instrument for reducing water consumption by households. For example, the experience in Denmark shows that in a period with a significant increase in water prices, water consumption decreased from 196 litres per person per day in 1982 to 122 in 2002 (see below). Another example is Hungary where increases in water prices in the 1990s resulted in water use being reduced from 153 to 101 litres per person per day (Hungarian Central Statistical Office, 2001).

Figure 4.3 Water prices and household water use in Denmark



Source: Danish EPA, 2004

Information is important

Providing information to consumers, about the environmental impacts of the goods and services they buy, is important. Improving the current EU labelling schemes, such as the EU flower and the energy labelling scheme, and expanding labelling to other types of goods and services could be considered. Labelling the energy efficiency of houses and apartments is another

Policy effectiveness example: EEA pilot study on urban wastewater treatment policies

An EEA pilot study on policy effectiveness, published in 2005, evaluated the comparative effectiveness of urban wastewater treatment policies in Denmark, France and the Netherlands (between 1972 and 2002) and in Estonia, Poland and Spain (between 1990 and 2002). Specifically, it evaluated the effectiveness of policies aimed at reducing water pollution from point sources, including sewage from households. Such policies are implemented at the national level in the context of the urban waste water treatment directive.

The study concluded that putting in place user fees and levies to prevent the generation of wastewater, in combination with wastewater treatment, is an eco-efficient and cost-effective way of reducing water pollution. Wastewater policies in the Netherlands have proved to be more policy- and cost-effective than in other countries because of the focus on the polluter pays principle and the early use of market-based instruments which started in the early 1970s. In other countries, policies have been less cost-effective because of higher and sometimes over-investment in the capacities of wastewater treatment plants. Experience in the Netherlands and Denmark shows that effective and clear institutional structures are essential for the success of policies. New Member States are currently facing the challenge of how best to reduce wastewater pollution. It is expected that the cohesion policy (through cohesion funds and structural funds) will continue to support sewage treatment plants from its proposed 336 billion EUR budget for 2007–2013 for all ten new Member States. Cost-effectiveness is a concern in this regard and the cohesion policy could possibly address the polluter pays principle more systematically (EEA, 2005a).

interesting option which has been used in some countries.

Community-based initiatives can be important

Finally, community-based initiatives (eco-communities, car sharing, education, etc.) can also be important actions to limit environmental pressures from housing.

Policy effectiveness example: the European flower label

Launched in 1992, the European flower label certifies that a product complies with strict ecological criteria and meets high performance standards. It is currently less widespread than many had expected more than ten years ago, but covers a wide range of goods including household appliances, electronic equipment, textiles and cleaning products. A renewed effort to promote the label was launched in October 2004. The number of eco-labelled articles sold in the EU-15 rose from 80 million in 2002 to more than 217 million in 2003 (EC, 2005a).

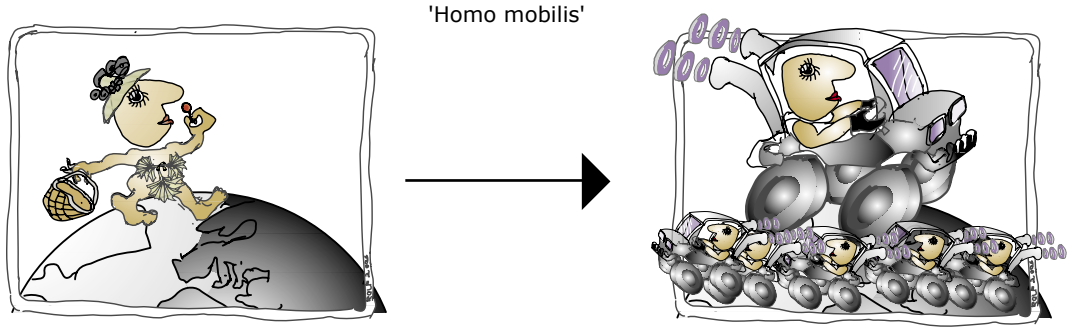
5 Personal travel and mobility: moving faster, further and more often

Key messages

Growing energy consumption and higher emissions of greenhouse gases from personal travel by road and air are a major course of climate change. The expansion of infrastructure to support travel causes fragmentation of natural habitats and thus affects biodiversity.

In Europe we have succeeded in tackling some air pollution problems mainly by applying end-of-pipe technologies and using cleaner fuels.

More actions could be taken to put sustainable mobility in place, especially using market-based instruments, labelling, better spatial planning and promoting investments in public transport infrastructures. The London congestion charge is an example of a measure that has already proven to be effective in reducing environmental pressures.



5.1 Why Europe should care about sustainable personal travel

Mobility is an essential aspect of our society and quality of life. We travel more often and over longer distances in order to go to work, school and shops, to enjoy our leisure time, to arrive at our vacation destination and for many other activities. EU citizens are generally very car-dependant and the personal travel and action radius is at its highest. Trends in the new Member States show that, unless preventative action is taken, kilometres travelled by car will continue to increase rapidly, giving rise to significant pressures on the environment and human health. Increasing greenhouse gas emissions from personal travel by road and air are a significant cause of climate change. Regulation, and promoting improvements in technology and fuels, have been successful in reducing emissions of certain air pollutants — particulates, acidifying substances and ozone precursors. But much can still be done to steer mobility behaviour in a more sustainable direction, especially through the use of regulation, market-based instruments, labelling, better spatial planning and investments in public transport infrastructure.

Personal travel and mobility is driven by the needs of people to access goods (shopping), services (employment, business, education, leisure) and other people. The time spent daily on travelling varies considerably from person to person, but on average is remarkably constant over time (45 minutes on average per day). Distances between home, work, school, shopping and leisure activities are increasing

as a consequence of urban sprawl, employment dynamics and increasing car ownership. The relative importance of the different purposes of travel are also changing.

Constant share of transport in household expenditure

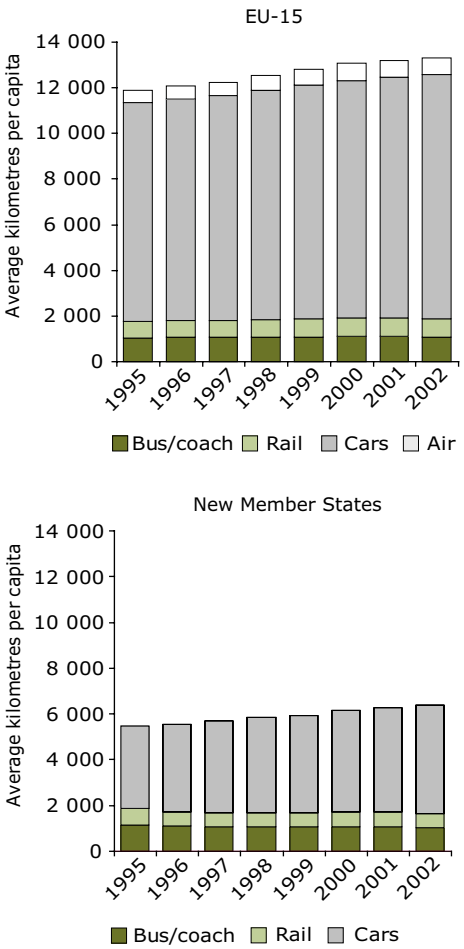
The share of transport in household expenditure in Europe has remained more or less constant over time (14 %), but varies between countries, for example from almost 15 % in France to less than 8 % in Estonia (Eurostat, 2005). The biggest increase in this share has been in the Member States with the lowest GDP per capita (for example, in Lithuania and Latvia (Eurostat, 2005). The share of transport in household expenditure gives an indication of the relative share of personal travel in the total consumption.

The growth of passenger transport is coupled to economic growth

Passenger kilometres in the EU-15 have in recent decades been closely coupled to GDP growth (EEA, 2204c). In the new Member States, the economic transition initiated after 1989 led to a period of economic recession in the early 1990s, and a drop in transport volumes. From 1994 onwards, economies and transport volumes both recovered. In the period 1995 to 2002, and looking at the EU-25 as a whole, a slight relative decoupling between growth in passenger transport and economic growth was observed: passenger transport demand increased by some 15 %, while GDP (in constant prices) increased by almost 18 % (Eurostat, 2005).

Strategies to improve the modal balance between the different types of transport are being developed under the EU's common transport policy and in several countries. But there has been a significant shift from the use of public transport towards the private car in the EU-15 in recent decades, its share now stabilising at around 80 %. In the new Member States car travel has increased its share at the expense of public transport by bus and rail. Explanatory factors for these trends include the fact that public transport passenger fares have increased faster than the costs of private car use, and a deterioration in the quality of public transport in some countries.

Figure 5.1 Per-capita passenger transport demand by mode



Notes: There are not consistent time series passenger transport demand data in Malta, Cyprus, Latvia, Lithuania and Estonia. The calculations for the new Member States are based on Poland, Hungary, Czech Republic, Slovenia and Slovakia. Data for air transport passenger demand are not available for the new EU Members States. For the EU-15, air transport data includes domestic flights plus intra-EU-15 flights.

Sources: Eurostat, 2005; EC, 2004c.

Air travel is growing faster than the economy

After a temporary slowdown following 11 September 2001 and the SARS epidemic in 2002, aviation is now growing significantly faster than the economy. This trend is projected to continue. Aviation's share of total passenger-km now almost matches that of rail transport. People tend to visit more remote destinations, and are more often making short trips to destinations outside and inside Europe.

The recent highly competitive prices of the 'low-cost carriers' is a very important contributor, from the supply side, to the increase in personal air travel. The tendency towards lower prices is not new, but rather a continuation of a development since the beginning of commercial aviation.

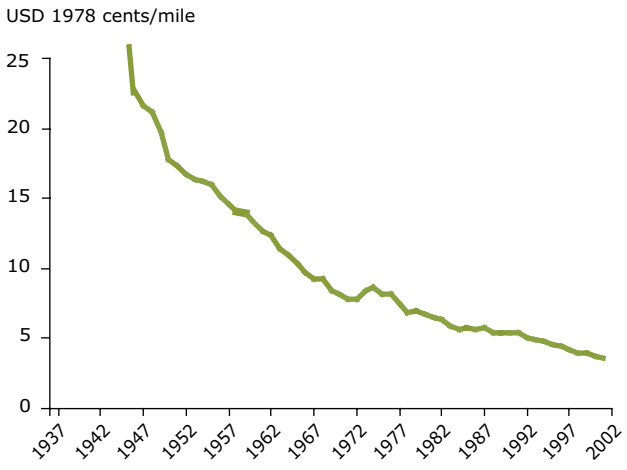
Use of rail is low in EU-15, and decreasing in the new Member States

The share of rail use in total passenger-km has remained constant in the EU-15 (at around 5.5 %), but is decreasing in the new Member States. For five new Member States (representing 87 % of the population of the new Member States) it fell from 13.2 % in 1995 to 9.7 % in 2002 (EEA, 2004c). One reason is that prices for rail travel have increased compared with those for road travel. Another is the demise of old rail systems.

With the gradual development of the trans-European high-speed rail network, high-speed trains are gaining market share in some countries. Fast trains are becoming a viable alternative to the car and aviation for intercity traffic. Many of Europe's larger airports also see high-speed rail as an opportunity to shift their (often less profitable) short-distance flights to rail. As a result, for example, Air France has ended its flights between Paris and Brussels, and is cooperating with the high-speed train service from Brussels to Paris Charles de Gaulle airport.

Passenger-km by walking or biking is low compared with the other modes, but increasing. In 2000, each EU-15 citizen on average walked 382 km (a 5 % increase since 1992) and cycled 188 km (the same as in 1992) (EC, 2003a).

Figure 5.2 Fifty years of decrease in international flight prices (USD 1978 cents/mile)



Note: Yields of US airlines in international traffic. Domestic figures show similar trends.

Source: Air Transport Association, 2005.

Car use is increasing continuously

Looking at personal travel in passenger cars, total passenger-km travelled in the EU-15 increased by 10 % between 1995 and 2002, when it was almost 10 700 km per person on average. In the new Member States, passenger-km travelled is significantly lower (4 750 for five NMS in 2002), but is increasing more rapidly than in the EU-15.

Car ownership, also closely linked to economic growth, is an important factor driving mobility growth. The growth in the number of cars per capita has been strongest in the European countries with initially low numbers, for example Portugal, the Baltic States, and Poland. The growth in passenger cars per 1 000 inhabitants in 1990–2001 in the new Member States was 74 % (EC, 2003; Eurostat, 2005). Nevertheless the absolute number of cars is still largest in countries that already had high numbers per capita, such as Luxemburg, Germany, and Italy, but other countries are catching up quickly.

We are also seeing an increasing share of households with two or more cars (EEA, 2005e). There are, however, many households without a car. In 1996, 10.5 % of EU households did not have a car because they could not afford it and 16.2 % because they did not want one (EEA, 2005e). In 2001, the figures for the United Kingdom showed that 27 % of households did not own a car (UK Office for National Statistics, 2005).

Unsustainable behaviour offsets technology improvements

While efforts have been made to make cars more energy-efficient, these gains are being offset by changes in behaviour. People tend to buy heavier cars equipped with more energy-consuming features such as air conditioners and electronic devices. And in many EU-15 countries the trend of increased use of more fuel-consuming multi-purpose vehicles, for example sport utility vehicles, is now evident.

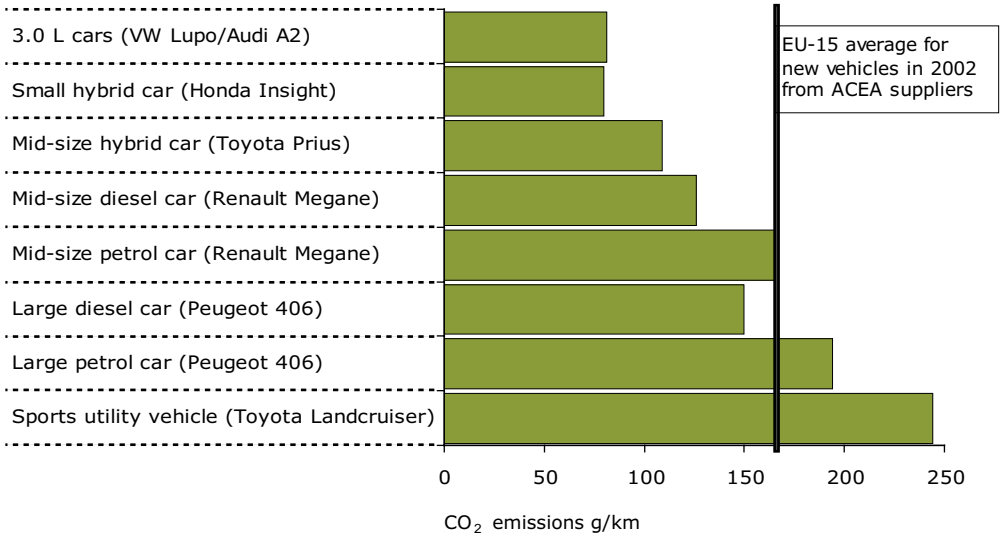
Around half of passenger trips are quite short, less than 6 km (EEA, 2004b). Decreasing occupancy rates (fewer people per car) and driver behaviour (e.g. speed) are also important factors determining the trends in the environmental impacts of car use.

Sport utility vehicles (SUVs)

In the United States sport utility vehicles (SUVs — often four wheel driven) are the second-most common way of transporting families, after the minivan. As SUVs tend to be much less fuel-efficient than regular-size cars, they contribute significantly to climate change and air pollution (Public citizen, 2003).

In Europe, we are now starting to see a similar shift from regular-size cars to SUVs and we can expect that as a result the average fuel efficiency of a car in Europe would be less than if SUVs were not used. Thus, it may be more difficult to reduce emissions of greenhouse gases and other air-polluting substances than previously thought.

Figure 5.3 Fuel efficiency of new vehicles in Europe



Source: EEA, 2004b.

The environmental effects of personal travel and mobility result not only from energy use, but also from the expansion of infrastructure, which causes fragmentation of natural habitats and hence biodiversity loss, and noise from traffic.

Growth in transport volume outweighs fuel efficiency gains

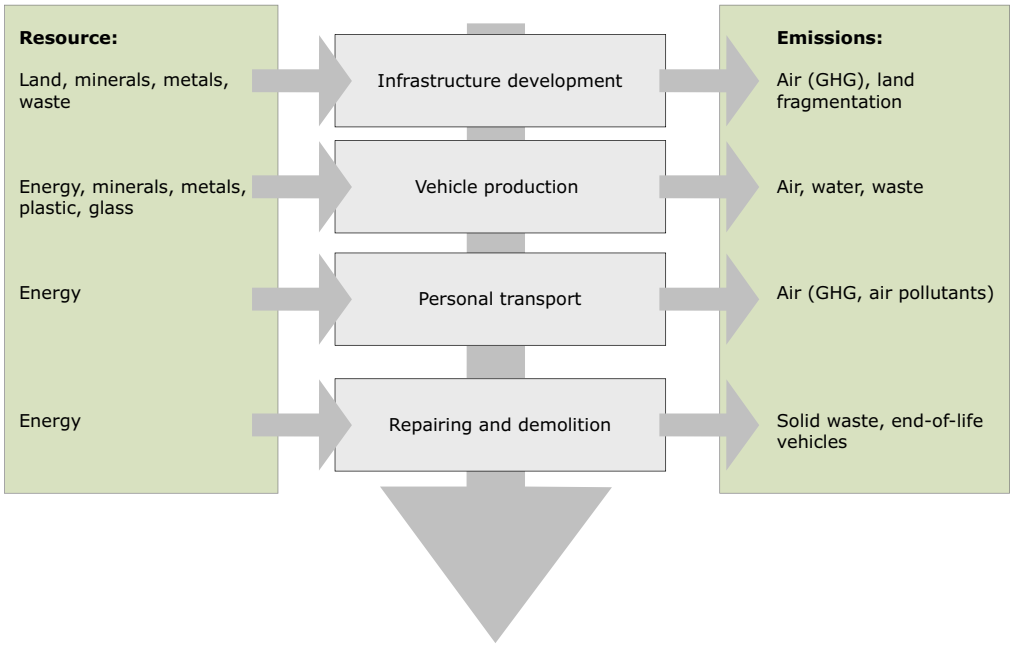
Passenger cars have generally become more energy-efficient, but the growth in transport demand and the increased use of heavy and relatively fuel-inefficient cars has outweighed these improvements, resulting in a net increase of about 20 % in greenhouse gas emissions from transport over the past decade (EEA, 2004). The most fuel-efficient motor vehicles on the European market emit about a third of the CO_2 that a typical sports utility vehicle emits. In addition, one should be aware that the tested fuel efficiency is not always a true reflection of actual emissions since real traffic is often more energy-demanding than test conditions, because of acceleration and fast driving and the use of air conditioning and other energy-using devices.

GHG emissions from air travel have increased

Greenhouse gas emissions from air travel have increased rapidly in recent decades as a reflection of the strong increase in air traffic. This trend is expected to continue.

Emissions of air pollutants from passenger transport by road are currently decreasing. This is due mainly to technological improvements, such as the catalytic converter and other technical abatement measures needed to meet EU standards, which currently outweigh the growth in personal travel volumes. As a result, emissions of particulates (PM_{10}), acidifying substances (NO_X, NMVOCs) and ozone precursors (SO_X, NO_X, NH_3) have decreased in the past decade. However, in spite of this decrease, there are still major air quality problems from road transport in many urban areas of Europe.

Figure 5.4 Environmental effects of personal travel and mobility



Other environmental effects of personal travel and mobility include those on biodiversity, noise, and waste from end-of-life vehicles. The expansion of infrastructures to support personal travel, in particular road, air and high-speed trains, fragments natural habitats and is posing serious threats to biodiversity in some areas (EEA, 2004c). As a result of increasing personal travel, noise problems are also increasing, in particular in urban areas and close to airports. Road accidents still result in an extremely high toll in terms of lives (50 000 annually in the EU-25) and injuries.

Our personal mobility comes at high cost

Personal mobility provides significant benefits to society but also places high costs on people and the environment. The external costs of transport are a matter for debate since there is no consensus on a methodology for estimating them, but it may amount to between 4 % (ECMT, 1998) and 8 % (Infras, 2000) of GDP, with passenger transport being responsible for around half of the total cost.

Our current mobility patterns are also potentially unsustainable from a socio-economic point of view. Congestion is making European urban areas less and less easily accessible, leading to significant costs in terms of delivery delays and lost working hours.

Environmental gain because of IT revolution?

Information and communication technology (ICT) can create transport savings (for example through tele-working and internet shopping), but this potential should not be overestimated. The net effect on the environment is not clear. Money or time saved may be spent on something else that also requires transport at some level, or transport savings may be applicable only for small segments of the population, and in the case of online shopping, savings in personal transport are (partly) outweighed by delivery transport (Wuppertal Institute, 2003). Also, internet shopping may provide consumers with opportunities to buy goods and services they would not otherwise have bought.

Facts and figures

- Households spend on average 12 % of their income on private transport, and less than 2 % on public transport (EEA, 2004b).
- In the EU-15, the share of cars in the modal split has remained constant at around 80 % since 1995, while the share of air transport increased from 4.6 to 5.6 % between 1995 and 2002. At the same time the share of rail has remained constant at 6.1 % and the share of bus and coach has fallen from 8.7 to 8.1 % (EEA, 2004b).
- For the five new Member States for which a time series is available (no data for air travel) the share of cars increased from 66 % in 1995 to 74 % in 2002, while the share of both rail and bus/coach decreased significantly (EEA, 2004b).
- The motorway network in the 10 new Member States grew by 62 % between 1990 and 1998 (by 1 045 km), compared with 35 % in the EU-15 (by 12 606 km). Between 1990 and 1998, it is estimated that 30 000 ha of land (about 10 ha every day) were taken for motorway construction alone in the EU-15 (EEA, 2004b).
- Transport CO_2 emissions per capita in the new Member States are on average about three times lower than in EU-15 (EEA, 2002).
- 30 million Europeans are exposed to harmfully high levels of road transport noise (EEA, 2004b).

5.2 Emerging trends

The modes and extent of our travel will depend on how we organise our lives, how functions are spatially planned, in what way information technology affects this organisation, the quality of the supply of different modes of transport, and on whether we become globally or more locally orientated.

The role of personal travel is expected to become increasingly important in the new Member States, especially as income levels rise. As in the rest of Europe, the environmental effects depend strongly on whether the current shifts in the modal split continue, whether passenger car and air transport become more fuel-efficient, and the extent to which alternative fuels and energy sources become widely available.

Air travel is projected to increase its share from 5.5 % to 10.5 %

Passenger transport (km/person) in the EU-25 is projected to increase by 53 % between 2000 and 2030, which represents a continued slight relative de-coupling from economic growth (EEA, 2005d). A change in the modal split can be expected. In that period, the share of air travel in the EU-25 is projected to increase from 5.5 % to 10.5 %, while that of cars and motorcycles falls (from 78 % to 76 %) and that of public transport (rail, bus, metro) falls (from 9 % to 6.5 %). Such shifts would increase greenhouse gas emissions from passenger travel. For air travel, the expectation of the industry is a continued expansion in travel in the range of 2.3 to 3.4 % per year for the next 20 years (Eurocontrol, 2004).

Technology keeps improving

But while production technology has improved tremendously, improvements to the final vehicle have been smaller. Nevertheless a number of technologies hold the promise of greatly reduced emissions. Technologies such as hybrid cars and fuel cells may help to reduce emissions per consumption unit, but as long as consumption keeps growing the net benefit will eventually be overwhelmed by growth in demand.

In many cities, parents make more and more use of the car to transport their children to school. Congestion around schools is becoming a key urban traffic problem. In the longer term, this behaviour also risks developing an even more car-dependent generation; children who are not encouraged to walk, cycle or use public transport will later in life be much less inclined to chose alternatives to car transport.

The e-society may replace or remove some mobility needs, or create new ones

The information society allows new ways of working, education, shopping and contacting people. It may replace or remove some mobility needs, but at the same time create new ones (due to expansion of personal and professional networks, and access to services and goods). It is not yet possible to document any reductions in demand for transport resulting from home offices, etc. Indeed demand may actually increase as people become less dependent on travelling during rush hours, and therefore take trips that would earlier have been avoided because of congestion.

But what if?

The emerging personal transport and mobility trends include a rapid growth in air transport, further technological improvements, and a continued increase in car use and the possible growth of car-dependency of future generations. The future is anything but certain, and it is important to recognise this when describing such trends.

What if new energy-efficient and highly convenient modes of public transport were introduced and available at competitive prices? Perhaps larger parts of society might leave the car in the garage and use more efficient 'on demand' modes of public transport. Perhaps technology holds the clue to help people feel less car-dependent. But such public transport modes would need a new system of infrastructure, which might put extra pressure on land use and biodiversity. And would the new modes be available to all?

Or what if a fully-fledged knowledge economy were established? Perhaps people might need to commute less between work and home. But what if they used their increased spare time to travel for other reasons? In that case we might observe a shift in mobility split from home-work to leisure. The reduction in home-to-work travel may be outweighed by a larger increase in 'free time' person kilometres.

5.3 Bending the trend

In addition to implementing cleaner technologies and fuels, many options are available to influence transport behaviour in order to manage the growth in car and air transport. One is a change from the mainly supply-orientated actions of recent decades (focusing particularly on road transport infrastructure and car supply) towards more integrated demand-side policies designed to improve accessibility, with restrictions on the growth of motorised traffic. The challenge for policy makers lies in reconciling such policies with the public perception of mobility as an expression of personal freedom.

Many and varied options for reducing the environmental effects of transport

There are many and varied policy options for reducing the negative environmental effects of transport. Road pricing, congestion charges, traffic-calming schemes, better provision for pedestrians and cyclists, public transport investment, better mixing of functions, telecommunications, car sharing, etc. have all been put in place in various places in Europe, with some success. It is a challenge to put in place a mix of actions across Europe, including legal and regulatory tools, information, spatial and urban planning, and public transport infrastructure.

Giving the right price signals

A generic tool that could be used in a broader approach to transport planning is pricing, with users being asked to pay for the external effects of their transport. This would include taxing fuel use by air transport, and charging for the use of motorways or roads in city centres, such as the London congestion charge. At the EU level, the application of transport taxation and charges still needs improvement. Another possible market-orientated approach is more effective urban parking management. Charging for parking in cities is an easy-to-implement way of creating incentives for a switch to environmentally sound modes such as bus, rail and bicycle. Efforts could focus on long-term parking for commuters in order to give this group, in particular, added incentives to switch to environment-friendly modes. The revenue could be targeted at developing local public transport and bicycle traffic

Ensuring that consumers have access to comparable information is another tool. However, the purchasing of transport is not a rational process. This is especially true for personal vehicles, where decisions are guided by many aspects, including status.

Improving the attractiveness of environment-friendly non-motorised vehicles such as bicycles has had some success, but again has not managed to bend the trend. People often take their car to go to work and then continue on to a sports centre rather than using a bicycle to go to work and get exercise from that activity.

Awareness-raising campaigns are being organised

More awareness-raising campaigns are being organised throughout Europe. Car-free cities, car-free days, mobility weeks, car sharing, etc. can all help focus on the need to reduce transport demand. Eurobarometer surveys show that traffic-related

Policy effectiveness example: the London congestion charge

The London congestion charge was introduced in February 2003 with the aim of reducing the significant congestion in central London during the day. It charges a fee of GBP 8 for driving private cars into London during weekdays. During the first five months of the programme, automobile traffic in London declined by 20 %, a reduction of about 20 000 vehicles per day. The charge has now significantly reduced car traffic, congestion and emissions from cars. At the same time it has improved bus and taxi services and generated substantial revenues while public acceptance has grown (Litman, 2004). The charge is a very good example of the effective use of a market-based instrument (a charge) to reduce car traffic and its environmental effects — an example which could be copied by other cities in Europe. As the charge increased from GBP 5 to GBP 8 on 1 July 2005, it may reduce car traffic even further.

Policy effectiveness example: free public transport in Hasselt, Belgium

In Hasselt (Belgium) people can make use of free public transport by bus. This opportunity has been offered since 1997. Since these measures were implemented, the use of public transport in the city has increased significantly, by a factor of 8 to 12. However, surveys showed that a large share of these 'new' passengers are people that previously walked or cycled. This shows the importance of combining such measures with other instruments to encourage car drivers to make the shift to public transport (e.g. parking policies, car restrictions in the centre) (Wikipedia NL, 2005; Groenlinks Groningen, 2005).

environmental problems and congestion rate high among EU citizens' concerns. The challenge is to turn these concerns into individual action.

Photo: © EEA. Source: Pawel Kazmierczyk, 2005.

6 Tourism behaviour: consuming elsewhere, and getting there

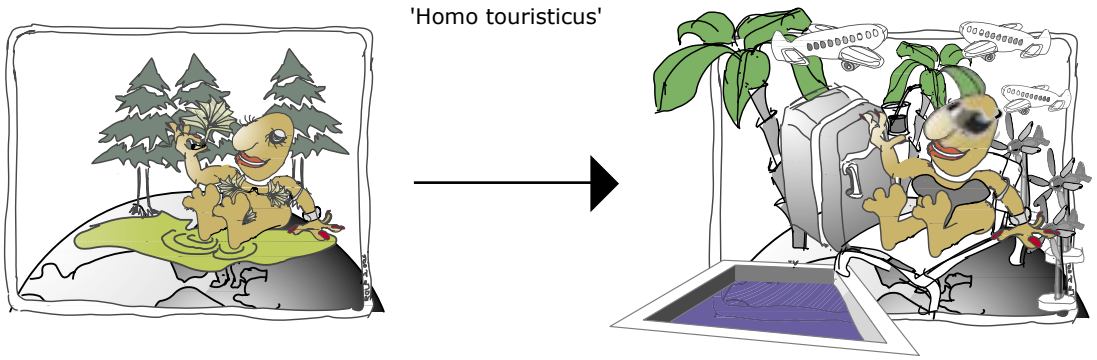
Key messages

Tourism is a rapidly growing sector of the EU economy and the tourism behaviour of European consumers is changing.

The negative environmental effects of tourism are increasing. In particular, air and car travel to and from destinations generates greenhouse gas and other harmful emissions, while at destinations the consumption of water and energy, the use of land and the generation of waste and waste water are all increasing.

A further growth in tourism by European citizens — also to new parts of Europe and other parts of the world — is to be expected. As a consequence, environmental pressures from tourism are expected to continue to increase.

Few sustainable tourism policy instruments have so far been developed and implemented at the European level.



6.1 Why Europe should care about sustainable tourism

Tourism has become important in the lives of European consumers: we have an increasing wish to discover other cultures, lifestyles and landscapes and to relax away from home. As a result, tourism is now a booming business. Many Europeans travel to other regions of the world and enjoy their vacations in many different ways, while at the same time we see prices have beenfalling. Increasing wealth and changed lifestyles, in combination with relatively cheaper flights and accommodation and more leisure time, have stimulated tourism. Additional developments like internet reservations, which make booking easier, shorter travel times (e.g. because of the use of high-speed trains and more flight opportunities) and media promotion of tourism all contribute to this continuing trend.

The growth in tourism has offered many European citizens new dimensions to their quality of life and a chance to discover other parts of Europe and the world. However, the other side of the coin is that the environmental effects of such tourism (travel and the activities we undertake at the destination) are growing, not only inside but also outside Europe.

Tourism is one of the most rapidly growing economic sectors

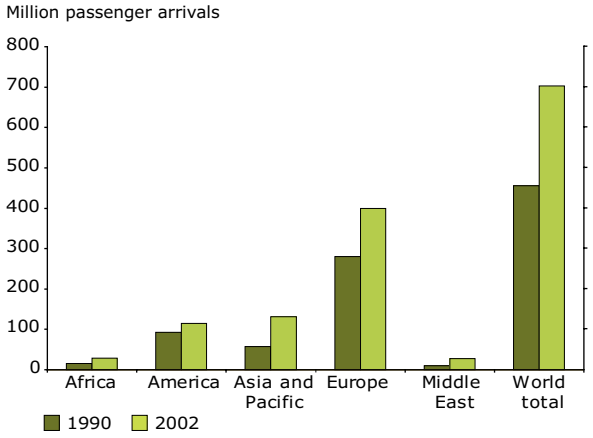
Tourism is important for the European economy as it is one of the most rapidly growing economic sectors. In 2002, Europe confirmed its leading position as the world's top destination with a 57 % market share, and generated 400 million arrivals (World Tourism Organisation, 2005a).

In recent decades, tourism has evolved from something only the wealthy could afford to a widely accessible and affordable consumption service for many citizens in Europe.

The current trend is to take more and more frequent trips to a wider array of destinations, including for example beach resorts, large cities and winter sport areas. We travel longer distances, mainly because destinations further away have become more accessible due to cheaper and faster air transport and better road and air transport infrastructures. But domestic tourism still counts for a great part of all tourism activities in Europe.

The share of air travel for tourism in Europe is increasing rapidly. However, in Europe — where most of the countries are partly or completely landlocked and infrastructures are well developed — tourism remains characterised by the large share of arrivals over land. Travel by road account for more than half (57 %) of all arrivals while travel by train accounts for only 5 % (World Tourism Organisation, 2005a).

Figure 6.1 International arrivals 1990 and 2002



Source: World Tourism Organisation, 2005a.

The largest flow is to the Mediterranean

A closer look at the picture shows that by far the largest flow is from the colder northern regions to the countries bordering the northern coast of the Mediterranean. But large numbers of tourists also go to large cities and ski resorts. A recent trend is the increase in tourists to the new Member States.

Mass tourism is characterised by very large seasonal peaks. The high number of EU tourists affected by the Asian tsunami tragedy has painfully brought to attention the large number of travellers seeking warmer resorts outside Europe in order to escape European winters. The Alps are particularly subject to mass tourism in wintertime.

The three summer months from July to September are definitely the favourite ones for long holidays. Short holiday trips, for example to major European cities, are more popular during the rest of the year.

Second homes are a recent and growing trend

A recent and growing trend is that Europeans are buying more second homes in which they can spend part of their holiday and/or use for weekends. Many are in the most environmentally sensitive areas, on coastal zones and in skiing areas. One the other hand, second homes may prevent some citizens from travelling much further for tourism and leisure or from buying other goods and services, thereby avoiding perhaps even higher pressures on the environment.

Regarding impacts, tourism is leading to increasing greenhouse gas emissions from air and road travel, higher noise levels and the consumption of more energy and water, waste generation, land use and loss of scenic and coastal habitats at destinations.

More second homes in France

In France, the number of second homes has increased significantly since the 1990s, notably in the most environmentally sensitive areas, in coastal zones and skiing areas.

Construction of second homes increased by 10 % during the past decade, covering more than 22 million m^2 of land. Second homes represent 73 % of total tourism lodging capacity, and 18 % of all nights spent by residents in 1999 were in second homes. This highlights that most second homes are seldom used: often only 2 weeks a year (up to 11 weeks) compared with more than 30 weeks for hotels (Rouquette and Taché, 2002).

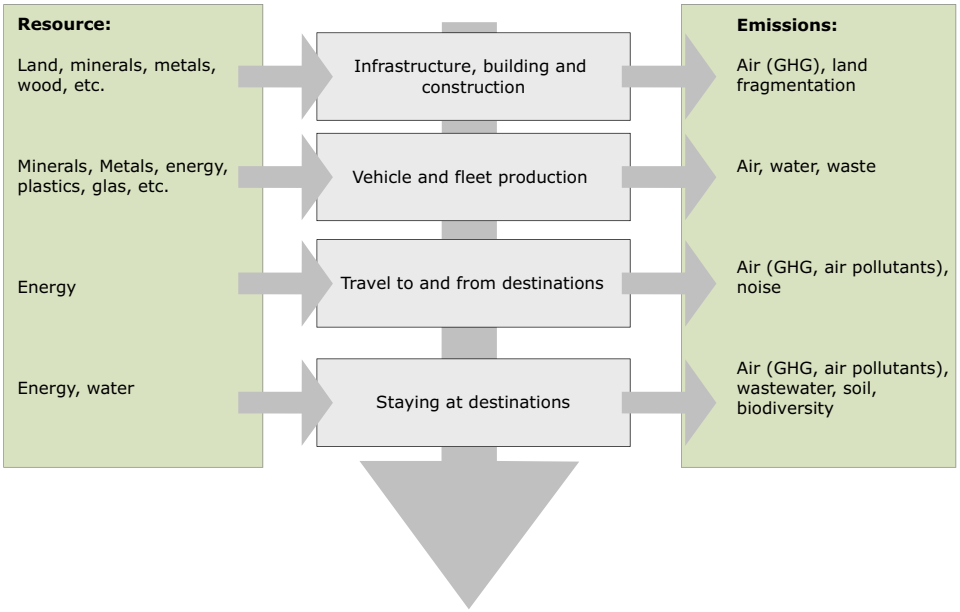
GHG emissions from air travel to destinations are increasing

Because of the rapidly increasing number of tourist arrivals by air and the longer distances to destinations, the share of greenhouse gas emissions from air transport of tourists to their destinations of total greenhouse gas emissions is increasing. Also, because emissions from air transport are at higher altitudes, their potential impacts on climate change are more severe.

At destinations, tourists consume large amounts of water, energy and space

At destinations, especially those with more luxurious accommodation, tourists consume large amounts of water, energy and natural space. Consumption of water and energy is particularly high during peak seasons. Natural space at destinations is used both for building of resorts, facilities and infrastructure. Hotels have the highest water and energy consumption per tourist night compared with other types of accommodation (Rijkens-Klomp, Liehout and Amelung, 2004). The heating of hotels, their swimming pools, and air conditioning, require the use of significant amounts of energy. Energy use per person staying in a hotel

Figure 6.2 Environmental effects of tourism



Facts and figures

- In the EU, tourism now accounts for about 4.3 % of GDP (WTTC, 2004).
- In 2002, more than half of the countries in the top 25 of the world tourism earners were in Europe, with Spain and France taking positions two and three after the United States. China comes in fourth (World Tourism Organisation, 2005a).
- 88 % of all international arrivals in European countries are from other parts of Europe (World Tourism Organisation, 2005a).
- Tourism from northern Europe to the Mediterranean amounts to about one-sixth of all tourist trips worldwide. (World Tourism Organisation, 2005a) France welcomed 75 million international tourist arrivals (11 % of worldwide arrivals) in 2003. Spain has the second position, and tourist arrivals are growing by more than 3 % per year. Italy follows with arrival numbers almost reaching 40 million. Turkey leads growth with an increase of over 15 % per year (World Tourism Organisation, 2005a).
- 1995–2002 saw a significant growth in arrivals in Estonia (157 %), Lithuania (120 %), and Slovenia (78 %) (World Tourism Organisation, 2005a).
- The main holiday destinations chosen by European citizens are by the sea (63 %) (EC, 1998).
- International arrivals are expected to double (from 1995) to reach more than 1.56 billion by 2020, by when the top three receiving regions are expected to be Europe (717 million tourists, still almost 50 % market share), East Asia and the Pacific (397 million) and America (282 million) (World Tourism Organisation, 2005b).
- The energy consumption of hotels ranges from around 15 to 90 kWh per occupied room per day (plus 15 kWh for laundry) (ACCOR, 1998).
- The water consumption of an average hotel is 200 to 450 litres per day per occupied room (700 litres including laundry) (ACCOR, 1998).

is often higher than at home because tourists use more showers and air conditioning during summer, and more heating in winter, for example at ski resorts. Water consumption per person in hotels is also much higher than at home.

Tourism places severe pressures on water resources at the regional and/or local level in some parts of Europe. The popularity of Mediterranean coastal resorts and the heavy seasonal and geographical concentration of tourism in some cases results in over-pumping of groundwater and the discharge of large volumes of untreated or poorly-treated wastewater into coastal waters. The increase in water demand is often associated with recreational uses such as swimming pools, golf courses and aquatic parks as well as consumption by a much-increased population during holiday seasons.

Leisure facilities such as yacht marinas, golf courses and skiing (ski lifts and artificial snow making) also use natural resources intensively. Visiting environmentally sensitive areas such as natural parks, forests, and coastal and mountainous zones has direct impacts on biodiversity.

6.2 Emerging trends

The expectation is that the tourism sector in Europe will continue to grow rapidly during the coming decades, which will lead to an extra environmental burden inside and outside Europe. The characteristics of tourism are likely to change in terms of types of future tourists and preferred destinations, transport modes, accommodation, activities and their prices. All these factors together will determine the future environmental burden of tourism.

The environmental burden from tourism is likely to continue to increase

There are no signs that the growth in tourism by European consumers is reaching saturation. On the contrary, it is projected to continue to increase rapidly in the coming decades (Rijkens-Klomp, Lieshout and Amelung, 2004). A further growth in tourism

in Europe and by Europeans will undoubtedly lead to even higher direct pressures on the environment, locally and globally. Thus, the environmental burden from tourism is set to rise.

The future European tourist will be older on average, may have a higher income and may prefer holidays designed for the individual. The number of European tourists is likely to increase as more people, including the inhabitants of the new Member States, travel inside and outside Europe on a frequent basis. Also more tourists from other regions in the world such as China are likely to visit Europe.

Destinations in the new Member States are likely to become increasingly popular

We can expect that new destinations will be discovered and that people will travel throughout the year. This will spread the tourist peaks in time and space. New destinations in the new Member States and in Accession countries are likely to become increasingly popular. And we can expect more people to travel to destinations outside Europe, including exotic destinations or regions such as the Arctic.

In the long run, transport modes may eventually become so much faster and prices so much lower, that Europeans may increasingly take short trips, for example to America or Asia.

Another possible future trend is that ecotourism is likely to become more important. While its purpose is to interpret the natural and cultural heritage of a destination to the visitor, it needs to be carefully developed like any other form of tourism with respect to careful consumption and management of resources, in particular energy and water.

At the moment the demand for sustainable tourism is small, but with growing awareness in combination with strong policies, consumers may prefer more sustainable vacations in the future.

But what if?

The current and emerging trends describe a sector expected to continue to grow rapidly in Europe. Demographic changes, rising incomes, and a demand for exploration are driving tourism growth, which leads to increasing environmental pressures from travel and at destinations. But the future is anything but certain, and it is important to recognise uncertainties related to the future.

For example what if in the long term climate change positively changes the climatic conditions of some destinations? Will preferences change accordingly? Climate change might spread tourism to the north of Europe, and reduce the pressure on the Mediterranean. In which case tourist facilities would be needed in northern Europe. The pressure on scarce land and on biodiversity may increase further.

Or what if in the long term technology enables the tourism industry to offer all kinds of facilities near to where people live? Perhaps immense tropical swimming paradises, with artificial sun, and beaches or indoor golf tracks can partly replace the need to travel abroad. Travel by air might drop as a result of this, and consequently the CO_2 emissions from tourism travel by air would decrease. But might such new vacation and recreation options be considered as complementary to the regular holidays, resulting in a higher environmental burden from tourism?

6.3 Bending the trend

The key for change, for bending the trend, seems to lie in changing behaviour, especially on the demand side through the needs and preferences of consumers, but also on the supply side by targeting tour operators and travel agents. A mix of options could combine legal, market-based, communication and education tools to influence the travel opportunities offered to tourists and their needs and perceptions. They could aim to affect consumer behaviour and the environmental burden of tourism. Few sustainable tourism policy instruments

have so far been developed and implemented at the European level.

An EU Communication on sustainable tourism was adopted in 2003

In Europe, only a few, scattered policy measures have been put in place to address the environmental effects and sustainability of tourism. In 2003, however, the European Commission adopted a 'Basic orientations for the sustainability of European tourism' Communication which emphasises the need to ensure consistency of EU policies affecting the sustainability of tourism and the competitiveness of the industry.

In order to minimise the environmental effects of tourism and thereby improve its sustainability, a variety of options are available including market-based, information and other instruments. A mix of options could address both the demand and the supply side.

Market-based instruments can be used to get the prices right

Market-based instruments can be used to get the prices right, in other words to have prices better reflect the 'true' costs of tourism. For example, taxes on motorised transport modes (e.g. travel by air) could be considered. At destinations, various market-based instruments could be considered to make tourist pay the 'true' costs of their energy, water use and the waste they generate.

Labelling can enable consumers make informed choices

Labelling can provide a useful tool to enable consumers to make informed choices about their tourism behaviour, including its sustainability. In some countries labeling schemes for accommodation and municipalities have been in place for some years. An EU eco-label for tourist accommodation has been in place since 2004 (EC, 2005b). But consumers have no information about the environmental effects of their travel to tourist destination. Providing such information would enable consumers to choose their mode of travel knowing its environmental effects.

Developing leisure activities relatively close to where people live, for example, open and green spaces in cities, nature parks, theme parks or second homes, or promoting domestic tourism are potentially promising ways of reducing the demand for tourist activities far from home and thereby reducing the environmental effects of tourist travel.

Governments and employers could also consider encouraging the spreading out of employee holidays, so that tourist activities are not concentrated in time and thus in place.

Purchasing behaviour, and thus attitudes and lifestyles, can be influenced by different means of communication. Such tools could be used for campaigns to make people more aware of attractive alternative destinations and travelling modes. Educational programmes in schools and spreading

Policy effectiveness example: eco-labelling

The EU eco-label also covers tourist accommodation services and an EU eco-label for camp sites is being completed. The European Flower for tourist accommodation service was created to label accommodation services that respect the environment. It signals good environmental performance, and is an added-quality value when consumers are choosing a resort. Enterprises bearing the Flower Logo have officially been distinguished as being among the most environmentally friendly in their area. However, hardly any research on the effectiveness of labelling in the tourist sector is available (EC, 2005a).

Policy effectiveness example: blue flag for beaches

The Blue Flag is an eco-label which was awarded to more than 2 900 beaches and marinas in 29 countries across Europe, South Africa and the Caribbean in 2004. The Blue Flag Campaign is owned and run by the independent non-profit organisation Foundation for Environmental Education (FEE).

The Blue Flag works towards sustainable development at beaches/marinas through strict criteria that cover water quality, environmental education and information, environmental management, safety and other services. Compliance with requirements and standards such as those of the EU bathing water directive and the EU urban waste water directive are required (EC, 2005c).

information on the environmental impacts of tourism, both from travelling and at destinations, could be set up. NGOs and the media could play an important role in this.

Good and best practices could be exchanged

To stimulate companies and tourists themselves to work on sustainable tourism, good and best practices could be exchanged. Some examples can already be seen today, but this approach could be implemented on a broader scale in the future.

7 Conclusions

Key messages

The analysis presented in this report shows that many pressures on the environment from household consumption continue to grow despite efficiency improvements. This is mainly because consumption growth outweighs gains in production and consumption efficiency.

Many potentially effective policy measures are available to address the environmental effects of household consumption. They include legal and regulatory instruments (such as directives, laws and regulations), market-based instruments (such as taxes, tradable permits and subsidy removal), enabling technological improvements, information and other instruments. This report highlights examples of assessments of the effectiveness of selected measures in selected areas and provides some options for 'bending the trend'.

Achieving more sustainable consumption and production patterns is a common joint challenge where all actors, including public authorities, business and consumers, come together to take responsibility and implement actions.

This report presents the results of analysis of the environmental effects of household consumption in Europe, focusing on four consumption clusters that have been identified by researchers and international organisations as causing either high or increasing environmental pressures: food and drink consumption, housing, personal travel and mobility, and tourism.

It shows that European household consumption has grown continuously with GDP in the past decade, while its composition has changed. The share of household expenditure on recreation, culture, restaurants, transport, communication and health have all increased, while the share of more basic goods such as food and drink, clothing and housing in the relatively wealthy countries have decreased.

The main factors that shape our consumption have been identified

The main factors that shape our household consumption patterns have been identified. Patterns of consumption are not easy to map as they are shaped and re-shaped by an array of interdependent economic, technological, political, social and cultural changes in Europe and the world. Economic and technological factors that drive consumption include, in particular, growing incomes, the globalization of the world economy and recent major technological breakthroughs such as the internet and the mobile phone. The main demographic driving factors are the trends towards smaller households (which contribute to higher consumption of energy and water and more waste per person) and the ageing population (which may lead to larger expenditures on health and personal travel, and more second homes).

At the individual level, consumption patterns are shaped by needs, abilities and opportunities. But they are also shaped by the desire to identify with groups of consumers that define themselves in a variety of different ways, for example with role models. The supply of goods and services and how they are advertised and marketed also have a major influence.

Food and drink: the consumer's choice matters

The share of European household expenditure that goes on **food and drink** has declined with rising incomes and this is projected to continue. However, food consumption continues to cause large negative environmental effects, mainly indirect effects from food production and processing in Europe and other regions of the world. Effects include emissions to water, soil and air from livestock, agriculture, industry and transport, and also waste. Labelling of

environment-friendly food products, for example organic food, has been found to be an effective policy measure.

Housing: from basic shelter to multiple electronic appliances

Housing is another large element of household consumption. It includes the consumption of energy and water, and the generation of waste. Homes are becoming more luxurious and equipped with multiple electronic appliances. Even though the energy efficiency of such appliances is improving, growth in their use together with energy use for heating results in high levels of emissions of greenhouse gases and increasing amounts of waste. Household water use, however, is decreasing in all regions of Europe, mainly as a result of water pricing.

Personal travel and mobility: moving faster, further and more often

The share of **personal travel** in household expenditure has remained more or less constant. Personal travel by road is now growing slightly slower than GDP, but air travel is growing faster than the economy. Personal road and air travel are leading to increased emissions of greenhouse gases such as CO_2. Emissions of air pollutants such as particulates (PM_{10}), acidifying substances (NO_X, NMVOCs) and ozone precursors (SO_X, NO_X, NH_3) from personal travel by road, however, are currently falling.

Tourism: consuming elsewhere — and getting there

Tourism in Europe is growing rapidly and more than half of all international tourist arrivals are in Europe, mostly in the Mediterranean region. As a result, the negative environmental effects of tourism are increasing rapidly. In particular, tourism is leading to growing greenhouse gas and other harmful emissions, especially from air and car travel to destinations, and to the consumption of more energy and water, and more land use and waste generation at destinations.

As shown in the chapters on food and drink, housing, personal travel and tourism, many environmental pressures are still increasing because consumption growth outweighs efficiency gains. Projections by the EEA and others show that many of those pressures are expected to continue to grow in the next 25 years if no further action is taken.

Difficult to influence consumption behaviour effectively

A possible reason for the lack of progress, despite agreement on the need for sustainable consumption and production policies, is that the debate on the basic principles of sustainable consumption from which a framework for actions could be derived remains unresolved. The main factors that shape our consumption and the major changes we have seen in just the past decade highlight the complexities involved. Many of these factors are social and cultural in nature which makes it difficult to agree on how to influence consumption behaviour effectively, given the different types of consumer behaviour and influencing factors across Europe, and hence the challenges of designing and implementing suitable measures.

The report has looked at the effectiveness of certain policy measures in selected areas, mainly to show examples of measures that have proved to be effective, at least in certain parts of Europe. Examples include the labelling of organic food, the use of water pricing, wastewater taxes and charges, and traffic congestion measures.

Achieving more sustainable consumption and production is first and foremost a common joint challenge where all actors, including public authorities, business and consumers come together to take responsibility and implement actions.

Public authorities can provide a framework within which business and consumers can operate

Public authorities at the global, EU, national, regional and local levels can influence the sustainability of consumption and production by providing a framework within which business and consumers can operate and improve coordination across actions. The tools available include legal and regulatory instruments (such as directives, laws and regulations), market-based instruments (such as taxes and charges, tradable permits and subsidy removal), enabling technological improvements, information and other instruments. Legal instruments and supporting technology are necessary, but not necessarily sufficient actions, basically because consumption growth can outweigh the efficiency gains from improved technology and because new technologies sometimes stimulate consumption. However, they can be combined with adequate market-based measures, information and other tools. In practice the challenge is to implement the right combination of policy instruments that take different groups of consumers into account, in order to achieve the most sustainable results.

Business has an instrumental role

Business has an instrumental role in enabling and implementing sustainable consumption and production. Operating within the framework provided by public authorities and meeting the demands of consumers, the challenge for business is to produce goods and services which are profitable, and are sustainable, both in their production and when consumed. In recent decades, companies across Europe have made significant progress towards more sustainable production and consumption, improving efficiency, particularly of energy and water use and material consumption. For example, many companies have developed and implemented corporate social responsibility strategies, where companies assess themselves on the sustainability of their products (often throughout their life-cycle). But some industries and businesses have made more progress than others. And there is still the significant challenge of further increasing efficiency and producing goods and services that use less materials, energy and water, generate less waste, and require less transportation. Also, new and more sustainable goods and services could be produced and advertised to meet the demands of consumers.

Consumer choice makes the difference

Finally, Europe's consumers themselves have an important role to play since they are the ones who decide on which goods and services, and resources to consume and in what amounts. Provided that information on the environmental effects of the goods and services is available within the framework set by public authorities, and that prices are affordable, consumers can choose to buy goods and services that are sustainable throughout their life-cycle from production to consumption. Other options for consumers include to use sustainable energy resources, use transport modes which cause the least environmental effects, use less water and generate less waste.

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Glossary

Consumption	A sequence of choices and actions by households including the 'selection, purchase, use, maintenance, repair and disposal of any product or service' (Campbell, 1998).
Corporate social responsibility	A concept whereby companies voluntarily integrate social and environmental concerns in their business and the way they interact with stakeholders. This implies going over and above legal requirements, integrating economic, social and environmental concerns in their business, and adopting new approaches to business management (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary).
Direct material consumption (DMC)	Accounts for all materials used up by a country and is defined as all materials entering directly the national economy (used domestic extraction plus imports), minus the materials that are exported. In economic terms, it is related to the consumption activities of the residents of a national economy. In environmental terms, DMC is a proxy for potential environmental pressures associated to the disposal of residual materials to the domestic environment. http://waste.eionet.eu.int/definitions/dmc.
Ecological footprint	An index that measures the amount of renewable and non-renewable ecologically productive land area required to support the resource demands and absorb the wastes of a given population or specific activities (Wackernagel and Rees, 1996).
EEA countries	The 31 member countries of the EEA, which are the EU-25 countries plus Bulgaria, Iceland, Liechtenstein, Norway, Romania and Turkey.
EFTA countries	European Free Trade Agreement countries: Iceland, Liechtenstein, Norway and Switzerland.
Emerging trends	A term used in this report to bring together information and analysis on recent trends which may continue in the future, projections of future trends based on modelling, and some qualitative information on possible future scenarios.
End-of-pipe technologies	Technologies such as for example scrubbers on smokestacks and catalytic converters on automobile tailpipes that reduce emissions of pollutants after they have formed (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/; US EPA, http://www.epa.gov/OCEPAterms/eterms.html).
Environmental effects	Used in this report as a general term for describing the general consequences of an activity for the environment and natural resources. They include changes in the pressures on the environment, the state of the environment and environmental impacts.
Environmental pressures	Describe pressures from human activities exerted on the environment, including natural resources. For example, they include the use of resources and the discharges of pollutants and waste materials from consumption. (OECD, 2003) It refers to the pressure category in the Driving Force – Pressure – State – Impact – Response framework used by the EEA.

Environmental impacts	Impacts on ecosystems in the environment and on the health of the organisms inhabiting it. It refers to the impacts category in the Driving Force – Pressure – State – Impact – Response framework used by the EEA http://org.eea.eu.int/documents/brochure2002/approach.html.
EU-25 countries	The former EU-15 countries and the ten new Member States.
EU-15 countries	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden, United Kingdom.
Gross Domestic Product (GDP)	The total output of goods and services produced by a national economy in a given period, usually a year, valued at market prices. It is gross, since no allowance is made for the value of replacement of capital goods (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary).
Greenhouse gasses	A gas that contributes to the natural greenhouse effect. Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, that absorb and emit radiation at specific wavelengths within the spectrum of infrared radiation emitted by the Earth's surface, the atmosphere and clouds. The Kyoto Protocol covers a basket of six greenhouse gases (GHGs) produced by human activities: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/; European Commission, Climate change: Glossary of common terms and acronyms. http://europa.eu.int/comm/environment/climat/glossary.htm).
Global warming	Changes in the surface-air temperature, referred to as the global temperature, brought about by the greenhouse effect which is induced by emission of greenhouse gases into the air. (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/glossary EEA).
Household	A household includes all the persons who occupy a housing unit. A housing unit is a house, an apartment, a mobile home, a group of rooms, or a single room that is occupied (or if vacant, is intended for occupancy) as separate living quarters. Separate living quarters are those in which the occupants live and eat separately from any other persons in the building and which have direct access from the outside of the building or through a common hall (U.S. Census Bureau, 2005).
Household consumption	Household consumption is the consumption of goods and services by households. It includes the selection, purchase, use, maintenance, repair and disposal of any product or service. However, it does not include consumption by the public sector or intermediate consumption of products and services in the productive sector (OECD, 2002a).
Household expenditure	Any spending done by a person living alone or by a group of people living together in shared accommodation and with common domestic expenses (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/).

Internalisation of costs	Incorporation of an externality into the market decision making process through pricing or regulatory interventions. In the narrow sense, internalisation is achieved by charging polluters (for example) with the damage costs of the pollution generated by them, in accordance with the polluter pays principle (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/; European Conference of Ministers of Transport. Social costs glossary. CEMT/CS(97)12.).
Market-based instruments (similar term: economic instruments)	Instruments that seek to address the market failure of 'environmental externalities' either by incorporating the external cost of production or consumption activities through taxes or charges on processes or products, or by creating property rights and facilitating the establishment of a proxy market for the use of environmental services. (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/).
Municipal waste	Waste collected and treated by or for municipalities. It covers waste from households, including bulky waste, similar waste from commerce and trade, office buildings, institutions and small businesses, yard and garden waste, street sweepings, the contents of litter containers, and market cleansing waste. The definition excludes waste from municipal sewage networks and treatment, as well as municipal construction and demolition waste (OECD, 2004). On average in EEA member countries, two-thirds of municipal waste is from households (EEA, 2000).
Needs, opportunities, and abilities	Aspects of a rational consumption behaviour model that describes behaviour as the mutual interaction between needs: a set of objectives that individuals pursue to maintain or improve their quality of life or well-being; opportunities: A set of external facilitating conditions, such as the objective availability of goods, material and services; and abilities: A set of internal capacities of an individual or household to procure goods and services (Gatersleben and Vlek, 1998).
New Member States	The ten states that acceded to the EU in May 2004: Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia.
Non-renewable energy sources	Minerals, oil, gas and coal. Their use as material and energy sources leads to depletion of the Earth's reserves and are characterised that they do not renew in human relevant periods. (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/).
Rebound effect	The rebound effect refers to the volume of consumption outweighing any gains made through the improved efficiency of the products. For example, despite improvements in the energy efficiency of the average new electronic appliance (for example a TV, DVD-player or personal computer), the total energy use from electronic appliances in the average home increases because the number of electronic appliances in each household increases. The rebound effect is most simply measured by the difference between the projected and actual reductions in environmental pressures (DEFRA, 2003).

Renewable energy sources	Energy sources that do not rely on fuels of which there are only finite stocks. The most widely used renewable source is hydroelectric power; other renewable sources are biomass energy, solar energy, tidal energy, wave energy, and wind energy (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/).
Renewable resources	Resources capable of being replaced by natural ecological cycles or sound management practices. Resources such as trees, fish, oxygen, and fresh water are generally considered to be renewable resources as they can be continually reproduced. (http://www.eco-pros.com/renewableresources.htm).
Sustainable consumption	The use of goods and services that respond to the basic needs, bringing better quality of life, while minimising the use of natural resources, toxics materials and emissions of waste and pollutants over the life-cycle, so as not to jeopardise the needs of future generations (Norwegian Ministry of Environment 1994 and 1995; UN-CSD, 1995).
Tonnes equivalent	Carbon dioxide equivalent is a metric measure used to compare the emissions from various greenhouse gases based upon their global warming potential (GWP). Carbon dioxide equivalents are commonly expressed as 'million metric tonnes of carbon dioxide equivalents (MMTCDE)'. The carbon dioxide equivalent for a gas is derived by multiplying the tonnes of the gas by the associated GWP. MMTCDE = (million metric tonnes of a gas) * (GWP of the gas). For example, the GWP for methane is 21 and for nitrous oxide 310. This means that emissions of 1 million tonnes of methane and nitrous oxide respectively is equivalent to emissions of 21 and 310 million tonnes of carbon dioxide. (EEA Glossary: http://glossary.eea.eu.int/EEAGlossary/; based on IPCC Third Assessment Report, 2001)

Annex Inventory of policies related to sustainable consumption and production

This Annex contains policies and examples selected by the European Commission (EC, 2004b) in its report 'Sustainable consumption and production in the European Union'. A few examples for Austria and Slovenia have been added by the EEA as suggested by those countries during the consultation of the draft report. Examples of national policies are by no means a complete list of relevant polices, but are just a few selected examples.

	Inventory of EU policies related to sustainable consumption and production	Examples of national policies
General policy framework	• Lisbon strategy of economic and social renewal (2000) • Sustainable development strategy (2001) • Sixth community environmental action programme (6EAP) • The Cardiff integration process (1998) • The Aarhus Convention • Social policy agenda (2000)	• Germany: national process of sustainable consumption and production • The United Kingdom: government framework for sustainable consumption and production • Finland: national programme on sustainable consumption and production • Hungary: network for sustainable consumption and production • Slovenia: strategy of Slovenia's development — Vision and priorities
Thematic strategies	• Thematic strategy on the sustainable use of natural resources • Thematic strategy on the urban environment	• Austria: eco-efficiency action programme

General policies	• Integrated product policy • Environmental technology action plan (ETAP) • EU Consumer policy strategy • Corporate social responsibility • Public procurement policies	• Austria: programme on Technologies for Sustainable Development • The United Kingdom: market transformation programme • Hungary: network of eco-counselling offices • France: law on new economic regulation • Netherlands: corporate social responsibility policy; green public procurement
Market-based (economic) instruments	• Forthcoming communication on market-based instruments in environmental policy • Framework directive to restructure and harmonise the Member States' national systems of energy taxation • Commission proposal for further harmonisation of the taxation of motor fuels • Commission proposal on infrastructure charging for road transport • Water framework directive requiring Member States to introduce water pricing policies by 2010 • Community guidelines on State air for environmental protection • CO_2 emissions trading scheme (2005) • EU WTO commitment to eliminate export subsidies for agricultural products • Generalised system of preferences	• Ireland: plastic bags levy • Denmark: environmental taxes • Greece: environmental taxes • Ireland: environmentally superior products initiative • Sweden: local investment programmes
Information tools	• Publication: environment for Europeans • Green week • European mobility week • The EU Flower eco-label • Food labelling directive • Rules on labelling meat-based products • Health information on tobacco products • Directive on genetically modified organisms • The European pollutant emission register	• Malta: eco-projects • Italy: network of local environmental education centres • Poland: education campaign • Czech Republic: eco-labelling • Sweden: eco-labelling

Analytical tools	• Environment and sustainable development indicators • Structural indicators • Annual review of the Lisbon process and the sustainable development strategy • Reporting mechanisms • Forthcoming EEA report on sustainable consumption • The sixth EU framework programme for research and technological development	• Spain: system of environmental indicators • Finland: the environmental cluster research programme
Industry/cleaner production	• Regulatory framework on air and water pollution • Directive on integrated pollution prevention and control (IPPC) • Product standards • Communication on environmental agreements at Community level • Integrated strategy for Europe on life sciences and biotechnology • The environmental management and auditing scheme (EMAS) • Proposed directive on eco-design requirements for energy-using products • Directive on environmental liability	• Lithuania: wastewater treatment • Belgium: framework law on product standards • Malta: cleaner technology centre
Energy	• The European climate change programme	• Germany: the renewable energy sources act
Agriculture and forestry	• The common agriculture policy (CAP) • European action plan for organic food and farming • Regulation on monitoring of forests and environmental interactions	• Greece: energy investments in agriculture • Czech Republic: organic farming • Lithuania: organic farming
Fisheries	• Common fisheries policy • Strategy for sustainable development of European aquaculture	

Transport	• Strategy for improving fuel efficiency of passenger cars • White paper on transport policy • Voluntary agreements with car manufacturers • Directives on the regulatory and fiscal promotion of biofuels • CIVITAS initiative (reduction of congestion and pollution in cities) • Introduction of hydrogen-powered city buses)	• Italy: the Arese site for sustainable mobility
Tourism	• Communication on basic orientations for the sustainability of European tourism • EU eco label for accommodation services	• France: management of tourist activities and 'terroirs'
Waste	• Various directives on waste reduction, reuse and recycling	• Slovakia: waste management plan • Poland: packaging waste • Belgium: actions developed by regional authorities
Chemicals	• Chemicals regulation: REACH	• Denmark: information centre for environment and health
Housing and construction	• The Construction product directive	• Austria: 'Haus der Zukunkft' programme on sustainable housing • Slovenia: subsidy schemes for renovation and renewable energy use

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